



A review of research on the negative accounting relationship between risk and return: Bowman's paradox

Manuel Núñez Nickel^{a, *}, Manuel Cano Rodríguez^b

^a*Department of Business Economics, Carlos III University, C Madrid, 126; 28903 Getafe-Madrid, Spain*

^b*Department of Business Administration, Accounting and Sociology, University of Jaén, Paraje las Lagunillas s/n; 23071 - Jaén, Spain*

Received 15 March 2000; accepted 21 September 2001

Abstract

A cornerstone in finance theory continues to be the positive relationship between risk and return in spite of Fama and French (The Journal of Finance 47(2) (1992) 427–65) and several later papers finding no relationship between the two variables. Twelve years earlier, Bowman (Sloan Management Review 1980, pp. 17–31) studied the same relationship from organization theory, achieving similar results with accounting data, and developing a whole research stream known as “Bowman's paradox”. This stream has contributed to some curious and interesting ideas that could also be applied to other different streams: new risk measures, managerial goal selection, response to the decline in the organization, diversification strategy on risk and return, among others. Similar to the financial stream, a number of researchers have tried to study this issue from the strategic management perspective. Their inconclusive results have generated a considerable controversy, keeping this research stream alive. In this work, we describe and explore this phenomenon from “Bowman's paradox”, theoretical explanations, criticisms and future orientations.

Keywords: Risk–return relationship; Bowman's paradox; Accounting risk

Contents

1	Introduction	1
2	General focus on accounting relationship: organization theory	2
3	Theoretical explanations in organization theory	3
	3.1 Management behavior towards risk	3
	3.1.1 Prospect theory	4
	3.1.2 Behavioral theory	5
	3.2 Strategic position and competitive advantage	7
	3.2.1 Diversification strategy	7
	3.2.2 Market power	11
	3.2.3 The impact of previous risk on return	11
4	Criticisms of the methodology in organization theory	11
	4.1 Statistical measures	11
	4.2 Sample criticisms	14
5	Conclusions and future research	14
	Appendix A	15
	References	16

1. Introduction

A cornerstone in finance theory is the positive relationship between risk and return [3, p. 244]. This relationship arises mainly from a risk-averse reasoning: people will not support higher risk for the same level of return; they will only accept higher risk if they get a higher return. This relationship has been widely tested with financial data from the stock market, using the beta of capital assets pricing model (CAPM) as the risk measure, and the results achieved are contradictory. Until the work by Fama and French [1], most research had obtained a significant positive relationship, as the CAPM theory postulates. From Fama and French [1] onwards, a new research stream in financial economics, known as “the death of beta” has arisen [4,5], which includes tests that have reported positive, negative or no correlation at all between return and beta (e.g., [3,6,7]). This new research stream is therefore challenging some of the more established assumptions in financial economics.

Twelve years before Fama and French's paper [1], Bowman [2] studied the same relationship from organization theory, achieving similar results with accounting data; that is to say, a negative slope between risk and return. From this work, another totally independent research stream, known

☆ This research was funded by FEGA-FEOGA (305/166) and DGES (PB 97-13.58) August, 2001.

* Corresponding author. Tel.: +34-91-624-58-46; fax: +34-91-624-96-07.

E-mail addresses: mnunez@emp.uc3m.es (M.N. Nickel), mcano@ujaen.es (M.C. Rodriguez).

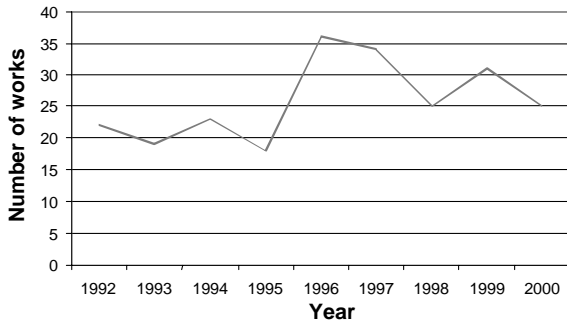


Fig. 1. Works that cited Bowman's paradox articles, from 1992 to 2000.

as Bowman's paradox has arisen because, at that time, it went against the established financial economics tenet. This paradox implies that managers accept higher risk at the same time that they expect lower returns. To date, similar to the financial stream, a number of researchers have tried to study this issue from the strategic management focus. They obtained inconclusive results that have generated a considerable controversy that continues with no consensus emerging [8, p. 330].

The importance of this research stream is demonstrated by the key issues that management scholars are currently studying. These originate in the works that described this paradoxical relationship, and whose ideas can also be applied to different streams. For instance, since the traditional risk measures (e.g. beta) present problems, it is possible to use measures of strategic risk specifically developed by this stream [9]. The research on other interesting topics, such as managerial goal selection, the response to the decline in the organizations, the influence of the diversification strategy on risk and return, or the relationship between accounting and market variables, has also been enhanced by these works.

An intuitive idea of the depth of Bowman's paradox can be obtained through Fig. 1, which shows the number of works that cite all the articles reviewed in this survey between 1992 and 2000. Among these papers we find both works about Bowman's paradox and papers that, from outside this line of thought, rest on it to develop some feature of their own theories. In Fig. 1 we can see that, although the maximum interest in this topic was reached in 1996 and 1997, there is a clearly global positive trend, and the number of works continue to increase. (See Appendix A for specific analysis by paper.)

We think that it is important to review this literature for several reasons: (1) There is at present considerable controversy because of the contradictions, gaps, and inconsistencies in this literature. Thus, as there is no agreement between researchers of this topic, it is interesting to study in depth the problems that prevent this consensus. (2) Although there are significant differences between Beta's death and Bowman's paradox streams, both pursue the same goal: the relation be-

tween risk and return. Nevertheless, in the whole literature of Beta's death there is no citation of Bowman's paradox. If we assume that the financial stream is successful at this time [10], that is, that the beta as measure of market risk has failed [11], we can see why financial scholars are looking for new risk measures, mainly from accounting [12,33]. In this sense, we think that it is possible that in the very near future both streams will achieve their results together.¹ (3) Although we are discussing accounting measures, there are only citations from financial and organization theories. Accounting research could add a valuable new focus, and contribute with its own tenet about more sophisticated risk measures, as in the case of Kim and Ismail [12].

For these reasons, we agree with Ruefli [9] that: "an important step would be to examine and reexamine the nature of the risk-return relationships for the various samples examined."

In this paper, the literature about the relationship between risk and return is reviewed. The targets are to define and clarify the relationship through this literature, summarize previous investigations in order to inform the reader of the state of current research, identify relations and inconsistencies between (and inside) different theories, and suggest new openings for future research.

The rest of the paper is organized as follows. First, the survey structure is explained, distinguishing between the two main groups of studies: theoretical explanations and empirical criticisms. Second, the works included in the first group are surveyed according to their theoretical backgrounds. Third, the main criticisms made about the empirical research of the paradox are reviewed. Finally, we extract some conclusions from the literature examined, with special mention of those research foci that are still to be addressed in depth.

2. General focus on accounting relationship: organization theory

Some works before Bowman [2] tested the relationship between return and risk with accounting measures, finding a theoretical positive relationship or no significant relationship. These works are presented in Table 1. It was Bowman [2] who first pointed out the paradoxical negative relationship. From this initial work, a new research stream grew, centered on the risk-return relationship using accounting variables. The objective of this work is a review of the literature from the discovery of the paradox, and, therefore, it will be centered on those articles that have tested this relationship from Bowman's pioneer work.

¹ To date, only four papers simultaneously investigate the risk-return relationship in financial and organizational terms, always from management literature [13-15,9].

Table 1
Empirical risk–return papers before Bowman [2]

Researchers	Measures		Sample				Results
	Return	Risk	Firms	Industries	Source	Period	Relationship
Conrad and Plotkin [16]	ROA	ROA dispersion	763	59	Compustat	1950–1965	Positive
Fisher and Hall [17]	ROA	ROA variance and skewness	Not mentioned	11	Not mentioned	1950–1964	Significant positive at firm and industry level
Hurdle [18]	Stockholder profitability	Absolute deviation of return measure	231	85	Sheperd	1960–1969	Significant positive
Armour and Teece [19]	ROE	ROE variance	28	1	Fortune 500	1955–1973	Not significant negative
Bowman [2]	ROE	ROE variance	387 1572	11 85	Value Line	1955–1973 1968–1976	Negative at firm level, no significant at industry level

Two main research themes can be addressed as they apply to the study of “Bowman’s paradox”. The first is composed of those works that assume the possibility of a negative risk–return relationship, hypothesizing this relationship from their theoretical backgrounds. In other words, they are works that justify the paradox theoretically. The second is composed of works that address the methodological mistakes present in the previous studies. For these studies, these methodological problems condition the acceptance of the negative risk–return relationship. Within the studies that follow the first guideline, there are two main points of view from which the paradox is explained [20, p. 271]: (1) the decision-maker behavior toward risk, which is studied mainly from prospect theory [21] and behavioral theory [22]; (2) the privileges of the strategic position of the firm. In this group of studies, issues such as the diversification strategy [23,24], the market power [25] or the negative effects of the historic risk on the return [26,14,27] are related to the risk–return association.

For the studies that follow the second theme, we address the criticisms that several researchers have stated about the sample, measures, and statistical methodology followed in the first group of studies.

An overview of the theories that attempt to explain the negative relationship and the main criticisms about the empirical research will be presented to facilitate future research about the paradox. Following the example of Bruno Latour’s diagrams [28], Fig. 2 shows the structure of these groups of studies.

The arrows have the following explanations: (a) arrows pointing to the circle represent agreement with Bowman’s paradox; (b) arrows pointing away from the circle indicate that the researcher(s) dissents from Bowman’s conclusions; and (c) arrows pointing in both directions, joining the circle with some researcher(s) indicate that this study has been undertaken by some component of Bowman’s investigation team.

3. Theoretical explanations in organization theory

Those researchers who assume the existence of a negative relationship between return and risk with accounting measures have sought to explain such a relationship through certain theories. These works can be grouped into two types: the decision-maker behavior towards risk and the strategic position of the firm.

3.1. Management behavior towards risk

Decision theory accepts three attitudes towards risk [29, p. 72]: (1) *risk averse*: investments with less risk will be preferred at the same expected return level. (2) *risk seeking*: investments with higher risk will be preferred at the same expected return level. These decision makers will assume higher risk because they will get higher probability of reaching extraordinary returns because of the high variance values. (3) *risk neutral*: the higher expected return investment will be selected, independent of its risk level.

Although these three behaviors have been acknowledged, risk aversion has been a constant in the investment selection models [21, p. 264], [30, p. 5], [58, p. 11]. This risk aversion leads to a positive relationship between return and risk: risk-averse decision makers will choose high-risk alternatives only if they also offer high expected values [58, p. 11]. If the decision maker was risk seeking, the relationship between risk and return would be negative. Now, both high return and high risk will increase the utility of the subject. If two alternatives offer the same expected return, that which offers higher risk will be preferred, because it will allow higher probability of extraordinary returns. Hence, a lower profitability investment will not be selected unless it offers a high variance too; that is to say, if we decrease the expected return, it is because we are also increasing the risk.

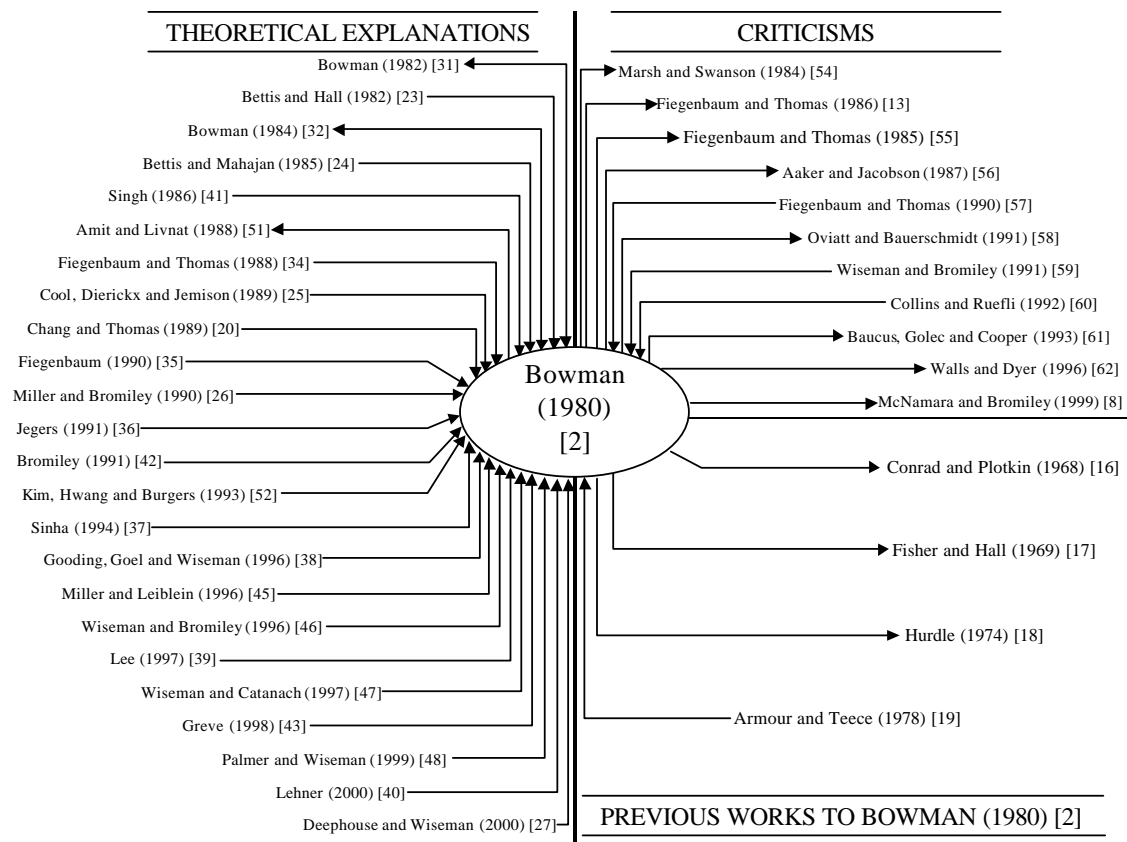


Fig. 2. Survey structure.

A risk-averse behavior leads to a positive relationship between risk and return, and a risk-seeking behavior leads to a negative relationship. As Bowman [2] found a negative relationship between accounting risk and accounting return, it makes the traditional assumption about risk-averse behavior questionable. However, as a constant risk-seeking behavior is “rather unlikely and contrary to most economic thought” [2, p. 25], the risk preference could change; that is to say, be dependent on the context of a choice [58, p. 5]. Thus, in some circumstances, individuals can be risk averse and, in other circumstances, can be risk seeking or risk neutral.

Two theories that assume this changeable behavior have been used to explain the “Bowman’s paradox”. These theories are “Prospect Theory” [21] from economic theory, and “Behavioral Theory” [22] from organizational theory.

3.1.1. Prospect theory

This theory was developed to explain some empirical results that contradict the traditional expected return theory. One of the main propositions of prospect theory points out the key role of the reference point or target for defining the decision maker’s attitude towards risk. When the expected

results of an alternative are “good” — that is to say, they are higher than the target level — the decision maker shows a risk-averse attitude. When the expected results are “bad” — lower than the target level — the decision maker will be risk seeking. High expected results lead to a risk-averse attitude and, therefore, a positive risk–return relationship, while low expected results lead to a risk-seeking attitude and, hence, a negative relationship. Prospect theory also points out that this second relationship will be steeper than the first [21, p. 280].

Though prospect theory was developed to explain individual decision-making, some researchers [31,32,34–36] consider that prospect theory postulates can also be applied to organizational decision-making. Such postulates are translated in a double relationship between risk and return: those firms that have reached their target levels (high return firms) will show risk-averse behavior; those firms that have not reached their target levels (low return firms) will be risk seeking. Then, the former firms will show a positive relationship between risk and return, and the latter, a negative relationship.

Fig. 3 shows the graphic relationship between risk and return [34, p. 98].

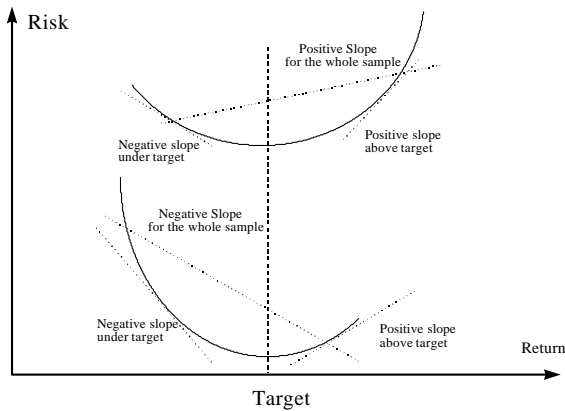


Fig. 3. Prospect theory's hypothesis and risk–return relationship.

The upper figure corresponds to a sample where most firms have reached the target level. Therefore, the relationship between risk and return for these firms is positive. Fewer firms have not reached the target level, presenting a negative slope relationship. However, for the whole sample, the obtained relationship is positive.

The lower figure presents the opposite: most firms have not reached the target level, so these firms present a negative risk–return relationship. Fewer firms present a positive relationship and their position is above the target. Overall, the stronger negative relationship makes the whole sample relationship negative.

Hence, this theory can explain both positive and negative relations between risk and return for the whole sample.

Table 2 shows the works that have tried to test Bowman's paradox through Prospect Theory with these two hypotheses: (1) low performers show a negative risk–return relationship, and (2) high performers show a positive risk–return relationship. These studies divide the sample into two sub-samples — high and low performers — based on the return values and the target value. Therefore, if a firm's return is lower than the target value, it will be a low performer; otherwise, it will be a high performer. The selected target is usually some central measure of the return of the industry (e.g., the mean of the median of the industry returns).

Most empirical works [20,31,34–36] support the two hypotheses: low performers show a negative relationship between risk and return, and high performers show a positive relationship. Besides, Chang and Thomas [20] found a curvilinear relationship between risk and return, and Fiegenbaum [35] obtained that the low-performers' regression slope was steeper than the high performers, according to prospect theory hypothesis [21, p. 280].

Though empirical tests support these hypotheses, some problems are evident:

1. Prospect theory describes the individual behavior but, in these tests, is used as a theory that describes organizational behavior.

2. There are some problems with the definition of the target level. Most researchers assume that the target level is the same for all firms in an industry, setting the industry average or median of returns as the target level. Nevertheless, prospect theory posits the status quo of a firm's performance and not the industry average as the reference point [39, p. 62]. Therefore, the reference point seems to be firm specific, and it can be an error to consider it common for all firms in the sample. This problem will be discussed further in behavioral theory.

3. Most of these studies are cross-sectional in design, so do not decisively reject the possibility that the variation in risk taking across organizations stems from established differences among them [58, p. 6]. Furthermore, the risk attitude can be considered firm specific, which makes the use of cross-sectional analyses inappropriate. As a solution, some authors have used firm-specific longitudinal models [39,40], reaching similar results to cross-sectional works.

4. Finally, most of the studies have related the firm risk level to the performance level, while prospect theory links the risk attitude to the performance level. This treatment implicitly assumes that the risk experienced by the firm is the risk the decision maker desired [39, p. 62]. This assumption presents two problems: (a) it implies that the decision maker has perfect knowledge of performance in the future [39, p. 62], and (b) it is assumed that all the risk of the firm is a consequence of the decision maker's attitude. To avoid this problem, some authors have tried to measure the managerial risk attitude [32,41,39], finding support for prospect theory hypotheses.

3.1.2. Behavioral theory

Behavioral theory [22] is the second theory that explains the paradox from the attitude towards risk showed by the firms, and it leads to similar hypotheses to prospect theory.

With this focus, firms are described as large systems of standard operating procedures, where managers take decisions based on two different measures: the performance level they aspire to (aspirations), and the performance level they expect (expectations) [42, p. 39]. Thus, managers will differentiate between two kinds of outcomes: failures and success outcomes [43, p. 61]. The first ones will be those outcomes lower than the aspiration level, while the second will be those higher than the aspiration level.

According to this theory, the amount of risk managers will accept will depend on the expected performance in relation to the aspiration [43, p. 59]. When the expected performance is higher than the aspiration, managers consider that the firm is performing well, so no change is needed. If managers expect performance to fall below the aspiration level, creating a gap between aspirations and performance sufficient to create a sense of crisis, a major organizational change in the firm will be needed [44, p. 136] to find new procedures and techniques that increase the performance. This change

Table 2

Focus on prospect theory

Researchers	Measures			Sample				Results
	Return	Risk	Target	Firms	Industries	Source	Period	Relationship
Bowman [31]	ROE	Content analysis	Bottom quartile as low performers, top quartile as high performers	155	3	Value Line	1979	Negative for firms, but not significant for industries
Bowman [32]	ROE	Content analysis	Bottom quartile as low performers, top quartile as high performers	26	1	Value Line	1972–1981	No risk influence on future performance. Negative influence of performance on future risk. Significant support for prospect theory
Fiegenbaum and Thomas [34]	ROE	ROE variance	Median industry ROE	2322	47	Compustat	1960–1979	Positive for firms above the target; negative for firms below target. Significant support for prospect theory
Chang and Thomas [20]	ROA (ROA) ²	ROA variance	Not mentioned	64	Not mentioned	Compustat I and II Census of Manufacturing	1977–1981	Curvilinear risk–return relationship observed. Significant support for prospect theory
Miller and Bromiley [26]	ROE ROA	Income variability, market risk and strategic risk	Mean industry ROE and ROA	746 526	Not mentioned	Compustat and C.R.S.P.	1978–1982 1983–1987	No support for prospect theory hypotheses
Fiegenbaum [35]	ROA	ROA variance	Median of industry ROA	3300	85	Compustat	1977–1984	Positive for firms above the target; negative for firms below the target. Significant support for prospect theory
Jegers [36]	ROE ROA cash flow/ capital cash flow plus interests over assets	Variance and coefficient of variation of return measures	Median of industry	3250	110	Belgium National Bank	1977–1982	Positive for firms above the target; negative for firms below the target. Significant support for prospect theory
Sinha [37]	ROA	Standard deviation of ROA	Median return of the industry	341	14	Centre for Research in Finance database of the Annual Report Record	1977–1985	Negative and significant below median; weak and positive above the median
Gooding et al. [38]	ROE	Standard deviation of ROE	Obtained from the minimal level of risk	Between 1405 and 5107	Between 29 and 45	Compustat	1970–1974 1975–1979 1980–1984 1985–1989	Significant support for the positive quadratic relationship. Denies the fixed reference point
Lee [39]	ROE and market share	Content analysis	Previous year performance	6	1	Annual reports and Compustat	Different for each firm	Performance change has a negative influence in risk
Lehner [40]	ROE	Absolute difference between ROE _t and ROE _{t-1}	Identificated by the minimal level of risk	876	14	Compustat	1972–1991	Empirically, the relative position to the reference level explains the risk–return relationship better than the change in environmental conditions

involves risk for the firm, because the consequences of change are usually less well known than the consequences of the status quo [43, p. 58]. Finally, if no solution is found, managers will be forced to set lower aspirations.

By linking performance with profitability, behavioral theory generates two hypotheses: (1) low performers — those whose expectations fall below the aspiration level — will undertake a risky organizational change resulting in a negative influence of return over risk; (2) high performers — those whose expectations are above the aspiration level — do not increase risk, and, therefore, their risk–return relationship will be positive.

Table 3 shows the empirical research relating to the paradox under this focus. All of the studies obtained strong support for these hypotheses.

Although prospect theory and behavioral theory hypotheses relating to a risk–return relationship are similar, there are some differences: (1) behavioral theory makes postulates about the firm's behavior, while prospect theory studies individual behavior; (2) in behavioral theory, the risk–return relationship is defined not only by the attitude towards risk, but also by some firm characteristics — mainly, organizational slack. The role played by these slack resources needs to be more properly defined, as both theoretical hypotheses and the empirical results are contradictory.

These works present some common problems with prospect theory. The first is the definition of the target or reference point. Many authors [26,34–36] have used the median of the performance of the sector as the reference point, but the assumption of a common target point for all firms in the industry does not seem likely. Other works [42,45,43,46] address this problem and use the previous performance as a target, especially for those firms that are above the median of the sector.

Theoretical works about reference points state that these points are influenced by the overall context of experience [30, p. 8], [40, p. 65]. Fiegenbaum, Hart and Schendel [49] propose that past, present and future performance, as well as internal and external reference dimensions, form a strategic reference point matrix. Moreover, the focus of attention can make one reference point dominate over others, explaining the differences in risk taking [40, p. 65]. This fact can explain the differences between two different theories: prospect theory and threat-rigidity theory [50]. This latter theory postulates that the lower the performance of a firm, the lower the risk assumed by its managers. This behavior could be the result of establishing the distress point as the reference point: the firm would be above the distress point, so the managers will not take risks that could end the firm. Therefore, the relationship could be caused by a different reference point instead of a different risk-return pattern [40, p. 65], [27, p. 477]. Finally, following these arguments, some authors have tried to find the reference point for a firm by identifying the level of minimal risk in the quadratic equation that relates performance and risk in behavioral and prospect theories [38,40].

The second problem is the cross-sectional design. In the same manner as prospect theory's authors, scholars have used firm-specific longitudinal analysis to test behavioral theory, obtaining support for behavioral theory hypotheses [48].

Finally, Palmer and Wiseman [48] dealt with the differentiation between managerial risk taking and firm risk, measuring them separately. Their results also supported behavioral theory.

3.2. *Strategic position and competitive advantage*

The relationship between risk and return can arise from the different strategic positions of the firms. A good firm management could achieve not only higher return, but also lower risk. Thus, market power, consumer orientation, and diversification strategy can produce high performance–low risk investments [2, pp. 25,26].

Researchers have studied these differences from three basic points of view: firm diversification, market power, and the influence of previous risk over performance. Table 4 shows the works included in this group.

3.2.1. *Diversification strategy*

The theoretical relationship between risk and return at the firm level can depend on the product diversification strategy of the firm. Thus, firms that follow an unrelated diversification strategy would — in theory — face a relatively low risk level because the relation among its businesses is low. Then, the covariance among these businesses' returns is near to zero or negative, reducing the whole firm's risk [23, p. 257, 20, p. 273]. Its expected return will be low too, because the weak relations among the business units do not allow them to reach synergies or share resources. Besides, the most common method for achieving an unrelated diversification pattern is by buying businesses in the market, which means that the assets of these businesses are highly priced. Return calculated on this high base will therefore be lower [23, p. 257, 20, p. 273]. Hence, these firms present a theoretical positive relationship between risk and return: a high variance business (high risk business) will be bought only if the expected return is also high.

Firms with related diversification will achieve a different risk–return pattern. The relationships among the businesses of the firm will theoretically involve greater risk because of the high correlation. Nevertheless, expected return will also be high, because such relationships will allow synergies among the business units. This diversification pattern is commonly achieved by developing the business into the firm, so assets will be priced lower than they would be if the business were bought in the market [23, p. 258]. The possibility of sharing managers' skills among related businesses can affect risk as well as return. Sharing manager skills and resources can lead to a lower risk for the firm. Hence, the relationship between risk and return would be less clear from this diversification pattern.

Table 3
Focus on behavioral theory

Researchers	Measures				Sample				Results
	Return	Risk	Expectations and aspirations	Slack	Firms	Industries	Source	Period	Relationship
Singh [41]	ROE, ROA subjective index	Subjective index		Absorbed slack: selling, general and administrative expenses and working capital to sales; unabsorbed slack: cash over current liabilities	64	Not mentioned	Khandwalla's questionnaire, Moody's industrial, transportation, public utility and OTC industrial manuals	1973–1975	Direct negative between risk and return; significant support for behavioral theory
Bormiley [42]	ROE, ROA, Return on sales	Variances of forecasted earnings	Expectations by the mean of earnings forecast; aspirations based on past performance and industry mean	Current ratio, SG&A over sales, debt to equity, interest coverage ratio	288	Not mentioned	Compustat and IBES	1976–1987	Negative between risk and return; significant support for behavioral theory
Miller and Leiblein [45]	ROE, ROA	Standard deviation and first and second order low moments	Aspirations based on previous performance, average performance of the industry and loss aversion	Accounts receivable over sales; inventories over sales; SG&A over sales	Not mentioned	Not mentioned	Compustat	1971–1991	More statistical significance with partial moments. Positive influence of risk on return and negative of return on risk; significant support for behavioral theory
Wiseman and Bromiley [46]	ROE, ROA and Return on sales	Variance of forecasted incomes	Aspirations based on the industry average performance for low performers and on the previous performance for high performers	Current ratio, SG&A over sales, debt to equity ratio and interest coverage ratio	323	Food processing and manufacturing industries	Compustat and IBES	1975–1988	Organizational decline increases risk-taking; risk taking reduces subsequent performance

Wiseman and Catanach [47]	Operating cash flow to total assets	Realized credit risk, realized interest-rate risk and realized liquidity risk	Not mentioned	SG&A to assets SG&A to assets ²	From 3544 to 2586	1	Department of Labor Statistics and Thrift Financial Reports	1979–1988	Support for behavioral hypotheses even when agency-based influences are controlled for
Greve [43]	Audience share	Organizational changes	Aspirations based on previous performance and average of the performance of the industry		160	1	Arbitron	1984–1992	High performance reduces the change likelihood; significant support for behavioral theory
Palmer and Wiseman [48]	ROA and ROE	Variance in ROA, Variance in PER, R&D expenditure, diversification indicators	Aspirations based on the average return of the industry for low performers; based on the previous returns for high performers	Quick ratio, administrative and operational expenses to sales, debt to equity ratio	235	64	Compustat	1984–1991	Support for behavioral explanation of risk
Deephouse and Wiseman [27]	ROA	Variance of forecasted incomes	Expectations using the average forecast of earnings per share; aspirations using the greater of industry average return for the prior year or the firm's actual return in the prior year plus a five percent growth factor	Current ratio SG&A on sales Debt to equity ratio	367 and 695		Compustat and IBES	1973–1977 1978–1982 1983–1987	Significant support for behavioral theory. Weak support for Agency Theory. Strong influence of the economic environment on the risk–return relation

Table 4
Focus on strategic position

Researchers	Theory	Measures		Sample				Results
		Return	Risk	Firms	Industries	Source	Period	Relationship
Bettis and Hall [23]	Diversification	ROA	Standard deviation of ROA	80	Not mentioned	Compustat	1973–1977	Positive association for non related diversification strategy firms; negative association for related diversification
Bettis and Mahajan [24]	Diversification	ROA	Standard deviation of ROA	80	Not mentioned	Compustat	1973–1977	Related diversification firms are in negative relation cluster; non-related are in positive relation clusters
Amit and Livnat [51]	Diversification	Funds from operations over assets	Standard deviation of return	400	Not mentioned	Compustat	1977–1984	Most of the firms show positive relationship. No support for the Paradox
Chang and Thomas [20]	Diversification	ROA and ROA ²	ROA variance	64	Not mentioned	Compustat I and II	1977–1981	No impact of diversification on strategic risk
Cool et al. [25]	Market power	ROA, return on sales, average return on assets	Standard deviation of return measures	21	1	Census of Manufacturing Indiana Banks	1975–1979	Positive between risk and return, negative between market share and return, negative between market share and risk
Miller and Bromiley [26]	Adjustment costs and default risk	ROE and ROA	Measures from factorial analysis; income variability, market risk and strategic risk	526 746	Not mentioned	Compustat and CRSP	1978–1982 1983–1987	Support for the negative influence of risk over subsequent return
Kim et al. [52]	Diversification	Industry ROA	Industry standard deviation of ROA	125	Not mentioned	Compustat	1982–1986	Global market diversification increases returns and reduces risk; risk–return trade off found for product diversification

Despite these theoretical relations, the empirical tests of these hypotheses do not strongly support them. Related firms achieved, on average, higher return at a lower risk, but there was no causal relationship between diversification strategy and risk–return relationship [23,24]. Product diversification seems to have little impact on the negative risk–return relation [20,52] or no influence at all [51].

Kim et al. [52] found a positive relationship between multinational diversification and return, as well as a negative relation between multinational diversification and risk. They concluded that, once the industry effect is controlled, multinational diversification can produce the Bowman’s paradox.

3.2.2. Market power

Another factor that can influence the risk–return relationship is the market power of the firm. The theoretical link between market power and return has been considered positive, for reasons such as brand fidelity, economies of scale, experience curve effects, and greater bargaining power with suppliers and distributors [53, p. 149]. A high market power firm could also get lower risk because firms with greater market power can pass their risk on to customers or suppliers [53, p. 151] instead of their stockholders.

Market power has been directly related to return and inversely related to risk, so it may be considered one of the possible causes of Bowman’s paradox. However, empirical results do not sufficiently support the former explanation. Several works acknowledge the positive relationship between return and market power, but, as Woo [53, p. 149] points out, other studies have also acknowledged insignificant relationships after third factors common to both variables have been removed. Concerning the market power–risk relation, Woo [53] shows that it was dependent on the risk measure used and the industry selected. The results for accounting risk (ROA variance) were not significant in this study.

When Cool et al. [25] tested the relationship between return, risk and market power, their results supported the former hypotheses: market power is positively related to return and inversely related to risk. However, they also found a direct relationship between risk and return.

In brief, these ambiguous results indicate that the role of market power has not been thoroughly tested empirically. Hence, research on this area should continue.

3.2.3. The impact of previous risk on return

The main focus of scholars who have studied Bowman’s paradox has been the influence of the expected return on the managerial risk taking. This is the focus employed in those works that use prospect or behavioral theories as background. Nevertheless, the risk level can also influence the performance level of a firm. Two arguments support this risk influence on the latter return: default risk and adjustment costs.

The first argues that variability in performance increases a firm’s default risk, because this variability also increases the

likelihood that a firm will default on its explicit or implicit commitments. Hence, customers, suppliers and employees will require a monetary incentive to induce them into a transaction [26, p. 766]. The adjustment costs argument says that high variability in sales makes efficient utilization of capital difficult, and hence increases costs [26, p. 767].

This focus has been little employed to date, but its hypotheses have been significantly supported. For example, Miller and Bromiley [26] found that their data supported this focus instead of Prospect theory hypotheses. Similar results were achieved by Bromiley [42], although this study was based on behavioral theory [22]. Deephouse and Wiseman [27] and Veliyath and Ferris [14] also employed the default risk argument as a theoretical background, finding a negative influence of risk on the latter return.

Finally, Miller and Leiblein [45] studied the influence of risk on subsequent performance, finding a positive influence of the first on the latter, contrary to default risk hypothesis. The explanation is that they tested the influence on the long run, while Bromiley [42] studied the influence on a shorter period of time.

4. Criticisms of the methodology in organization theory

Some scholars point out that Bowman’s paradox can only be the result of some methodological mistake that biases the real relationship between risk and return. We now survey works grouped into three categories of criticisms: statistical measures, sample and accounting data reliability. These works are shown in Table 5.

4.1. Statistical measures

Most criticisms of Bowman’s paradox studies have focused on the statistical measures used in the research. Bowman’s paradox is centered on the relationship between the accounting variables of return and risk. Hence, most articles have used accounting ratios to measure them. For example, to measure return, researchers have mainly employed the average of ROA, ROE, or profit over sales. The main risk measures have been the variances of the return variables, though some researchers have used other measures, as analysts forecast variance, R&D cost or advertising cost.

Criticisms have been made about both expected return and risk measures, although the latter have been more important. The first problem is caused by cross-sectional analysis. Thus, using this methodology, the risk is measured ex-post, but not ex-ante [2, p. 18], [9, p. 168]. Some scholars have tried to avoid this problem by using lagged models [45,32,42] to prove causal relationships between risk and return from different periods, or employing ex-ante measures of risk, such as the variability of earnings forecasts [42], questionnaire information [41], or the risk aversion coefficient obtained from a theoretical utility function [62].

Table 5
Empirical criticisms to Bowman's paradox works

Researchers	Criticisms	Measures		Sample				Results
		Return	Risk	Firms	Industries	Source	Period	Relationship
Marsh and Swanson [54]	Statistical measures	Transformed ROE	Variance of transformed ROE	175	10	Ross Watts and Value Line	1958–1981	Both relationships, but most of them are not significant
Fiegenbaum and Thomas [55]	Temporal stability	ROE	ROE variance	Between 345 and 700	7	Value Line and Compustat	1960–1979	Negative on 1970s and positive on 1960s
Fiegenbaum and Thomas [13]	Temporal stability, market risk	ROE	ROE variance and CAPM beta	Between 1283 and 2394	35 to 76	Compustat	1960–1979	Negative on 1970s and positive on 1960s; not significant with market measures
Aaker and Jacobson [56]	Statistical measures	ROI	Systematic and unsystematic risk	1376 businesses	Not mentioned	PIMS	Not mentioned	Positive correlation between both risks and ROI
Fiegenbaum and Thomas [57]	Temporal stability, statistical measures	ROE, debt to assets, current ratio, sales to assets	Variance of returns	Not mentioned	9	Compustat	1972–1980	Negative for stockholders and bondholders; overall support for the paradox
Oviatt and Bauerschmidt [58]	Statistical measures	Logarithm of ROE	Deviation of return measure from a trend line	141	8	Standard and Poor stock report	1970–1979	Negative using OLS; positive using SLS
Wiseman and Bromiley [59]	Statistical measures	ROE and ROA	ROE and ROA variances and sum of quadratic errors from a trend line	2179	57	Compustat	1968–1987	No difference between both risk measures
Collins and Ruefli [60]	Statistical measures	ROA	Ordinal risk measure	27	1	Not mentioned	1968–1985	Negative
Baucus et al. [61]	Statistical measures, temporal stability	ROA measured at the end of the period (EOP) and at the beginning of the period (BOP)	Standard deviations of return measures	1005	35	Compustat	1969–1988	EOP measures tend to negative; BOP measures tend to positive; no stable relationship
Walls and Dyer [62]	Statistical measures	ROA	Risk tolerance ratio	55	1	Oil and Gas Journal Energy Database	1983–1990	Substantial differences between ex-ante and ex-post measures of risk
McNamara and Bromiley [8]	Statistical measures	Average interest rate charged and risk-adjusted return	Lender's perceptions	1	1	Evaluations made in a banking division		Positive relationship when expected returns are measured by interest rate; negative when they are measured with risk-adjusted returns

The key problem concerning the study of risk is the use of the variance. Although widely used by researchers as a measure of risk, there is no theory linked to it [9, p. 168]. It is questionable that the “strategic risk” could be properly measured by the simple variance, as “risk” is a very complex concept. Therefore, the paradox could be not a real relationship between risk and return, but a mean-variance relationship, where the variance is a bad indicator for risk [45,56,63–65].

The theoretical discussion of variance as a risk indicator has adopted two main postures. First, it seems that managers do not use the variance when they make their decisions because they are not used to the distributions of probability of the variables [64], or because they consider only the negative variations “risky”, not the positive ones [45,9, p. 178]. Following this argument, when Miller and Leiblein [45] tested the relationship using measures of downside risk they obtained support for Behavioral Theory hypotheses.

Second, contrary to the former line of thought, managers could use variance and additional information in their risk measuring. Other dimensions of strategic risk have been acknowledged, such as the failure risk — the probability of not reaching a target point — [65–67], the ruin risk — the probability of ruinous loss — [65–67], the size of loss [64,66], the lack of information [66], and the innovation level of the firm [31,32,66]. In addition, managers should take into account the risk for all the stakeholders of the firm [57]. Miller and Bromiley [26] used various risk measures in a factor analysis, obtaining three factors for risk measure: income variability, market risk, and strategic risk. Their analyses obtained a negative influence of risk on subsequent return.

In summary, if variance is not used by managers as a measure of risk, or if it is insufficient for measuring it, the mean–variance relationship cannot be assimilated into the real risk–return relationship. Nevertheless, the empirical works that have tested the paradox using risk measures different from the variance of the performance have provided significant support for the paradox hypotheses [45,31] similar to the variance.

A third criticism of variance is that this measure can bias the results if used on a sample whose results are part of a trend. Thus, firms in an industry whose sales are growing or declining would have higher variances and, hence, higher estimated risk. Nevertheless, the relationship between return and risk measured with the errors on a regression line has been tested, and the results do not differ significantly from the variance studies [58,59].

The last criticism of risk is the possible statistical relationship between the mean and the variance of the same variable. By measuring return as the average of profitability, and risk as a variance of profitability, we are relating two moments of the same random variable. The relationship between risk and return could be only a statistical relationship between those two moments, not a real economic relationship between risk and return. One of the most common hypotheses to avoid this problem is to consider that firm

profitability is normally distributed, and then mean and variance are not statistically related. However, accounting ratio distributions studies show that these variables are not normally distributed, and their probability distributions are similar to log-normal or gamma distributions [54, p. 37]. Thus, mean and variance would be statistically related by the distribution of the random variable.

Another problem with the mean–variance relationship is its dependence on the aggregation period chosen [68–70]. Thus, a negative relationship in a period T could be obtained from positive relationships in sub-periods of T [68]. Hence, the mean–variance approach would not be useful in determining the real relationship between risk and return, as any relationship can be caused by relationships of any sign in lower periods or can cause any sign relationships in higher periods.

The stability of the profitability distribution is also a key issue in the empirical research [68, p. 371] because the relationship between profitability and time can be the result of elements drawn from a single risk–return relationship or from various mean–variance relationships caused by different profitability distributions throughout time. Since estimations of variance and mean are meaningful only for stationary time-series of returns [40, p. 63], an initial hypothesis should be the stability of the return distribution, although this hypothesis is questionable for the analysis of long time-periods [71, p. 208].

To avoid the effects of non-stationary time-series, the period analyzed by the researchers has been relatively short (five-year periods) [40, p. 67], but this short period makes the influence of extreme observations greater, which can produce similar results to Prospect Theory or Behavioral theory hypotheses. Let us consider a firm with expected return M and variance V for the five-year period. Let us assume that, in one of the five years, the firm obtains an extremely low (high) result. If we try to measure M and V using the five observations, the extreme observation will imply a higher variance and a lower (higher) expectation. The result is the same as that predicted by Prospect and Behavioral theories: if a firm obtains an extremely low value, its mean will be low (below the target) and its variance will be high, that is to say, low return and high variance; on the other hand, if the extreme value is high, the mean will also be high (above the target) and the variance will be high as well, that is to say, high return and high variance. In summary, the negative relationship below the reference point or the positive relationship above it can be simply produced by firms with extremely low or extremely high observations.

Return measures have been questioned less than risk measures although the accounting ratios of profitability present some defects that bring into question their quality as indicators of return: they relate the earnings of the period with investments or net worth, but these denominators can also influence future earnings [56, p. 283].

The main criticism of the profitability measure is based on the measurement of the denominator of the ratio at the end

of the period [61]. Accounting ratios such as ROE or ROA, which use end of the period (EOP) measures — book value or total assets measured at the end of the period — have been used in almost all the empirical studies. This fact tends to present a negative relationship between profitability ratio and its variance: firms that have achieved an extraordinarily high profit — high return — increase book value too. If we use this variable at the end of the period, the denominator of the ratio will be higher, and therefore, the ratio itself and its variance will be lower. If the firm obtained high losses — low return — the book value measured at the end of the period will be lower and, hence, the ratio and its variance will be higher [61, p. 390].

4.2. *Sample criticisms*

One of the methodological problems researchers have to confront is the sample selection. In the first place, it is possible that the relationship found by Bowman was only a short-term relationship, being a real positive correlation between risk and return in the long term as the financial economic theory states [2, p. 27]. This idea led researchers to employ samples from diverse time periods to study the stability of the negative relationship, and find both negative and positive relationships depending on the period of time chosen [55,13]. Despite this, no longitudinal study has examined this temporal instability.

Another problem related to sample selection is the industry classification. It has been demonstrated that the industry effect on the risk–return pattern is very important [45, p. 99]. Thus, features like concentration degree, and position in life cycle are key variables in the relationship between risk and return of the firms [2, p. 27, 13, p. 400].

5. **Conclusions and future research**

Although many works provide evidence of the negative relationship between the accounting measures of risk and return, none are free from criticism because they have not resolved all their problems at the same time. The correct measure of “risk”, the stability of the relationship, or the cross-sectional design of the research are weak points of nearly all the works that have been overcome independently.

Nevertheless, it can be said that investigation in this area is progressing, mainly in the area of risk measures. In this sense, the literature has proved that the traditional variability measures — the variance and its derivatives — present important methodological problems in relation to the mean of the variable. Perhaps the strongest criticisms are that there are problems of identification because mean and variance come from the same variable, and that the variance is measured ex-post (historical) when it should be ex-ante (expectation) [9]. Although there is no methodological solution in the papers on Bowman’s paradox to date, both problems can be solved using GARCH models, in which mean and vari-

ance are defined by different equations. Besides solving the problem of identification, this model can estimate forward variances equal to the mean. Nevertheless, for accounting data, it is necessary to recognize that we could find a restriction in relation to the small number of observations. The solution applied to this problem is the search for new measures of risk, different from the traditional variance or variance-related measures. Some examples of the new kind of risk measures could be downsize measures [45], ordinal risk measures [60], content analysis measured risk [32,39], the mean of the quadratic changes in performance [40], or the variance of forecasted incomes [42,46,27]. Another focus has been the direct measure of the manager’s risk perception, using questionnaires [41,47,8]. Finally, some authors use proxies for measuring managerial risk taking, such as the R&D expenditure or debt to equity ratio [26,48]. The results achieved when these new measures are used often show a negative relationship between risk and return, supporting the hypothesis from the paradox, if other criticisms are not considered. Nevertheless, these measures are still rarely studied, and have their own problems. Therefore, research of more suitable ways for measuring risk is vital for the development of this stream of investigation [9].

As we mentioned in the introduction, from Fama and French [1], the theoretical positive relationship between risk (beta) and return at the market level has been challenged. Several authors have tried to demonstrate that the death of beta has been exaggerated [4,5] because there still exists a positive relationship between beta and return; other authors support the result found by Fama and French [1], proving that there is no correlation between beta and returns [11]; and finally, other authors have stated that the relationship between both measures depends on the situation of the market expected return, above or below the risk-free return [3,6]. It is amazing how this evolution in financial economics theory is almost identical to the evolution of Bowman’s paradox, although it is surprising that there is no mention in these financial works to the previous Bowman’s paradox literature.

In this sense, some financial authors are starting the search for new measures of risk that substitute or complement the beta from the CAPM [12]. Between these new measures, the accounting measures have the most relevant position.

We think that these two research lines that to date have been mutually ignored, with the exceptions of Fiegenbaum and Thomas [13], Veliyath and Ferris [14], Chatterjee et al. [15], and Ruefli et al. [9], should be integrated in a wider frame for researching the relationship between risk and return.

This inter-disciplinary focus must also be extended towards accounting research, since most of the measures used in Bowman’s paradox, and the new risk measures for the financial works, come from the accounting information. The development of reliable methods of measuring accounting risk is vital for the progress of this line of research.

Finally, the inter-disciplinary focus is necessary for researching some lags in Bowman’s paradox. In this sense, we

mention the reliability of the accounting measures, since a common criticism of accounting information research is the relative reliability of these measures. Accounting scholars have demonstrated that some accounting practices, known as “earnings management”, can influence reported income, presenting a distorted picture of firm performance. Bowman [2, p. 25] pointed out that the paradox could be only the result of these practices among the high-performing firms. Although various works have tested Bowman’s paradox hypotheses using measures different from accounting indicators [42,46,27,41,47,8], or accounting measures less susceptible to manipulation [36], to date no study has tested the possible effect of earnings management practices on the risk–return relationship. In this sense, it is interesting to observe how prospect theory has been employed to explain both Bowman’s paradox and earnings management [72,73].

A second lag in Bowman’s paradox literature is the so-called “masking effect” of the market, that is, how the accounting risk–return relationship influences the market relation. Scholars have hardly studied this issue, and their results are contradictory. In his first work, Bowman [2] hypothesized that the market could mask the paradox through the price mechanism. On one hand, those firms with high accounting returns and low variance would be highly priced at the market, which would produce lower rates of return and risk. On the other hand, firms with low accounting returns and high variance would be lowly priced at the market, and this price would allow higher returns and variability. This “masking effect” was tested by Fiegenbaum and Thomas [13] by relating the accounting return with a market risk measure (this measure was the beta parameter from the CAPM). They found a significant positive relationship between beta and accounting return and, based on this result, concluded that the market masked the paradox. Nevertheless, there is a contradiction between Bowman’s argument [2] and Fiegenbaum and Thomas’ results [13]: while Bowman’s argument implies a negative relationship between accounting return and both market measures (high accounting returns imply high price and hence, low market

risk and return) and a positive relationship between accounting risk and market measures (the higher the accounting risk, the lower the price and hence, the higher market return and risk), Fiegenbaum and Thomas [13] found a positive relationship between accounting returns and market risk. In another work, Veliyath and Ferris [14] found a significant negative relationship between accounting return and total market risk, but no significant relationship between accounting return and systematic risk (measured by the beta from the CAPM model). In conclusion, it is not clear how the accounting risk–return relationship influences the market relation, and it should be studied as part of the new research about the market risk–return relationship. It is important that the financial stream of Fama and French [1] contributes with its own conclusions.

Lastly, most of the empirical tests that have supported the existence of the paradox are cross-sectional. This creates the following problems: (1) the temporal evolution of the relationship is not well tested, so different relationships can arise, as in Fiegenbaum and Thomas [55,13]; and (2) it is possible that the variation in risk taking across firms stems from established differences among them that also produce differences in their successes [2, p. 6]. Again, a new methodology could solve these problems. The use of dynamic statistical techniques such as “panel data” could solve both problems. We can better understand the evolution of the relationship with time, and we can also examine whether the risk–return relationship depends mainly on the attitude towards risk of every manager or the established differences among firms through the whole market.

Appendix A

Empirical risk–return papers before Bowman [2], focus on prospect theory, behavioral theory, strategic position, empirical criticisms to Bowman’s paradox works, and number of citations of the reviewed articles are given in Tables 1–6, respectively.

Table 6
Number of citations of the reviewed articles from 1992 to February 2001

Author	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Bowman [2]	5	3	4	2	9	5	6	4	4		42
Bowman [31]	3	7	3	1	7	5	5	5	2		38
Bettis, Hall [23]	9	5	5	1	4	4	3	1	2	1	35
Bowman [32]			5	2	3	6	1	2	3		22
Marsh, Swanson [54]	1		1		3						5
Bettis, Mahajan [24]	4	4	4	1	3	5	1	2	2		26
Fiegenbaum, Thomas [55]	1		1		1	2		1			6
Fiegenbaum, Thomas [13]	2		3		3	3	2	1	2		16
Singh [41]	6	4	11	6	14	14	9	2	8		74
Aaker, Jacobson [56]	1			3	4	1	1	2	2		14

Table 6 (continued)

Author	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Fiegenbaum, Thomas [34]	4	3	7	1	8	3	2	7	3	1	39
Amit, Livnat [51]	3	4	2	2	3	5	3	1	1		24
Cool et al. [25]	1	1	1	2	4	4	1	6	3		23
Chang, Thomas [20]	2	2	1	1	1	2			1	1	11
Fiegenbaum [35]		1	1		5	3		5	1	1	17
Miller, Bromiley [26]	4	2	4		5	5	1	2	3		26
Jegers [36]	1		1		4	1	1	1			9
Bromiley [42]	2	3	2	1	11	7	7	9	4	1	47
Oviatt, Bauerschmidt [58]	1		1		2	1			2		7
Wiseman, Bromiley [59]	1		2	1	2			3	1		10
Collins, Ruefli [60]			1	1	2				1		5
Kim, Hwang, Burgers [52]					2	1	2	1	4		10
Baucus, Golec, Cooper [61]					2	1		1	1		5
Sinha [37]									1		1
Miller, Leiblein [45]					1		4	3	2	1	11
Wiseman, Bromiley [46]								1	2		3
Gooding et al. [38]									1		1
Walls, Dyer [62]								1			1
Lee [39]								1			1
Wiseman, Catanach [47]								2	1		3
Greve [43]							1	3	3		7
McNamara, Bromiley [8]											0
Palmer, Wiseman [48]											0
Deephouse, Wiseman [27]											0
Lehner [40]											0

References

- [1] Fama EF, French KR. The cross-section of expected stock returns. *The Journal of Finance* 1992;47(2):427–65.
- [2] Bowman EA. Risk/return paradox for strategic management. *Sloan Management Review* 1980;Spring:17–31.
- [3] Fletcher J. On the conditional relationship between beta and return in international stock returns. *International Review of Financial Analysis* 2000;9(3):235–45.
- [4] Clare AD, Priestley R, Thomas SH. Reports of beta's death are premature: Evidence from the UK. *Journal of Banking & Finance* 1998;22:1207–29.
- [5] Grundy K, Malkiel BG. Reports of beta's death have been greatly exaggerated. *Journal of Portfolio Management* 1996;22:36–44.
- [6] Hodoshima J, Garza-Gómez X, Kunimura M. Cross-sectional regresión análisis of return and beta in Japan. *Journal of Economics and Business* 2000;52:515–33.
- [7] Wang X. Size effect, book-to-market effect, and survival. *Journal of Multinational Financial Management* 2000;10:257–73.
- [8] McNamara G, Bromiley P. Risk and return in organizational decision making. *Academy of Management Journal* 1999;42(3):330–9.
- [9] Ruefli T, Collins JM, LaCugna JR. Risk measurement in strategic management research: Auld lang syne? *Strategic Management Journal* 1999;20:167–94.
- [10] Campbell JY. Asset pricing at the millennium. *The Journal of Finance* 2000;55(4):1515–67.
- [11] Fama EF, French R. The CAPM is wanted, dead or alive. *The Journal of Finance* 1996;51(5):1947–58.
- [12] Kim MK, Ismail BE. An accounting analysis of the risk–return relationship in bull and bear markets. *Review of Financial Economics* 1998;7(2):173–82.
- [13] Fiegenbaum A, Thomas H. Dynamic and risk measurement. Perspectives on Bowman's risk–return paradox for strategic management: An empirical study. *Strategic Management Journal* 1986;7:395–407.
- [14] Veliyath R, Ferris SP. Agency influences on risk reduction and operating performance: an empirical investigation among strategic groups. *Journal of Business Research* 1997;39:219–30.
- [15] Chatterjee S, Lubatkin MH, Schulze WS. Toward a strategic theory of risk premium: moving beyond CAPM. *Academy of Management Review* 1999;24(3):556–67.
- [16] Conrad G, Plotkin I. Risk/return: U.S. industry pattern. *Harvard Business Review* 1968;46(2):90–9.
- [17] Fisher IN, Hall GR. Risk and corporate rates of return. *Quarterly Journal of Economics* 1969;83:79–92.
- [18] Hurdle G. Leverage, risk, market structure and profitability. *The Review of Economics and Statistics* 1974;66(4):78–85.
- [19] Armour H, Teece D. Organizational structure and economic performance: a test of multidivisional hypothesis. *The Bell Journal of Economics* 1978;9:106–22.
- [20] Chang Y, Thomas H. The impact of diversification strategy on risk–return performance. *Strategic Management Journal* 1989;10:271–84.
- [21] Kahneman D, Tversky A. Prospect theory: an analysis of decision under risk. *Econometrica* 1979;47(2):263–91.
- [22] Cyert RM, March JG. *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall, 1963.

- [23] Bettis R, Hall W. Diversification strategy, accounting determined risk, and accounting determined return. *Academy of Management Journal* 1982;25(2):254–64.
- [24] Bettis R, Mahajan V. Risk/return performance of diversified firms. *Management Science* 1985;31(7):785–99.
- [25] Cook K, Dierickx I, Jemison D. Business strategy, market structure and risk–return relationships: a structural approach. *Strategic Management Journal* 1989;10:507–22.
- [26] Miller K, Bromiley P. Strategic risk and corporate performance: an analysis of alternative risk measures. *Academy of Management Journal* 1990;33(4):756–79.
- [27] Deephouse DL, Wiseman RM. Comparing alternative explanations for accounting risk–return relations. *Journal of Economic Behavior and Organization* 2000;42:463–82.
- [28] Latour B. *Science in action*. Cambridge, MA: Harvard University Press, 1987.
- [29] Tobin J. Liquidity preference as behavior towards risk. *Review of Economic Studies* 1958;26:65–86.
- [30] March J. Variable risk preferences and adaptive aspirations. *Journal of Economic Behavior and Organization* 1988;9:5–24.
- [31] Bowman E. Risk seeking by troubled firms. *Sloan Management Review* 1982;31(Summer):33–42.
- [32] Bowman E. Content analysis of annual reports for corporate strategy and risk. *Interfaces* 1984;61–71.
- [33] Lipe MG. Individual investors' risk judgments and investment decisions: the impact of accounting and market data. *Accounting, Organizations & Society* 1998;23(7):625–40.
- [34] Fiegenbaum A, Tomas H. Attitudes toward risk and the risk–return paradox: prospect theory explanations. *Academy of Management Journal* 1988;31(1):85–106.
- [35] Fiegenbaum A. Prospect theory and the risk–return association: an empirical examination of 85 industries. *Journal of Economic Behavior and Organization* 1990;14:187–203.
- [36] Jegers M. Prospect theory and the risk–return relation: Some Belgian evidence. *Academy of Management Journal* 1991;34(1):215–25.
- [37] Sinha T. Prospect theory and the risk return association: another look. *Journal of Economic Behavior and Organization* 1994;24:225–31.
- [38] Gooding RZ, Goel S, Wiseman RM. Fixed versus variable reference points in the risk–return relationship. *Journal of Economic Behavior and Organization* 1996;29:331–50.
- [39] Lee DY. The impact of poor performance on risk-taking attitudes: a longitudinal study with a PLS causal modeling approach. *Decision Sciences* 1997;28(1):59–80.
- [40] Lehner JM. Shifts of reference points for framing of strategic decisions and changing risk–return associations. *Management Science* 2000;46(1):63–76.
- [41] Singh JV. Performance, slack, and risk taking in organizational decision making. *Academy of Management Journal* 1986;29(3):562–85.
- [42] Bromiley P. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal* 1991;24(1):37–59.
- [43] Greve HR. Performance, aspirations and risky organizational change. *Administrative Science Quarterly* 1998;43:58–86.
- [44] Grinyer P, McKiernan P. Generating major change in stagnating companies. *Strategic Management Journal* 1990;11:131–46.
- [45] Miller K, Leiblein M. Corporate risk–return relations: returns variability versus downside risk. *Academy of Management Journal* 1996;39(1):91–122.
- [46] Wiseman RM, Bromiley P. Toward a model of risk in declining organizations: an empirical examination of risk, performance and decline. *Organization Science* 1996;7(5):524–43.
- [47] Wiseman RM, Catanach AH. A longitudinal disaggregation of operational risk under changing regulations: evidence from the savings and loan industry. *Academy of Management Journal* 1997;40(4):799–830.
- [48] Palmer TB, Wiseman RM. Decoupling risk taking from income stream uncertainty: a holistic model of risk. *Strategic Management Journal* 1999;20:1037–62.
- [49] Fiegenbaum A, Hart S, Schendel D. Strategic reference point theory. *Strategic Management Journal* 1996;17:219–35.
- [50] Staw BM, Sandelands LE, Dutton JE. Threat-rigidity effects in organizational behavior: a multilevel analysis. *Administrative Science Quarterly* 1981;26:501–24.
- [51] Amit R, Livnat J. Diversification and the risk–return trade-off. *Academy of Management Journal* 1988;31(1):154–66.
- [52] Kim WC, Hwang P, Burgers WP. Multinationals' diversification and the risk–return trade-off. *Strategic Management Journal* 1993;14:275–86.
- [53] Woo C. Path analysis of the relationship between market share, business-level conduct and risk. *Strategic Management Journal* 1987;8:149–68.
- [54] Marsh T, Swanson D. Risk–return tradeoffs for strategic management. *Sloan Management Review* 1984;Spring:35–51.
- [55] Fiegenbaum A, Thomas H. An examination of the structural stability of Bowman's risk–return paradox. *Academy of Management Proceedings*, 1985. p. 7–10.
- [56] Aaker DA, Jacobson R. The role of risk in explaining differences in profitability. *Academy of Management Journal* 1987;30(2):277–96.
- [57] Fiegenbaum A, Thomas H. Stakeholder risk and Bowman's risk–return paradox. In: Bettis R, Thomas H, editors. *Risk, strategy and management*. Greenwich, CT: JAI Press, 1990. p. 111–33.
- [58] Oviatt B, Bauerschmidt A. Business risk and return. A test of simultaneous relationships. *Management Science* 1991;37(11):1405–23.
- [59] Wiseman R, Bromiley P. Risk–return associations: paradox or artifact? An empirical tested explanation. *Strategic Management Journal* 1991;12:231–41.
- [60] Collins J, Ruefli T. Strategic risk: an ordinal approach. *Management Science* 1992;38(12):1707–31.
- [61] Baucus D, Golec J, Cooper J. Estimating risk–return relationships: an analysis of measures. *Strategic Management Journal* 1993;14:387–96.
- [62] Walls MR, Dyer JS. Risk propensity and firm performance: a study of the petroleum exploration industry. *Management Science* 1996;42(7):1004–21.
- [63] Baird IS, Thomas H. Toward a contingency model of strategic firm risk taking. *Academy of Management Review* 1985;10:230–43.
- [64] March J, Shapira Z. Managerial perspectives on risk and risk taking. *Management Science* 1987;33(11):1404–18.
- [65] Sitkin SB, Pablo AL. Reconceptualizing the determinants of risk behavior. *Academy of Management Review* 1992;17(1):9–38.
- [66] Baird IS, Thomas H. What is risk anyway? In: Bettis R, Thomas H, editors. *Risk, strategy and management*. Greenwich, CT: JAI Press, 1990. p. 111–33.

- [67] Libby R, Fishburn PC. Behavioral models of risk taking in business decisions: a survey and evaluation. *Journal of Accounting Research* 1977;15:272–92.
- [68] Ruefli T. Mean–variance approaches to risk–return relationships in strategy: paradox lost. *Management Science* 1990;36(3):368–80.
- [69] Ruefli T. Reply to Bromiley’s comment and further results: paradox lost becomes dilemma found. *Management Science* 1991;37(9):1210–5.
- [70] Ruefli T, Wiggins R. When mean square error becomes variance: a comment on ‘business risk and return: a test of simultaneous relationships’. *Management Science* 1994;40(6):750–9.
- [71] Bromiley P. Paradox or at least variance found: a comment on ‘mean–variance approaches to risk–return relationships in strategy: paradox lost’. *Management Science* 1991;37(9):1206–15.
- [72] Burgstahler D, Dichev I. Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics* 1997;24:99–126.
- [73] Degeorge R, Patel J, Zeckhauser R. Earnings management to exceed thresholds. *Journal of Business* 1999;72:1–33.