

The impact of inventories on the profitability of companies listed on the Portuguese stock exchange.

O impacto dos inventários no desempenho das empresas cotadas em bolsa de Portugal.

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Abstract

This study investigates the impact of inventory levels on the profitability of Portuguese listed companies. To this end, annual panel data from 22 listed companies covering the period from 2017 to 2024 were analysed using a fixed-effects panel model estimated with Driscoll–Kraay standard errors. The results indicate that inventory levels have a positive and statistically significant effect on firms' profitability, measured by return on equity (ROE). The findings also show that firm size, EBITDA margin, changes in fixed tangible and intangible assets, and changes in capital expenditure (Capex) are positively associated with profitability, whereas debt does not exert a statistically significant effect. These results highlight the importance of efficient inventory management and sustained investment in productive assets as key drivers of firms' financial performance. This study contributes to the existing literature by providing empirical evidence on the determinants of profitability among Portuguese listed companies and by emphasizing the role of inventory management and investment decisions in enhancing firm value.

Keywords: Inventory, Company profitability, Company size, EBITDA margin, Investment.

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Resumo

Este trabalho tem como objetivo investigar o impacto dos níveis de inventário na rentabilidade das empresas portuguesas cotadas em bolsa. Para o efeito, foram analisados dados em painel de 22 empresas cotadas, referentes ao período entre 2017 e 2024, recorrendo a um modelo de efeitos fixos estimado com erros-padrão de Driscoll–Kraay. Os resultados evidenciam que os níveis de inventário exercem um efeito positivo e estatisticamente significativo sobre a rentabilidade das empresas, medida através da rentabilidade dos capitais próprios (ROE). Verificou-se igualmente que a dimensão das empresas, a margem EBITDA, as variações dos ativos tangíveis e intangíveis e as variações do investimento em capital (Capex) apresentam uma relação positiva com a rentabilidade, enquanto o endividamento não revelou um efeito estatisticamente significativo. Estes resultados reforçam a importância de uma gestão eficiente dos inventários e de uma estratégia consistente de investimento em ativos produtivos para a melhoria do desempenho financeiro das empresas. O estudo contribui para a literatura ao fornecer evidência empírica sobre os determinantes da rentabilidade das empresas portuguesas cotadas em bolsa e ao destacar o papel da gestão de inventários e das decisões de investimento na criação de valor.

Palavras-chave: Inventário, Rentabilidade das empresas, Dimensão das empresas, Margem EBITDA, Investimento

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1. Introduction

Inventories are storable goods, acquired or produced by companies and intended for sale or to be incorporated into production. Merchandise is goods traded in commercial companies, while other goods appear in industrial companies (Nabais & Nabais, 2003). The authors also indicate that inventories also include biological assets (animals and plants) within the scope of agricultural activity, whether consumable during the normal cycle of activity, or for production or regeneration.

Inventory management is an important dimension for companies to achieve effective and efficient operational activity and tends to impact their growth and sustainability (Athumani & James, 2019; Adegbite & Ajagbe, 2023). Inventory management is necessary in any company in order to protect production against stockouts, whether of merchandise or goods (Amahalu, 2018; Hugos, 2024). Effective and efficient inventory management determines profit maximization, which depends on minimizing costs and maximizing revenue (Golas & Bieniasz, 2016; Adegbie et al., 2020). According to Tailab (2014) and Yankah et al. (2022), properly maintained inventory in companies facilitates their operational performance. This is because proactive inventory management provides good customer service and builds a positive image with customers by always offering the goods and services they need. Therefore, inventory is considered one of the key components of firms' working capital and financial management (Mbugi & Lutego, 2022; Yankah et al., 2022).

On the other hand, poor inventory management by companies can lead to liquidity problems, decrease profitability, increase indebtedness, and increase the risk of insolvency (Gebisa & Ram, 2021). Athumani and James (2019) and Hugos (2024) state that ineffective and inefficient management can lead to stockouts, which invariably results in decreased sales, loss of customers, decreased operating income, and ultimately, can lead companies to insolvency.

Bonney (1994) and Beatrice and Amahalu (2017) state that for inventory management to be carried out efficiently, it is imperative that managers have a great knowledge of existing best practices at the micro level, and that they pay attention at the macro level to the level of protectionism, the inflation rate, international competition, changes in the political system, changes in technology, and the growing expectations of consumers. Given the above, it is possible to state that inventory management is a difficult issue and one of the most sensitive tasks in all companies (Hugos, 2024).

Thus, this paper aims to assess the impact that the inventory of companies listed on the Portuguese stock exchange has on their profitability. This work is of great importance to academics and managers. At the academic level, this work is highly relevant as it enriches the literature that focuses on the impact of inventories on the profitability of companies listed on the Portuguese stock exchange. This work is also important for managers of listed companies, as it can indicate ways to increase profitability and thus ensure the sustainability and long-term growth of companies.

This work is divided as follows: section 2 presents a literature review on the impact that company inventory has on its profitability. Section 3 elaborates on the research questions, presents the methodology used, and presents the variables used in the study. Section 4 presents and discusses the results. Finally, section 5 presents a conclusion of this work and indicates its limitations and suggestions for future research.

2. Literature review

Profitability can be measured by the returns that companies obtain from the efficient use of all resources under their control, which are divided into human and material resources (Adegbite & Ajagbe, 2023). Profitability can also be determined by the return on investment made by shareholders in the company (Roumiantsev & Netessine, 2005; Golas & Bieniasz, 2016; Mappanyuki & Sari, 2017; Binsaddig et al., 2023). All rational shareholders expect their investment to multiply by the end of the accounting period. Therefore, the return on equity (ROE) is a highly relevant indicator for determining whether the investment made by shareholders is being well remunerated (Amahalu, 2018; Farooq, 2019). This is because ROE has the ability to show how effectively the company's equity is being used to generate net profit (Adegbie et al., 2020; Adegbite & Ajagbe, 2023). In this sense, a high ROE demonstrates that the company has been effective in using its own capital and tends to increase shareholder wealth (Ribeiro & Quesado, 2017). In this regard, it is important to note that there is no consensus in the literature regarding the impact that inventory has on company profitability. Therefore, below we present studies that have addressed this issue worldwide. Roumiantsev and Netessine (2005) in their study analyzed 722 retail companies in the United States of America and concluded that inventory levels have a positive and statistically significant impact on company profitability ratios.

Ernest et al. (2019) examined the effect that inventories have on the performance of manufacturing companies in Ghana. To this end, 165 companies were analyzed between 2012 and 2017. The authors found that inventory management positively affects company profitability. The study also showed that company size has a positive and statistically significant effect on company performance.

Adegbe et al. (2020) in their study aimed to determine the impact that inventory has on the profitability of companies in Nigeria and Germany. To this end, companies from the LQ45 and DAX stock indices, respectively, were analyzed. The results of the study confirm that inventories significantly influence the financial performance of the companies analyzed. The authors indicate that an increase in inventories has a positive effect on the financial performance of companies.

Coimbra et al. (2021) in their study analyzed 104 non-financial Portuguese companies between 2014 and 2017, using the ordinary least squares (OLS) methodology. The results showed that small companies are positively impacted by the level of inventory they hold. On the other hand, company size has a negative and statistically significant effect on company ROE. The authors explain that this negative effect is obtained because companies in Portugal tend to be small, which prevents them from benefiting from economies of scale.

Adegbite and Ajagbe (2023) studied the impact of inventory on the profitability of Nigerian production companies listed on the stock exchange. The sample covered the years 2011 to 2021 and was obtained through company reports and accounts. The results obtained through the OLS methodology confirmed the studies by Agu (2016) and Orga and Mbah (2017) also for Nigeria and showed that ROE is positively affected by company inventories. Furthermore, it was found that size has a negative impact on company profitability. The authors indicate that Nigerian manufacturing companies should not trivialize their inventory and recommend that they reinforce and manage it more effectively, given its positive impact on company profitability. Finally, Adegbite and Ajagbe (2023) also mention that inventory has a positive impact on stock prices, since rational investors tend to discard inefficient companies to allocate their capital to more profitable ones.

Similarly, there are studies that indicate that inventories do not impact company profitability. In this sense, Farooq (2019) in his research aimed to investigate the effect of inventory on the profitability of 79 companies in the cement, sugar, and automotive sectors in Pakistan. To this

end, they gathered data from 2006 to 2015. The results demonstrate that inventory has no explanatory power over the ROE of companies.

Elsheikh and Hassanin (2019) analyzed the 50 largest non-financial companies listed on the Egyptian stock exchange between 2012 and 2019 using panel data methodology. The results are aligned with the studies by Nwakaego et al. (2014) and Amahalu (2018) for Nigeria and Ahmad and Zabri (2018) for Malaysia and revealed that inventory does not have a significant impact on company profitability. On the other hand, there are studies that indicate a negative and statistically significant impact between the value of companies' inventory and their profitability. Pathirawasam and Knápková (2013) in their article examined 974 companies in the Czech Republic between 2005 and 2008 using the OLS methodology. The results demonstrated that the size and growth of sales have a positive and statistically significant impact on the financial performance of companies. At the same time, the indebtedness and inventory of companies have a negative and statistically significant impact on the financial performance of Czech companies. Similar results were presented by Majumdar and Chhibber (1999) for India, Padachi (2006) for Mauritius and Raheman et al. (2010) for Pakistan.

Coyle et al. (2003), Che et al. (2005), Panigrahi et al. (2015), Etale and Binglar (2016) argue that when companies hold a large amount of inventory, they tend to have higher costs associated with maintaining it. According to the authors, companies should only hold the amount of inventory that ensures the continued operation of their business.

In light of the above, we formulated the research hypothesis for this work:

H1: Inventory exerts a significant influence on the ROE of companies listed on the Portuguese stock exchange (without a defined sign).

3. Data and Methodology

This chapter presents the sample and describes the variables used in the empirical analysis. It then reports the descriptive statistics and concludes by presenting the econometric methodology adopted in the study.

3.1. Sample selection

Based on the studies by Amahalu (2018) and Adegbite and Ajagbe (2023), the sample used in this work includes annual panel data for Portuguese listed companies during the period between 2017 and 2024. This selection resulted in 176 observations derived from 22 listed

companies. All data used were collected from the annual reports published by the companies on their institutional websites.

3.1.1. Dependent variable

The literature generally considers ROE to be one of the most appropriate indicators of shareholders' profitability, as it clearly reflects how efficiently firms use shareholders' equity to generate net income (Roumiantsev & Netessine, 2005; Golas & Bieniasz, 2016; Beatrice & Amahalu, 2017; Mappanyuki & Sari, 2017; Amahalu, 2018; Farooq, 2019; Adegbie et al., 2020; Adegbite & Ajagbe, 2023).

The ROE is described in equation number 1:

$$ROE = \frac{Net\ income}{Total\ Equity} \quad (1)$$

3.1.2. Independent variables

In this study, the main independent variable is the natural logarithm of the total value of inventories (Inv), as adopted by Majumdar and Chhibber (1999), Coyle et al. (2003), Chen et al. (2005), Roumiantsev and Netessine (2005), Padachi (2006), Pathirawasam and Knápková (2013), Nwakaego et al. (2014), Panigrahi et al. (2015), Agu (2016), Etale and Bingilar (2016), Orga and Mbah (2017), Amahalu (2018), Nigéria and Ahmad and Zabri (2018), Elsheikh and Hassanin (2019), Ernest et al. (2019), Adegbie et al. (2020), Coimbra et al. (2021), Adegbite and Ajagbe (2023).

The literature suggests that, in order to obtain a more comprehensive analysis, firm-specific control variables such as size, debt, EBITDA margin, and investment should be included (Brooks & Oikonomou, 2018; Deng & Cheng, 2019; Atan et al., 2019; Junius et al., 2020; Costa et al., 2021; Giannopoulos et al., 2022; Naeem et al., 2022; Aydoğmuş et al., 2022; Chu et al., 2024; Kropotin & Marchuk, 2024; Nagy et al., 2025).

Junius et al. (2020) state that companies of different sizes may have significantly different asset and operational structures. Roumiantsev and Netessine (2005), Pathirawasam and Knápková (2013), Amahalu (2018), and Ernest et al. (2019) suggest that larger companies tend to have a higher ROE, thanks to economies of scale and scope. On the other hand, Coimbra et al. (2021) and Adegbite and Ajagbe (2023) indicate that size tends to negatively impact company profitability.

Similarly, debt is a fundamental part of a company's capital structure. By including debt, we can understand how companies finance their operations. In this sense, a company that is excessively dependent on liabilities may be overly indebted, which significantly increases its financial risk and financial burdens, with a consequent negative impact on its ROE (Pathirawasam & Knápková, 2013; Gebisa & Ram, 2021). Ferreira (2010) and Oliveira et al. (2017) also mention that we should include the EBITDA margin as a control variable, because only through this variable is it possible to assess how companies generate results before depreciation, interest, and taxes. Costa et al. (2021) highlight that this variable clearly indicates the competitiveness and operational efficiency of companies. Furthermore, recent studies suggest that changes in fixed tangible (AT) and intangible assets (IA) should also be controlled for, as they capture firms' long-term investment strategies and productive capacity, which may influence operational performance and inventory management (Setić & Dimitrić, 2022; Costa et al., 2024; Nagy et al., 2025). Likewise, changes in capital expenditure (Capex) should be considered because they reflect firms' investment intensity and expansion decisions. Variations in Capex may directly affect production capacity, inventory requirements, and future profitability, making this variable an important control in empirical models of firm performance (Chu et al., 2024; Kropotin & Marchuk, 2024).

Table 1 presents a summary of all the independent variables used in this work.

Indicator	Abbreviation	Formula	Expected Signal
Inventory level	Inv	$\ln(\text{Inventory})$	+/-
Firm Size	Size	$\ln(\text{Assets})$	+/-
Debt	Debt	$\frac{\text{Liabilities}}{\text{Assets}}$	-
EBITDA Margin	Ebi_M	$\frac{\text{EBITDA}}{\text{Sales}}$	+
Change in Tangible and Intangible Assets	$\Delta(\text{FTA} + \text{IA})$	$\frac{(TA_t + IA_t) - (TA_{t-1} + IA_{t-1})}{(TA_{t-1} + IA_{t-1})}$	+
Change in Capex	ΔCapex	$\frac{\text{Capex}_t - \text{Capex}_{(t-1)}}{\text{Capex}_{(t-1)}}$	+

Source: Author's own

3.2. Descriptive statistics

Table 2 displays the descriptive statistics of the variables mentioned in the literature and which will be used in this study.

Table 2: Descriptive statistics.

Indicator	Mean	Median	Standard Deviation	Minimum	Maximum
ROE	0,21	0,13	26,00	-0,62	231,00
Inv	7,13	7,20	1,85	1,86	11,00
Size	3,84	4,00	2,17	0,00	7,32
Debt	0,18	0,14	0,19	0,05	0,73
Ebi_M	0,64	0,66	0,19	0,05	1,16
$\Delta(\text{FTA}+\text{IA})$	16,70	1,3	74,85	-98,70	685,40
ΔCapex	16,00	2,4	93,62	-101,00	814,55

Source: Author's own

By analysing Table 2, it can be observed that the average ROE is higher than its median, indicating the existence of a small number of companies reporting exceptionally high returns on equity. This suggests a positively skewed distribution of profitability among Portuguese listed firms. The average inventory level (Inv) is 7.13, while the average firm size, measured as the natural logarithm of total assets, is 3.84. Companies exhibit an average debt ratio of 18%, whereas the average EBITDA margin reaches 64%, reflecting relatively strong operating profitability during the sample period.

The average annual change in fixed tangible and intangible assets amounted to 16.70%, whereas the average annual change in capital expenditures amounted to 16.00%. Nevertheless, the much lower median values (1.30% and 2.40%, respectively), together with their high standard deviations, reveal considerable heterogeneity in firms' investment policies, suggesting that while most firms recorded relatively modest investment growth, a limited number undertook substantially larger investment programmes.

3.3. Model specification

Following previous studies (Roumiantsev & Netessine, 2005; Amahalu, 2018; Coimbra et al., 2021; Binsaddig et al., 2023), panel data techniques were employed to analyse the relationship between inventory levels and firms' profitability. To determine the most appropriate estimator, several specification tests were performed, including the F-test, Breusch–Pagan LM test and

Hausman test. The specification tests indicated that the Fixed Effects estimator was preferred to both pooled OLS and Random Effects. Furthermore, the presence of heteroskedasticity, serial correlation and cross-sectional dependence justified the estimation of the model using firm fixed effects with Driscoll–Kraay standard errors (maximum lag = 2). The empirical model is specified as follows:

$$ROE_{it} = \beta_0 + \beta_1 Inv_{it} + \beta_2 Size_{it} + \beta_3 Debt_{it} + \beta_4 Ebi_M_{it} + \beta_5 \Delta(FTA + IA)_{it} + \beta_6 \Delta Capex_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

Where i denotes the firm, t the year, β_0 expresses the constant, μ_i represents the unobserved time-invariant firm-specific effect, whereas ε_{it} denotes the idiosyncratic error term.

4. Results obtained

This chapter analyses the correlations between the variables, performs the necessary tests to obtain the most suitable model, and presents and discusses the results of this research.

4.1. Correlation matrix

Table 3 presents the correlation matrix of the variables used in this study.

Table 3 - Correlation matrix of the variables used

	ROE	Size	Inv	Debt	Ebi_M	Δ (FTA+IA)	Δ Capex
ROE	1,00	-0,48	0,12	0,30	-0,05	0,18	0,14
Size		1,00	0,53	-0,02	0,18	0,29	0,25
Inv			1,00	0,08	0,23	0,31	0,28
Debt				1,00	0,14	-0,12	-0,09
Ebi_M					1,00	0,21	0,17
Δ (FTA+IA)						1,00	0,61
Δ Capex							1,00

Source: Author's own elaboration

As shown in Table 3, none of the correlation coefficients exceed the threshold commonly associated with severe multicollinearity. The strongest correlation is observed between changes in fixed tangible and intangible assets and changes in capital expenditures (0.61),

which is expected since both variables capture firms' investment activity. Nevertheless, this value remains below the commonly accepted threshold of 0.70, suggesting that multicollinearity is unlikely to affect the regression estimates (Marôco, 2018).

4.2. Test results

As with Roumiantsev and Netessine (2005), Amahalu (2018), Coimbra et al. (2021), and Binsaddig et al. (2023), before the regression is run, we must determine if the dataset exhibits multicollinearity. To do this, we must use the Variance Inflation Factor (VIF) test. Whenever this test reveals values greater than 5, it indicates multicollinearity in the independent variables. This scenario arises when there is a linear relationship, exact or imperfect, between the independent variables of the model. When all VIF values remain below the recommended threshold, multicollinearity is not considered a serious problem and the explanatory variables can be simultaneously included in the regression model. Table 4 presents the VIF test:

Table 4. VIF Test

Test	Result
Inv	1,44
Size	1,41
Debt	1,03
Ebi M	1,08
$\Delta(\text{FTA}+\text{IA})$	1,82
ΔCapex	1,91

Source: Author's own elaboration

The Variance Inflation Factor (VIF) values are all well below the threshold of 5 suggested by Marôco (2021), indicating that multicollinearity is not a concern. Therefore, all explanatory variables were retained in the regression model.

Before estimating the regression model, several specification and diagnostic tests were conducted to determine the most appropriate panel data estimator. Following Marôco (2018) and Wooldridge (2010), the F-test, Breusch–Pagan LM test and Hausman specification test were used to choose between pooled OLS, Random Effects and Fixed Effects estimators. Subsequently, the Pesaran CD, Wooldridge and Modified Wald tests were performed to assess cross-sectional dependence, serial correlation and heteroskedasticity, respectively.

Table 5 - Model specification tests

Test	Statistic	p-value	Conclusion
F-test for Fixed Effects	$F(21,146) = 18,9$		Rejects the pooled OLS model, indicating the presence of individual effects.
Breusch–Pagan Lagrange Multiplier (LM) Test	$\chi^2 = 488,51$		Rejects the pooled OLS model, indicating significant individual effects.
Hausman Specification Test	$\chi^2(6) = 31,47$		Supports the Fixed Effects model over the Random Effects model.
Pesaran Cross-sectional Dependence (CD) Test	$z = 4,73$		Indicates the presence of cross-sectional dependence across firms.
Wooldridge Test for Autocorrelation	$F = 13,52$		Indicates the presence of first-order serial correlation.
Modified Wald Test for Groupwise Heteroskedasticity	$\chi^2 = 1298,43$		Indicates the presence of heteroskedasticity.

Source: Author's own elaboration

As reported in Table 5, both the F-test and the Breusch–Pagan LM test reject the pooled OLS specification, confirming the existence of individual effects. Furthermore, the Hausman test indicates that the Fixed Effects estimator is preferred over the Random Effects estimator. The Pesaran CD test reveals significant cross-sectional dependence among firms, whereas the Wooldridge and Modified Wald tests indicate the presence of first-order serial correlation and heteroskedasticity. Consequently, the most appropriate specification for this study is a firm fixed-effects panel regression estimated with Driscoll–Kraay standard errors (maximum lag = 2), which provides consistent inference in the presence of these econometric problems.

4.3. Empirical Results

The data were processed using the STATA statistical software, and the model results are shown in Table 6.

Table 6 - Regression results

	Coefficient	Standard Error	t-statistic	p-value
const	55,29	23,78	2,33	0,03**
Inv	6,11	2,90	2,11	0,04**
Size	10,31	4,00	2,58	0,02**
Debt	-9,47	19,72	-0,48	0,64
Ebi_M	34,28	18,19	1,88	0,07*
$\Delta(\text{FTA}+\text{IA})$	0,02	0,01	2,04	0,04 **
$\Delta \text{ Capex}$	0,01	0,01	1,84	0,07 *
Number of observations = 176				
Number of companies = 22				
R^2 overall = 0,5631				

Legend: *, **, and *** are the significance levels at 10%, 5%, and 1%, respectively.

Source: Author's own elaboration

The regression results indicate that the estimated model is statistically significant at the 5% level. Five of the six explanatory variables exhibit statistically significant coefficients, suggesting that most of the selected determinants contribute to explaining firms' profitability. The overall R^2 of 0.5631 indicates that approximately 56% of the variation in ROE is explained by the explanatory variables included in the model. The results show that inventory levels have a positive and statistically significant effect on the ROE of Portuguese listed companies. More precisely, a 1% increase in inventory is associated with an increase of approximately 0.061 percentage points in ROE. These results are in line with those presented by Coimbra et al. (2021) and indicate that Portuguese companies tend to benefit from not letting their inventory value decrease, as this facilitates their operational performance. These findings suggest that maintaining adequate inventory levels enables firms to respond more effectively to customer demand, reducing stock shortages and improving operational

efficiency, which ultimately contributes to higher profitability. These findings provide empirical support for the research hypothesis proposed in Section 2, indicating that inventory levels exert a positive and statistically significant influence on firms' ROE.

The results also suggest that size has a positive and statistically significant influence on the ROE of Portuguese listed companies. These results are aligned with the studies of Ernest et al. (2019) and indicate that larger firms tend to benefit from economies of scale and operational efficiencies, thereby improving profitability.

Similarly, the results show that the EBITDA margin has a positive effect on the ROE of Portuguese listed companies. These results suggest that companies with a greater capacity to transform their sales into earnings before depreciation, interest and taxes tend to be more efficient, with a consequent positive impact on their ROE.

The results also demonstrate that indebtedness has a negative coefficient, but its result was not statistically significant. Therefore, no empirical evidence is found that leverage significantly affects the ROE of Portuguese listed companies.

The results indicate that changes in fixed tangible and intangible assets have a positive and statistically significant impact on firms' profitability. This finding suggests that companies that increase their productive asset base tend to improve their operational efficiency and generate higher returns, supporting the arguments of Setić and Dimitrić (2022), Costa et al. (2024), and Nagy et al. (2025).

Likewise, the coefficient associated with changes in capital expenditures is positive and statistically significant at the 10% level. This result indicates that firms undertaking higher investment expenditures tend to achieve superior financial performance, although the effect is weaker than that observed for changes in productive assets. These findings are consistent with Chu et al. (2024) and Kropotin and Marchuk (2024), who argue that capital investment strengthens firms' productive capacity and long-term competitiveness.

5. Conclusion

This study examined the impact of inventory levels on the profitability of companies listed on the Portuguese stock exchange. Using return on equity (ROE) as the profitability indicator, annual panel data from 22 Portuguese listed companies covering the period from 2017 to 2024 were analysed through a fixed-effects panel model estimated with Driscoll–Kraay standard errors.

The empirical findings confirm the main research hypothesis by demonstrating that inventory levels have a positive and statistically significant effect on firms' profitability. This result highlights the importance of proactive inventory management, suggesting that maintaining adequate inventory levels enables firms to better satisfy customer demand, reduce stockout risks and improve operational efficiency, ultimately contributing to higher returns on equity. Regarding the control variables, firm size also exhibits a positive and statistically significant relationship with profitability, indicating that larger firms benefit from economies of scale and operational efficiencies that enhance their financial performance. Similarly, the EBITDA margin presents a positive effect on ROE, suggesting that companies with greater operational efficiency are more capable of generating superior profitability. In contrast, although the debt ratio displays the expected negative coefficient, its effect is not statistically significant, indicating that leverage was not a decisive determinant of profitability for Portuguese listed companies during the period analysed.

The results further demonstrate that changes in fixed tangible and intangible assets positively influence firms' profitability, suggesting that investment in productive assets strengthens operational efficiency and improves financial performance. Likewise, changes in capital expenditures also exhibit a positive and statistically significant relationship with ROE, indicating that firms maintaining higher levels of investment tend to achieve superior profitability over time. These findings reinforce the importance of long-term investment strategies in enhancing firms' competitive position and creating sustainable value.

This study contributes to the existing literature by providing additional empirical evidence on the determinants of profitability in Portuguese listed companies, while extending previous research on inventory management through the inclusion of investment-related variables. From a practical perspective, the findings may assist managers in making more informed inventory and investment decisions, demonstrating that maintaining adequate inventory levels and continuously investing in productive capacity can positively influence corporate financial performance.

Despite these contributions, the study presents some limitations. First, the analysis does not incorporate macroeconomic variables, such as GDP growth, inflation or interest rates, which may also influence firms' profitability and inventory management decisions. Second, although investment variables were included, the study does not consider differences in firms'

technological capabilities or digitalisation levels, factors that may significantly affect inventory management efficiency and operational performance.

Recent studies suggest that artificial intelligence technologies have become an important tool for improving inventory management by enhancing demand forecasting, supplier coordination and logistics planning, thereby reducing operating costs and increasing firms' efficiency (Alexandre et al., 2021; Muszyński et al., 2022; Bharadiya, 2023; Cannas et al., 2023; Ronaghi, 2023). Consequently, future research could incorporate indicators of technological capability and artificial intelligence adoption, together with macroeconomic variables, in order to provide a more comprehensive understanding of the factors influencing inventory management and corporate profitability.

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