

**MINISTRY OF EDUCATION AND TRAINING  
DUY TAN UNIVERSITY**

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**THE IMPACT OF INVENTORY MANAGEMENT  
ON THE OPERATING PERFORMANCE OF  
MANUFACTURING FIRMS IN THE  
VIETNAMESE STOCK MARKET**

**Major: Finance and Banking**

**Code: 9340201**

**SUMMARY OF DOCTORAL DISSERTATION IN  
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- **National Library of Vietnam**

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## **CHAPTER 1: INTRODUCTION**

### **1.1. Research rationale**

In the context of globalization and intense competition, inventory management is a key determinant of the operating performance of manufacturing firms, particularly listed firms that face dual pressure from market discipline and transparency requirements (Firth, 1976; Ndubuisi et al., 2018). In Vietnam, inventory typically accounts for 25%–35% of current assets and may reach 40%–45% in some industries (Nguyen Hoang Phi Nam et al., 2022), thereby increasing costs, eroding efficiency, and exposing substantial risks during the Covid–19 period (Ho Thuy Tien & Ngo Van Toan, 2024; Truong, 2023; General Statistics Office, 2022, p. 322; 2023, p. 314; 2024, p. 318).

From a scholarly perspective, inventory is often viewed as a “double-edged sword”: an appropriate level may generate benefits, whereas excessively high or low inventory can be detrimental (Chen et al., 2005; Koech et al., 2021). Prior studies, however, have not reached consistent conclusions, and recent evidence suggests the possibility of a nonlinear relationship (Elsayed & Wahba, 2016; Khan et al., 2019; Panigrahi et al., 2022). In particular, the moderating roles of firm growth and management costs remain underexplored, especially in emerging markets such as Vietnam. Accordingly, examining the nonlinear relationship between inventory and performance, while testing these moderating effects, is both theoretically and practically important for helping firms optimize resources and strengthen competitiveness.

### **1.2. Research objectives**

#### **1.2.1. General objective**

The dissertation aims to analyze the impact of inventory management on the operating performance of manufacturing firms listed on the Vietnamese stock market, with particular attention to the nonlinear nature of this relationship. It also examines the moderating roles of firm growth and selling and business expenses, thereby providing empirical evidence and managerial implications for improving performance and competitive advantage.

#### **1.2.2. Specific objectives**

- Systematize the theoretical foundation and review prior studies on the relationship between inventory management and firm operating performance, thereby identifying research gaps in the Vietnamese context.

- Develop the research model and hypotheses for evaluating the impact of inventory management on the operating performance of listed Vietnamese manufacturing firms.

- Estimate and quantify the impact of inventory management on operating performance, while testing the nonlinear nature of this relationship.

- Examine the moderating roles of firm growth and management costs in the relationship between inventory management and operating performance.

- Propose managerial implications and policy recommendations to improve operating performance and competitive advantage through more effective inventory management.

### **1.3. Research questions**

- Which theoretical and practical arguments explain the relationship between inventory management and operating performance, and what model and hypotheses are appropriate for listed Vietnamese manufacturing firms?

- Which methods and analytical framework are appropriate for assessing the impact of inventory management on the operating performance of listed Vietnamese manufacturing firms?

- How does inventory management affect the operating performance of listed Vietnamese manufacturing firms, and is this relationship nonlinear?

- Do firm growth and management costs moderate the relationship between inventory management and operating performance?

- What managerial implications can be drawn to optimize inventory management and improve the operating performance and competitive advantage of listed Vietnamese manufacturing firms?

### **1.4. Research subject and scope**

#### **1.4.1. Research subject**

The research subject comprises the core issues of inventory management, operating performance, and the impact of inventory management on the operating performance of manufacturing firms listed on the Vietnamese stock market.

#### **1.4.2. Research scope**

+ *Content scope*: The dissertation focuses on the relationship between inventory management and firm operating performance; inventory management is measured by inventory days (IND) and

inventory ratio (INV), while operating performance is measured by return on assets (ROA).

+ *Spatial scope*: The study investigates manufacturing firms listed on the Vietnamese stock market.

+ *Time scope*: The dataset is compiled from financial statements covering the period from 2012 to 2023.

## **1.5. Research methodology**

The dissertation employs a mixed-methods approach, combining qualitative analysis with quantitative analysis based on panel-data regression models.

## **1.6. Novelty and contributions of the study**

### **1.6.1. Theoretical contributions**

The findings extend inventory management theory by clarifying the nonlinear effect of inventory and the moderating roles of firm growth and management costs, thereby developing a more comprehensive analytical framework for emerging-market settings. Specifically:

- The dissertation provides additional evidence on the roles of inventory turnover and inventory ratio in explaining operating performance, while identifying differences across stock exchanges and highlighting the heterogeneous impact of inventory.

- It confirms an inverted U-shaped nonlinear relationship between inventory ratio and financial performance, showing that inventory can support operations when maintained at an appropriate level but becomes a source of risk once it exceeds the optimal threshold.

- It expands the theoretical framework by incorporating firm growth as a moderating variable and demonstrating the dual effect of growth in the inventory performance relationship.

- It also offers a new contribution by treating management costs as a moderator, identifying differentiated effects across stock exchanges and enriching the theory of cost management.

### **1.6.2. Practical contributions**

The findings generate important implications for manufacturing firms and policymakers seeking to improve firm performance. Specifically:

- Shorter inventory holding periods significantly improve profitability, especially for firms listed on HOSE.

- The nonlinear relationship between INV and ROA indicates that firms should determine an optimal inventory threshold to balance costs

and benefits: inventory below the threshold improves performance, whereas inventory above the threshold reduces profitability.

- Evidence for 2012–2023 shows that about 60% of firms were able to capture the benefits of inventory holdings, whereas 40% failed to exploit these positive effects, suggesting the need to review and adjust inventory policies.

- Firm growth and management costs act as moderators: fast-growing firms need tighter inventory control to avoid exceeding the optimal threshold, while management costs should be optimized to mitigate adverse effects on ROA.

- Large firms with strong cash flow and reinvestment capacity tend to use inventory more effectively; by contrast, high leverage and excessive management costs reduce efficiency. The Covid–19 shock further underscores the need for flexible strategies, digital transformation, and supply-source diversification to mitigate risk.

## **7. Structure of the dissertation**

The dissertation is organized into five chapters:

*Chapter 1: Research introduction.*

*Chapter 2: Theoretical background and related studies.*

*Chapter 3: Research design.*

*Chapter 4: Research results and discussion.*

*Chapter 5: Conclusions and managerial implications.*

## **CHAPTER 2**

### **THEORETICAL BACKGROUND AND RELATED STUDIES**

#### **2.1. Theoretical overview of inventory management in firms**

*2.1.1. Concepts, motives for holding inventory, and the role of inventory*

*2.1.2. The concept and role of inventory management*

*2.1.3. Inventory-management models*

#### **2.2. Theoretical background of firm operating performance**

*2.2.1. Concept of firm operating performance*

*2.2.2. Measures of firm operating performance*

#### **2.3. Underlying theories related to the relationship between inventory management and firm operating performance**

*2.3.1. Speculative Motive Theory (SMT)*

*2.3.2. Preventive Motivation Theory (PMT)*

*2.3.3. Transaction Cost Theory (TCT)*

*2.3.4. Just-In-Time Theory (JIT)*

*2.3.5. Operating Cycle Theory (OCT)*

*2.3.6. Lean Inventory Theory (LIT)*

#### **2.4. Review of empirical studies on the impact of inventory management on firm operating performance**

*2.4.1. International studies*

*2.4.2. Domestic studies*

*2.4.3. Remarks on prior studies of the impact of inventory management on firm operating performance*

#### **2.5. Research gaps and research orientation**

##### **2.5.1. Contextual gap**

Studies on inventory management and operating performance have been conducted in many countries, including Vietnam, but they largely focus on specific manufacturing industries. Listed manufacturing firms, which face high requirements for transparency and pressure from shareholders, remain underexamined. This gap has become even more important in the context of international integration and the effects of the Covid-19 pandemic.

Accordingly, investigating the impact of inventory management on the operating performance of listed Vietnamese manufacturing firms contributes both to academic knowledge and to practical managerial implications.

##### **2.5.2. Gaps in the research model and estimation methods**

- *Research model:* Most prior studies examine only the linear relationship between inventory management and firm operating

performance, whereas nonlinear analyses remain scarce and are virtually absent in Vietnam.

This is an important research gap, especially as firms increasingly emphasize resource optimization. Clarifying the nonlinear nature of the relationship would enrich theory while also helping identify the optimal inventory threshold and formulate more appropriate strategies.

- *Variables in the model*: Prior studies generally adopt a similar structure in which:

(i) the dependent variable captures operating performance through ROA or ROS;

(ii) the independent variable represents inventory management through inventory days, inventory turnover, and inventory ratio to total assets;

(iii) control variables include firm size, leverage, liquidity, and sales growth. However, the moderating roles of factors such as firm growth and management costs have received limited attention, creating an empirical gap that is particularly relevant when firms face pressure to grow while optimizing operating costs.

- *Estimation methods*: Most prior studies employ OLS, FEM, REM, or FGLS, but these approaches become limited when the data violate econometric assumptions, especially under endogeneity.

The dissertation adopts system GMM (SGMM) because it can address endogeneity, heteroskedasticity, autocorrelation, and omitted variables while exploiting the dynamic structure of panel data.

The application of SGMM not only improves the reliability of the estimates but also represents a methodological contribution to research on the relationship between inventory management and firm operating performance.

### **2.5.3. Research orientation on the impact of inventory management on firm operating performance**

Building on the gaps identified in prior studies, the dissertation analyzes the impact of inventory management on the operating performance of listed Vietnamese manufacturing firms. The research model includes:

(i) dependent variable: ROA;

(ii) independent variables: inventory days and inventory-to-total-assets ratio;

(iii) control variables: firm size, leverage, growth, and operating cash flow;



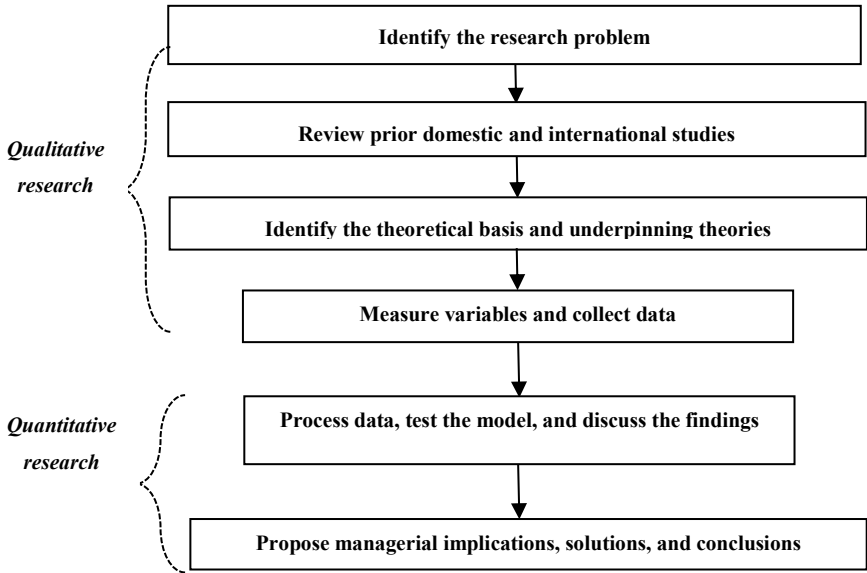
(iv) moderating variables: growth opportunities and management costs.

Unlike OLS, FEM, REM, or FGLS, which are limited in dealing with endogeneity, the dissertation applies system GMM (SGMM) to address this issue and strengthen the reliability of the findings. This is the first application of SGMM to inventory-management research in Vietnam, representing a novel methodological contribution.

## CHAPTER 3 RESEARCH DESIGN

### 3.1. Conceptual framework

### 3.2. Research process



*Source: Proposed by the author*

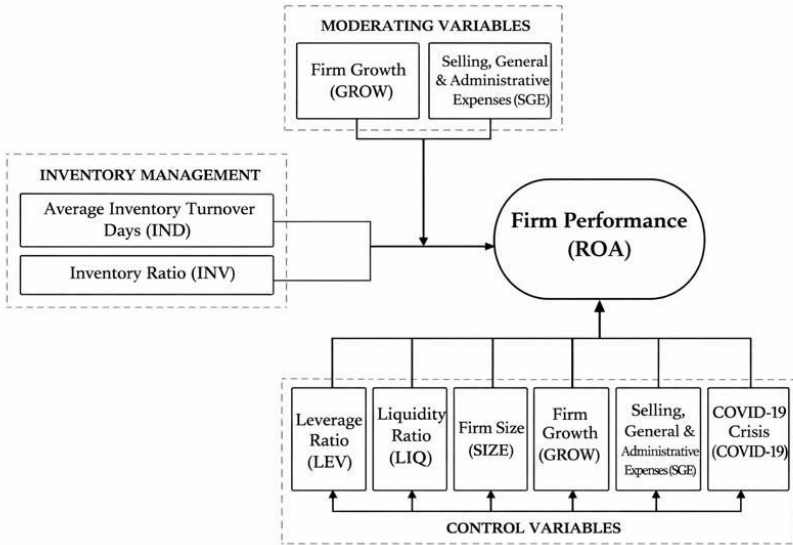
**Figure 3.1. Research process**

### 3.3. Proposed hypotheses and research model

#### 3.3.1. Development of research hypotheses

#### 3.3.2. Research model and variable measurement.

- Proposed research model



*Source: Proposed by the author*

**Figure 3.2. Proposed model of the impact of inventory management on firm operating performance**

### 3.4. Data and sample

The dataset is compiled from the public disclosures of manufacturing firms listed on the Vietnamese stock market across the three exchanges HOSE, HNX, and UPCOM for 2012–2023, using data provided by Tai Viet Joint Stock Company (Vietstock.vn).

The collected data were cleaned to remove firms lacking sufficient information, indicators, or years of operation, as well as abnormal values (outliers). From 541 manufacturing firms observed in 2012–2023, 364 firms (equivalent to 4,368 observations) met the study requirements.

### 3.5. Data-analysis methods

#### 3.5.1. Descriptive statistics

#### 3.5.2. Correlation analysis and multicollinearity testing

#### 3.5.3. Estimation methods used in the study

The procedure for selecting and applying the estimation methods is as follows:

- *Step 1:* Estimate the regression model using the fixed-effects model (FEM).

- *Step 2*: Estimate the regression model using the random-effects model (REM).
- *Step 3*: Conduct the Hausman test to choose between FEM and REM.
- *Step 4*: Test for heteroskedasticity in the selected FEM or REM model.
- *Step 5*: Test for autocorrelation in the selected FEM or REM model.
- *Step 6*: If the selected FEM or REM model exhibits autocorrelation or heteroskedasticity, generalized least squares (GLS) is applied.
- *Step 7*: If endogenous variables are detected, SGMM is employed to correct for endogeneity in the model.

## CHAPTER 4

### RESEARCH RESULTS AND DISCUSSION

#### 4.1. Description of the data and sample

#### 4.2. Descriptive statistics of the variables in the research model

#### 4.3. Correlation analysis among the variables in the model

#### 4.4. Regression results

4.4.1. *Regression results for the effect of IND on ROA using FEM, REM, and FGLS*

**Table 4.16. Regression results for Model (1): Effect of IND on ROA**

Dependent variable (ROA)	FEM model	REM model	FGLS model
IND	-0,000104*** [-5,83]	-0,000105*** [-6,55]	-0,0000984*** [-9,61]
LEV	-0,159*** [-17,73]	-0,161*** [-23,33]	-0,140*** [-33,59]
OCF	0,0783*** [10,52]	0,0995*** [13,30]	0,0500*** [11,63]
SIZE	0,0182*** [7,02]	0,0122*** [10,02]	0,00699*** [10,55]
GROW	0,0277*** [12,02]	0,0307*** [13,19]	0,0365*** [17,32]
SBE	-0,138*** [-10,93]	-0,127*** [-10,93]	-0,0933*** [-9,24]
COV_19	-0,0208*** [-10,60]	-0,0195*** [-10,19]	-0,0121*** [-8,62]
Constant	-0,331*** [-4,79]	-0,172*** [-5,26]	-0,0461*** [-2,60]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2088	0,2055	
Thống kê F và Wald	F(7, 3633) = 136,96***	Wald chi2(7) = 1.355,56***	Wald chi2(7) = 1.743,81***
Hausman test	Chi2(7) = 694,74 Prob > Chi2 = 0,0000***		
Heteroskedasticity test for the selected FEM model	Chi2(364) = 1.5e+05 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model	F(1, 363) = 36,318 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

4.4.2. *Regression results for the moderating effect of GROW on the relationship between IND and ROA using FEM, REM, and FGLS*

**Table 4.17. Regression results for Model (2): Moderating effect of GROW on the relationship between IND and ROA**

Dependent variable (ROA)	FEM model	REM model	FGLS model
IND	-0,0000981*** [-5,52]	-0,0000998*** [-6,20]	-0,0000961*** [-9,36]
LEV	-0,162*** [-18,03]	-0,163*** [-23,63]	-0,141*** [-33,83]
OCF	0,0785*** [10,57]	0,0999*** [13,38]	0,0512*** [11,94]
SIZE	0,0189*** [7,30]	0,0123*** [10,16]	0,00707*** [10,66]
GROW	0,0379*** [11,18]	0,0412*** [11,95]	0,0458*** [16,51]
IND*GROW	-0,0000853*** [-4,10]	-0,0000867*** [-4,11]	-0,0000799*** [-6,07]
SBE	-0,138*** [-10,97]	-0,128*** [-10,99]	-0,0927*** [-9,27]
COV_19	-0,0211*** [-10,73]	-0,0195*** [-10,22]	-0,0120*** [-8,61]
Constant	-0,350*** [-5,07]	-0,175*** [-5,37]	-0,0485*** [-2,73]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2124	0,2088	
F and Wald statistics	F(8, 3632) = 122,47***	Wald Chi2 (8) = 1382,15***	Wald Chi2 (8) = 1765,88***
Hausman test	Chi2(8) = 628,37 Prob > Chi2 = 0,0000***		
Heteroskedasticity test for the selected FEM model.	Chi2(364) = 1.5e+05 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model	F(1, 363) = 36,581 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

#### 4.4.3. Regression results for the moderating effect of SBE on the relationship between IND and ROA using FEM, REM, and FGLS

**Table 4.18. Regression results for Model (3): Moderating effect of selling and business expenses on the relationship between IND and ROA**

Biến phụ thuộc (ROA)	FEM model	REM model	FGLS model
IND	-0,000251*** [-10,87]	-0,000214*** [-10,27]	-0,000149*** [-10,06]
LEV	-0,161***	-0,163***	-0,141***

Biến phụ thuộc (ROA)	FEM model	REM model	FGLS model
	[-18,18]	[-23,71]	[-33,57]
OCF	0,0733*** [9,96]	0,0950*** [12,80]	0,0498*** [11,56]
SIZE	0,0196*** [7,64]	0,0126*** [10,34]	0,00707*** [10,51]
GROW	0,0262*** [11,48]	0,0297*** [12,86]	0,0370*** [17,36]
SBE	-0,265*** [-14,76]	-0,225*** [-13,50]	-0,144*** [-10,38]
IND*SBE	0,000684*** [9,83]	0,000555*** [8,12]	0,000301*** [5,00]
COV_19	-0,0205*** [-10,56]	-0,0193*** [-10,18]	-0,0122*** [-8,58]
Constant	-0,347*** [-5,09]	-0,167*** [-5,10]	-0,0406** [-2,26]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2293	0,2243	
F and Wald statistics	F(8, 3632) = 135,06***	Wald Chi2 (8) = 1437,36***	Wald Chi2 (8) = 1710,41***
Hausman test	Chi2(8) = 565,52 Prob > Chi2 = 0,0000***		
Heteroskedasticity test for the selected FEM model.	Chi2(364) = 1.4e+05 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model.	F(1, 363) = 44,442 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

#### 4.4.4. Regression results for the models estimated by SGMM

**Table 4.19. Dynamic panel-data estimates using SGMM for Models (1), (2), and (3)**

Dependent variable (ROA)	Model (1)	Model (2)	Model (3)
L.ROA	0,358*** [10,73]	0,363*** [10,67]	0,375*** [11,39]
IND	-0,000071*** [-2,68]	-0,000056** [-2,11]	-0,000197*** [-5,07]
LEV	-0,150*** [-8,53]	-0,153*** [-8,61]	-0,151*** [-8,95]
OCF	0,0982*** [6,28]	0,0995*** [6,33]	0,0908*** [6,12]

<b>Dependent variable (ROA)</b>	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>
SIZE	0,0135*** [4,01]	0,0139*** [4,06]	0,0133*** [3,87]
GROW	0,0387** [2,01]	0,0587** [2,32]	0,0375* [1,95]
SBE	-0,121*** [-3,43]	-0,121*** [-3,40]	-0,282*** [-6,09]
COV_19	-0,0145*** [-5,76]	-0,0149*** [-5,82]	-0,0145*** [-5,55]
<b>IND*GROW</b>		<b>-0,000185**</b> [-2,43]	
<b>IND*SBE</b>			<b>0,00091***</b> [4,27]
Constant	-0,239*** [-2,66]	-0,251*** [-2,74]	-0,214** [-2,37]
Observations (N)	3640	3640	3640
Number of groups	364	364	364
Number of instruments	341	342	342
Wald test (Prob > chi2)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(1) (Prob > z)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(2) (Prob > z)	0,850	0,886	0,950
Hansen test (Prob > chi2)	0,359	0,291	0,370

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

(Source: Author's compilation and calculations)

#### 4.4.5. Exchange-level differences in the models estimated by SGMM

**Table 4.20. Dynamic panel-data estimates using SGMM for Models (1), (2), and (3): Exchange-level differences**

<b>Dependent variable (ROA)</b>	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>
L.ROA	0,369*** [10,75]	0,353*** [10,79]	0,390*** [11,92]
<b>IND</b>	<b>-0,000161***</b> [-3,80]	<b>-0,000106*</b> [-2,31]	<b>-0,000243***</b> [-3,79]
<b>IND*HNX</b>	<b>0,000143**</b> [2,78]	<b>0,000181**</b> [3,01]	<b>0,000129</b> [1,69]



<b>Dependent variable (ROA)</b>	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>
<b>IND*UPCOM</b>	<b>0,000132**</b> <b>[3,00]</b>	<b>0,000114*</b> <b>[2,49]</b>	<b>0,000102</b> <b>[1,76]</b>
LEV	-0,151*** [-8,19]	-0,163*** [-9,50]	-0,147*** [-8,34]
OCF	0,0979*** [6,41]	0,106*** [7,47]	0,0935*** [6,43]
SIZE	0,0143*** [4,08]	0,0118*** [3,69]	0,0126*** [3,70]
GROW	0,0390* [1,99]	0,124*** [7,93]	0,0382 [1,95]
SBE	-0,123*** [-3,51]	-0,136*** [-3,60]	-0,267*** [-5,71]
COV_19	-0,0145*** [-5,72]	-0,0141*** [-5,45]	-0,0140*** [-5,28]
<b>IND*GROW</b>		<b>-0,000390*</b> <b>[-2,09]</b>	
<b>IND*GROW*HNX</b>		<b>-0,000687***</b> <b>[-3,48]</b>	
<b>IND*GROW*UPCOM</b>		<b>0,000131</b> <b>[0,73]</b>	
<b>IND*SBE</b>			<b>0,000955**</b> <b>[2,80]</b>
<b>IND*SBE*HNX</b>			<b>-0,000181</b> <b>[-0,41]</b>
<b>IND*SBE*UPCOM</b>			<b>-0,000183</b> <b>[-0,56]</b>
Constant	-0,261** [-2,82]	-0,193* [-2,29]	-0,202* [-2,26]
Observations (N)	3640	3640	3640
Number of groups	364	364	364
Number of instruments	343	346	346
Wald test (Prob > chi2)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(1) (Prob > z)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(2)	0,851	0,585	0,979

Dependent variable (ROA)	Model (1)	Model (2)	Model (3)
(Prob > z)			
Hansen test (Prob > chi2)	0,366	0,240	0,365

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

#### 4.4.6. Regression results for the effect of INV on ROA using FEM, REM, and FGLS

**Table 4.21. Regression results for Model (4): Effect of INV on ROA**

Biến phụ thuộc (ROA)	FEM model	REM model	FGLS model
INV	-0,169*** [-4,64]	-0,0126 [-0,42]	0,0973*** [5,11]
INV2	0,176*** [3,31]	-0,0122 [-0,27]	-0,130*** [-4,29]
LEV	-0,159*** [-17,62]	-0,161*** [-23,17]	-0,145*** [-34,09]
OCF	0,0797*** [10,72]	0,104*** [13,88]	0,0545*** [12,40]
SIZE	0,0157*** [6,04]	0,0115*** [9,41]	0,00669*** [10,02]
GROW	0,0279*** [12,10]	0,0313*** [13,36]	0,0387*** [17,99]
SBE	-0,167*** [-13,19]	-0,147*** [-12,67]	-0,114*** [-11,88]
COV_19	-0,0221*** [-11,21]	-0,0203*** [-10,55]	-0,0128*** [-8,99]
Constant	-0,245*** [-3,48]	-0,157*** [-4,69]	-0,0565*** [-3,11]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2079	0,2003	
F and Wald statistics	F(8, 3632) = 119,18***	Wald Chi2 (8) = 1312,1***	Wald Chi2 (8) = 1658,84***
Hausman test	Chi2(8) = 325,27 Prob > Chi2 = 0,0000***		
Heteroskedasticity test for the selected FEM model.	Chi2(364) = 1.5e+05 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model.	F(1, 363) = 36,097 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

4.4.7. Regression results for the moderating effect of GROW on the relationship between INV and ROA using FEM, REM, and FGLS

**Table 4.22. Regression results for Model (5): Moderating effect of firm growth on the relationship between INV and ROA**

<b>Biến phụ thuộc (ROA)</b>	<b>FEM model</b>	<b>REM model</b>	<b>FGLS model</b>
INV	-0,223*** [-6,38]	-0,0606** [-2,14]	0,0831*** [4,48]
INV2	0,260*** [5,09]	0,0608 [1,39]	-0,111*** [-3,81]
LEV	-0,172*** [-19,97]	-0,169*** [-25,89]	-0,153*** [-35,80]
OCF	0,123*** [16,50]	0,153*** [20,35]	0,0896*** [18,19]
SIZE	0,0129*** [5,15]	0,00978*** [8,66]	0,00648*** [10,55]
GROW	-0,0145*** [-3,78]	-0,0167*** [-4,26]	-0,00721 [-1,41]
<b>INV*GROW</b>	<b>0,519***</b> <b>[9,66]</b>	<b>0,589***</b> <b>[10,72]</b>	<b>0,375***</b> <b>[8,18]</b>
<b>INV2*GROW</b>	<b>-0,337***</b> <b>[-3,27]</b>	<b>-0,399***</b> <b>[-3,78]</b>	<b>-0,235***</b> <b>[-2,92]</b>
SBE	-0,164*** [-13,56]	-0,142*** [-12,90]	-0,110*** [-11,37]
COV_19	-0,0201*** [-10,67]	-0,0181*** [-9,80]	-0,0139*** [-9,50]
Constant	-0,161** [-2,39]	-0,109*** [-3,51]	-0,0474*** [-2,83]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2783	0,2704	
F and Wald statistics	F(10, 3630) = 140,01***	Wald Chi2 (10) = 1908,88***	Wald Chi2 (10) = 2151,13***
Hausman test	Chi2(10) = 900,86 Prob > Chi2 = 0,0000***		
Heteroskedasticity test for the selected FEM model.	Chi2(364) = 78664,81 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model.	F(1, 363) = 35,304 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

4.4.8. Regression results for the moderating effect of SBE on the relationship between INV and ROA using FEM, REM, and FGLS

**Table 4.23. Regression results for Model (6): Moderating effect of selling and business expenses on the relationship between INV and ROA**

<b>Biến phụ thuộc (ROA)</b>	<b>FEM model</b>	<b>REM model</b>	<b>FGLS model</b>
INV	0,125*** [2,73]	0,199*** [5,03]	0,117*** [4,14]
INV2	-0,303*** [-4,33]	-0,373*** [-5,84]	-0,199*** [-4,14]
LEV	-0,159*** [-17,90]	-0,165*** [-23,73]	-0,145*** [-33,53]
OCF	0,0746*** [10,16]	0,100*** [13,50]	0,0538*** [12,21]
SIZE	0,0137*** [5,30]	0,0112*** [9,12]	0,00676*** [9,97]
GROW	0,0280*** [12,35]	0,0313*** [13,49]	0,0386*** [17,90]
SBE	-0,0221 [-1,13]	-0,0346* [-1,82]	-0,127*** [-6,21]
INV*SBE	-2,199*** [-10,53]	-1,653*** [-8,30]	-0,143 [-0,83]
INV2*SBE	3,734*** [10,06]	2,877*** [8,04]	0,566* [1,94]
COV_19	-0,0216*** [-11,09]	-0,0205*** [-10,72]	-0,0129*** [-8,93]
Constant	-0,214*** [-3,07]	-0,163*** [-4,86]	-0,0578*** [-3,13]
Observations (N)	4004	4004	4004
R-squared (R2)	0,2315	0,2225	
F and Wald statistics	F(10, 3630) = 109,33***	Wald Chi2 (10) = 1395,71***	Wald Chi2 (10) = 1636,74***
Hausman test	Chi2(10) = 24,48 Prob > Chi2 = 0,0064***		
Heteroskedasticity test for the selected FEM model.	Chi2(364) = 1.3e+05 với Prob > Chi2 = 0,0000***		
Autocorrelation test for the selected FEM model.	F(1, 363) = 33,005 với Prob > F = 0,0000***		

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. t-statistics are reported in square brackets.

4.4.9. Regression results for the models estimated by SGMM

**Table 4.24. Dynamic panel-data estimates using SGMM for Models (4), (5), and (6)**

Dependent variable (ROA)	Model (4)	Model (5)	Model (6)
L.ROA	0,376*** [243,71]	0,341*** [218,50]	0,385*** [263,38]
INV	0,118*** [16,18]	0,0697*** [10,74]	0,340*** [43,45]
INV2	-0,203*** [-15,93]	-0,142*** [-13,43]	-0,662*** [-44,55]
LEV	-0,144*** [-104,90]	-0,164*** [-127,56]	-0,156*** [-125,97]
OCF	0,0993*** [102,81]	0,147*** [144,67]	0,0986*** [91,67]
SIZE	0,0111*** [46,91]	0,00800*** [30,69]	0,0108*** [41,90]
GROW	0,0377*** [169,25]	-0,0139*** [-30,57]	0,0377*** [163,13]
SBE	-0,137*** [-107,23]	-0,139*** [-101,27]	-0,0467*** [-25,51]
COV_19	-0,0139*** [-43,51]	-0,0127*** [-39,99]	-0,0144*** [-47,13]
INV*GROW		0,554*** [60,88]	
INV2*GROW		-0,345*** [-21,88]	
INV*SBE			-1,363*** [-47,33]
INV2*SBE			3,114*** [57,19]
Constant	-0,195*** [-30,05]	-0,0992*** [-13,86]	-0,201*** [-28,74]
Observations (N)	3640	3640	3640
Number of groups	364	364	364
Number of instruments	342	344	344
Wald test (Prob > chi2)	0,000***	0,000***	0,000***

<b>Dependent variable (ROA)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>
Kiểm định Arellano-Bond với AR(1) (Prob > z)	0,000***	0,000***	0,000***
Kiểm định Arellano-Bond với AR(2) (Prob > z)	0,833	0,729	0,855
Hansen test (Prob > chi2)	0,299	0,252	0,259

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. *t*-statistics are reported in square brackets.

#### 4.4.10. Exchange-level differences in the models estimated by SGMM

**Table 4.25. Dynamic panel-data estimates using SGMM for Models (4), (5), and (6): Exchange-level differences**

<b>Dependent variable (ROA)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>
L.ROA	0,378*** [244,53]	0,339*** [198,78]	0,377*** [250,57]
INV	0,0276** [3,01]	0,0771*** [6,93]	0,406*** [31,97]
INV2	-0,0433* [-2,26]	-0,229*** [-8,77]	-0,952*** [-29,88]
INV*HNX	0,165*** [15,01]	0,0630*** [4,08]	-0,0696*** [-4,20]
INV2*HNX	-0,285*** [-11,04]	-0,0340 [-0,89]	0,227*** [5,34]
INV*UPCOM	0,109*** [13,05]	-0,0150 [-1,67]	-0,126*** [-11,10]
INV2*UPCOM	-0,188*** [-9,47]	0,153*** [6,70]	0,460*** [15,47]
LEV	-0,144*** [-107,99]	-0,164*** [-120,81]	-0,155*** [-119,58]
OCF	0,0988*** [101,64]	0,145*** [143,76]	0,0964*** [96,51]
SIZE	0,0121*** [50,00]	0,00943*** [33,06]	0,0122*** [53,24]
GROW	0,0380*** [152,40]	-0,00782*** [-11,42]	0,0380*** [140,71]
SBE	-0,133*** [-116,92]	-0,134*** [-104,81]	-0,0459*** [-22,23]
COV_19	-0,0142***	-0,0128***	-0,0143***

<b>Dependent variable (ROA)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>
	[-46,14]	[-39,18]	[-47,30]
<b>INV*GROW</b>		<b>0,454***</b> [39,72]	
<b>INV2*GROW</b>		<b>-0,233***</b> [-7,96]	
<b>INV*GROW*HNX</b>		<b>-0,0532**</b> [-3,00]	
<b>INV2*GROW*HNX</b>		<b>0,333***</b> [5,77]	
<b>INV*GROW*UPCOM</b>		<b>0,0769***</b> [6,02]	
<b>INV2*GROW*UPCOM</b>		<b>-0,101**</b> [-3,13]	
<b>INV*SBE</b>			<b>-2,484***</b> [-26,51]
<b>INV2*SBE</b>			<b>6,533***</b> [26,94]
<b>INV*SBE_HNX</b>			<b>1,544***</b> [13,08]
<b>INV2*SBE_HNX</b>			<b>-3,364***</b> [-11,09]
<b>INV*SBE*UPCOM</b>			<b>1,302***</b> [13,66]
<b>INV2*SBE*UPCOM</b>			<b>-4,089***</b> [-16,49]
Constant	-0,222*** [-34,75]	-0,141*** [-19,24]	-0,236*** [-37,84]
Observations (N)	3640	3640	3640
Number of groups	364	364	364
Number of instruments	346	352	352
Wald test (Prob > chi2)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(1) (Prob > z)	0,000***	0,000***	0,000***
Arellano-Bond test for AR(2) (Prob > z)	0,840	0,736	0,872

Dependent variable (ROA)	Model (4)	Model (5)	Model (6)
Hansen test (Prob > chi2)	0,379	0,295	0,344

Source: STATA output. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. *t*-statistics are reported in square brackets.

#### 4.5. Synthesis of findings and comparison with prior studies

**Table 4.26. Number of firms by INV threshold and year**

Year	INV ≤ 29,06%		INV > 29,06%	
	Number	Share (%)	Number	Share (%)
2012	0	0%	364	100%
2013	230	63%	134	37%
2014	218	60%	146	40%
2015	233	64%	131	36%
2016	250	69%	114	31%
2017	246	68%	118	32%
2018	235	65%	129	35%
2019	229	63%	135	37%
2020	240	66%	124	34%
2021	247	68%	117	32%
2022	245	67%	119	33%
2023	241	66%	123	34%
<b>Total</b>	<b>2614</b>	<b>60%</b>	<b>1754</b>	<b>40%</b>

(Source: Author's compilation and calculations)

**Table 4.27. Comparison of the dissertation's findings with prior studies and with the proposed hypotheses**

Variables	Author's findings	Inter national	Vietnam	Hypothesis testing
<b>Independent variables</b>				
Average inventory days (IND)	–	–	–	Accept H1
Inventory ratio (INV)	Optimal level: 29.06%	K	K	Accept H2



Variables	Author's findings	Inter national	Vietnam	Hypothesis testing
<b>Control variables</b>				
Financial leverage (LEV)	–	–	–	Accept H3
Operating cash flow (OCF)	+	+	+	Accept H4
Firm size (SIZE)	+	+	+	Accept H5
Firm growth (GROW)	+	+	+	Accept H6a
Selling and business expenses (SBE)	–	K	+/-	Accept H7a
Covid-19 crisis (COV_19)	–	K	–	Accept H8
<b>Interaction terms</b>				
Moderating effect of GROW on the IND–ROA relationship (IND*GROW)	Moderating effect found	K	K	Accept H6b
Moderating effect of GROW on the INV–ROA relationship (INV*GROW)	Moderating effect found	K	K	
Moderating effect of GROW on the INV2–ROA relationship (INV2*GROW)	Moderating effect found	K	K	
Moderating effect of SBE on the IND–ROA relationship (IND*SBE)	Moderating effect found	K	K	Accept H7b
Moderating effect of SBE on the INV–ROA relationship (INV*SBE)	Moderating effect found	K	K	
Moderating effect of SBE on the INV2–ROA relationship (INV2*SBE)	Moderating effect found	K	K	

Note: K = not found; (+) positive relationship; (–) negative relationship.

(Source: Author's compilation)

## CHAPTER 5

### CONCLUSIONS AND MANAGERIAL IMPLICATIONS

#### 5.1. Conclusions

#### 5.2. Selected managerial implications

##### 5.2.1. For firms

##### 5.2.2. For investors

#### 5.3. Limitations of the dissertation and directions for future research

Several limitations and directions for future research are as follows:

+ *First*, the dissertation uses data from 364 manufacturing firms on HOSE, HNX, and UPCOM during 2012–2023. Although the sample is relatively broad, the 12-year time span still limits generalizability; future research should extend the dataset (including periods before the 2008 crisis and the 2011–2012 bad-debt episode for comparison) and expand the analysis to non-manufacturing firms and SMEs.

+ *Second*, operating performance is measured mainly by ROA and therefore reflects the accounting perspective more than the market perspective; future studies should incorporate ROE, ROS, and market-based measures (such as Tobin's Q) to test robustness and broaden the implications.

+ *Third*, the dissertation does not disaggregate inventory into its components and does not incorporate operational practices (such as EOQ or MRP), so the process-level mechanism remains unclear; future studies should integrate variables representing policies and processes and classify inventory into appropriate groups.

+ *Fourth*, the moderating role of growth should be examined more deeply in rapidly expanding markets; future research should incorporate the corporate life cycle into the model to clarify differences across stages of development.

+ *Finally*, although the dissertation identifies an inverted U-shaped INV–ROA relationship with an optimal threshold of approximately 29.06%, this threshold may depend on the motive for holding inventory; future studies should model inventory-holding motives by firm group and by INV level in order to estimate a more realistic optimal threshold.

## LIST OF THE AUTHOR'S PUBLISHED WORKS

### I. Journal articles

1. Nguyen Van Bay, Phan Thanh Hai, and Phan Huy Tam (2024). Applying machine learning to explain the determinants of inventory management. *Journal of Trade Science*, Special Issue 02/2024, 188–200.
2. Nguyen Van Bay, Nguyen Thanh Cuong, and Phan Thanh Hai (2025). The impact of inventory days on operating performance: Empirical evidence from manufacturing firms listed on the Vietnamese stock market. *Journal of Trade Science*, No. 201, May 2025. DOI: 10.54404/JTS.2025.201V.06.
3. Nguyen Van Bay, Phan Thanh Hai, and Nguyen Thanh Cuong (2025). The impact of inventory holdings on the operating performance of manufacturing firms listed on the Vietnamese stock market. *Finance Journal*, 852(1), 108–112.
4. Nguyen, V. B., Nguyen, T. C., Phan, T. H., & Phan, H. T. (2025). Inventory and firm performance nexus: The influence of capital intensity. *Journal of Finance - Marketing Research*, 3(2), 50–64. <https://doi.org/10.52932/jfmr.v3i2e>.
5. Bay Nguyen Van, Hai Phan Thanh, and Cuong Nguyen Thanh (2025). Business growth and management costs as moderators of the inventory-performance link: Evidence from Vietnamese manufacturing firms. *Investment Management and Financial Innovations*, 22(3), 108–125. [https://doi.org/10.21511/imfi.22\(3\).2025.09](https://doi.org/10.21511/imfi.22(3).2025.09).
6. Nguyen, V. B., Nguyen, T. C., & Phan, T. H. (2025). The effect of communication technology adoption on inventory management and firm performance. *Journal of Finance - Marketing Research*, 4(1en). <https://jfm.edu.vn/index.php/jfme/article/view/846>.

### II. Conference proceedings

1. Nguyen Van Bay, Phan Thanh Hai, and Nguyen Thanh Cuong (2023). The impact of inventory management on firm operating performance: A review of empirical studies for the period 2005–2022. *Proceedings of the National Scientific Conference on Research Trends in Finance, Accounting, Auditing, and Management in the New Context* (pp. 523–534). Finance Publishing House. ISBN: 978-604-79-3785-1.
2. Nguyen Van Bay, Nguyen Thanh Cuong, Phan Thanh Hai, and Huynh Van Thach (2025). The impact of inventory holdings on the operating performance of manufacturing firms listed on the Vietnamese stock market. *Proceedings of the 7th Annual National Conference on*

*Accounting and Auditing – VCCA 2025* (pp. 3016–3037). Finance Publishing House. ISBN: 978-604-79-5115-4.

3. Nguyen, V. B., Nguyen, T. C., Phan, T. H., & Mai, T. T. (2025). The impact of inventory days on the operational performance of manufacturing firms in Vietnam: The moderating roles of growth and SG&A expenses across stock exchanges. *In The 8th International Conference on Finance, Accounting and Auditing (ICFAA 2025) Proceedings* (pp. 2171–2190). National Economics University Publishing House. ISBN 978-632-615-179-4.

### **III. Research projects**

1. Nguyen Van Bay, Phan Nguyen Bao Nhu, Pham Xuan Truong, and Bui Quang Huy (2025). *Research on the impact of inventory management on the operating performance of manufacturing firms listed on the Vietnamese stock market*. Institution-level scientific research project, Project code: TR2023-13-42, acceptance date: 28/03/2025. Nha Trang University.