Correspondence
Author's reply

Manuel Cano Rodríguez[a], Manuel Núñez Nickel[b,]

[a] *Department of Business Administration, Accounting and Sociology, University of Jaén, Paraje Las Lagunillas, s/n 23071 Jaén, Spain*
[b] *Department of Business Economics, Carlos III University, C/Madrid, 126 28903 Getafe-Madrid, Spain*

Abstract

This issue of *Omega* contains a commentary by P.L. Brockett, W.W. Cooper, K.H. Kwon, and T.W. Ruefli on the review of Bowman's paradox by Nickel and Rodríguez, published in the February 2002 issue of Omega. In their commentary, the authors describe an article, published in the 1992 issue of *Decision Sciences* but not covered by the review, and claim that they had previously overcome three of the outstanding problems noted in Nickel and Rodríguez's review.

This reply to the commentary proves that the conclusions drawn in the review by Nickel and Rodríguez are relevant in spite of the Brockett et al. arguments against them. In this reply, we show that the paper by Brockett et al. neither explains Bowman's paradox nor resolves its underlying problems. First, the definitions of risk and return measures are mathematically linked, and second, a cross-sectional methodology is used. We also provide our opinion on what would be necessary to bear in mind in order to extend any conclusion from Bowman's paradox to beta's death and vice versa.

1. Introduction

The commentary by Brockett et al. [1] (in this same issue of Omega) describes an article by Brockett et al. [2] published in the 1992 issue of Decision Sciences, which was not covered by the review of Bowman's paradox [3] published in the February 2002 issue of Omega. The main aim of their commentary [1] is to show that the article [2] had previously overcome the criticisms that the authors of the review [3] noted as further research. They claim to have resolved conclusively: (i) the identification problem between risk and return measures, (ii) the relationship among ex-post versus ex-ante measures, and (iii) the extension of the conclusions of the Bowman's paradox to what the financial research has come to name as beta's death. The commentary by Brockett

et al. [1] could be interpreted to imply that a fundamental paper in this literature had been omitted. However, we tend to disagree with this.

The aim of this reply is to prove that the conclusions and ideas contained in the review continue in force in spite of the Brockett et al. arguments [2] against them. We find two reasons why the article by Brockett et al. does not resolve the underlying problems of Bowman's paradox: first, its return and risk measures are conceptually and mathematically linked, and second, the authors use cross-sectional methodology. This last methodology would not be incorrect by itself, but it makes it impossible to extend the results inside Bowman's paradox.

Our reply is structured as follows. Firstly, we stress the definition problem of the risk and return measures in [2], which would invalidate conclusions outlined in such commentary. Secondly, we explain what aspects would have been necessary in the Brockett et al. article for unifying and generalizing the results of the two research lines: beta's death, and Bowman's paradox. Finally, we conclude with a brief discussion of some aspects of the research issues.

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* Correspondence address: Carlos III University, C/Madrid, 126, 28903 Getafe-Madrid, Spain. Tel: +34-91-624-58-46; fax+ 34-91-624-96-07.

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

2. The correct measure of "risk"

Since both Brockett et al. [1] and Nickel and Rodríguez [3] agree with the following paragraph [1, p. 2], we think that this could be the point from which the different interpretations between [1] and [3, p. 14] arise:

> [Part One] "the strongest criticisms [of the studies reviewed] are that there are [unresolved] problems of identification because mean [= average returns] and variance [the commonly used measure of risk] come from the same variable and [Part Two] the variance is measured ex-post when it should be measured ex-ante."

The method of choice in the Bowman's paradox literature for solving part one has generally been to define other risk measures without the problems of the variance [4–14]. Articles in [5,6,9,12] came before [2]. In relation to part two, there are scholars of Bowman's Paradox who were aware of this problem and solved it by calculating measures ex-ante [9,12,15]. Articles in [9,12] came before [2]. We are not providing new information here. This state of the art has been surveyed in the review in [3, p. 13–14] in relation to part one and in [3, p. 11] in relation to part two. These solutions have also been employed in [2]. However, the risk and return measures must be carefully selected, because it is possible to stumble against other problems in choosing measures that may suffer from low validity and reliability [17, p. 183]. For instance, it is possible to choose measures that mathematically force a given relationship between risk and return, without any economical, sociological or behavioral cause behind them. We think that this problem is present in Brockett et al. [1,2].

At the theoretical level, Brockett et al. [1, p. 4; 2, p. 394] choose $\Pr(x \geqslant S)$ as the return measure and $\Pr(x \leqslant W)$ as the risk measure, where $\Pr$ is probability, x is the rate of return for individual fund or funds portfolio, S is S& P 500 rate of return, and W is T-bill rate of return. In this form, the risk measure is defined as the probability of failing; that is to say that the portfolio return falls below the T-bill rate. Intuitively, it seems reasonable to think that the inverse of failing is to be successful. In other words, that there is a probability of equaled or exceeded returns at another upper level, for instance the S& P 500 rate, just as the return measure has been measured in the same paper. Therefore, if we are successful, we cannot fail, and vice versa; if we fail, we cannot be successful. Brockett et al. have conceptually chosen a risk measure that is the inverse of the return measure. Perhaps this intuition can be seen better with the empirical measures that Brockett et al. [1, p. 3; 2, p. 395] denote as the solution to the problems:

Return
$$= \frac{\text{Number of times a fund's return} \geqslant \text{S\&P 500 return}}{\text{Number of months in the same period}}$$
$$= \frac{N1}{N},$$

Risk $= \dfrac{\text{Number of times a fund's return} \leqslant T\text{-bill rate}}{\text{Number of months in the same period}}$

$$= \frac{N2}{N}.$$

We know that the total number of months (N) is

$$N = N1 + N2 + N3,$$

where $N3$ is the number of months when the fund's return is between T-bill and S& P 500. If we divide this expression by N

$$1 = \frac{N1}{N} + \frac{N2}{N} + \frac{N3}{N} = \text{Return} + \text{Risk} + \frac{N3}{N}.$$

Hence

$$\text{Return} = \left(1 - \frac{N3}{N}\right) - \text{Risk} = \alpha - \text{Risk}.$$

In this form, this return definition is equal to something (α) minus this risk definition. If we calculated regression or correlation between these concepts, we would always obtain a negative sign between them. Therefore, we find that the negative relationship between "risk" and "return" is actually a result forced by specific definitions of risk and return, and not by the underlying idea of Bowman's paradox; that is to say, the behavior of the decision makers.

It is clear that if we were right, if the risk and return measures lack validity, then the conclusions of the paper would also lack validity. Furthermore, even if these problems were resolved, it would not guarantee the existence of Bowman's paradox. As we have already argued in the review in Omega [3, p. 14]: "none (works in Bowman's paradox literature) are not free from criticism because they have not resolved all their problems at the same time". The paper by Brockett et al., where a cross-sectional methodology has been used instead of a time series, is a case in point. Nevertheless, this affirmation needs a deeper study in this case, as we will see below.

3. What might need to be taken into account to compare results between research lines?

The third claim in the paper by Brockett et al. is that their conclusions can be extended to financial economics (beta's death). Because of this claim, in the next sub-paragraphs, we try to explain some differences between research streams, which would prevent comparison with their results. We extend this analysis to the paper by Brockett et al., and see that, even if the previous measures were correct, it would not be possible to extrapolate these results to other research streams, including Bowman's paradox and beta's death.

3.1. Decision-maker focus: investor vs. manager

Some scholars used market data to link financial economics and of Bowman's paradox literatures [3, p. 15]. We

think, however, that the problem is a little deeper than the utilization of market data. For instance, the nature of the decision maker is a criterion that could encapsulate the fundamental root of the problem, from which arise the main obstacles to extrapolating conclusions to any research line. As an investor, the decision maker has not only different motivations from a manager, but she/he has different resources for making choices. For example, there are significant differences between markets of investment for managers and investors, especially in the higher efficiency of the stock market as compared with the real goods market. Thus, an investor can diversify her/his portfolio quite easily. She/he can invest the amount she/he desires in any given asset at any time, and can abandon the investment quite easily. On the other hand, a manager cannot diversify her/his investments so easily. The amounts to be invested and the moment of the investment are often conditioned by the investment option, and abandoning the investment is much more difficult.

In classic financial economics, the investor could diversify the specific risk thus reducing the total risk that she/he bears. This is a consequence of her/his choices set. She/he can choose among all the titles quoted in the stock market. On the other hand, the manager has only one available investment; the firm she/he manages. In consequence, she/he cannot reduce the total risk in the same measure and, very likely, she/he will have different motivations to act [6]. This is to say, that perhaps she/he will have other targets, different from the minimization of the firm risk or the maximization of returns. This divergence is fundamental because the risk concepts are different. In the investor case, we are speaking about systematic risk. On the other hand, in the manager case, the concept used would be total risk. We could hypothesize that this difference, the specific risk, is the cause of the "masking effect". In every work in Bowman's paradox, the chosen risk and return measures have always been calculated for each firm individually, and not for portfolios, as is the case for mutual funds. A possible path to resolve this enigma must be to clarify the influences of these kinds of risk on the return.

The choices set generates another methodological, and perhaps more important, problem. All investors can invest in financial instruments of the same choices set; that is, all the assets available in a given financial market. For this reason, the differences in their cross-sectional risk-return patterns will be produced by their risk attitude, and not by the differences among the set of available investments, as could happen with managers. Therefore, the cross-sectional approach can be correct and justified in the case of mutual funds if we consider that their managers act as investors. However, this methodology cannot be used taking a manager focus, because the set of available investments is different for each firm and, therefore, the different risk-return pattern can be due to either a different risk attitude or the differences in the possible investments. Therefore, we might always have the following doubt: are the divergences in the risk-return pattern a consequence of different behaviors or of different possibilities of choice? To avoid this problem, we might only use firm-specific time series models.

After this reasoning, where could the paper by Brockett et al. [2] be placed? The database used in this paper is formed by the data and ratings of several mutual funds [1, p. 2–3; 2, p. 388–9]. Each mutual fund is a portfolio created from the same choices set for each decision maker. That is to say, the paper has no problem using a cross-sectional approach. Every manager can choose the same financial instruments. For this reason, in spite of the manager of each firm being the decision maker, she/he performs in this situation as a standard investor of the stock market. She/he could diversify risks of the mutual fund and, in any case, this risk would not be the risk of her/his own firm, but the fund risk. This is to say, using mutual funds could have many advantages, among these, justifying the utilization of the cross-sectional models. However, this data, together with the present development of the paper by Brockett et al. [2], makes impossible the comparison with the Bowman's paradox line.

Being impossible the comparison of the Brockett et al. paper with the Bowman's paradox line, perhaps we could compare it with beta's death. The answer is also no. Even if the risk and return measures were right, these are very different from beta parameters and expected returns. What relation would the beta parameter employed in beta's death have with the probability of failure used in the Brockett et al. paper? Moreover, what would be the probability of success with the expected return? These relationships are still more sophisticated as above, but they are not explained. These concepts could be so different that they cannot be homologues. For this reason, a first step in linking both literatures would be to choose measures that can be easily translated and accepted between research streams.

3.2. Theoretical explanation focus

The theoretical explanations that scholars have chosen in Bowman's paradox can be grouped into two types: the decision-maker attitude towards risk, and the strategic choice [3, p. 3–11]. Both explanations have implicit assumptions that hinder the extrapolation of results.

Risk-seeking or risk-averse attitudes: From the seminal Bowman paper [16], most researchers (73% of the reviewed articles in *Omega*) considered the possibility of a risk-seeking behavior under certain situations. However, the fundamental assumption of most financial models is risk-averse behavior. The financial world is a place without risk-seeking decision makers. In this form, to compare both research lines, it would be necessary to relax the assumption of risk aversion.

The world created by Brockett et al. with their model [1, p. 4; 2, p. 392–4] is only a world of risk-averse decision makers, very similar to a financial model. There are no risk-seeking decision makers. The only difference, as above, is the definition of the risk and return measures. Their model maximizes the returns subject to a given risk in a clearly

risk-averse model. For this reason, and in this sense, this model could be in tune with most financial models, but it would also not be comparable with the Bowman's paradox papers that have used this theoretical explanation. In this form, the theoretical model of Brockett et al. does not invalidate by itself the work, but limits the view of the problem or, at least, does not allow consideration of the possibility of risk-seeking.

Strategic position: Lastly, the second theoretical interpretation from Bowman's paradox is the strategic position of the firm, although we think this perspective is more difficult, if not impossible, to adapt to financial economics. The reason is that another fundamental assumption of financial models is the efficiency of the investment market. This is just the opposite assumption to the strategic management one: market imperfections, like market power, allow the firm to achieve privileged places. Therefore, similar to the previous theoretical explanation, the only solution would be to relax the assumption of market efficiency. A possible solution at the empirical level would be to use control variables with organizational characteristics. This would have helped to isolate the effects from imperfections and, thus, to clarify which hypothesis would be more fitting.

4. Discussion

Intuition tells us that many possibilities for Bowman's paradox exist, and that the beta's death can be a very similar phenomenon, if not the same. If this were so, that is to say, that both managers and investors were risk seeking, or that the strategic position was relevant, we could be at the threshold of a new financial and management thought. However, this intuition is not sufficient. Additional evidence is necessary to support such intuitive suggestions. We do not discuss the validity and reliability of some new risk measures employed in the Paradox literature, since this has already been done by part of the Brockett et al. research group 7 years after their paper [17, p. 183] was published. We sincerely think that these new measures must be a successful way, and perhaps the only one. However, to resolve Bowman's paradox, it is necessary to overcome all problems together, not only this one. Moreover, it is also necessary that there is a unification of criteria to allow us to be sure that we are speaking about the same subject. Each research line uses very similar concepts, but they are not equal. This inexactness is what generates the problems, but equally enriches the evolution and discussion of each research stream. For instance, March and Shapira point out that the managerial concept of risk is not primarily a probability concept [18, p. 1407]. However, Sitkin and Pablo [19, p. 11] assert that "a risk averse decision maker ... (overestimates) the probability of loss relative to the probability of gain". Whom do we pay attention to? Again, we see the unification of criteria and terminology are the only way to make substantial progress in this field.

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