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Market beta coefficient and enterprise risk management: A literature review

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Abstract

One of the significant factors in the valuation of publicly listed firms is their market beta coefficient, commonly utilised in the capital asset pricing model (CAPM) as a proxy for stock volatility directly affecting market value. This article's primary purpose is to explore the theoretical basis for future empirical research into the relationship between the market beta coefficient and enterprise risk management (ERM). The author explores academic literature about various researched variables affecting the market beta coefficient in the context of the neoclassical capital asset pricing model, which was founded on the premise of an efficient market hypothesis. The review starts with the works of orthodox theorists and moves on to the works of less orthodox ones who argue that neoclassical models might be flawed due to inherent market inefficiencies. Next, the article takes us to the works of proponents of radical theorems of a world of multidimensional risk and return relationships clashing outright with neoclassical views. Lastly, the author explores a relatively new and evolving modern ERM practice as a potential endogenous and idiosyncratic variable of indirect influence on a forward-looking market beta and its impact on the firm's value, from a somewhat novel angle in the CAPM controversy. The review identifies gaps in the literature about a specific cause-and-effect relationship between ERM and the market beta coefficient. This paper adds to the literature by exploring controversies surrounding the market beta coefficient and ERM viewpoints disparity and bridging the two subject matters with the aim of further research study.

Keywords

- CAPM
- market beta
- beta coefficient
- systematic risk
- ERM

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Introduction

When assessing the value of a business, an income approach is often utilised, anticipating the level of cash flows a company will generate in the future. As unforeseen future events impact those projected cash flows, the net present value of future value streams will significantly depend on the employed discount rate. A lower discount rate is indicative of a higher value, whereas a higher discount rate is indicative of a lower value, all other things being equal. In general terms, larger companies with economies of scale and predictability of growth tend to enjoy lower discount rates, and the inverse holds for smaller companies. The important component of the discount rate is the systematic risk or beta coefficient.[2] Since the level of control a company has over a systematic risk is limited, this literature review will first concentrate on beta's exogenous factors and then take a somewhat less orthodox approach to examine endogenous factors in the context of the capital asset pricing model (CAPM).

Since CAPM is indeed one of the most controversial areas of modern business valuations and beta plays a significant role in the model's controversy, this literature review is important because we need to understand what other factors might co-play a part in skewing the beta coefficient. This article will introduce yet another novel element into the beta puzzle after first reviewing the CAPM's theoretical background, including its beta component and its latest stance on the subject-matter by the academic community. Once that is established, the article will explore possible endogenous effects on beta, specifically a relatively new risk management practice of enterprise risk management (ERM) as an element of potentially having indirect observable effects by lowering a firm's systematic risk, even though it is deemed not controllable from the individual firm's perspective. Accordingly, this article is organised into five sections by topic area: literature review structure; CAPM; a related market beta component of the CAPM and the widely-published controversy surrounding it; a relatively new and evolving risk management practice, i.e. ERM, and its potential value; and lastly, a synthesis of the market beta with an ERM system.

Conceptually, an effective ERM system should reduce the variability of the firm's earnings and lower the volatility of its stock price. Thus, it should have a positive impact on the firm's value. To support this notion, using the financial results and share market performance of nearly 400 publicly traded companies from around the world that have participated in the Risk Maturity Index survey, Aon analysts

[2] The market beta, beta or beta coefficient is used as a proxy for the "systematic risk" of the individual stock in the context of CAPM. Thus, those terms are used interchangeably throughout this article. Albeit, such a proxy is subject to much controversy (Harrington & Korajczyk, 1993).

have compiled the data necessary to identify the correlations between advanced risk management capabilities and company stock price performance. According to the 2017 Aon's Risk Maturity Index Insight Report, they have continued to find a positive correlation between stock price performance and company profitability and higher risk maturity ratings since their initial research was conducted in 2011 (Aon, 2017).

This article aims to probe if ERM creates value by affecting the most critical beta component of the discount rate for equity or the cost of equity capital utilised for business valuation purposes of those companies from a somewhat different angle than Aon's research. If a successful ERM strategy can reduce variability, thus lowering the market beta coefficient, more conservative investors will naturally choose lower-beta stocks over high-beta stocks, supporting the company's expenditures in ERM to increase shareholders' value. Therefore, the aim will be to test the theoretical relationship between the market beta coefficient and ERM once a theoretical ERM impact model is established in further study.

The market beta controversy has been widely debated in modern literature since the neo-classical model was established. Some of the more recent research proposes novelties, such as a new joint model of expected return and volatility forecasting, namely the two-component beta (Haddad et al., 2023). Another research offers duration-adjusted betas for the three-factor model betas, including risk associated with the firm's dividend policy (Varela, 2022). Also adding to the more recent controversy among many other research papers is "Time-varying beta – The case study of the largest companies from the Polish, Czech and Hungarian Stock Exchanges," indicating that in many cases, the Kalman filter estimates outperform the estimate of the beta parameter obtained based on the linear Sharpe model (Dębski et al., 2021). This controversy review continues in section three of this article.

Equally valid is the value of ERM as a widely published subject matter. Some researchers argue that ERM potentially creates value for firms from theoretical and empirical perspectives (Bohnert et al., 2017). Others find that ERM and investment decisions positively influence firm value, with investment decisions mediating the relationship between ERM and a firm's value (Faisal et al., 2021). Somewhat mixed results have been shown in yet another study, with ERM having a negative effect on the expected growth rate, thus adversely affecting the fundamental value. However, on the positive side, that same study also revealed that ERM is associated with higher free cash flows (Marc et al., 2018). Still, another study found that ERM positively affects financial performance and firm value (Chairani & Siregar, 2021). ERM's value creation capabilities debate continues in numerous other studies, more thoroughly discussed in section four of this article.

1. Literature review structure

The initial focus of this literature review will be on beta in the context of the capital asset pricing model (CAPM) and other potential variables which capture volatility associated with market beta. Since the beta coefficient is a measure of a stock's systematic risk and since systematic risk refers to external market forces,[3] what makes security A over security B, or firm A over firm B, more able to withstand those forces by keeping its trading or stock volatility in check? In other words, what makes them less volatile than market averages, and consequently, with all other things being equal, results in a higher incremental value? The search for the "Holy Grail" or "Holy Grails" seems never-ending, as discussed in the following sections. This literature review will also briefly touch on some of the beta anomalies and plausible factors contributing to those anomalies, such as firms' leverage constraints and margin requirements, certain unfavourable market conditions, as well as market-driven premiums and discounts for overperformance and underperformance, respectively, that are exhibiting residual skewness. It will also consider exogenous events such as regulation effects on a firms' beta, among other factors.

Subsequently, this article will explore potential venues of correlation of good governance practices such as ERM with firms' performance, and ultimately, the effect on firms' values, culminating in a provocative question: does a proprietary ERM system have any degree of influence on the beta? Theoretically, the answer should be no, as beta is a measure of stock volatility compared to its market average, and there is very little controllability from the individual firm's perspective. Yet, some firms tend to do better than others during the so-called non-controllable events such as geopolitical crises, financial crashes, changes in law and natural disasters. What if a tailor-made ERM strategy could be, to some degree, a unique advantage resulting in a positive beta anomaly?

2. Capital asset pricing model

Ceteris paribus, the efficient-market hypothesis (EMH) states that asset prices fully reflect all available information (Fama, 1965). This theory is also one of the basic tenets of the original CAPM[4] and a method, albeit modified, of determining a discount rate commonly applied in the appraisal of larger companies for business valuation purposes (Trugman, 2016). The basic premise is that expected re-

[3] Broad external factors unrelated to individual investment-specific factors.

[4] The model was originally developed in the context of portfolio theory to measure the risk an individual stock contributes to a well-diversified portfolio (Trugman, 2016).

turns on investment portfolios are directly correlated with expected risks. Thus, the higher the risk is, the higher the reward will be, and vice versa. In the efficient-market hypothesis, under the equilibrium assumption, prices that are indeed rational reflections of value will gravitate toward the stable centre (McNally, 2011). The same equilibrium assumption holds for the diversified stock portfolios. Prices of securities that are indeed rational reflections of value will congregate toward stability of their true value, even though they are subject to intermittent swings. This relationship was originally described by William F. Sharpe, who posited that prices have adjusted so that the investor, primarily through diversification, can only attain a higher-than-expected rate of return over pure interest or a risk-free interest rate by incurring additional risk (Sharpe, 1964). Sharpe was one of the founding fathers of modern CAPM, together with (Lintner, 1965), (Mossin, 1966), and (Black, 1972), building on the earlier work of (Markowitz, 1952), as well as (Markowitz, 1959). The main difference is that the former works assumed a risk-free lending and borrowing rate, whereas the latter did not (Reinsel & Velu, 1998). This long list of forefathers of CAPM would not be complete without Jack L. Treynor, who also deserves credit for the original CAPM because of his revolutionary manuscripts – Market value, time, and risk (Treynor, 1961) and Jack Treynor's "Toward a theory of market value of risky assets" (Treynor, 1962), which were circulated during the 1960s in a mimeographed draft form but have never been published in an academic or practitioner journal (French, 2002).

The mathematical formula for the modified CAPM model used to determine a discount rate[5] applicable to the firm's equity valuation is as follows:

$$ke = Rf + \beta\,(Rm - Rf)$$

where (ke) is the expected return (market) or the so-called discount rate for equity, applied in valuing large companies, (Rf) is the risk-free interest rate, and (β) beta is a systematic risk. Lastly, ($Rm - Rf$) is the long-term average risk premium of the whole market less the long-term average risk-free rate, also known as the equity risk premium (ERP).

3. Market beta controversy

Much has been written about the beta (or systematic risk) in both academic and non-academic literature. In fact, its viability has been widely debated among

[5] It was modified to determine the discount rate, commonly used in the appraisal of larger companies (Trugman, 2016).

scholars and the business community alike. Some argue that the standard CAPM model does not hold under certain constraint conditions, such as investors' leverage constraints and margin requirements. For example, Frazzini and Pedersen affirm that under those conditions, high beta portfolios produce lower alphas[6] and vice versa, in the US as well as in the international equity markets. This anomaly is attributed to the fact that the constrained investor will bet on riskier assets, artificially bidding-up high beta assets. Thus, they conclude that the security market line (SML) is flatter than predicted by the traditional CAPM model, and the deviation from the standard can be explained by what is known as betting against beta factors (BAB) (Frazzini & Pedersen, 2014). Figure 1 serves to illustrate the traditional CAPM model. The SML intersects the y-axis at the risk-free rate (Rf), and the slope of the line is the market risk premium ($Rm - Rf$). The expected (market) return of (Rm) from a balanced market portfolio (M) will correspond to the beta value of 1.0 since the portfolio cannot be more or less risky than the market as a whole.[7] It is useful to show this graphically: the SML line is an upwardslope shown in Figure 1, and the slope gradient depends on the risk premium.

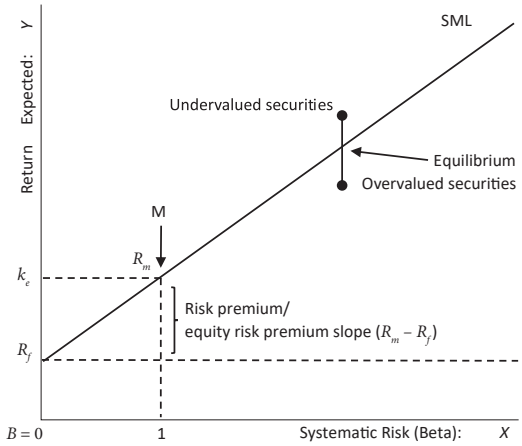

Figure 1. Security Market Line – SML is the graphical representation of CAPM

Source: (Sharpe, 1964).

This anomaly was also disseminated more recently in the "beta risk in the cross-section of equities" working paper. Researchers in that study extended the standard CAPM model to allow beta to vary stochastically (Boloorforoosh et al.,

[6] Alpha is used interchangeably with "excess return" or "return" throughout this article.

[7] A completely diversified market portfolio with only systematic risk and expected return equaling expected market return.

2020). In that model, low betas tended to increase during turbulent market times, resulting in what they describe as "wrong-way" beta risk. Their model's first prediction was that part of the equity risk premium corresponds to compensation for risky betas. The second prediction was that the SML's deviations are related to low beta firms co-moving more positively with the stochastic discount factor (SDF) and negatively with market returns. Furthermore, the risk is compensated by the additional premium earned beyond SML by those firms.

Others have observed that deep value events (periods of highest spreads between least expensive and most expensive securities) might explain the irrational behaviour of return patterns compared to market betas (Asness et al., 2017). Some authors found strong correlations between beta risk and returns by utilising a proprietary equity option valuation model, which predicts that firms with higher market betas have higher implied volatilities, steeper moneyness slopes, and a term structure that co-varies more with the market. Still, they note that further research is required in this area (Christoffersen et al., 2018). Others concluded that pricing errors in the traditional CAPM model exhibit residual co-skewness. Thus, high and low beta stocks appear to underperform and outperform, respectively, reflecting compensation demanded by investors for negative skewness (Schneider et al., 2016). More recently, one study found that there are considerably more variations in expected returns than previously acknowledged over time and across stocks. Pointing to the risk and return relationship that is better reflected by deriving predictive variables from real-time option prices than historical information such as historical market betas (Martin & Wagner, 2019).

Specific scrutiny is given to historical betas utilised as robust measures for forward-looking betas when markets are turbulent. A similar analogy can be drawn from the financial institution sector, whereby quantitative methodologies and tools to manage and stress test financial risks rely on historical data. In one study on the subject matter, the author argues that there is a risk of seriously underestimating the probability and magnitude of tail events[8] when frequency distributions of nominal exchange-rate changes are derived on the basis of fairly short data samples (Abildgren, 2014).

Yet another perspective was taken in the Consumption-Based Equity Valuation paper (Bach & Christensen, 2016), whereby the traditional CAPM model was adjusted: risks were adjusted in the forward-looking residual income returns and aggregate consumption (numerator), rather than in historical stock returns (denominator), to calculate the cost of equity discount rate for valuation purposes, as per the modified Consumption-based CAPM (CCAPM) model. This study is perhaps another indicator that historical betas are not reliable in predicting future performance. What if you

[8] By their very nature, tail events are hard to quantify with traditional models, which pay little heed to rare events (Bhansali, 2008).

could compare various market beta estimation techniques and determine which is the most accurate? A study of several historical, time-series models and option-implied estimation approaches concluded that a hybrid approach to combine historical return data with forward-looking information from the options market was shown to produce the lowest number of errors (Hollstein & Prokopczuk, 2016).

Finding the proper interval for measuring the rates of return is among some of the challenges with calculating beta (Feder-Sempach, 2017). One of the studies concluded a positive development of stationarity of distribution of the monthly logarithmic rate of return for all companies studied in the sample, which presents a great hope for the favourable statistical properties of the results for further studies, particularly relating to the beta parameter (Dębski et al., 2017). Last but not least, an adequate time horizon of rates of return in those further studies becomes paramount, as not adjusting for periods of instability (e.g. the COVID-19 pandemic) may produce abnormal results, proving that using beta to measure market risk at times of instability may lead to significant calculation errors (Lisicki, 2022).

Some earlier revolutionaries have already argued that (a) beta does not seem to help explain the cross-section of average stock returns and (b) the combination of size and book-to-market equity appears to absorb the roles of leverage and earning-price ratio in average stock returns, at least in the 1963–1990 sample period selected (Fama & French, 1992). Thus, variables such as size and the book-to-market value of equity explain cross-sectional variations in average stock returns associated with beta. Contradicting Fama and French, another empirical work suggested no correlation between beta risk and expected returns and describing markets as essentially not rational at all (Dempsey, 2013), which directly disputes Sharpe's CAPM model. Furthermore, the author suggested that crowd psychology plays a powerful role in abolishing any risk-return relationship. Mike Dempsey indeed proposed that other models, which were refined to produce more sophisticated CAPM models, indeed represented a radical departure from the essential risk-return premise of CAPM. This radical conclusion was partly corroborated in the "ß" study (Benson & Faff, 2013). In the authors' assessment, the model and the subsequent enhanced versions have weaknesses and should be used cautiously. So, where does this leave us?

First, let us look at exogenous and idiosyncratic events, such as the effect of regulation in the English electricity distribution industry on beta instead of broader variables or anomalous effects discussed in preceding paragraphs. Based on empirical findings in the electric power industry, Paleari and Redondi (2005) argued that regulatory events affect both overall risk and market correlation in the same direction. Let us break this down. First, two components were considered determinants of the systematic risk, or beta, under CAPM: the company's overall risk and market correlation. In Paleari and Redondi's model, it has been deemed that if regulation becomes tighter, abnormal returns will turn negative.

In contrast, beta will increase because both market correlation and overall risk increase, and vice versa. There is an underlying assumption that the model is static, meaning that all other exogenous and endogenous effects have already been considered. Thus, specific exogenous effects, such as regulatory events, can distort the risk and reward relationship under the CAPM model, at least on the short-term basis considered in that modified model.

"Well, what about endogenous and idiosyncratic effects?" one might ask. One relevant study was undertaken to address two questions: are accounting earnings numbers useful in the assessment and pricing of a firm's risk, and secondly, are accounting numbers incrementally-associated with the market's assessment and pricing of a firm's risk beyond other observable risk factors, such as those in the three-factor model (Fama & French, 1992): beta, firm size and book-to-market ratios (Baginski & Wahlen, 2003)? The study concludes that the capital markets price systematic risk in the residual income[9] and that the market beta is, in fact, a weak indicator of systematic risk, at best. If beta itself is not the best proxy for systematic risk, what else can it be? That question alone is a big "Pandora's Box" involving many years' worth of existing research, as well as that which remains to be done. What else could be a proxy for stock volatility? Before we go any further, let us summarise the outcomes of the review thus far.

Inevitably, market beta might not be the best proxy for systematic risk, but it is still widely used given the lack of better indicators. While some researchers are still giving it mixed scores, others no longer feel compelled to do so, as markets are becoming ever more complex and less perfect than when the idea was originally conceived. Colloquially, "it takes a model to beat a model." Thus, further studies might create something truly revolutionary, in tune with Mike Dempsey's assertion that CAPM and related beta are long overdue for a complete overhaul (Dempsey, 2013). There is a widespread debate about this, with alternative models and approaches being explored, in an attempt to make sense of the maze of variables and factors that are shaping stock volatility in today's markets.

To encapsulate this part of the cross-sectional literature review, a sample of subject matter studies were reviewed, beginning with those founded on neo-classical theorems, all the way up to modern ones, in order to shed light on the multitude of different variables theorised as capturing volatility associated with the market ß in the entire spectrum: from full explanatory powers to partial explanatory powers, to none at all. The earlier studies imply market efficiency. However, more recent studies suggest otherwise, moving in the opposite direction along the spectrum. Please note that studies in the sample under review were based predominantly on US equities, though some international and UK equities were

[9] It also stands for abnormal earnings or residual return on equity (Baginski & Wahlen, 2003).

included. However, the aim was to illustrate the broader spectrum of the beta-related debate.

In recent years, the emergence of new risk management strategies such as ERM has become a popular tool for a firm's performance variability. It makes sense conceptually: the better the firm is at managing risk, the better it will be at managing earnings, and consequently, conceptually, its stock variability should positively reflect that. Thus, an antidote such as ERM might increase firms' value and build resilience. If such a relationship exists, firms with an effective ERM system might experience less stock volatility, which could be proven accordingly via their beta coefficient. First, let us explore what constitutes an effective ERM and why it should be taken into consideration as one of the factors on the broader beta spectacle.

4. The value factor of ERM

Before jumping into the ERM as a novel idea, let us start with its origins. The word "risk" has its roots in the early Italian "risicare", which means to dare (Bernstein, 1995). In the past millennia, the traditional risk management programs considered only pure loss exposures of simply addressing two possible outcomes: a loss or no loss scenario. The next significant milestone added speculative financial risks[10] as a new trend emerging during the 1990s, with ERM becoming a natural choice, thereafter including strategic and operational risks into the mixture as a holistic approach to a risk management practice. George E. Rejda and Michael McNamara define ERM as: "a comprehensive risk management program that addresses an organization's pure risks, speculative risks, strategic risks, and operational risks" (Rejda G. E., & McNamara, 2014). In September 2004, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) published their *Enterprise risk management – Integrated framework*, expanding on a previously issued framework.[11] The expanded version defined ERM as "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" (COSO, 2004). This framework was disseminated to the business community due to heightened concern

[10] Speculative financial risks are commodity price risk, interest rate risk and currency exchange risk.

[11] *Internal Control: Integrated Framework* to help businesses and other entities assess and enhance their internal control systems.

about risk management practices in the field in the wake of high-profile business scandals and failures that plagued business communities across the world in the years preceding the new publication.

However, since "one size does not fit all", identifying the right blend of ingredients of what constitutes an effective ERM system is in itself, just like CAPM and beta, a widely debated subject. The right "formula" will likely depend on the organisation's unique circumstances and the level of its business complexity, among other factors. Smaller organisations that face great external pressures might be tempted to concentrate more on short-to-midterm goals or objectives to fulfil their immediate obligations towards stakeholders and postpone addressing longer-term objectives.

On the other hand, when external pressures are lower, larger organisations might allow themselves the luxury of looking ahead to a wider time horizon with greater precision. These organisations execute this by anticipating either positive or negative deviations from their objectives, properly assessing these deviations, prioritising them, and mitigating or exploiting them as needed. Furthermore, the tendency to concentrate on one particular time horizon or another will significantly depend on the governance structure, experience level and objectivity of those managers at the helm who will steer the organisation through the vast oceans of uncertainty. Equally important, if not more so, are the specific individual elements needed to function collectively to elevate the ERM system as a management tool to the level at which it can enhance informed decision-making and reduce variability, thus reducing adverse outcomes and maximising favourable ones. There are undoubtedly many organisational variables or nuances that will contribute to its overall success.

Now, let us look into the basic premise of ERM and its effects since the inception of the framework. The fundamental premise is that "value is maximized when management sets strategy and objectives to strike an optimal balance between growth and return goals and related risks, and efficiently and effectively deploys resources in pursuit of the entity's objectives" (COSO, 2004). The framework established eight interrelated components derived from how management runs an enterprise to be integrated with the management process. So far so good regarding the conceptual framework, but how it weathered the storm of reality since its beginnings?

One study put this to the test by following 112 US equities across a variety of industries and concluded that the relationship between ERM and firm performance is contingent upon five variables: environmental uncertainty, industry competition, firm's size, firm's complexity and monitoring by the board of directors (Gordon et al., 2009). In this context, environmental uncertainty relates to the increasingly unpredictable environment within which the firm must operate. Industry competition relates to the competitive rivalry as the level of concentration risk a firm is

confronted with is a determinant of ERM system robustness. The firm's size relates to its ability to allocate necessary resources to governance programs such as ERM. A firm's complexity refers to the notion that the more complex organisations are, the more likely they are to be willing to establish an effective ERM system. The final variable – monitoring by the board of directors was measured by dividing the number of directors by a natural logarithm of sales as a proxy for a firm's size in their observations. As an alternative measure, the frequency of board meetings was also used. A positive correlation was found between ERM and a firm's performance contingent on that last variable in both cases.

So, what could this tell us? If there is sufficient coverage of management board members to the organisation's size, and if they meet regularly, ERM could have an effect on a firm's performance. This simple conclusion is too simplistic because we do not know anything about the management board members' level of qualifications, meeting attendance or the extent of their involvement in ERM monitoring activities. Nevertheless, it gives us an idea that board members play an essential role in risk management activities, a role which may be equal to, or more important than, other factors.

As we can now point to references suggesting there is indeed some positive correlation between ERM and a firm's performance, how does this translate into value creation? The 2007–2008 financial crisis, originating in the US market, had a ripple effect that swept over economies worldwide. There were investigations to identify the "culprits", and some identified the lack of effective risk management programs as the root cause, so a scrutiny of ERM was called for (Mishra & Rolland, 2011). One of the main conclusions from the OECD's report on the issue was that, in some of the companies analysed, risk management was simply an activity rather than a collective and holistic approach (Kirkpatrick, 2009). In other words, some companies had not been taking it seriously. Other studies concluded that ERM contributes to little if any incremental value-added, compared to the more sophisticated traditional risk management practices, with the caveat that further research is needed in this somewhat unchartered territory (McShane et al., 2011).

If the relationship between ERM and a firm's value is negligible, what then is ERM's benefit? (McShane et al., 2011) pointed out that, since 2007, Standard and Poor (S&P) began to use an ERM assessment rating to complement its already existing credit ratings, focusing first on the insurance industry. Eight years later, S&P developed a new framework for the evaluation and scoring of ERM in three areas: risk culture, risk exposure management and risk optimisation. S&P would assess each insurance firm on the three areas and then combine their assessments to derive an overall ERM evaluation score for each firm (S&P Global Ratings, 2019). This forward-looking use of ERM scoring as a performance proxy constitutes a benchmarking platform and might help researchers evaluate ERM's real value creation capabilities. One small piece of that value creation element was put un-

der the microscope by researchers studying the relationship between the default risk and ERM implementation at 78 of the world's largest banks. The researchers concluded that the higher degrees of ERM implementation are negatively correlated to the default risk (Lundqvist & Vilhelmsson, 2018). Thus, this one measure could indicate ERM's success and its impact on a firm's value. The same seems to hold for family enterprises. Large family firms that have not implemented ERM could be missing an opportunity to create value (Hiebl et al., 2019).

Reverting to the maturity of ERM, which can also be bridged to the degree of implementation discussed in the preceding paragraph, ERM aims to treat each risk in a holistic manner, not in "silo" isolation (Gordon et al., 2009). What that implies is that when risks are identified within a particular division or department, or function, a certain degree of silo thinking is inevitable to maximise the benefit or minimise the risk for that area of responsibility. This narrow view could lead to risks or opportunities being identified related to a specific business area rather than the enterprise as a whole, which traverses to the system's maturity. The more mature the system is, the more all-encompassing and truly "enterprise" it will become – rather than merely silo-based. In a study of 225 publicly listed firms across various sectors subjected to the RIMS Risk Maturity Model (RMM)[12] assessment over the 2006–2011 period, a significant valuation premium was associated with enhanced ERM maturity (Farrell & Gallagher, 2015). The study further concluded that the most substantial valuation factors are the organisation's engagement from the executive level downwards and integrating the ERM process into their strategic activities and everyone's practices.

Thus, sponsorship from the Board of Directors and senior management as well as their commitment to the program will likely be crucial to implementing the process. Without the right tone from the top, the integration of risk and strategy is unlikely to succeed with potentially damaging consequences. Management must be committed to embedding explicit risk considerations in critical business areas related to strategy and "walking-the-talk" themselves, i.e. demonstrating their focus through active participation and engaging others in the process. Nevertheless, companies find integrating risk into strategy to be a significant challenge, according to research conducted as part of the Association of International Certified Professional Accountants and North Carolina State University's Enterprise Risk Management Initiative for the *2017 Global risk oversight report*. Fewer than 20% of the European, UK or US based organisations surveyed for the report believe their risk management processes provide a unique competitive advantage. Only about 50% of respondents from around the world agreed with the statement: "Risk exposures are considered when evaluating new strategic initiatives" (CGMA, 2017).

[12] The RIMS Risk Maturity Model (RMM) for enterprise risk management is a tool to help auditors evaluate the ERM system's effectiveness.

Let us now explore the theoretical question of whether the value creation is enhanced by any particular risk management techniques or a combination thereof, such as those discussed in the preceding paragraphs. For example, according to the Irrelevance Proposition Theorem, the firm's valuation will remain the same regardless of its capital structure if income taxes, bankruptcy costs, agency costs and asymmetric information are absent (Modigliani & Miller, 2009). This theorem implies that markets are efficient because the firm cannot alter its valuation as the share price is only affected by future expected cash flow streams and the required return by equity investors.

This finding can also be applied to risk management in general, as risk management practices would have no bearing on value under this theorem. Nevertheless, a significant body of research has found that markets are imperfect and that risk management practices may create value by reducing or exploiting market imperfections (Grace et al., 2015). Grace et al. took another angle on whether more sophisticated risk management techniques such as ERM can improve performance and increase a firm's value. They studied specific ERM initiatives and found them to be correlated with a firm's performance for both public and private organisations. The results of their study suggest that ERM practices result in an economically and statistically significant increase in cost and revenue efficiency. Yet, the greatest increase in a firm's value was attributed to a simple economic capital model, a dedicated "risk manager that is indeed part of a cross-functional committee and a requirement that this risk manager reports directly to the Board of Directors or the Chief Executive Officer. Another study corroborated this result, having found significant evidence that a value premium is associated with effective ERM programs (Zou et al., 2019). The finding implies that an effective ERM program adds value to manufacturing firms by mitigating cost and enhancing efficiency. However, the study points out that ERM's full benefit is more likely to be enjoyed by larger diversified firms with flexible capital structures. One of the pioneering studies on the subject laid the groundwork for ERM proponents by concluding that the ERM premium is statistically and economically significant (Hoyt & Liebenberg, 2011). They did so by estimating ERM's effect on Tobin's Q ratio[13] as a standard proxy for firm value.

What about the opposing views, then? Some argue the reverse completely: that ERM is negatively correlated with firm value, and it erodes it because a poorly implemented ERM program can be detrimental to the firm (Lin et al., 2012). Meanwhile, others fail to find tangible evidence to support the notion that ERM has any effect on performance or at least an impact that can be measured from the financial statement user perspective (Pagach & Warr, 2010).

[13] Tobin's Q is the ratio between a physical asset's market value and its replacement value.

To fine-tune the ERM concept and provide greater clarity as to its value creation capabilities, COSO updated the framework in 2017. *Enterprise risk management – Integrating with strategy and performance* (COSO, 2017) offers ideas on how a business' value can be preserved or enhanced by incorporating and examining risks right from the strategy formulation stage. This approach elevates ERM from an operational- and compliance-focused information-gathering and reporting model by making it much more strategy-focused to add tangible value for organisations. It is perhaps too early to tell whether this update will provide a more decisive answer to the value creation dilemma. Since the COSO publication came out, more and more studies have been looking into the cause-and-effect relationship. One such study found that strategic planning plays a vital role in the success of ERM, and that ERM and strategy are not "substitutes" for one another, but rather complementary processes, and that when those two processes work hand-in-hand, profitability can be enhanced while financial leverage is kept in check (Sax & Andersen, 2019). We can expect new angles and ideas on this subject-matter to be proposed in the future, as the emergence of artificial intelligence, the exponential growth of data, automatisation of processes, and the further globalisation of trade, among other aspects, make things even more complicated for organisations. The search for factors contributing to value creation may prove to be never-ending. To summarise a sample of research into ERM, there is a high degree of disparity among the scientific and business communities worldwide over the decisive factor or a combination of factors potentially influencing firms' performance/value, if any.

While some researchers conclude that ERM implementation has positive effects on performance/value, some authors identify specific conditions under which the system can achieve its full potential and have some relevance. Others still conclude that it is irrelevant and makes no difference whatsoever, and it may even be detrimental to performance/value if not implemented properly.

5. Synthesis of market beta and ERM

If market beta and ERM both affect a firm's value, albeit to a debatable level, perhaps there is some observable level of correlation between ERM and the individual firm's market beta coefficient? Well, let us unravel this first. Under the traditional CAPM – EMH, a specific firm's risk (unsystematic risk)[14] is irrelevant because that risk is deemed to be eliminated in a well-diversified portfolio. Thus, the residual factor is that an individual firm's share price co-varies with its market

[14] Also known as idiosyncratic risk or diversifiable risk.

portfolio. That covariance is reflected by its beta coefficient, and that coefficient is indeed one of the ingredients in the cost of capital formula under CAPM. Thus, it has a direct and observable effect on the firm's value. On the other hand, ERM has a direct and observable impact on the firm's performance as a shareholder value maximisation mechanism, in line with its basic premise according to the relatively large number of empirical studies undertaken to prove that premise since it was initially conceived. Those studies further imply that ERM affects a firm's share price variability through the impact on the firm's performance, so ultimately the firm's market value could be affected.

According to some researchers, EMH may no longer hold, as some of the studies mentioned above have demonstrated. Therefore, other variables have been identified to decipher stocks' volatility associated with beta or systematic risk. On the other hand, some of the research reviewed shows that an effective ERM system influences firm performance/value solely on its merit or under certain conditions. If ERM can affect systematic risk, it might be another "culprit" in the never-ending beta controversy. One study supports such a nexus of ERM as a value creation mechanism that reduces systematic and unsystematic risk in tandem. The theoretical framework for that value enhancement is theorised by a "strategic conceptualisation of the risk premium model".[15]

It is a far-fetched idea, but firms' endogenous and idiosyncratic variables, such as their ERM systems, could have some explanatory power for residual variance in the beta coefficient. As such, ERM and beta could have some degree of correlation. By the way, this is not such a revolutionary idea as some other idiosyncratic and exogenous variables were proven to have a similar relationship in the past (Paleari & Redondi, 2005). One particular study had already provided that theoretical basis quite clearly a long time ago but explicitly focused on endogenous financial (accounting) variables. That study has indeed conceptualised the relationship between systematic risk defined as beta parameter and the firm's leverage (debt-to-equity ratio) and accounting beta[16] under certain assumptions, but not a theoretically related (directly) to the earnings variability, dividends, size or growth of a firm (Bowman, 1979). Thus, if a clear link does exist between a firm's financial variables (accounting) and market variables (systematic risk), a similar relationship could exist between the ERM system directly or indirectly impacting financial (accounting) variables and market variables (systematic risk). Fundamental questions remain to be answered as to what constitutes effective risk management in the context of ERM. Answering these questions would enable us to identify variables that may have some relationship with the market beta.

[15] The Strategic Risk Premium Model (Lai, 2015).

[16] Accounting beta is expressed as the coverability of a firm's accounting earnings with the accounting earnings of the market portfolio (Ball & Brown, 1969).

Conclusions

The neoclassical finance theories clash with some of the subsequent research developments in finance and economics (modern finance theories) and are being debated more widely than ever. The precise boundaries are still being drawn, but those boundaries may never be absolutely defined as new developments are inevitably fuelling more controversies. It is essential to realise that the mechanisms that interact within capital markets are much more complex and intertwined than can be interpreted by one model or another alone. The multitude of variables might have to be analysed individually in isolation and perhaps in some multivariate aggregation to assess risk and return relationships that became modern CAPM's foundation. By shedding more light on this crucial subject, we can better understand at least one variable and its effect on forward-looking market beta parameter. That variable is the ERM system and its evolving influence on organisations, and perhaps to a greater extent, markets themselves. The challenging part might be finding the right formula for an effective ERM system. That successful ERM formula could determine the coefficient of influence on the market beta and, ultimately, its impact on the firm's value if any. Therefore, the further study's primary purpose will be to explore the relationship between ERM and beta coefficient co-variability and to probe whether the implementation of ERM and its level of maturity reduces the market beta coefficient to some statistical degree. Once that relationship is established, a value creation impact could be theorised, with all other things being equal.

An effective ERM system will help to gather relevant and vital information for decision-makers, to enable them to respond to and manage risks and opportunities appearing on the horizon, stemming either from negative or positive internal and external circumstances, as soon as they become relevant. The key is timing and focus. Those who can respond fastest with the correct measures or countermeasures will mitigate or exploit those circumstances and preserve or enhance business value. The numerous recent high-profile organisational failures highlight the need for further research in this critical area. In too many cases, the business value was eroded in the marketplace without any early warning signs. This literature review paper provides a theoretical introduction to a future empirical study on ERM's efficacy from a somewhat novel angle as a value factor. It seeks to propose ERM as a potential variable in the market beta controversy. To test the theoretical relationship between the market beta coefficient and ERM, a theoretical ERM impact model must be established first to test potential causality further. Maturity and integration might be a good indicator of a well-functioning ERM system (model) that has an impact, or there may be other surrogates that prove more relevant. Consequently, the secondary aim of the further study will be to

establish which theoretical ERM impact model will have the most significant influence potential or the greatest impact on value as a value creation mechanism.

Furthermore, since the traditional market beta is a relative measure of a systematic risk, it might be necessary to decompose individual stock's risk, when measured either by standard deviation or by variance, in the studied sample, into its separate unsystematic and systematic risk components. This decomposition will provide an absolute measure of systematic risk rather than a relative measure for any individual stock within the sample (Marshall, 2015). Hence, the precision of the study might be enhanced by utilising the decomposition approach.

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