Corporate Risk Returns and Economic Outlook, Australian Data

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Abstract

The paper examines the relationship between accounting-based risk and return for Australian listed companies, on an aggregate basis and during economic upturns and downturns. A similar analysis conditioned on economic outlook is carried out for each industry grouping and also for each firm size grouping, recognising that any risk taking strategy would be dependent on the nature of the industry the company belongs to and the size of the firm. A causal regression model of firm risk and lagged return based on the Behavioural Theory of the Firm was utilised. A consistent significant negative relationship between accounting-based risk and return was observed across all industry groupings and firm size groupings except in the case of large companies. The results of the analysis are somewhat inconclusive and largely counterintuitive, consistent with the Bowman paradox on accounting risk-return relationship, but promising paths for research were identified in the paper.

Introduction

Several early work have postulated a positive relationship between financial market level risk and expected return of securities, including the Intertemporal Capital Asset Pricing Model (Merton 1973). This so-called investment risk-return trade-off, which intuitively makes sense, has been widely tested empirically with one recent paper finding this trade-off to be independent of the state of the economy (Nyberg 2012) although another recent paper found it time-varying and could even be negative in the case of European securities (Aslanidis *et al.* 2016). Another paper using US stocks data found that risk-return trade-off is positive only during financial crises and insignificant during other periods (Christensen *et al.* 2015). The universal measure for risk in these papers is variability of returns. While most research have found a significant positive relationship between market level risk and expected return, a few have found contradictory results (Nickel & Rodriguez 2002).

At the firm level and based on accounting measures, the relationship between risk and return is a lot more inconclusive. An early work observed a seeming risk-return paradox with accounting-based risk and returns negatively correlated across companies within industries (Bowman 1980). One explanation put forward was that good management, if present in an industry, will bring about higher returns and lower return variability in that industry. A criticism of the findings is that risk and return were measured coincidentally and causality therefore

cannot be established. To address this, one paper used a lagged model but still found a similar result with risk being negatively correlated with next period return (Bromiley 1991). A review paper showed the depth of Bowman's paradox, with increasing citation in subsequent papers that are mostly supportive of the original conclusions (Nickel & Rodriguez 2002). More recently however, consideration of additional control variables such as issuance and repurchase of shares, firm size and leverage showed that a positive relationship between accounting-based risk and return is more likely than a negative one (Brick *et al.* 2015).

The present paper aims to examine the relationship between accounting-based risk and return for Australian listed companies. It is important to examine the consequences of corporate risk taking as it is an essential element of business activity. Lack of willingness to take some level of risk generally precludes financial reward and growth (Stulz 2015). In the competitive business environment, the ways to increase profitability and to grow are either to establish a sustainable competitive advantage (Porter 2004) or to take greater risks (Shaw 2003).

The present paper also examines the risk-return relationship when economic outlook is up and when it is down. Among investors, an early work established that risk premia is higher during economic downturns than during economic upturns (Fama & French 1989). A more recent paper reinforces the conclusion that risk premia is countercyclical relative to economic conditions, meaning downturns are associated with high expected excess returns (Campbell & Diebold 2009). This would suggest that businesses will tend to take less risks during economic downturns as they will expect to be compensated more for the risk. On the other hand, it would be interesting to examine at the accounting level whether risk taking is actually being rewarded during downturns as it would suggest a contrarian strategy of perhaps taking advantage of the opportunity when competitors are less aggressive.

A similar analysis conditioned on economic outlook is carried out for each industry grouping and also for each firm size grouping. This recognises that any risk taking strategy would be dependent on the nature of the industry the firm belongs to (Mihet 2013) and also on the size of the firm (Walls 2005; Bhagat *et al.* 2015; Coskun & Kulali 2016). To the best of our knowledge, no previous study in academic literature has done a similar set of analysis as in the present paper.

To address the above research objectives, the present paper utilised a causal model consisting of corporate risk and lagged return based on an early work (Bromiley 1991). Said paper, which

was in turn based on the Behavioural Theory of the Firm (Cyert & March 1963), posited that a company's Next Period Return is dependent on the following variables: Previous Period Return, Industry Returns, Company Expectations, Company Aspirations, Slack and Risk. Returns were measured by ROA. Expectations and Aspirations were defined such that if the level of performance expected is below the level of level of performance aspired, then management either attempts to bring the former up or lowers aspirations. Slack is the excess resources that the company can utilise to buffer the need for organisational responses to changes in the environment and was measured by debt equity and interest coverage ratios. Risk was measured ex-ante as the variance in security analysts' forecasts of a company's earnings per share for the year.

The present paper utilised the following modified regression model:

$$\text{Next Return} = C_0 + C_1\text{Previous Return} + C_2\text{Current Risk} + C_3\text{Current Slack} + \varepsilon$$

The variable Industry Returns in the Bromiley model is incorporated in the proposed model by having firm returns measured in terms of excess over industry returns. Company Expectations and Company Aspirations were not included because of the subjectivity involved in measuring them. The application of the proposed regression model is discussed in detail in the following section.

Data and methodology

A key variable in the regression model is Current Risk. The measures of risk that have predominated in literature are variance of returns and relative volatility (i.e. β from CAPM) at the financial market level and variance of earnings at the firm accounting level (Miller & Bromiley 1990; Ruefli *et al.* 1999). In a departure from the Bromiley model, which utilised an ex ante risk measure namely variance of analysts' earnings forecast, the present paper utilised an ex post risk measure namely variance of accounting income scaled by firm total assets. Consistent with another paper on corporate risk taking (John *et al.* 2008), earnings before interest tax and depreciation allowance (EBITDA) scaled by total assets (TA) are calculated for each firm in excess of the industry average of EBITDA/TA for each year. Risk for a four year period is then calculated as the variance of the return differences over the four year period. EBITDA was considered appropriate in analysing returns among companies because it does not include the effects of financing and accounting decisions (Berk *et al.* 2014).

Similarly, both Next Return and Previous Return were measured as the averages over four year periods of the differences between firm and industry EBITDA/TA. This is also a departure from the Bromiley model which only looked at returns for one year periods and recognises that any effect of risk taking is manifested over a number of years. A two-year lag was used for Next Return and a two-year lead was used for Previous Return. Current Slack was measured as the average over four year periods of the differences between firm and industry Total Equity/TA.

Exhibit 1 summarises the four-year periods utilised in the present paper. It also shows the changes in the All Ords price indeces over the four year periods, which in turn was used as an indicator of economic outlook, resulting in three periods of economic downturn and three periods of economic upturn for this study. The first period from 2000 to 2003 was considered a downturn as the small gain in the All Ords price index is negated by inflation during the period.

Exhibit 1 – Periods utilised in the study

Previous 4yr period	Current 4yr period			Next 4yr period
	Years	Change in All Ords price index	Economic outlook	
1998,99,00,01	2000,01,02,03	+1.0%	Flat or down	2002,03,04,05
2000,01,02,03	2002,03,04,05	+23.5%	Up	2004,05,06,07
2002,03,04,05	2004,05,06,07	+10.4%	Up	2006,07,08,09
2004,05,06,07	2006,07,08,09	-6.7%	Down	2008,09,10,11
2006,07,08,09	2008,09,10,11	-26.2%	Down	2010,11,12,13
2008,09,10,11	2010,11,12,13	+21.0%	Up	2012,13,14,15

Literature provides support for the use of share prices as economic indicators. An early work using US data found that share prices were the best predictor of future economic growth from among several variables tested (Fischer & Merton 1984). Another paper using international data found share price changes as a leading indicator of GDP growth in most countries, including Australia (Aylward & Glen 2000). A more recent paper found GDP growth lagged behind changes in share market indices by three quarters in the US and four quarters in France (Zalgiryte *et al.* 2014).

Exhibit 2 shows the industry groupings and the number of listed companies for each industry with accounting data available on Morningstar Datanalysis. Only those companies with complete data or incomplete data for at most three years were included in the study. Incomplete data was filled in by interpolation. On aggregate, around 36% of the total listed companies was included in the study, which can be considered a good representation.

Exhibit 2 – Industry groupings and number of companies utilised in the study

Industry group	Business activities	Listed companies on Morningstar Datanalysis	Listed companies used in research dataset	Percentage used in research dataset
Energy	Energy equipment and services, oil gas and consumable fuels	235	80	34%
Materials	Chemicals, construction materials, containers and packaging, metals and mining, paper and forest products	677	207	31%
Industrials	Aerospace and defence, building products, construction and engineering, equipment and machinery, trading companies, commercial services and supplies, professional services, transportation	179	79	44%
Consumer discretionary	Automobiles and components, consumer durables, consumer services, media, retailing	172	72	42%
Consumer staples	Food and staples retailing, food beverage and tobacco, household and personal products	56	26	46%
Health care	Health care equipment and supplies, health care providers and services, pharmaceuticals and biotechnology	156	61	39%
Financials	Banks, diversified financials, insurance, real estate	304	112	37%
Information technology	Software and services, technology hardware and equipment, semiconductors	173	70	40%
Tele-communications	Diversified telecommunications services	22	8	36%
Utilities	Utilities	29	10	34%
Totals		2003	725	36%

Based on six four-year periods for each of the 725 companies, there was a total of 4,350 cases for analysis equally divided into those occurring during economic upturn and during economic downturn. In the analysis, large values of EBITDA/TA were capped at +/-200% to avoid distorting the annual industry means. This should not significantly affect the analysis as capped figures accounted for only 3% of total cases.

The use of currently listed firms only may bring about the issue of survivorship bias. As most of the delisting is due to either bankruptcies or mergers, the observed risk-return relationship may be affected. However, it was found that survivorship bias makes no difference in the analysis of the relationship between accounting-based risk and return (Brick *et al.* 2015).

Results and discussion

The results for the complete dataset shown in Exhibit 3, on an aggregate basis and during economic upturn and downturn, show a significant negative relationship between accounting-based risk and return consistent with the Bowman paradox. There is also a significant negative relationship between firm slack and return, which appears counterintuitive in that borrowing leeway should help companies take advantage of opportunities and improve next period returns. The model used in the regression is fairly acceptable, with the specified independent variables significantly accounting for almost half of the variance of the dependent variable.

Exhibit 3 – Results for the complete dataset

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.099***	0.108***	0.088***
Previous return	C_1	0.472***	0.461***	0.485***
Risk	C_2	-0.436***	-0.481***	-0.387***
Slack	C_3	-0.086***	-0.094**	-0.081**
N		4,350	2,175	2,175
Model fit R^2		0.425	0.436	0.415
F		1071.859***	559.460***	513.531***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

Results per industry grouping

For Energy, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 4 – Results for Energy

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.121***	0.173***	0.071*
Previous return	C_1	0.340***	0.199**	0.509***
Risk	C_2	-0.401***	-0.535***	-0.254**
Slack	C_3	-0.051	-0.153	0.016
N		480	240	240
Model fit R^2		0.308	0.303	0.353
F		70.590***	34.188***	42.852***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Materials, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 5 – Results for Materials

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.137***	0.158***	0.117***
Previous return	C_1	0.385***	0.362***	0.409***
Risk	C_2	-0.519***	-0.603***	-0.437***
Slack	C_3	-0.187***	-0.209***	-0.159**
N		1,242	621	621
Model fit R^2		0.390	0.401	0.383
F		263.737***	137.527***	127.643***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Industrials, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 6 – Results for Industrials

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.099***	0.115***	0.074***
Previous return	C_1	0.467***	0.408***	0.563***
Risk	C_2	-0.613***	-0.745***	-0.445***
Slack	C_3	-0.088	-0.198*	-0.002
N		474	237	237
Model fit R^2		0.569	0.587	0.568
F		206.898***	110.163***	102.283***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Consumer Discretionary, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is greater during economic downturns perhaps suggesting that risk taking during such times is penalised more in terms of returns.

Exhibit 7 – Results for Consumer Discretionary

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.050***	0.048*	0.055**
Previous return	C_1	0.516***	0.482***	0.541***
Risk	C_2	-0.416***	-0.376***	-0.483***
Slack	C_3	-0.015	0.004	-0.029
N		432	216	216
Model fit R^2		0.493	0.442	0.549
F		138.640***	56.050***	86.167***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Consumer Staples, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is greater during economic downturns perhaps suggesting that risk taking during such times is penalised more in terms of returns.

Exhibit 8 – Results for Consumer Staples

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.039	0.028	0.053
Previous return	C_1	0.431***	0.538***	0.328**
Risk	C_2	-0.239*	-0.221*	-0.270*
Slack	C_3	-0.086***	-0.216	-0.808***
N		156	78	78
Model fit R^2		0.497	0.492	0.551
F		50.053***	23.845***	30.225***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Health Care, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 9 – Results for Health Care

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.191***	0.211***	0.173***
Previous return	C_1	0.509***	0.563***	0.455***
Risk	C_2	-0.666***	-0.756***	-0.589***
Slack	C_3	-0.254**	-0.125	-0.337*
N		366	183	183
Model fit R^2		0.507	0.595	0.431
F		124.117***	87.579***	45.113***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Financials, there is a similar significant negative relationship between accounting risk and return. The negative coefficient for risk is about the same during both economic upturns and downturns suggesting that risk taking is penalised to the same degree during such times in terms of returns.

Exhibit 10 – Results for Financials

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.060***	0.058***	0.061***
Previous return	C_1	0.301***	0.350***	0.253***
Risk	C_2	-0.443***	-0.426***	-0.450***
Slack	C_3	0.002	0.023	-0.020
N		672	336	336
Model fit R^2		0.407	0.420	0.393
F		152.752***	80.211***	71.649***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Information Technology, there is a similar significant negative relationship between risk and return. However, the negative coefficient for risk is greater during economic downturns perhaps suggesting that risk taking during such times is penalised more in terms of returns.

Exhibit 11 – Results for Information Technology

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.152***	0.145***	0.160***
Previous return	C_1	0.552***	0.560***	0.543***
Risk	C_2	-0.495***	-0.475***	-0.522***
Slack	C_3	-0.061	-0.088	-0.030
N		420	210	210
Model fit R^2		0.485	0.503	0.467
F		130.602***	69.551***	60.063***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Telecommunications, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is much greater during economic downturns perhaps suggesting that risk taking during such times is penalised more in terms of returns.

Exhibit 12 – Results for Telecommunications

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.170**	0.016	0.306**
Previous return	C_1	0.612***	1.058***	0.265
Risk	C_2	-0.687**	-0.074	-1.121**
Slack	C_3	0.029	-0.109	0.071
N		48	24	24
Model fit R^2		0.769	0.932	0.719
F		48.787***	91.017***	17.059***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Utilities, there is a similar significant negative relationship between accounting risk and return. However, the negative coefficient for risk is much greater during economic downturns perhaps suggesting that risk taking during such times is penalised more in terms of returns.

Exhibit 13 – Results for Utilities

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.261*	0.230	0.555**
Previous return	C_1	0.325*	0.538**	-0.235
Risk	C_2	-0.710**	-0.707**	-1.105**
Slack	C_3	-0.136	-0.123	-0.423
N		60	30	30
Model fit R^2		0.520	0.662	0.515
F		20.225***	16.974***	9.191***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

In summary, there is a consistent significant negative relationship between accounting-based risk and return across all industry groupings. The negative coefficient for risk is smaller during economic downturns in the case of Energy, Materials, Industrials and Health Care. This implies that risk taking during economic downturns in these industries is penalised less in terms of returns relative to risk taking during economic upturns, suggesting a strategy contrarian to holding back or taking less risk during downturns.

There is a need to understand the nature of each industry grouping to better explain these observations. Several factors could come into play such as industry maturity, industry bargaining power, nature of competition, regulatory environment (Porter 2004) and opaqueness of financial reporting (Mihet 2013). For instance, it is argued that in a growing industry, good performers improve their returns over time while bad performers have stable returns resulting in generally high variance of returns, hence a positive mean-variance relationship. In contrast, good performers in declining industries have stable returns while bad performers have declining returns resulting to a negative mean-variance relationship for such industries (Brick *et al.* 2015). Explaining accounting risk-return relationships across industry groupings could be a fertile ground for future research.

Results per firm size grouping

For Large companies (i.e. top third in terms of assets), there is a significant positive relationship between accounting risk and return contrary to the Bowman paradox. The positive coefficient for risk is greater during economic upturns perhaps suggesting that risk taking during such times is rewarded more in terms of returns.

Exhibit 14 – Results for Large companies

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.049***	0.047***	0.051***
Previous return	C_1	0.726***	0.753***	0.697***
Risk	C_2	0.212***	0.238***	0.190***
Slack	C_3	-0.040**	-0.052*	-0.031
N		1,452	726	726
Model fit R^2		0.538	0.534	0.545
F		562.379***	275.837***	288.794***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Medium companies (i.e. middle third in terms of assets), there is again a significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 15 – Results for Medium companies

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	0.122***	0.135***	0.108***
Previous return	C_1	0.348***	0.323***	0.378***
Risk	C_2	-0.347***	-0.402***	-0.294***
Slack	C_3	-0.014	0.023	0.278
N		1,446	723	723
Model fit R^2		0.272	0.297	0.252
F		179.545***	101.297***	80.689***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

For Small companies (i.e. bottom third in terms of assets), there is again a significant negative relationship between accounting risk and return. However, the negative coefficient for risk is smaller during economic downturns perhaps suggesting that risk taking during such times is penalised less in terms of returns.

Exhibit 16 – Results for Small companies

Independent variables		Regression coefficients (dependent variable: Next return)		
		Aggregate	Positive economic outlook	Negative economic outlook
Constant	C_0	-0.023	-0.014	-0.031
Previous return	C_1	0.322***	0.321***	0.324***
Risk	C_2	-0.441***	-0.475***	-0.407***
Slack	C_3	0.001	-0.046	0.043
N		1,452	726	726
Model fit R^2		0.266	0.272	0.260
F		174.856***	90.012***	84.683***
***significant at 0.1% level, **significant at 1% level, *significant at 5% level				

In summary, there is a significant positive relationship between accounting-based risk and return among large firms but not for medium and small firms. The positive coefficient for risk is greater during economic upturns in the case of large firms. This implies that risk taking during economic upturns in these industries is rewarded more in terms of returns relative to risk taking during economic downturns, suggesting a herd strategy of taking more risk during upturns.

The negative coefficient for risk is smaller during economic downturns in the case of medium and small firms. This implies that risk taking during economic downturns in these industries is penalised less in terms of returns relative to risk taking during economic upturns, suggesting a strategy contrarian to holding back or taking less risk during downturns.

There is a need to understand the nature of each firm size grouping to better explain these observations. This could be another area for future research.

Conclusion

The results of the analysis are somewhat inconclusive and largely counterintuitive, consistent with the Bowman paradox on accounting risk-return relationship, except in the case of large firms that showed a positive risk-return relationship. Perhaps the reason why the Bowman paradox persists in literature is because an accurate measure for corporate risk taking that is truly independent and causative of returns have not been found yet. One major drawback of the common method of using means and variances of accounting returns is that two moments of the same variable might have an inherent relationship that could result to statistical bias (Coskun & Kulali 2016). Use of simple variance also incorrectly assumes a symmetry between positive and negative variance therefore some studies have suggested the use of downside risk measures (Miller & Leiblein 1996).

Some other refinements have been suggested (Brick *et al.* 2015). Most previous studies have calculated percentage return as measure of income divided by either total assets or total equity at the end of the period. Future studies could use beginning of period equity or asset to be more consistent with the practice in finance of having the initial investment in the denominator. Income figures could also be adjusted for earnings management and accruals.

While the present paper was not able to conclusively address the research questions posed, it nevertheless was able to suggest paths of research that would be of significant benefit to both academia and industry, not only in Australia but in other country contexts as well.

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