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Factors affecting the profitability of food companies listed on the vietnam stock market

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The study aims to determine the factors affecting the profitability of the food companies listed on the Vietnam stock market. The study uses panel data with 198 observations of 22 food companies listed on the Vietnamese stock market in the period 2011-2019 into the regression analysis. With 3 methods POLS, FEM and REM; the author uses F test and Hausman test to select the appropriate model. The result show that REM is the most optimal model selected. However, the REM model still has variable variance defects and endogenous variables; therefore, the author uses GMM method to overcome the defects of the model. The results from the GMM regression model show that the profitability of food companies listed on the Vietnamese stock market is affected by internal factors including size, risk, past profitability, leverage, and macro factors such as: economic growth, inflation, calamity. From there, the author proposes recommendations to improve the profitability of these enterprises.

keywords: Profitability, food companies, calamity.

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1 Introduction

Currently, the food industry is one of the sectors with great potential in Vietnam. In particular, domestic agricultural products and food are gradually becoming an important and rich source of supply for many countries around the world. The food industry accounts for about 15% of GDP and tends to increase in the near future; besides, food and beverages represent the highest percentage in the monthly expenditure structure of consumers, approximately 35% of total spending Almajali et al. (2012). The development opportunities of Vietnamese food brands have excellent prospects, however, the presence of international companies on the Vietnamese market creates numerous opportunities for investment and production cooperation, while also increasing competition. Domestic enterprises that want to survive and develop must actively capture the market to promptly meet the market's needs, creating competitive advantages in all aspects of their operations.

Improving productivity is an important issue that many businesses in general and domestic food businesses in particular are interested in. Entities participating in the economy conducting production and business must put efficiency first along with improving productivity and quality. There are many factors affecting the sales performance of enterprises; depending on the business line, enterprises operating in different industries are affected by different influencing factors.

Through review from the studies on factors affecting the profitability of enterprises, it is found that the internal factors affecting the profitability of enterprises include: leverage, business growth rate, size, assets, liquidity, corporate age, tax, risk, receivables management, inventory management, net working capital, dividend policy, owner structure, management capacity, expenses costs, business lines and past profitability. While macro factors affecting profitability involve: economic growth, politic, inflation and interest rate (Bhattarai, 2016; Trivedi, 2010). However, previous studies mainly focused on analyzing the impact of internal factors on business performance, did not mention much about macro factors and especially did not study the influence of the "**calamity**"on the performance of enterprises in Vietnam. Especially in the current context, the situation of natural disasters is complicated, causing a lot of damage to people and property. Additionally, in terms of approaches to analyzing the influence of factors on business performance, according to Driffill et al. (1998), the General Method of Moments (GMM) regression method is better than the conventional regression methods at examining the movement of financial variables, this method solves problems of endogeneity, variance, and autocorrelation on panel data that have not been approached by previous studies Xu and Banchuenvijit (2014). Stemming from the above practical and academic context, the study is expected to fill the above research gaps based on the use of the GMM regression method to analyze the influence of internal and external factors as well as the macro factor that affects the profitability of enterprises; supplement the effect of the new factor "calamity"on the profitability of food companies listed on the Vietnamese stock market.

From the importance as well as the urgency of the issue of energy efficiency and the need to understand the factors affecting the productivity to improve the competitiveness of

enterprises in the food industry, the author has selected the topic "Factors affecting the profitability of the food companies listed on the Vietnam stock market" for research.

2 Theoretical background

2.1 Theoretical basis

2.1.1 Profitability overview

The concept of profitability

According to Malik (2011), profitability is one of the most important goals of financial management because the goal of financial management is to maximize owner's profit, and profitability is a very important determinant for financial management. An unprofitable business cannot survive. In contrast, a highly profitable business is likely to give its owners a large return on their investment Patel (2015).

In the study on the influence of accounting information systems on the profitability of enterprises, Patel (2015) stated that profitability is the ability to generate profit compared to sales revenue or profit achieved on invested capital (assets, equity) of the enterpriseZeitun and Tian (2014).

Trivedi (2010) argues that profitability is the ability to generate profits from the company's business activities. To create the desired profit, the company's business process is very important, including investment, operation, revenue generation, etc. Therefore, profitability is the highest expression of business efficiency in enterprises.

Profitability metrics

Return on assets (ROA): This indicator shows how much net profit the business can achieve in 100 VND of total assets. The higher the ROA, the better, because it shows the investment efficiency and good cost management of the business.

Return on Equity (ROE): This indicator shows how much net profit the business earns out of 100 VND of equity in the period. This indicator reflects all aspects of financial management level, capacity to plan and implement financial policies and business strategies of enterprises in each period.

2.1.2 Factors affecting profitability

Internal factors

Financial leverage: This indicator reveals the combination of liabilities and equity in operating the financial policy of the enterprise. The success or failure depends on the ability to choose the financial structure of the administrator.

Firm size: Usually, large-scale enterprises will have advantages in capital, factories, and warehouses and have more opportunities for efficient production and business than small-scale enterprises.

Current solvency: This indicator shows how much of a short-term debt the enterprise is able to pay. Care should be taken when this coefficient increases or decreases; For example, when this ratio increases, it may be due to high uncollected debt, a lot of unsold

inventory as high current assets, high short-term solvency is not necessarily good.
Average collection period: This metric shows how many days on average it takes a business to collect its receivables. If the business does not sell goods on credit, it may lead to customers switching to buying competitors' goods, reducing sales revenue. However, when enterprises sell too many goods on credit, they run the risk of not being able to recover their debts, resulting in businesses not having enough capital to continue investing in production and business activities.
Risk: Enterprises often face a situation of high revenue but disproportionate cash flow, leading to difficulties in turning capital for the next business cycle. Businesses will be in trouble when they do not have enough cash or highly liquid assets to serve short-term needs even though the revenue is very high.
Tangible fixed assets: Fixed assets have great value, participating in many business and production cycles of enterprises. Although it still retains its original physical form when participating in the production and business process, the value of fixed assets gradually decreases and is transferred to the product value in the form of depreciation. Therefore, the investment and use of fixed assets directly affect the business performance of the enterprise.
Enterprise growth rate: Businesses with high growth rates often have good business performance because they can generate profits from their investments. However, companies with high growth opportunities may incur higher inefficiencies and financial distress costs than others.
Past profitability: This indicator is used as a proxy for the sustainability of profitability. Past profits are seen as retained earnings, innovative products and processes also help the company invest and grow. The more previous achievements, the stronger the company is in maintaining its competitive advantage, thereby increasing the profitability of the business in the future.

Macro factors
High or low GDP growth rate of an economy reflects the production and business efficiency of enterprises in that economy. However, when businesses are not quick to adapt to this change, it can lead to losses and bankruptcy.
Inflation is an increase in the economy's overall price level over time. A low or moderate rate of inflation within a country can have a positive effect on a company's lines of business. High inflation has more negative effects on economic actors.
Calamity has a serious impact on the economy and businesses are also seriously affected. Specifically, Vietnam is a country located in the tropical monsoon region, which is hot, humid and rainy, and is influenced by both oceanic and continental climate. Besides, Vietnam is one of the countries heavily affected by the Asia-Pacific storm, one of the six major hurricanes in the world, hence it often faces many types of natural disasters, especially storm flood. Damage caused by storms and floods has impacted significantly on businesses where: factories are destroyed, workers' lives are threatened, production and business activities are interrupted, costs are increased, revenue is decreased, and the impact on the environment also affect customers and partners. Especially, raw food production and supply enterprises are the subjects that suffer the most direct and heaviest

damages such as: the loss of rice fields and crops because the flood leads to uncultivable fields; the death of many livestock and poultry, and fishing was also affected. In 2017, storms and floods killed 325 people while 61 people were missing and more than 600 people were injured. The total material damage was approximately 60,000 trillion VND.

2.2 Research model

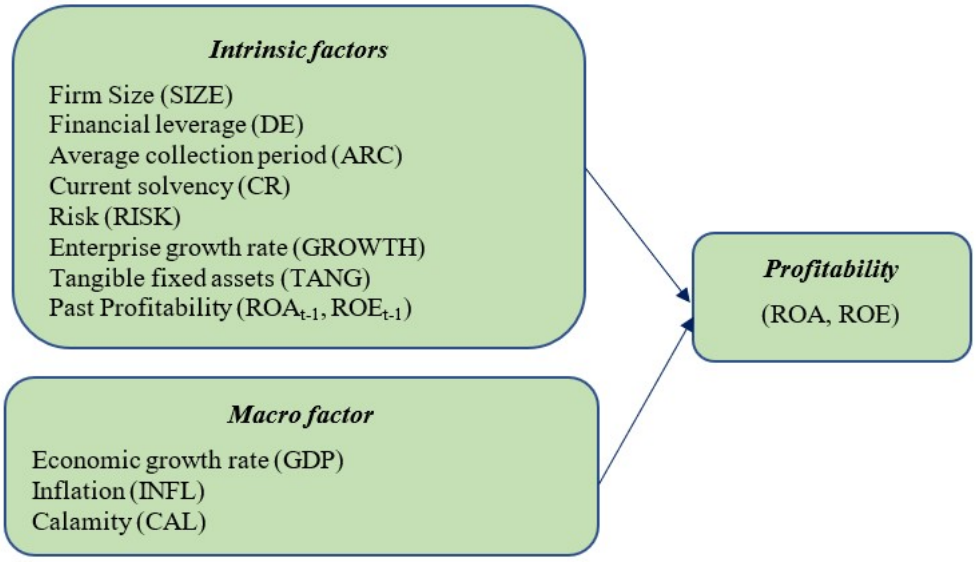

Figure 1: Theoretical model of factors affecting profitability of enterprises. Source: own research

Static model

$$ROA_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 DE_{it} + \alpha_3 ARC_{it} + \alpha_4 CR_{it} + \alpha_5 RISK_{it} + \alpha_6 GROWTH_{it} + \alpha_7 TANG_{it} + \alpha_8 GDP_{it} + \alpha_9 INFL_{it} + \alpha_{10} CAL_{it} + e_{it} (1)$$

$$ROE_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 DE_{it} + \beta_3 ARC_{it} + \beta_4 CR_{it} + \beta_5 RISK_{it} + \beta_6 GROWTH_{it} + \beta_7 TANG_{it} + \beta_8 GDP_{it} + \beta_9 INFL_{it} + \beta_{10} CAL_{it} + u_{it} (2)$$

Dynamic Models

$$ROA_{it} = \mu_0 + \mu_1 ROA_{it-1} + \mu_2 SIZE_{it} + \mu_3 DE_{it} + \mu_4 ARC_{it} + \mu_5 RC_{it} + \mu_6 RISK_{it} + \mu_7 GROWTH_{it} + \mu_8 TANG_{it} + \mu_9 GDP_{it} + \mu_{10} INFL_{it} + \mu_{11} CAL_{it} + x_{it} (3)$$

$$ROE_{it} = z_0 + z_1 ROE_{it-1} + z_2 SIZE_{it} + z_3 DE_{it} + z_4 ARC_{it} + z_5 RC_{it} + z_6 RISK_{it} + z_7 GROWTH_{it} + z_8 TANG_{it} + z_9 GDP_{it} + z_{10} INFL_{it} + z_{11} CAL_{it} + y_{it} (4)$$

Table 1: Summary of variables and expected signs in the research model. Source: own research

Num	**Variable name**	**Encode**	**Determine**	**Expectation sign**	**Reference studies**
Internal factors					
1	Firm size	SIZE	Ln (Total assets)	+	Safarova (2010), Almajali et al. (2012), Omondi and Muturi (2013), Bhattarai (2016)
2	Financial leverage	DE	$\frac{\text{Liabilities}}{\text{Equity}}$	-	Safarova (2010), Malik (2011), Xu and Banchuenvijit (2014)
3	Average collection period	ARC	$\frac{\text{Average receivables}}{\text{Net sales}}$	-	Khalifa and Shafii (2013)
4	Current solvency	CR	$\frac{\text{Short-term assets}}{\text{Short-term debt}}$	-	Khalifa and Shafii (2013), Bolek and Wili'nski (2012)
5	Risk	RISK	Cash Flow Standard Deviation (Earnings after taxes + depreciation)	+	Zeitun and Tian (2014)
6	Enterprise growth rate	GROWTH	(Total assets at the end - Total assets at the beginning)/ Total assets at the beginning	+	Safarova (2010), Zeitun and Tian (2014) , Patel (2015)
7	Tangible fixed assets:	TANG	$\frac{\text{Tangible fixed assets}}{\text{Total assets}}$	+	Pouraghajan et al. (2012)
8	Past profitability	ROA_{t-1}	$\frac{\text{profit after tax}_{t-1}}{\text{Total average assets}_{t-1}}$	+	Gharaibeh (2015)
		ROE_{t-1}	$\frac{\text{profit after tax}_{t-1}}{\text{Total average assets}_{t-1}}$	+	Gharaibeh (2015)
Macro factors					
9	Economic grow rate	GDP	GDP grow	-	Gharaibeh (2015)
10	Inflation	INFL	Consumer price index	-	Gharaibeh (2015)
11	Calamity	CAL	Ln (Total economic losses due to storms and floods every year)	-	There are no usage studies

3 Methodology

3.1 Order of research

Descriptive statistics
Describe the collected data by calculations, the statistical indicators include: maximum value (max), minimum value (min), mean value (means), standard deviation (standard deviation).

Correlation analysis
Perform correlation analysis to determine specifically which independent variables have a relationship with the dependent variable. Pearson correlation coefficient (denoted r) is used to quantify the closeness of the linear relationship between two quantitative variables, the absolute value of r approaches 1 when the two variables are linearly correlated rigor.
Regression analysis
While correlation analysis checks whether there is a correlation between variables, regression analysis is used to measure the influence of independent variables on dependent variables. Prob coefficient (P-value) of the results of regression analysis indicates the degree of impact of the independent variables on each dependent variable. The commonly used statistical significance levels are 1%, 5%, or 10%. In this study, the author chose a statistical significance level of 10% (P-value<0.1).
For panel data, there are many methods to estimate regression for research model. Usually, studies use from the most popular model to the more complex, consistent with the research data. The author uses multivariable linear regression models to examine the influence of independent variables on the dependent variable. There are popular regression estimation methods: least squares regression method (Pooled OLS_POLS), fixed effects regression method (Fixed Effects Model_FEM), random effects regression method (Random Effects Model_REM). These methods have their own strengths and have different existences, among which common problems are due to data characteristics that lead to biased estimation results, such as phenomena: multicollinearity, variable variance, autocorrelation, endogenous. To solve the above problem, the author uses the generalized method of moment (GMM) estimation. This method uses the appropriate lags of the instrumented variables to form the instrument variables. In addition, GMM exploits table pooling and constrains the time series length of the table units in the data table. Hence, it is allowed to use an appropriate delay structure to exploit the dynamic nature of the data. Regression analysis steps:
Step 1: Compare the model according to the OLS method with the FEM method, the author checks it with the F test. If the test results show that the model is suitable for the FEM method, then move to step 2, if the test results show that the model is suitable for the POLS method, go to step 3.
Step 2: Comparing the model according to the FEM method with the REM method, the author checks it by Hausman test and moves to step 4.
Step 3: Compare the model by POLS method with REM method, the author verifies by LM test and move to step 4.
Step 4: After selecting the appropriate model running method, the author will check the variable variance, multicollinearity, autocorrelation, and endogenous phenomena of the model. In case the model has defects, the author will use GMM method to overcome.

3.2 Research data

The study uses secondary data sources collected from audited financial statements of 22 food industry enterprises listed on Vietnam's stock market in the period 2011-2019.

Besides, the author uses macro data sources taken from the General Statistics Office of Vietnam, the State Bank of Vietnam and the International Monetary Fund.

4 Results

4.1 Descriptive statistics

Table 2: Descriptive statistics of model data. Source: own research

Variable	Obs	Mean	Std. Dev	Min	Max
ROA	198	0.1047721	0.085422	-0.3172369	0.3612425
ROE	198	0.1855155	0.1583028	-0.9696568	0.7109973
SIZE	198	13.17755	1.493242	11.36035	17.61548
ARC	198	27.26837	26.21352	0.0244614	179.5526
DE	198	1.065934	0.9069224	0.1205674	4.605097
CR	198	2.020262	1.113995	0.1018388	8.480821
RISK	198	8.815404	1.575785	3.313483	14.04443
GROWTH	198	0.0896678	0.2072236	-0.6742211	1.042052
TANG	198	0.2368866	0.1267417	0.0197897	0.6992729
GDP	198	0.0623556	0.0068158	0.0503	0.0708
INFL	198	0.0588709	0.0505555	0.008786	0.186755
CAL	198	16.41429	0.9561509	14.74846	17.91031

There are a total of 198 research data for the period 2011-2019 of 12 variables in the research models.

4.2 Correlation coefficient analysis

The correlation coefficient (r) is a statistical indicator that reflects the degree of linear relationship between variables. This coefficient varies from -1 to +1. Through this coefficient, it is possible to know the correlation direction between the dependent variable and the explanatory variable.

The results in Table 3 show that the independent variables have a linear relationship with the dependent variable. In which, the variables of firm size (SIZE), current solvency (CR), risk (RISK), enterprise growth (GROWTH), tangible fixed assets (TANG) and inflation (INFL) have positive relationship to business productivity. While variables average collection period (ARC), financial leverage (DE), economic growth rate (GDP) and Calamity (CAL) have negative relationship to profitability of enterprises.

Table 3: Correlation coefficient matrix between variables in the model. Source: own research

	ROA	ROE	SIZE	ARC	DE	CR	RISK	GROWTH	TANG	GDP	INFL	CAL
ROA	1											
ROE	0.8423	1										
SIZE	0.1458	0.0659	1									
ARC	-0.1328	-0.1158	-0.0497	1								
DE	-0.3664	-0.0169	-0.0406	0.2145	1							
CR	0.4007	0.0806	-0.0519	-0.0265	-0.5915	1						
RISK	0.1699	0.1185	0.8218	-0.1217	-0.0013	-0.0566	1					
GROWTH	0.2015	0.2136	0.231	-0.0913	0.1105	-0.0186	0.1727	1				
TANG	0.1187	0.022	0.0347	-0.1586	-0.2391	-0.0845	0.1344	-0.1601	1			
GDP	-0.0305	-0.051	0.0936	0.1088	0.0057	-0.0482	0.1034	-0.0608	-0.1516	1		
INFL	-0.066	-0.0148	0.0788	-0.1081	-0.0013	0.082	0.0938	0.1618	0.1101	0.536	1	
CAL	-0.1439	-0.125	0.0186	0.0549	0.0253	-0.0651	0.0267	0.0024	0.0243	-0.0116	-0.0287	1

4.3 Multicollinearity Test

The author uses the Variance Inflation Factor (VIF) to check for multicollinearity in the model.

Table 4: VIF regression results with dependent variable ROA, ROE. Source: own research

Variable	**VIF regression with dependent variable ROA**		**VIF regression with dependent variable ROE**	
	VIF	**1/VIF**	**VIF**	**1/VIF**
SIZE	3.34	0.2994	3.36	0.2976
ARC	1.14	0.8772	1.15	0.8696
DE	2.01	0.4975	1.98	0.5051
CR	1.91	0.5236	1.80	0.5556
RISK	3.40	0.2941	3.40	0.2941
GROWTH	1.23	0.8130	1.21	0.8264
TANG	1.32	0.7576	1.31	0.7634
GDP	1.44	0.6944	1.45	0.6897
INFL	1.47	0.6803	1.47	0.6803
CAL	1.03	0.9709	1.03	0.9709
Mean VIF	**1.79**		**1.75**	

Table 4 shows that the VIF coefficients of the variables are all less than 10, hence there is no multicollinearity between the variables in the model.

4.4 Regression analysis with POLS, FEM, REM

4.4.1 *Regression model based on dependent variable ROA*

Table 5: Model results with dependent variable ROA. Sourch:own research

ROA	**OLS**	**FEM**	**REM**
SIZE	-0.0016	-0.0031	-0.0006
	[-0.24]	[-0.17]	[-0.06]
ARC	-0.0001	0.0004*	0.0003
	[-0.38]	[1.78]	[1.55]
DE	-0.0159***	-0.0180***	-0.0188***
	[-1.96]	[-2.71]	[-2.99]
CR	0.0241*	0.0137***	0.0145***
	[3.82]	[2.95]	[3.23]
RISK	0.0084	0.0076	0.0078
	[1.37]	[1.47]	[1.57]
GROWTH	0.0921*	0.0782***	0.0784***
	[3.36]	[4.11]	[4.50]
TANG	0.0813***	-0.0253	-0.0130
	[1.71]	[-0.56]	[-0.30]
GDP	0.0625	-0.2756	-0.2710
	[0.07]	[-0.45]	[-0.47]
INFL	-0.001	0.0502	0.0486
	[-0.01]	[0.63]	[0.64]
CAL	-0.0112***	-0.0121***	-0.0120***
	[-2.02]	[-3.62]	[-3.66]
_cons	0.1737	0.2717	0.2339*
	[1.37]	[1.24]	[1.82]
N	**198**	**198**	**198**
R-sq	**0.2905**	**0.3038**	**0.3029**
Prob>F		**0.0000**	
Hausman Prob>chi2		**0.9952**	

Note: *, **, *** correspond to the significance level of 10%, 5%, 1%

Through the F test, it is found that Prob >F = 0.0000 $<\alpha = 5\%$, so at 5% significance level reject H0. Thus, with the collected data, the choice of FEM method is appropriate. After choosing FEM method instead of OLS method, the study turns to estimate panel data based on FEM and REM methods, Hausman test gives the result Prob>chi2 = 0.9952 $>\alpha = 5\%$, therefore the REM method is more suitable than the FEM method.

Thus the REM method is the best choice.

4.4.2 *Regression model based on dependent variable ROA*

Table 6: Model results with dependent variable ROE. Source: own research

ROE	**OLS**	**FEM**	**REM**
SIZE	-0.0126	-.0276	-0.0111
	[-0.93]	[-0.58]	[-0.54]
ARC	-0.0006	0.0005	0.0002
	[-1.34]	[1.03]	[0.51]
DE	0.0188	0.0207	0.0163
	[1.11]	[1.19]	[1.01]
CR	0.0209	0.0057	0.0086
	[1.60]	[0.47]	[0.74]
RISK	0.0169	0.0136	0.0151
	[1.32]	[1.01]	[1.18]
GROWTH	0.1552***	0.1377***	0.1345***
	[2.71]	[2.77]	[2.99]
TANG	0.0363	-0.1351	-0.0941
	[0.37]	[-1.13]	[-0.86]
GDP	1.8110	1.3705	1.2766
	[0.94]	[0.84]	[0.87]
INFL	0.0031	0.0763	0.0812
	[0.01]	[0.36]	[0.41]
CAL	-0.0191*	-0.0208**	-0.0207**
	[-1.65]	[-2.37]	[-2.40]
_cons	0.3334	0.6513	0.4225
	[1.26]	[1.13]	[1.52]
N	**198**	**198**	**198**
R-sq	**0.0986**	**0.1322**	**0.1322**
Prob>F		**0.0000**	
Hausman Prob>chi2		**0.9799**	

Note: *, **, *** correspond to the significance level of 10%, 5%, 1%

Through the F test, it is found that Prob >F = 0.0000 <α = 5%, so at 5% significance level reject H0. Thus, with the collected data, the choice of FEM method is appropriate. After choosing FEM method instead of OLS method, the study turns to estimate panel data based on FEM and REM methods, Hausman test gives the result Prob>chi2 =

0.9799 $>\alpha = 5\%$, therefore The REM method is more suitable than the FEM method. Thus, the REM method is the best choice.

4.4.3 *Check the regression results*

Variance test
To test the variance in the model, the author uses Breusch-pagan Lagrangian Multiplier test. With the hypothesis: H_0: There is no phenomenon of variance change; H_1: There is a phenomenon of variance. If the test result for P_value is small (less than 0.05), reject hypothesis H_0, accept hypothesis H_1.

Table 7: Variance test for the REM method. Source: own research

Test model	**Dependent variable**	**P_value**	**Variation phenomenon**
Model (1)	ROA	0.0000	There is a phenomenon of variance
Model (2)	ROE	0.0000	There is a phenomenon of variance

The test results from Table 7 show that the P_values of both models are less than 0.05, thus rejecting the H_0 hypothesis, accepting the H1 hypothesis. That is, at 5% significance level, the method of running the REM model occurs the phenomenon of variance in both models (1) and (2).

Autocorrelation test
To check the autocorrelation phenomenon in the model, the author uses Wooldridge test. With the hypothesis: H_0: No autocorrelation phenomenon; H_1: There is autocorrelation. If the test results show P_value <5%, reject hypothesis H_0 and accept hypothesis H_1.

Table 8: Autocorrelation test

Test model	**Dependent variable**	**P_value**	**Variation phenomenon**
Model (1)	ROA	0.6703	There is a phenomenon of variance
Model (2)	ROE	0.5824	There is a phenomenon of variance

The test results from Table 8 show that the P_value of both models is greater than 0.05, so we accept the hypothesis H_0 and reject the hypothesis H_1 which means that at the significance level of 5% the variables in the model do not occur autocorrelation.

Endogenous test between variables
To test the endogenous phenomenon, the author uses the Durbin - Wu - Hausman (DWH) test. With the hypothesis: H_0: There is no endogenous phenomenon; H_1: There is an endogenous phenomenon. If the test results show P_value <5%, reject hypothesis H_0 and accept hypothesis H_1.

Table 9: Endogenous test with dependent variable ROA. Source: own research

Variable name	**P_value**	**Endogenous phenomenon**
SIZE	0.0000	There is an endogenous phenomenon
ARC	0.2310	Not detected
DE	0.4208	Not detected
CR	0.3146	Not detected
RISK	0.1728	Not detected
GROWTH	0.1575	Not detected
TANG	0.8085	Not detected
GDP	0.6932	Not detected
INFL	0.3714	Not detected
CAL	0.8026	Not detected

The results of the endogenous test with the ROA dependent variable in Table 9 show that there is an endogenous SIZE variable at the 5% significance level.

Table 10: Endogenous test with dependent variable ROE

Variable name	**P_value**	**Endogenous phenomenon**
SIZE	0.0000	There is an endogenous phenomenon
ARC	0.2072	Not detected
DE	0.0064	There is an endogenous phenomenon
CR	0.5829	Not detected
RISK	0.3017	Not detected
GROWTH	0.0170	There is an endogenous phenomenon
TANG	0.4616	Not detected
GDP	0.9627	Not detected
INFL	0.3505	Not detected
CAL	0.5487	Not detected

The results of the endogenous test with the dependent variable ROE in Table 10 show that there are endogenous variables SIZE, DE, and GROWTH at 5% significance level.

4.5 Regression analysis by GMM method

Inspection result

The results of the Sargan test show that there is no endogenous phenomenon occurring in the model. Because the P_values of Sargan's test are all greater than $\alpha = 1\%$, it shows that the hypothesis H0 that the variables are exogenous is accepted at the 1% significance level. Besides, the results of Arellano-Bond AR (2) autocorrelation test with both P_values greater than $\alpha = 1\%$ also show that there is no autocorrelation phenomenon occurring at all levels of the model with the significance level means 1%.

In GMM the instrumental variables are evaluated as efficient using the Sargan and AR (2) tests. The results of these tests are not statistically significant, showing that the

GMM model does not have order 2 autocorrelation and the instrumental variables are suitable to ensure that they are exogenous variables in the model.

Regression result

Table 11: Regression results with dependent variable ROA, ROE. Source: own research

Regression results with dependent variable ROA		**Regression results with dependent variable ROE**	
ROA	**GMM**	**ROE**	**GMM**
ROA_{t-1}	0.4039***	ROE_{t-1}	0.3888***
	[4.55]		[4.3]
SIZE	0.1567**	SIZE	0.2827*
	[2.50]		[1.80]
ARC	-0.0002	ARC	-0.0002
	[0.78]		[-0.24]
DE	-0.0776***	DE	-0.1640**
	[-3.44]		[-2.90]
CR	-0.0030	CR	-0.0457
	[-0.24]		[-1.46]
RISK	0.0116	RISK	0.0323*
	[1.60]		[1.76]
GROWTH	0.0322	GROWTH	0.0301
	[1.03]		[0.37]
TANG	0.0942	TANG	0.0684
	[0.94]		[0.27]
GDP	-7.3857***	GDP	-13.2943***
	[-4.17]		[-3.07]
INFL	-1.2888***	INFL	-3.0240***
	[-3.84]		[-3.60]
CAL	-0.0127***	CAL	-0.0194**
	[-3.56]		[-2.16]
N	**198**	**N**	**198**
Sargan test	**0.334**	**Sargan test**	**0.180**
Self-regression order 2 – AR (2)	**0.415**	**Self-regression order 2 – AR (2)**	**0.071**

Note: *, **, *** correspond to the significance level of 10%, 5%, 1%

After selecting the model and overcoming the defects, the author considers the regression results of Table 11 to test the research hypotheses.

Table 12: Summary of hypothesis testing results. Source: own research

	Hypothesis	**Inspection results**
H_1	Firm size positively affects profitability of food companies listed on Vietnam's stock market	Accept
H_2	Leverage negatively affects profitability of food companies listed on Vietnam stock market.	Accept
H_3	Average collection period negatively affects profitability of food industry companies listed on Vietnam stock market.	Rejected
H_4	Current solvency has a negative effect on profitability of food companies listed on Vietnam stock market.	Rejected
H_5	Risk affects the profitability of food companies listed on the Vietnamese stock market in the same direction.	Accept
H_6	Enterprise growth rate has a positive influence on profitability of food companies listed on Vietnam's stock market.	Rejected
H_7	Tangible fixed assets have a positive effect on profitability of food industry companies listed on Vietnam's stock market.	Rejected
H_8	Economic growth rate negatively affects profitability of food industry companies listed on Vietnam stock market.	Accept
H_9	Inflation negatively affects the profitability of food companies listed on Vietnam's stock market	Accept
H_{10}	Calamity negatively affects profitability of food companies listed on Vietnam's stock market	Accept
H_{11}	Past profitability has a positive influence on profitability of food companies listed on Vietnam stock market.	Accept

Thus, the signs of the variables SIZE, DE, GDP, CAL, RISK, INFL, ROA_{t-1}, ROE_{t-1} are consistent with the original hypothesis; in which variables SIZE, RISK, ROA_{t-1}, ROE_{t-1} positively affect the profitability of food companies listed on Vietnam's stock market; variables DE, GDP, and CAL negatively affect the profitability of food companies listed on Vietnam's stock market. Variables CR, ARC, GROWTH, TANG are not significant in GMM regression method.

4.6 Discussion of research results

Enterprise size

According to GMM regression results, in the period from 2011-2019, firm size positively

affects the profitability of food industry companies listed on Vietnam's stock market. In fact, large-scale enterprises will have advantages in capital, factories, and warehouses and have more opportunities for efficient production and business than small-scale enterprises. The larger the scale, the more reputable the business is in the market, investors and customers will put more faith in investment and consumption, especially for the food industry, where products are mainly essential goods, necessary for daily life.

Lever
According to GMM regression results, in the period from 2011-2019, leverage has a negative impact on profitability of food companies listed on Vietnam's stock market. If total assets are not able to generate a large enough rate of return to cover the interest expenses payable, the after-tax return on equity is reduced; because the profit made by the owner must be used to cover the shortfall in interest payable. As a result, the income of the remaining dollar of equity will be very little compared to the money they should be entitled to. Indeed, it can be seen that food businesses have not yet promoted financial leverage by using debt capital.

Average collection period
According to GMM regression results, in the period from 2011-2019, the average collection period has no effect on the profitability of food companies listed on the stock market. It can be seen that the average collection period of listed food companies is quite small, ranging from 21 days to 32 days and there is not much change during the research period; this proves that the debt collection ability of enterprises is good and stable over the years.

Current solvency
According to GMM regression results, in the period from 2011-2019, current solvency does not affect the profitability of food companies listed on the Vietnamese stock market. From the research situation, it is found that the current solvency ratio of enterprises in the whole period is quite stable and at a relatively high level (the average liquidity ratio is greater than 2 times), with very little volatility over the years, proving that food companies listed on Vietnam's stock market are large enterprises with good potential and easy access to capital, so they are less affected by issues of liquidity as small and medium enterprises.

Risk
According to GMM regression results, in the period from 2011-2019, risks have a positive impact on profitability of food companies listed on Vietnam's stock market. The occurrence of risks can make the business less effective, but if the enterprise can predict them, then it can take steps to exploit the risks from the outset to operate effectively. In addition, the higher the risk, the greater the profit.

Business growth rate
According to GMM regression results, in the period from 2011-2019, the growth rate has no effect on the profitability of the food industry companies listed on the stock market.

In fact, during the Investigation, the company's growth rate fluctuated between years was relatively low, and there was not much fluctuation.

Investing in fixed assets
According to GMM regression results, in the period from 2011-2019, fixed asset investment has a positive impact on profitability, but there is no statistical significance in the model. The food businesses under study have the average proportion of fixed assets to total assets, in the period from 2011-2019, accounting for no more than 30% and there is not much fluctuation. It shows that for enterprises in the food industry, fixed assets investment is not too large, usually a one-time investment and is less prone to obsolescence.

Economic growth rate
According to GMM regression results, in the period from 2011-2019, the economic growth rate negatively affected the profitability of food industry enterprises listed on the Vietnam stock market. The increased economic growth leads to competition among businesses, along with the appearance of more and more substitute products; besides the market for food and drink in Vietnam is very promising and has been attracting foreign enterprises to participate in the production expansion. This has become a big challenge for domestic enterprises.

Inflationary
According to GMM regression results, in the period from 2011-2019, inflation negatively affected the profitability of food industry enterprises listed on Vietnam's stock market. When inflation is high, prices escalate, the price of input materials for production will increase, leading to higher product prices than expected. The rising prices of all kinds of goods cause a lot of difficulties for businesses. High inflation will make production and business activities more difficult, leading to a decrease in profits or inflation has a negative relationship with the profitability of enterprises.

Calamity
According to GMM regression results, in the period from 2011-2019, calamity negatively impacted the profitability of food industry enterprises listed on Vietnam's stock market. In terms of geographical features, Vietnam is a country located in the tropical monsoon region, which is hot, humid and rainy, and is influenced by both oceanic and continental climate. In addition, Vietnam is one of the countries heavily affected by the Asia-Pacific typhoon, one of the six major hurricanes in the world, so it often faces many types of natural disasters. Every year, natural disasters cause great damage to people and property. In particular, Vietnam is a large country in the production and processing of agricultural products, and these food businesses are the subjects that suffer the most from calamity.

Past profitability
According to GMM regression results, in the period from 2011-2019, past profitability had a positive impact on the profitability of food companies listed on the Vietnamese

stock market. When the business has performed well in the past by generating high profits, that leads to the increased profitability over the years, this will be a positive basis for the current year's profitability.

5 Conclusion

Increasing profitability is an important issue for businesses. Finding out the factors affecting the profitability of enterprises that helps business managers and investors can be evaluated and selected the model most suitable depending on their purposes. In addition, relevant policies are introduced to gradually improve profitability and enterprise value. Based on the above, the author described and analyzed the status of profitability along with internal and macro factors affecting the profitability of food companies listed on the Vietnamese stock market in the period 2011-2019. The results from the regression model show that the size, risk, and profitability in the past have a positive influence on the profitability of food industry companies listed on the Vietnamese market. Leverage, economic growth rate, inflation, and calamity negatively affect the profitability of food companies listed on Vietnam's stock market. The average collection period, current solvency, tangible fixed assets and business growth rate are not statistically significant in the model.

From determining the factors affecting profitability, based on the specific characteristics of the food industry, the author proposes solutions to improve the profitability of the listed food companies on the Vietnam stock market. For food businesses: it is necessary to consider expanding the appropriate scale; building a reasonable and flexible capital structure in the process of using debt; strengthen risk management very well, especially in cash flow management; focus on increasing profitability, propose specific measures to enhance competitiveness, increase revenue, reduce costs in order to increase net profit margin. For the government and authorities: it is necessary to take measures to support and promote businesses in the food industry to develop; curb inflation, ensure the balance between supply and demand for goods; disaster prevention, control and proactively responding to dangerous situations.

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