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# Accounting Determinants of Systematic Risk in Euro Area Manufacturing Industry

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**Abstract**

This paper aims to analyze the relationship between systematic risk and financial-economic variables for listed manufacturing companies that are part of the Euro Area. The study analyses how certain accounting variables impact systematic risk. The sample includes 635 listed companies. The variables are size, efficiency, profitability, liquidity and financial structure. The analysis is based on equity beta. The application of multiple linear least squares regression reveals a statistically significant negative relation between systematic risk and the ratio of equity funds to total liabilities, the EBITDA margin and the ROE. These findings have practical implications for both investors and companies and are consistent with previous studies. An increased equity base serves to enhance the company's overall financial stability, while greater operational efficiency and higher profitability contribute to strengthening the company and reduce systematic risk.

**Keywords:** systematic risk, beta, accounting variables, manufacturing sector

## 1. Introduction

The topic of systematic risk and its relationship with economic and financial variables is of central importance in modern finance, as it represents one of the fundamental aspects in the assessment of investment risk and return (Intrisano et al., 2017; Intrisano et al., 2018). Systematic risk is inextricably linked to the dynamics of economic and financial variables, and serves as a pivotal indicator in determining the returns that investors require. A deeper comprehension of the interrelationships between these variables and market risk facilitates more efficacious portfolio management, thereby enhancing the quality of investment decisions.

Differences in systematic risk that are often found depend on the characteristics of the companies (Hamada, 1972; Hill and Stone, 1980; Mandelker and Rhee, 1984). In general, these characteristics inform the manner in which a company responds to changes in the market, thereby shaping its systematic risk profile. Measured by the beta coefficient, it reflects the sensitivity of an asset’s returns to changes in the overall market. Characteristics that influence beta include the industry (some industries are more volatile than others, affecting the beta of companies in those industries); the size of the company (larger companies have lower betas than smaller ones, as they are generally more stable and less sensitive to market fluctuations); the capital structure (company with a high level of debt may exhibit a higher beta coefficient); the geographic scope of operations (beta of companies operating in international markets may differ from that of companies operating only domestically, due to the influence of disparate economic conditions and regulations).

The purpose of this paper is to examine the risk features of listed manufacturing companies located in the Euro Area. This work aims to identify economic-financial determinants with impact on systematic risk. The objective is twofold: firstly, to expand existing knowledge on the impact of accounting factors on systematic risk; secondly, to develop a model for predicting systematic risk (measured by beta) when prices traded on the stock market are unavailable, as is often the case with private companies. As in previous studies, our research employs multiple linear regression, with firms' financial measures serving as independent variables and beta as the dependent variable.

The work is structured as follows: section II contains the analysis of the relevant literature on the topic, section III explains the methodology used, section IV illustrates the results obtained and section V identifies the conclusions and practical implications of the work.

## 2. Literature Review

The present study is concerned with the accounting determinants of systematic risk. The issue is of greater relevance than ever in the context of the current financial market uncertainty. Over time, a substantial body of research has been conducted with the aim of identifying the factors that influence the riskiness of listed securities, with a particular focus on systematic risk. Prior to analysing the scientific contributions, it is pertinent to define systematic risk in order to contextualise the topic more effectively.

A firm's beta coefficient is an indicator of systematic risk and reveals the sensitivity of individual stock returns to changes in the returns of a market portfolio of securities. According to the Capital Asset Pricing Model (CAPM), in equilibrium two assets with the same expected return must also exhibit an equivalent systematic risk (as measured by beta), although the overall risk (as measured by standard deviation) of the two assets may differ. The discrepancy between overall risk (the standard deviation) and systematic risk (beta) stems from the fact that a portion of the overall risk of the business can be eliminated through diversification. The part of risk that can be eliminated through diversification is called diversifiable risk (or specific risk) and represents the peculiar risk of a specific company associated with a particular company. It is not necessary for investors to receive compensation for assuming this risk, as it can be avoided through diversification. Consequently, the influence of diversifiable risk on expected returns is neutral. Conversely, a certain proportion of risk remains regardless of the extent to which investors diversify their portfolios. This risk is known as systematic risk (or market or non-diversifiable risk), which can be conceptualized as the risk inherent to the market as a whole. The extent to which an asset is exposed to this risk is quantified through the measurement of the asset's beta.

However, the CAPM does not explain any relationship on the factors that influence the beta. Since the advent of the CAPM, a considerable number of scholars have challenged this subject. The financial approach is a methodology employed for predicting risk, also in the manufacturing industry. Despite efforts by previous researchers to identify links between risk and financial variables, yet a consensus has not been reached.

The initial study on this topic conducted by Beaver et al. (1970) examined seven accounting variables (dividend payouts, leverage, liquidity, size, growth, earnings variability and accounting beta) and determined that only three of the seven variables were most effective in explaining the relationship with systematic risk. In particular, the study found that earnings variability, dividend payout ratio and asset growth were able to explain almost 45% of the cross-sectional variation in market beta.

Subsequently, numerous studies on the relationship between accounting variables and systematic risk have been conducted over time. Some studies have identified a positive relationship between systematic risk and accounting measures (Pettit and Westerfield, 1972; Beaver and Manegold, 1975; Mandelkar and Rhee, 1984) or a negative link (Biase and D'Apolito, 2012; Eldomiaty, 2009; Lee and Jang, 2006; Tandelilin, 1997; Lee et al, 2015; Kim, 2002; Logue and Merville, 1972; Asgari et al., 2015; Olibe et al., 2008); other have not found significant relationships (Breen and Lerner, 1973; Goendes, 1973; St. Pierre and Bahiri, 2006).

The theoretical relationship between systematic risk and accounting variables was also proposed by Bowman (1979) providing a basis for empirical research. The results of this study showed the absence of influence by variables such as growth, size and dividend policy on systematic risk and the existence of indirect relationships providing a useful model for future empirical studies.

Kim et al. (2002) examined systematic and non-systematic risk in the hotel industry using financial data of 19 US Real Estate Investment Trust (REIT) hotels from 1993 to 1999. Authors found that most of the total risk is unsystematic; as for systematic risk, total risk growths with increasing debt but decreases with company size.

Voulgaris and Rizonaki (2011) analyzed the effect of some economic-financial variables (leverage, liquidity, dividends, profitability, size and growth) on the systematic risk of listed Greek companies. Leverage financial, liquidity, dividends and growth were found as the variables best able to explain the variations in beta. The analysis conducted by Iqbal and Shah (2012) examined the existence of associations between systematic risk and economic-financial factors. The findings indicated that variables such as liquidity, financial leverage, operational efficiency, dividend payments and market value of share capital are inversely correlated with systematic risk. Conversely, positive associations with beta were observed for profitability, company size and growth.

The existence of relationships between market risk measures and accounting factors was also demonstrated by

Papadmov and Tzivinikos (2013). Another study conducted by Aruna and Warokka (2013) analysed the influence of accounting determinants, such as liquidity, leverage, firm size and growth, on systematic risk in leading Indonesian manufacturing firms. The findings indicate that, between 2005 and 2007, no accounting variable was found to exert an influence on systematic risk. Indonesian investors prefer short-term investments and perceive high liquidity risk by focusing more on the analysis of historical prices and trading volumes than on balance sheet data. The work of Schlueter and Sievers (2014) examined the association between systematic risk, accounting variables and macroeconomic variables. Relative to the period 1990-1999, the data concerning the United States show that growth risk is able to explain the variability of the beta. In a study conducted by Sabogal and Sadeghi (2015), accounting betas were employed as a proxy for systematic beta in the US stock market. The results indicated that these betas overestimated market betas by a significant margin, ranging from 20% to 50%.

In their 2016 study, Saravia and colleagues examined the fluctuations of systematic risk throughout a firm's life cycle. Their findings indicate that this risk declines rapidly during the early stages of a company's development, reaches a steady state during its mature phase, and may even increase during the decline stage. In conclusion, the authors posit that systematic risk will be less stable and predictable in young firms, whereas it will be more stable and predictable in mature firms.

Rutkowska and Pyke (2017) conducted an analysis of the Polish stock market over a six-year period, identifying a positive correlation between accounting variables and systematic risk. In a similar vein, Kamran and Malik (2018) identified a significant association between systematic risk and a number of accounting variables, including liquidity, profitability, operational efficiency, growth and dividend distribution.

Parthasarathy (2019) emphasised the significant correlation between market-determined risk and accounting measures, with the latter accounting for approximately 30% of the cross-sectional variance in systematic risk. The accounting variables that exert the greatest influence were the variability of profits (in relation to which the study demonstrates a positive association), growth, liquidity and ROE (in relation to which the results indicate a negative association).

Vongphachanh and Ibrahim (2020) studied the factors influencing systematic risk by examining companies listed on the Thai market and operating in six specific sectors. The results obtained were differentiated by sector. In the consumer services sector, no association with financial variables had emerged. In the consumer goods sector, the main variable that influences systematic risk was financial leverage. In the technology sector, the main variable was profitability. In the telecommunications sector, liquidity was found as significant. In the utilities sector, growth and company size whilst in the healthcare sector, growth is significant. Jaafar et al. (2020) identified size, profitability, liquidity and efficiency as the variables having a negative relationship with systemic risk for companies listed on the Malaysian Stock Exchange. Rutkowska-Ziarko and Markowski (2022) examine the relationship between market risk measures and accounting variables for listed Polish energy companies. A review of the literature reveals a sustained interest in the subject matter addressed in our analysis, which attests to its continued relevance.

## 3. Methodology

The analysis is based on a sample of 635 listed companies in the manufacturing sector, drawn from countries within the Euro Area. The application of this selection criterion enabled the consideration of companies exhibiting homogeneous characteristics in terms of operational parameters, as they were all operating within the manufacturing sector. Furthermore, the currency risk was mitigated by the fact that all the countries in question had the same currency, namely the Euro.

To test the hypothesis, as in previous studies, we employ Ordinary Least Squares (OLS) multiple linear regression. The research model, inclusive of all independent variables, is as follows:

$$\beta = \alpha + \alpha_1 SIZE + \alpha_2 EFFICIENCY + \alpha_3 PROFITABILITY + \alpha_4 LIQUIDITY + \alpha_5 FINANCIAL\ \ STRUCTURE$$

where β (that is the measure of equity beta) is the dependent variable, α is the intercept, SIZE, PROFITABILITY, LIQUIDITY and FINANCIAL STRUCTURE are the independent variables of the model.

The equity beta is employed as a proxy for systematic risk. In this context, we focus on the five-year equity beta. The decision to adopt a five-year time horizon is consistent with the findings of Gonedes (1973), Kim (1993) and Groenewold and Fraser (2000), who demonstrate that betas exhibit stability over five-year estimation periods. This length of the time horizon represents a fair compromise, allowing for the estimation of reliable values based on an adequate number of observations. The equity betas are obtained from Orbis Europe and calculated using the traditional formula.

$$\beta = \frac{Cov\ [Return\ \ stock; Return\ \ index]}{Var\ \ [Return\ \ index]}$$

The explanatory variables reflect firm's specific characteristics in terms of size, efficiency, profitability, liquidity and financial structure and are chosen on the basis of previous studies. For size these measures are logarithm of total assets and logarithm of operating revenue (Beaver et al., 1970; Logue and Merville, 1972; Breen and Lerner, 1972; Hasan, Hossain and Cheung, 2015). For efficiency we use asset turnover ratio, EBITDA margin. As measure of profitability we adopt Return On Equity (ROE), Return On Assets (ROA) (Melicher, 1974; Rowe and Kin, 2010). For liquidity we use current ratio (Beaver et al., 1970; Gu and Kim, 2002; Moyer and Chatfield, 1998). For financial structure we choose the ratio of shareholders' equity over total liabilities and the ratio of financial debts over shareholders' equity (Gu and Kim, 2002; Beaver et al., 1970; Voulgaris and Rizonaki, 2011; Brimble and Hodgson, 2007). To be included in the analysis companies had to have data for all variables. Accounting determinants are collected from Orbis Europe and refer to the year 2022.

As mentioned above, the research hypothesis we wish to test in this study concerns the ability of accounting measures to influence systematic risk, as detailed in Table 1:

Table 1. Explanation of the research hypothesis

| **GROUP** | **PREDICTOR** | **HYPOTHESIS** | **EXPECTED SIGNE of the relationship** |
|---|---|---|---|
| *Size* | Logarithm of total assets<br>Logarithm of operating revenue | Larger companies are perceived as less risky. As size increases, systematic risk decreases. | Negative |
| *Efficiency* | Asset turnover ratio<br>EBITDA margin | Businesses with greater operational efficiency are able to generate higher profits. Operational efficiency can be measured by EBITDA margin and asset turnover ratio. As the value of these variables increases, systematic risk is reduced. | Negative |
| *Profitability* | Return On Equity<br>Return On Asset | A company's success and likelihood of survival depends, among other things, on its profitability. Companies with better profitability ratios have a lower systematic risk because they are more robust. | Negative |
| *Liquidity* | Current ratio | Firms with better liquidity conditions are perceived as having a stronger financial position and are therefore seen as less risky. | Negative |
| *Financial structure* | Shareholders funds over total liabilities ratio | Companies with a high incidence of equity are considered more solid. As the incidence of equity increases, systematic risk decreases. | Negative |
| | Financial debts over shareholders funds ratio | Companies with a high levels of debt are riskier. As the incidence of financial debt rises, systematic risk increases. | Positive |

Source: Authors's elaboration.

## 4. Results

Table 2 summarises the descriptive statistics of beta and its predictors.

Table 2. Descriptive statistics

| | Valid | Mean | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Beta | 635 | 0.591 | 0.379 | -1.140 | 2.484 |
| Shareholders funds over total liabilities ratio | 635 | 45.909 | 17.736 | 6.349 | 98.942 |
| Asset turnover ratio | 635 | 1.391 | 0.898 | 0.000 | 8.176 |
| Financial debts over shareholders funds ratio | 635 | 89.858 | 94.897 | 0.689 | 970.538 |
| Current ratio | 635 | 2.071 | 2.185 | 0.031 | 42.096 |
| EBITDA Margin | 635 | 13.141 | 15.913 | -92.162 | 98.547 |
| ROE | 635 | 4.828 | 23.854 | -176.982 | 118.869 |
| ROA | 635 | 2.946 | 7.961 | -37.698 | 33.978 |
| Logarithm of total assets | 635 | 20.066 | 2.301 | 14.058 | 27.060 |
| Logarithm of operating revenue | 635 | 19.779 | 2.326 | 12.421 | 26.397 |

Source: Authors's elaboration.

The data show that the value of systematic risk/beta is on average 0.59 which means that the companies included in the analysis are, on average, less risky than the market beta always considered equal to 1. The dependent variable of this research fluctuates between -1.140 and 2.484. Similarly, the ratio of equity on total liabilities has an average value of 45.90%. For asset turnover ratio we observe an average value of 1.39, financial debts represent on average 89.85% of shareholders funds which means that companies are predominantly funded with financial debt. The average value of current ratio is 2.07, meaning that current liquid assets are able to cover the current liabilities. For EBITDA margin, ROE and ROA the mean values are 13.14, 4.82 and 2.94 respectively.

We use a multiple linear regression model to test the research hypothesis of the study. Table 3 illustrates the main results of the OLS regression between equity market beta and accounting measures. Almost 36% of the variation in the Euro Area market/systemic risk measure can be explained by the accounting measures, according to the R-squared and F-statistic coefficients of determination. The F-statistic is statistically significant at the 1% level, rejecting the null hypothesis that all regression coefficients are equal to zero.

Table 3. Regression results

| | Coefficient | Standard error | p-value |
|---|---|---|---|
| Intercept | -1.071*** | 0.165 | < .001 |
| Shareholders'equity over total liabilities ratio | -0.002* | 0.001 | 0.065 |
| Asset turnover ratio | -0.022 | 0.023 | 0.326 |
| Financial debts over shareholders'equity ratio | -0.209 | 0.205 | 0.306 |
| Current ratio | -0.008 | 0.007 | 0.241 |
| EBITDA Margin | -0.004*** | 0.001 | < .001 |
| ROE | -0.002* | 0.963 | 0.066 |
| ROA | 0.010*** | 0.003 | < .001 |
| Logarithm of total assets | 0.097*** | 0.031 | 0.002 |
| Logarithm of operating revenue | -0.004 | 0.031 | 0.909 |
| $R^2$ | 36.0% | | |
| Adjusted $R^2$ | 35.0% | | |
| F stat | 38.983*** | | |
| N. of observations | 635 | | |

*Notes*. (*), (**), and (***) indicate significance levels of 10%, 5%, and 1%, respectively.

The adjusted $R^2$, 0.35, shows that approximately 35% of the variation in equity beta was explained by the model. Consistent with our research hypothesis, we find evidence that systematic risk of listed manufacturing firms is negatively affected by shareholders funds over total liabilities ratio, EBITDA margin and return on equity. The

coefficient of Shareholders funds over total liabilities ratio is statistically significant at a 10% level: this result shows that the incidence of equity on total liabilities has a statistically significant association with systematic risk. Findings prove that EBITDA Margin and ROE also have statistically significant association with systematic risk, at 1% and 10% level respectively. As expected both variables are negatively related to systematic risk. Other measures fail to have a significant impact on beta: for the other predictors used, the regression analysis mainly returns coefficients that are not statistically significant. Findings obtained from our analysis are similar with earlier studies (Asgari et al., 2015; Gu and Kim, 2002; Olibe et al., 2008; Beaver et al.,1970; Alaghi, 2013; Eldomiaty, 2009; Kim et al., 2002; Logue and Merville, 1972).

## 5. Conclusions and Practical Implications

In this paper we investigate the relationship between systematic risk, as measured by beta, and accounting variables. Based on a sample of listed manufacturing firms located in the Euro Area, we find significant statistical evidence that systematic risk is negatively influenced by the ratio of shareholders' equity to, EBITDA margin and ROE. Results have practical implications for investors: knowing the link between systematic risk and economic and financial factors could help investors in diversifying their portfolios and maximising returns. Before making any investment decisions, investors should be aware of the factors that can affect the expected average returns of stocks, so that they can construct an optimal portfolio. For businesses, evidence can help minimise systematic risk and thus increase shareholder value. In this regard, as reported in numerous works, the topic of systematic risk is closely connected to the issue of the cost of capital: beta coefficient is one of the parameters of the CAPM for estimating the cost of equity. Therefore, the ability to manage systematic risk makes it possible to obtain more accurate estimates of the cost of capital and, consequently, to eliminate anomalies that may occur in the valuation.

### Informed consent

Obtained.

### Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal and publisher adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

### Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

### Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### Data sharing statement

No additional data are available.



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