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| **Are Larger Firm More Profitable?**  **Evidence from United Kingdom, Spain and Belgium** |
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Prepared for

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**Introduction**

Firm size and profitability have been the focus of numerous studies in the literature. In this study, a regression model for panel data with fixed effects is utilized as a tool to estimate whether larger firms are more profitable than small and medium firms in Western Europe. The related variables from the Europe database of all firms in the United Kingdom, Spain, and Belgium are targeted to find the relationship between firm size and firm profitability. The study selects the return on equity (ROE) as the dependent variable and the operating turnover (TUR), leverage (LV), and total assets (TASS) as independent variables.

The empirical results suggest that firm profitability may not be affected by firm size. The study finds a negative relationship between firm size and profitability, indicating that larger firms tend to have lower profitability. These findings have important implications for policymakers and practitioners in the three European countries studied, suggesting that promoting the growth of large firms may not necessarily lead to increased profitability.

**Literature Review**

Hall and Weiss (1967) were among the first to examine the relationship between firm size and profitability. Their study found that larger firms tended to be more profitable, due in part to their ability to achieve economies of scale. This finding has been supported by a number of subsequent studies, including the work of García et al. (2020) in Spain. The research shows that larger firms in Spain had significantly higher profitability than smaller firms, a finding that was consistent across different industries.

However, not all studies have found a positive relationship between firm size and profitability. Del Río González (2017) conducted a quantile regression analysis and found that the relationship between firm size and profitability varied across different quantiles of the distribution. In particular, the relationship was strongest for smaller firms in the lower quantiles but weaker or non-existent for larger firms in the upper quantiles.

Belghitar et al. (2019) explored the effect of institutional ownership on corporate social responsibility and firm profitability in the UK. They found that firms with higher levels of institutional ownership tended to be more profitable, which they attributed to the increased monitoring and discipline that comes with institutional ownership. They also found that this relationship was weaker for smaller firms, suggesting that the benefits of institutional ownership may be more limited for such firms.

The factors influence by firm size and profitability has also been studied in other countries, including Pakistan (Abbasi et al., 2017) and the Czech and Slovak Republics (Gavurova et al., 2017). It provides a positive relationship between firm size and profitability in Pakistan, which they attributed to larger firms' greater access to resources and economies of scale. In addition, a similar positive relationship shows in the Czech and Slovak Republics, but also noted that the relationship was weaker for firms in certain industries.

Arora and Sharma (2019) studied the capital structure and profitability in India, and examined whether this relationship varied based on firm size. They found that the relationship between capital structure and profitability was stronger for larger firms, which they attributed to their greater ability to manage debt and leverage.

Overall, the literature on the relationship between firm size and profitability is mixed. While some studies have found a positive relationship between the two variables, others have found no relationship or even a negative relationship in some cases. The differences in findings may be due to factors such as industry, country, and the specific measures used for firm size and profitability. Nonetheless, the literature suggests that firm size can be an important determinant of profitability, particularly for larger firms.

**Data**

The sample for this study comprises firms from three Western European countries: the UK, Spain, and Belgium. There are a number of 46,010 firms included in the analysis, representing a diverse range of industries and sizes. The time period under consideration spans eight years from 2014 to 2021. Data for the variables in the model was collected from the Orbis Europe database, a comprehensive source of financial and business information for European companies.

The dataset consists of 46,010 observations, each representing a unique firm-year combination. The variables included in the analysis are Return on Equity (ROE), operating turnover, leverage (LV), and total assets (TASS). The dependent variable, ROE, is a measure of a firm's profitability and is widely used in financial performance analysis. The independent variables, TUR, LV, and TASS were chosen based on their relevance in the literature on firm size and profitability, as well as their importance in financial performance analysis.

ROE is calculated as the net income divided by shareholders' equity, providing an indication of how effectively a firm is using its equity to generate profits. TUR represents a firm's revenue from its primary business activities, while LV is a measure of a firm's financial risk, typically calculated as the ratio of a firm's debt to its equity. The dummy variable SIZE is based on the total assets of firms, taking the value of '1' for larger firms with total assets above the 75th percentile (p75) and '0' for smaller firms with total assets below the 75th percentile.

By examining the relationships between these variables and ROE, the study aims to determine the impact of firm size on profitability, thus shedding light on the longstanding debate about the advantages and disadvantages of large firms in terms of financial performance.

**Methodology**

The methodology employed in this study is based on a panel data regression model with fixed effects, which allows us to account for unobserved heterogeneity across different firms and control for firm-specific characteristics that may affect profitability. The model is specified as follows:

Where;

= intercept

to = coefficients of independent variables

= Error

**Dependent Variable**

In this research, ROE serves as the dependent variable. ROE is an indicator of a firm's profitability, determined by dividing net income by shareholders' equity. This metric showcases a company's efficiency in using its equity to generate profits (Mensi-Klarbach, 2019). The adoption of ROE as a profitability measure is well-established in scholarly literature and has been utilized in numerous investigations of firm performance, including those concentrating on the UK, Spain, and Belgium (Gavurova et al., 2017; Gupta & Nanda, 2019).

**Independent Variables**

As a metric, TUR gauges the revenue a firm obtains from its core business operations, highlighting the company's proficiency in generating sales. It is frequently employed in profitability studies because of its direct influence on a company's earnings and financial performance, especially in the European context. Past studies have generally found a positive correlation between higher operating turnover and increased profitability (Abreu et al., 2017).

Measuring a firm's financial risk, LV is typically calculated as the ratio of a company's debt to its equity (Stournaras et al., 2016). In profitability studies, LV is frequently incorporated as an independent variable due to its potential influence on a firm's financial performance and stability. Prior research has shown that the relationship between LV and profitability could be either positive or negative, contingent on factors such as the company's industry, size, and growth opportunities.

Firm Size (SIZE) which is the dimension of a company is widely acknowledged as a crucial factor influencing its profitability and overall performance, particularly in European nations like the United Kingdom, Spain, and Belgium. In this research, a dummy variable representing SIZE is employed to distinguish between large enterprises and small businesses based on their TASS. The association between a firm's size and its profitability remains a topic of debate in academic literature. Some studies propose that larger companies benefit from economies of scale and scope, leading to increased profitability, while others contend that smaller firms may exhibit greater flexibility and innovation, contributing to enhanced financial performance.

**Hypotheses**

The objective of the study has prompted the current research to propose appropriate hypotheses to be investigated accordingly.

H0: Larger firms are more profitable.

H1: Larger firms are less profitable.

To test the null and alternative hypotheses, the fixed effects panel data regression model was estimated using ordinary least squares (OLS) regression. The model's goodness of fit was assessed by examining the R2 value, which indicates the proportion of the variation in the dependent variable (ROE) explained by the independent variables. The statistical significance of the independent variables was assessed using their p-values.

If the coefficient for SIZE (β3) is positive and statistically significant, it would provide evidence in favour of the null hypothesis (H0) that larger firms are more profitable. Conversely, if the coefficient is negative and statistically significant, it would support the alternative hypothesis (H1) that larger firms are less profitable. If the coefficient is not statistically significant, it would indicate that there is no significant relationship between firm size and profitability, and we would not be able to reject the null hypothesis in favour of the alternative hypothesis.

**Results**

To identify the larger firms or to differentiate larger firms from the smaller firms, a dummy variable named ‘SIZE’ is created. The total asset is used as a dummy variable by calculating its quantiles which change the value of ‘size’ to ‘1’ if the mean is more than p75 and ‘0’ if the size is less than p75. When ‘SIZE’ is 1 then it means these are the larger firms and when the SIZE is 0 then these are smaller firms. The dummy variable is shown in table 1 with its corresponding variables.

Table 1 Dummy variable

Shape

Description automatically generated with medium confidence

Based on variables selected for these three countries, the observations collected are shown in table 2 which also shows the values for each variable. Parameters such as mean, standard deviation, minimum, and maximum values are shown for each variable before and after normalization.

Table 2 Summary of descriptive statistics

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Description automatically generated with medium confidence

The first step which was performed was to check the correlation of variables. The correlation is checked for each variable with themselves and every other variable. The correlation of each variable is shown in table 3.

Table 3 Correlation between variables

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Description automatically generated with medium confidence

Table 4 Correlation between variables after removing redundant variables.

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Description automatically generated with medium confidence

Once the correlation of variables is calculated, the number of employees, shareholder funds, and equity are omitted from the model as shown in table 4 and the following final regression model is developed.

The R2 calculated by the model is 0.02 which indicates that only 2% of the total variables selected in this model effect the dependent variable ROE. It means, 98% of the ROE is unaffected by the choice of variables. Therefore, more variables should be added to the model to cover most of the dependent variable. The p-values of variables are used identify whether the variables in significant in explaining the dependent variable or not. The p-value should be equal to zero for the hypothesis to be true otherwise the alternate hypothesis is selected. All the p-values are zero in this model as shown in table 5. The p-value of each variable (as shown in table 5) shows that all the selected variables are significant for explaining the ROE (representing the firm profitability in this model or firms’ profitability).

In the coefficients, TUR and LV have a positive relationship with ROE which indicates that if they go up by about 4% or 5%, the ROE will also increase by the same percentage. On the other hand, ‘SIZE’ (which is created as a dummy variable) has a negative impact on ROE which means if it goes up by 11%, ROE will decrease by 11%. Therefore, the null hypothesis is rejected, and the alternate hypothesis is selected which states that larger firms are not profitable. After getting the regressions, the “regres,beta” command is utilized to calculate the coefficients (shown in table 5) and to achieve the following model. The error in the model is 50.306 which is also included in the final model.

ROE= -19.062+3.9000TUR+4.966LV-11.45809SIZE+50.306

Table 5 Coefficients for the final model

Shape

Description automatically generated with medium confidence

**Conclusion**

The relationship between firm size and profitability has been a topic of debate in the literature for many years. This study contributes to this debate by investigating the variables that affect firm size and profitability in the United Kingdom, Spain, and Belgium. Panel data analysis is used to explore the relationship between firm size, operating turnover (TUR), leverage (LV), total assets (TASS) and profitability, measured by return on equity (ROE). The study findings suggest that larger firms may not be more profitable, as the null hypothesis that larger firms are more profitable is rejected in favor of the alternative hypothesis that larger firms are less profitable. Additionally, the study finds a positive relationship between operating turnover and profitability, as well as a positive relationship between leverage and profitability.

The findings of this study have important implications for policymakers and investors in these three countries. Policymakers should consider providing support and incentives for smaller firms to encourage growth and innovation, while investors should carefully evaluate the profitability of large firms before making investment decisions. Future research should explore the relationship between firm size and profitability in other countries and industries to provide a more comprehensive understanding of this important issue.

**Limitation**

This study uses data from the Orbis database, which is known to have some missing information (Kumar & Mann, 2019). This could have affected the accuracy of the findings, particularly regarding the firm size and financial performance. Future studies could consider using alternative databases or sources of information to verify the results and increase the reliability of the findings. Additionally, the study only focuses on three European countries and may not be generalizable to other regions or industries. Finally, the use of cross-sectional data limits the ability to draw causal conclusions and the findings may not reflect long-term trends.

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