# Key Factors Impacting Business Performance an Investigation of Firms in Vietnam

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**Abstracts:** This study examines factors affecting company performance on the Ho Chi Minh Stock Exchange from 2008 to 2020, analyzing internal and external variables, including the Covid-19 pandemic's impact. Using data from 40 firms and macroeconomic indicators, advanced econometric models identify key determinants of Return on Assets (ROA). Findings suggest financial leverage and operating leverage enhance ROA, while asset size and consumer inflation have mixed effects. Industrial production positively correlates with ROA, whereas the pandemic negatively impacts corporate performance. These insights inform strategic management and policy-making for economic resilience.

**Keywords:** Financial Performance, Joint Stock Companies, HOSE, Leverage; ROA, Stock Market Pricing.

## 1. INTRODUCTION

The economic landscape of Vietnam has undergone significant transformations, shifting from a centrally planned economy to a vibrant market-driven one. This transition has catalyzed substantial economic growth, political stability, and a gradual integration into the global economy, marking Vietnam's ascent as a significant player in the Southeast Asian region. Central to this progress is the pivotal role of Vietnamese firms, whose performance is heavily influenced by both internal operational strategies and external economic policies formulated by the government.

In this dynamic context, the financial and economic frameworks set by the government aim primarily at enhancing the business performance of firms. These policies are crucial, especially in an era marked by global challenges such as the COVID-19 pandemic, which has introduced new complexities in the business environment. The pandemic's impact, characterized by necessary social distancing measures, has severely affected global economic activities, presenting unique challenges and opportunities for Vietnamese firms. As such, this thesis seeks to explore the myriad factors that influence the performance of firms listed on the Ho Chi Minh City Stock Exchange (HOSE) during these unprecedented times.

The Vietnamese government's swift policy responses to these economic disruptions have underscored the resilience of the Vietnamese market. Despite the global downturn, Vietnam has exhibited remarkable economic resilience, managing to sustain and even grow its Gross Domestic Product (GDP) during the first quarter of 2020 by 3.4% compared to the same period in the previous year. This growth has been largely fueled by Vietnam’s strategic emphasis on export diversification and capturing new markets, particularly in the face of shifting global trade dynamics.

This study sets the stage for a comprehensive investigation into the key factors that impact the business performance of Vietnamese firms amidst these evolving economic and social conditions. By examining the interplay between internal company dynamics and broader macroeconomic policies, this study aims to provide insightful contributions to both academic research and practical policy-making, ultimately supporting the sustainable development of Vietnam's economy.

## 2. LITERATURE REVIEW

### 2.1. Operational Definitions

**Internal Factor Financial Indicators:** Financial leverage impacts fixed costs through borrowing, while revenue comes from sales activities, reflected in net sales on the income statement. Operating costs, include selling, administration and management expenses; lower ratios of these costs improve management efficiency. Total assets shown on the balance sheet indicate business size and growth as assets increase. Externally, Vietnam's GDP and CPI, from the General Statistics Office, reflect economic growth and inflation, with a high CPI suggesting rising prices.

**External Factors** are macro-financial indicators such as GDP, CPI, inflation and bank interest rates.

**Moderating Factors** are events that have taken place in recent times such as the covid-19 epidemic, social distancing, immigration restrictions.

When the Covid pandemic took place, social distancing was implemented, spontaneous markets and non-essential shops and services were closed. This made the circulation of goods in the economy slower and more difficult - leading to the topline of the business being affected.

### 2.2. The Broader Definitions

**Definitions of Short-Run Returns on Business Performance**

The short-run return on firm-level business performance $\left(R_{i,t}^{s}\right)$ is defined as the marginal return on $i^{th}$ firm business performance at time $t$ to reflect the change in that firm's return on total accumulated revenues or sales in whole process of $i^{th}$ firm operating.

The short-run return on industrial-level business performance $\left(\bar{R}_{j,t}^{s}\right)$ is defined as the marginal return on $j^{th}$ industrial business performance at time $t$ to reflect the change in that industry's return on total accumulated revenues or sales in whole process of industrial operating. On the other hand, it could be considered as an average spatial productivity of whole firms' business performance in $j^{th}$ industry.

**Definitions of Long-Run Returns On Business Performance**

The long-run return on firm-level business performance $\left(r_{i,t}^{s}\right)$ is defined as the accumulated return on $i^{th}$ firm business performance at time $t$ to reflect the productivity of $i^{th}$ firm returns on total accumulated revenues or sales in whole process of $i^{th}$ firm operating.

The long-run return on industrial-level business performance $\left(\bar{r}_{j,t}^{s}\right)$ is defined as the accumulated return on $j^{th}$ industrial business performance at time $t$ to reflect the productivity of $j^{th}$ industrial returns on total accumulated revenues or sales in whole process of $j^{th}$ industrial operating.

These values are used in the formulae and ratios described in the next section.

### 2.3. Specific Definitions

#### Economic Value Added (EVA)

Economic value added (EVA) was developed by Stern Stewart & Co. in 1989 and measures business performance in terms of required returns. Grant (1996), Young (1997) is the person to give a basic definition that the EVA equals the operating profits minus capital charges on income statement, then the EVA is the amount of remaining profits after tax deducting capital charges for the firm business performance. This is a traditional approach on the explanation of accounting to determine the short-run EVA at each time.

$$EVA_{i,t} = NOPAT_{i,t} - \$WACC_{i,t},$$

where $EVA_{i,t}$ is the short-run EVA, $NOPAT_{i,t}$ is the net operating profits after tax income, and $\$WACC_{i,t}$ is the capital charges after tax income of firm $i$ at time $t$. Because the elements of EVA in the formula (1) arise at each time on income statement, the EVA is considered as the short-run value added measurement. De Villiers (1997), Rogerson (1997), Turvey et al. (2000), Shrieves and Wachowicz (2001), Abate et al. (2004), Palliam (2006) modify this basic definition on the tax shield of interest rate that the EVA is the value added to shareholders by the management defined as:

$$EVA_{i,t} = EBIT_{i,t}(1-T) - (E_{i,t} + D_{i,t})WACC_{i,t}, \text{ or}$$

$$EVA_{i,t} = EBIT_{i,t}(1-T) - \left[E_{i,t}R_{e\,i,t} + D_{i,t}R_{d\,i,t}(1-T)\right],$$

where $EBIT_{i,t}$ is the earning before interests and tax income, $R_{e\,i,t}$ is the equity cost with the market value of equity $E_{i,t}$, and $R_{d\,i,t}$ is the interest rate with remaining debt $D_{i,t}$ of firm $i$ at time $t$.

#### Return on Total Assets (ROA)

According to leading authors like Damodaran (2021) and Arnold (2023), return on total assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. And, ROA is calculated by dividing a company's net income by total assets. The formula at firm-level would be expressed as:

$$ROA_{i,t} = \frac{NI_{i,t}}{TA_{i,t}},$$

where $ROA_{i,t}$ is return on total assets of $i^{th}$ firm at time $t$, $NI_{i,t}$ is net income of $i^{th}$ firm at time $t$, and $TA_{i,t}$ is total assets of $i^{th}$ firm at time $t$. However, some limitation of ROA could not be used to calculate over time, because the ROA is a ratio without real weights to expose some inconsistency for return if the ROA denominator of total assets (TA) in balance statement is easily changed over time by normal factors of reinvestment, expanding production, etc. and it does not belong to the flows of business performance for the ROA numerator of net income (NI) in income statement.

#### Return on Sales (ROS)

According to Investopedia, return on sales (ROS) is a ratio used to evaluate a company's operational efficiency. This measure provides insight into how much profit is being produced per dollar of sales. An increasing ROS indicates that a company is growing more efficiently, while a decreasing ROS could signal impending financial troubles due to declining margins. As the formula of firm-level, it would be expressed as:

$$ROS_{i,t} = \frac{EBIT_{i,t}}{REV_{i,t}},$$

where $ROS_{i,t}$ is return on sales of $i^{th}$ firm at time $t$, $EBIT_{i,t}$ is operating profits as earnings before interest and tax of $i^{th}$ firm at time $t$, and $REV_{i,t}$ is net revenues of $i^{th}$ firm at time $t$. Return on sales (ROS) should only be used to compare companies that operate in the same industry but it could not exploit the consequent of real inflows and outflows on $i^{th}$ firm business performance, because it only stands for one-period return on firm business performance.

Moreover, the ROS numerator of EBIT could replace EBITDA (earnings before interest, taxes, depreciation and amortization), to consider total of firm business performance, but it only stands for one-period return on total of firm business performance, so that it could not reflect the long-run return on firm business performance unless measured in a time series.

**Earnings Per Share (EPS)**

According to Investopedia, earnings per share (EPS) is calculated as a company's profit divided by the outstanding shares of its common stock. The resulting number serves as an indicator of a company's bottom line profitability. It is common for a company to report EPS that is adjusted for extraordinary items and potential share dilution. The higher a company's EPS, the more profitable it is considered to be. The formula at firm-level is:

$$EPS_{i,t} = \frac{NI_{i,t} - Div^{p}_{i,t}}{Q_{i,t}},$$

where $EPS_{i,t}$ is earnings per share of $i^{th}$ firm at time $t$, $NI_{i,t}$ is net income of $i^{th}$ firm at time $t$, $Div^{p}_{i,t}$ is preferred-stock dividends of $i^{th}$ firm at time $t$, and $Q_{i,t}$ is common-stock outstanding of $i^{th}$ firm at time $t$. However, the measurement of firm business performance based on common-stock outstanding is inconsistent when that firm gives some policies of equity budgeting for the split of common stocks, the added issues of shared equity.

**2.4. Fundamental Theories**

**Economic Value Added (EVA) for Firm Business Performance**

According to Brigham and Houston (2003, p. 58), the determinant of $(E_{i,t} + D_{i,t})$ is equal to total investor minus supplied operating capital, to reflect the sum of interest-bearing debt, preferred stocks, and common stocks used to acquire firm’s net operating assets.

Moreover, the Economic Value Added (EVA) index, developed in the 1990s, draws on investment theory and financial market behavior but faces challenges in assessing long-term value due to its reliance on the Net Present Value (NPV) method for annual firm performance evaluation. For a more sustainable assessment, models considering the present value of expected long-term cash flows, discounted for risk, or those evaluating the operating value of sold assets over the firm's lifecycle using a reverse discount rate, may be more appropriate. These alternatives provide a more consistent measure of business performance.

**The Theory Of Investor Behavior On Capital Market For Exploration Of External Factors On Firm Business Performance**

The calculation of equity cost in the Economic Value Added (EVA) framework using the theoretical CAPM model. This model computes based on the risk-free rate, stock market's risk return, and the stock's risk coefficient, but it inaccurately determines the actual market value of equity for EVA cash flows due to the lack of actual structural balance. According to capital market tradeoff theory by Sharpe (1964), Lintner (1965) and Fama (1965), stock

returns are divided into two parts: risk return based on stock market volatility and risk-free return based on bond market interest rates. This classification is effective when the expected return from the stock market is higher than the bond interest rates.

**The Theory Of Investment For Exploration Of External Factors On Firm Business Performance**

Modigliani and Miller's seminal 1958 investment theory introduced pivotal concepts about capital cost and financial leverage, particularly concerning Economic Value Added (EVA) and its impact on firm market value. The theory critiques traditional models like the Discounted Cash Flow (DCF) and Dividend Discount Model (DDM), pointing out their limitations due to uncertain future cash flows and variable interest rates. It suggests that these models fail to accurately reconcile capital and equity costs with dividends, thus affecting equity pricing. The theory emphasizes the importance of the Internal Rate of Return (IRR) at the break-even point, where Net Present Value (NPV) is zero. Given the unreliability of stock prices to determine a universal break-even point, the theory advocates for a more practical examination of actual cash flows in the stock market to achieve a realistic valuation. Additionally, it notes that the Ordinary Least Squares (OLS) method in econometrics does not effectively overcome these discrepancies in stock return calculations, necessitating a reevaluation of investment valuation methods to better reflect market realities.

**Impact Of The Covid-19 Pandemic On Vietnamese Businesses Performance**

The Covid-19 pandemic significantly impacted Vietnamese businesses, leading to the cessation or dissolution of many, particularly in the first nine months of 2020 with 12,089 enterprises dissolving. Hard-hit sectors included accommodation and food services, education and training, employment and tourism services, and real estate. A survey by the Vietnamese General Statistics Office indicated that 85.7% of businesses experienced adverse effects due to the pandemic. Specific sectors like the aviation industry and hospitality services faced nearly complete impacts with over 90% of enterprises in textiles, garments, and electronics also heavily affected. Smaller enterprises and those with limited capital found it particularly challenging to withstand the economic downturn.

### 2.5. Theoretical Framework

#### 2.5.1. The Designment Of Returns On Firm Business Performance

2. Investment theory often uses the Dividend Discount Model (DDM) to estimate equity market value based on expected dividends, yet this approach can be imprecise due to uncertain future cash flows. This uncertainty can cause discrepancies between expected dividends and actual equity costs. Additionally, the divergence between book values, which represent total assets as recorded on balance sheets, and market values, which reflect traded or sold assets in income statements, suggests that Return on Assets (ROA) might not fully capture true business performance. This discrepancy prompts a reevaluation of ROA to include assets at both book value and market value for more accurate equity valuation. Moreover, Return on Sales (ROS) is noted for measuring short-term performance but lacks the ability to account for comprehensive business transactions over the long term (Anh, N.C, 2020).

#### 2.5.2. Short-run and long-run returns on firm business performance

The evaluation of firm business performance emphasizes long-run returns over short-run returns. Rappaport's shareholder value model (1983, 1987) highlights earnings per share as a key performance indicator for assessing the attractiveness of long-term corporate strategies. He posits that sustainable value creation involves investing in opportunities yielding returns above the cost of capital, driven by factors such as sales growth rate, operating profit margin, and capital investments. Rappaport further detailed in 2006 ten methods for enhancing shareholder value through strategic management decisions, including avoiding short-term earnings management, focusing on value-maximizing acquisitions, and rewarding executives based on long-term performance. Additionally, Renneboog and Vansteenkiste (2019) analyze the success and failure of mergers and acquisitions by examining market and business performance returns, highlighting inconsistencies in their measurement. Gauss’s numerical law of

dependence is suggested for refining the accuracy of calculating short-run and long-run returns. This approach advises financial analysts and researchers to reevaluate financial indices, particularly how returns based on total revenues relate to the total capital pricing on the balance statement.

**Table. Exchange of profits and returns on firm business performance**

| Items | | Methodology | |
|---|---|---|---|
| | | Gauss's dependence | Reverse discount rate |
| **Short-run firm business performance** | | | |
| Description | Net Profits | Returns | |
| Net profits before payment of interests and dividends at current time $t$ | $NOPAT_{i,t}$ | $R_{i,t}^{b} = \frac{NOPAT_{i,t}}{\sum_{\tau=1}^{t}(REV_{i,\tau} - NOPAT_{i,\tau})}$ | $R_{i,t}^{b} = \frac{NOPAT_{i,t}}{\sum_{\tau=1}^{t}\frac{REV_{i,\tau}}{\prod_{k=\tau}^{t}(1+R_{i,k}^{b})}}$ |
| Net profits after payment of interests and dividends at current time $t$ | $EVA_{i,t}$ | $R_{i,t}^{a} = \frac{EVA_{i,t}}{\sum_{\tau=1}^{t}(REV_{i,\tau} - EVA_{i,\tau})}$ | $R_{i,t}^{a} = \frac{EVA_{i,t}}{\sum_{\tau=1}^{t}\frac{REV_{i,\tau}}{\prod_{k=\tau}^{t}(1+R_{i,k}^{a})}}$ |
| **Long-run firm business performance** | | | |
| Description | Acc. Net Profits | Acc. Returns | |
| Accumulated net profits before payment of capital charges at current time $t$ | $\sum_{\tau=1}^{t} NOPAT_{i,\tau}$ | $r_{i,t}^{sb} = \frac{\sum_{\tau=1}^{t} NOPAT_{i,\tau}}{\sum_{\tau=1}^{t}(REV_{i,\tau} - NOPAT_{i,\tau})}$ | $r_{i,t}^{sb} = \frac{\sum_{\tau=1}^{t} NOPAT_{i,\tau}}{\sum_{\tau=1}^{t}\frac{REV_{i,\tau}}{\prod_{k=\tau}^{t}(1+R_{i,k}^{b})}}$ |
| Accumulated net profits after payment of capital charges at current time $t$ | $\sum_{\tau=1}^{t} EVA_{i,\tau}$ | $r_{i,t}^{sa} = \frac{\sum_{\tau=1}^{t} EVA_{i,\tau}}{\sum_{\tau=1}^{t}(REV_{i,\tau} - EVA_{i,\tau})}$ | $r_{i,t}^{sa} = \frac{\sum_{\tau=1}^{t} EVA_{i,\tau}}{\sum_{\tau=1}^{t}\frac{REV_{i,\tau}}{\prod_{k=\tau}^{t}(1+R_{i,k}^{a})}}$ |

(Source: Anh N.C & Khanh T.H.T, 2020)

### 2.5.3. A Proposed Model Of Firm Business Performance

This proposed model integrates elements from Rappaport's shareholder value models (1983, 1987, 2006) and the International Integrated Reporting Council's framework (2013) to assess factors affecting firm business performance, with an emphasis on internal and external influences. The model evaluates business performance using both short-run and long-run return metrics, including Return on Assets (ROA) and Return on Sales (ROS) for short-term assessment, and a more comprehensive long-run return measure to reflect sustained business productivity across different firm sizes. Key to this model is its adaptability in comparing firm performance within industries through a complex formula.

$$R_{i,t} - \bar{R}_{j,t} = \alpha + \beta_k \sum_{k=1}^{m} (X_{i,t} - \bar{X}_{j,t})_k + \delta g \sum_{g=1}^{p} M_t + \varepsilon_{i,t,}$$

Which incorporates a range of internal factors like financial leverage and asset growth, alongside external macroeconomic variables such as economic growth and inflation. The model's robustness is further enhanced by including moderating variables that account for financial leverage benefits and the operational years of the firm, allowing for a nuanced analysis of competitive advantages within industry contexts. And the proposed model of firm business performance in Vietnam is affected by independent variables and moderating variables as follows:

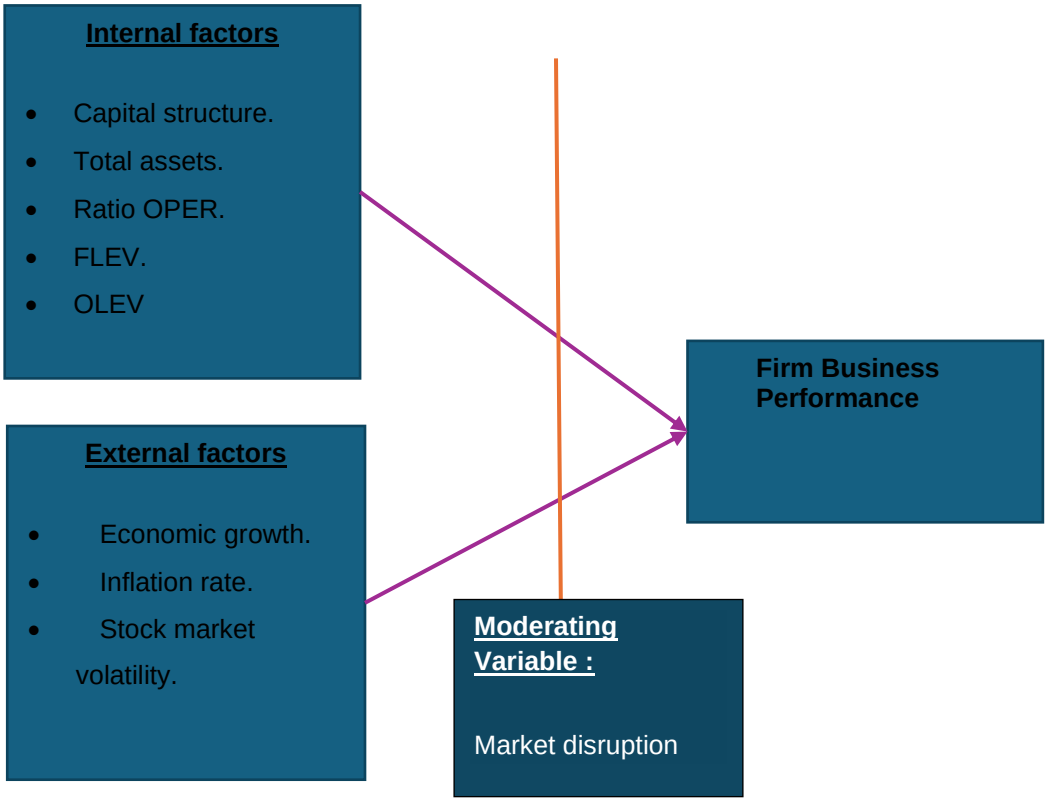


**Figure** - A Proposed Model of Research Framework to measure Firm Business Performance in Vietnam

### 2.6. Development of Hypotheses

The consideration of internal and external factors correlates with firm business performance to give suitable hypotheses for this research. First, internal factors are considered as exogenous variables to find out competitive advantages of $i^{th}$ firm in $j^{th}$ industry, including:

- $H_{1a}$: Capital structure of $i^{th}$ firm with firm business performance in Vietnam.

- $H_{1b}$: Total assets of $i^{th}$ firm affect $i^{th}$ firm business performance in Vietnam.

- $H_{1c}$: Ratio of operating cost (OPER) of $i^{th}$ firm affect negatively $i^{th}$ firm business performance in Vietnam.

- $H_{1d}$ : Ratio of Operating leverage (OLEV) of $i^{th}$ firm affect positively $i^{th}$ firm business performance in Vietnam.

Second, external factors of macro-variables are considered as exogenous variables over time that affect $i^{th}$ firm business performance, including:

- $H_{2a}$: Economic growth in Vietnam affects positively $i^{th}$ firm business performance in Vietnam.

- $H_{2b}$: Inflation rate in Vietnam affect negatively $i^{th}$ firm business performance in Vietnam.

- $H_{2c}$: Stock-market volatility in Vietnam affect positively $i^{th}$ firm business performance in Vietnam.

Although time bound, another moderating factor is events that have taken place in recent times such as the covid-19 epidemic.

## 3. DATA AND METHODOLOGY

### 3.1. The Study Design

1. Data from vietstock.vn, cophieu68.vn, and Asia Development Bank is collected and processed using Visual Basic in Excel to define variables for a proposed performance model, aiding specific research objectives.

2. The analysis uses panel data regression methods—Pooled-OLS, Fixed Effect, and Random Effect—based on Park (2011) to select the optimal approach. Incorporating panel data and two-stage least squares (2SLS) to address endogeneity in the model.

3. Final tests aim to integrate and extend prior research, establishing a cohesive understanding of financial implications for business performance in Vietnam.

### 3.2. Sampling Design

The proposed model of firm business performance in Vietnam uses the secondary data of financial statements, combining with macro-variables to find out internal and external factors on firm business performance. The selection of sampling design includes firms listed on Stock Exchange of Ho Chi Minh City (HOSE) to reflect almost firms' having financial ability and report responsibility.

### 3.3. Data Collection

Analytical framework uses data collected in financial statements within 12 years (from 2008 to 2020) of 40 randomly selected companies listed on the Ho Chi Minh City Stock Exchange (HOSE). Because by the time of the research (Q2 2021), during the covid epidemic, there were many difficult business enterprises that had not yet submitted their financial statements in 2020, only more than 75 enterprises published their financial statements continuously and updated to 2020 (10 years seniority). Therefore, this sample accounts for more than 50% of the total, so it is reliable.

### 3.4. Analysis and Findings

#### Descriptive Statistics

#### Summary Statistics Of Research Variables

**Table - Statistics and description variables**

| Variable | Obs | Mean | Std.Dev. | Min | Max |
|---|---|---|---|---|---|
| ROA | 520 | 7.2% | 9.6% | -64.6% | 79.1% |
| LNTA | 520 | 4.64 | 1.33 | 2.11 | 8.64 |
| LNREV | 520 | 4.60 | 1.22 | 1.66 | 8.27 |
| FLEV | 520 | 49.5% | 21.0% | -30.1% | 95.8% |
| OLEV | 520 | 17.8% | 13.4% | -150.2% | 51.1% |
| OPER | 520 | 9.1% | 7.3% | 0.3% | 70.5% |
| cLNTA | 520 | 0.40 | 1.44 | 0.00 | 8.64 |
| cLNREV | 520 | 0.38 | 1.39 | 0.00 | 8.27 |
| cFLEV | 520 | 3.7% | 14.4% | -26.6% | 92.1% |
| cOLEV | 520 | 1.2% | 4.9% | -8.9% | 46.7% |
| cOPER | 520 | 1.2% | 6.7% | 0.0% | 111.1% |
| bLNTA | 520 | 4.24 | 1.76 | 0.00 | 8.38 |
| bLNREV | 520 | 4.22 | 1.68 | 0.00 | 7.93 |

| | | | | | |
|---|---|---|---|---|---|
| bFLEV | 520 | 45.7% | 24.0% | -30.1% | 95.8% |
| bOLEV | 520 | 16.6% | 14.0% | -150.2% | 51.1% |
| bOPER | 520 | 12% | 11% | -26% | 142% |
| P | 520 | 0.71 | 0.84 | 0.00 | 5.68 |

**ROA** is the profit on total assets with an average value of 7.2% and a minimum value is -64.6% because there are loss-making businesses, typically TTF - Truong Thanh Furniture Corporation in 2019 is -47.6%; LAF - Long An Food Processing Export Joint Stock Company in 2012 is – 64.6%.

**OPER- operating cost on total revenues** is the operating cost with average value is 9.1%, small value is 0.3% and maximum value is 70.5%.

**FLEV - financial leverage** is a financial leverage with an average value of 49.5% and a minimum value of 30.1% belonging to TTF - Truong Thanh Furniture Corporation in 2019 equity is - 27.47 million USD and in 2020 is -25.42 million USD.

**P** (**price)** is the stock price of a last quarter with an average value of $0.71/share. In which the smallest value is 0 because a new listed business does not have a previous quarterly price to compare.

Data of 40 enterprises in the period from 2008 to 2020, are randomly selected from business listed on HOSE. The data is spread from groups of efficient business to group of inefficient business, so it is expected that this data is representative of the market.

**Correlation matrix**

**Table - Correlation matrix**

| | ROA | LNTA | LNREV | FLEV | OLEV | OPER | G | CPI | IIP | cLNREV | P | covid |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | 1.00 | | | | | | | | | | | |
| LNTA | 0.10 | 1.00 | | | | | | | | | | |
| LNREV | 0.23 | 0.86 | 1.00 | | | | | | | | | |
| FLEV | 0.49 | -0.08 | -0.08 | 1.00 | | | | | | | | |
| OLEV | 0.62 | 0.26 | 0.20 | 0.40 | 1.00 | | | | | | | |
| OPER | 0.05 | 0.22 | 0.05 | 0.19 | 0.32 | 1.00 | | | | | | |
| G | 0.04 | 0.00 | 0.01 | 0.01 | 0.01 | -0.03 | 1.00 | | | | | |
| CPI | 0.06 | -0.26 | -0.22 | 0.05 | 0.07 | -0.12 | -0.02 | 1.00 | | | | |
| IIP | 0.10 | -0.14 | -0.12 | 0.05 | 0.05 | -0.08 | 0.71 | 0.35 | 1.00 | | | |
| cLNREV | -0.04 | 0.19 | 0.18 | -0.02 | -0.02 | 0.09 | -0.78 | -0.17 | -0.46 | 1.00 | | |
| P | 0.31 | 0.32 | 0.35 | 0.27 | 0.41 | 0.39 | -0.04 | -0.32 | -0.13 | 0.25 | 1.00 | |
| Covid | -0.06 | 0.12 | 0.09 | -0.01 | -0.05 | 0.08 | -0.81 | -0.18 | -0.48 | 0.96 | 0.21 | 1.00 |

Most variables have a positive correlation with ROA, the strongest correlation being **OLEV-Operating leverage** with a correlation is 0.62, followed by **FLEV - financial leverage** with a correlation is 0.49 and P **- price** with a correlation is 0.315. Also, there are negative correlation variables such as covid has a correlation is -0.064 and cLNREV (cLNREV is the revenue of the 2020 covid)

**Regression POOLED-OLS**

The POOLED-OLS model is also the OLS model when we use a tabular data as a normal cloud data. That means it does not distinguish by year and by object. Therefore, the regression result has many limitations in analyzing

tabular data. However, the model is still the classical model that is used as a basic to confirm the relationship between Dependent variable and independent variable.

**Table 3.9. The Results of Regression Pool -OLS**

| POOLED - OLS | | |
|---|---|---|
| VARIABLES | ROA | |
| | Coef. | Std. Err. |
| LNTA | -0.0337*** | 0.00454 |
| LNREV | 0.0453*** | 0.00486 |
| FLEV | 0.135*** | 0.0151 |
| OLEV | 0.372*** | 0.0264 |
| OPER | -0.134*** | 0.0451 |
| CPI | -1.745** | 0.729 |
| IIP | -0.105* | 0.0606 |
| P | 0.526*** | 0.177 |
| cLNREV | -0.00848** | 0.00423 |
| G | 0.00392 | 0.00460 |
| Constant | -0.0339 | 0.0361 |
| Observations | **520** | |
| R-squared | **0.568** | |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Beta coefficient of LnTA = -0.337 this shows that total assets have a negative relationship with ROA. This is shown through the financial formula

**ROA = Profit / total assets = Net Income / total asset**

Beta **LNREV** = 0.0453 has a positive relationship with ROA, because as Revenue increases, while other variables remain unchanged, ROA also increases accordingly.

**FLEV- financial leverage** is a financial structure calculated by Equity / Total asset with a coefficient of Beta = 0.135, that means the Equity increases, then ROA will increase accordingly.

**OLEV-Operating leverage** is GrossProfit / Revenue. OLEV with a coefficient of Beta =0.372, that means Gross Profit / Revenue increases then ROA will increase.

**OPER- operating cost on total revenues** is the ratio of operating expenses to sales and it is calculated by the formula (sales expenses + administrative expenses)/Sales. So, Beta OPER = - 0.134, this means that this ratio increases more, ROA decreases accordingly.

**The Multi-collinearity tests**

Multicollinearity test is the phenomenon that the independent variables in the model have an interdependence relationship. The occurrence of this phenomenon will lead to the OLS 's estimates and the standard error becoming extremely sensitive to any small variation in the data, This will males the estimates of confidence interval not accurate. Therefore, the researcher used the multicollinearity test by using the Vif function to determine whether the model has multicollinearity or not.

**Table - The Results of *Multi-collinearity test***

| Variable | VIF | 1/VIF |
|---|---|---|
| **G** | 8.04 | 0.12 |
| **LNTA** | 4.70 | 0.21 |
| **LNREV** | 4.55 | 0.22 |
| **cLNREV** | 4.44 | 0.23 |
| **IIP** | 3.87 | 0.26 |
| **CPI** | 1.90 | 0.53 |
| **P** | 1.90 | 0.53 |
| **OLEV** | 1.61 | 0.62 |
| **OPER** | 1.40 | 0.71 |
| **FLEV** | 1.29 | 0.77 |
| **MeanVIF** | **3.37** | |

Variance Inflation Factor (VIF) of all independent variables in the model is less than 10, so multicollinearity is considered as non-serious multicollinearity.

**Test of Heroskedasticity**

This is one of the important assumptions in the performance of multivariable linear regression testing. It is also an assumption of constant error variance (also known as uniform variance). If the phenomenon of heteroskedasticity occurs, the results of the regression equation, that was used the OLS method, is not accurate, leading to the result of evaluation will easily be mistaken about the quality of the regression equation.

Thus, to consider if there is the existence of the phenomenon of heteroskedasticity, the researcher will perform inspection the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity with hypothesis:

**$H_0$: Not detected** heteroskedasticity

**$H_1$: detected** heteroskedasticity

**Breusch-Pagan / Cook-Weisberg test for heteroskedasticity**

**Ho: Constant variance**

**Variables: fitted values of ROA**

chi2(1) = 43.91

Prob > chi2 = 0.0000

With Significance α = 5%, the Breusch-Pagan / Cook-Weisberg test gives the result Prob = 0.0000

Thus, Prob < α should reject the hypothesis: $H_0$ and accept the hypothesis: $H_1$infer that the model has heteroskedasticity with significance = 5%.

**Fixed Effect Model (FEM)**

The Fixed Effect Model (FEM), the residual (standard errors between the forecast model and the actual value) of the linear regression model is separated into 2 components ($u_{it} = \mu_i + \varepsilon_{it}$). The component $\mu_i$ represents unobservable factors that vary between subjects but do not change over time. The component $\varepsilon_{it}$ represents unobservable factors that vary between subjects and change over time.

**Table. The Results of Fixed Effect Model (FEM)**

| FIXED EFFECTS MODEL | | |
|---|---|---|
| **VARIABLES** | **ROA** | |
| | Coef. | Std. Err. |
| LNTA | -0.0507*** | 0.0111 |
| LNREV | 0.0446*** | 0.00980 |
| FLEV | 0.153*** | 0.0288 |
| OLEV | 0.351*** | 0.0293 |
| OPER | -0.00128 | 0.0651 |
| G | -0.932 | 0.800 |
| CPI | -0.126** | 0.0591 |
| IIP | 0.349* | 0.187 |
| Clnrev | -0.00429 | 0.00467 |
| P | 0.00602 | 0.00567 |
| Constant | -0.00401 | 0.0421 |

| | | |
|---|---|---|
| **Observations** | **520** | |
| **Number of name** | **40** | |
| **R-squared** | **Within** | **0.398** |
| | **Between** | **0.6825** |
| | **Overall** | **0.5128** |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**The meaning of the regression coefficient**

Beta of **LnTA** = (-0.0507) shows that Total asset has an inverse relationship with ROA and this is through the following financial formula:

**ROA = Net incomes / total asset**

Beta **LNREV** = 0.0446 has a positive relationship with ROA, Net incomes increase and the others constant then ROA also increase accordingly.

**FLEV** is the **financial leverage, FLEV =** Equity/ Total asset with

Beta = 0.153, that means Equity increases then ROA increases.

**CPI- consumer price index** has an inverse effect to ROA of a business. Beta CPI = - 0.126, that means CPI increases 1% then ROA will decrease 0.126%.

**OLEV-Operating leverage** is GrossProfit /Revenue). OLEV with Beta =0.351, that means Gross Profit / Revenue increases then ROA also increases accordingly.

**IIP - Index of industrial production** has a positive effect to ROA of a business. Beta **IIP = 0.349, that means IIP** increase 1% then ROA of the business will increase 0.349%.

**Heteroskedasticity Test**

This is one of the important assumptions in the performance of multivariable linear regression testing. It is also an assumption of constant error variance (also known as uniform variance). If the phenomenon of heteroskedasticity occurs, the results of the regression equation, that was used the FEM method, is not accurate, leading to the result of evaluation will easily be mistaken about the quality of the regression equation.

Thus, to consider if there is the existence of the phenomenon of heteroskedasticity, the researcher will perform inspection **Modified Wald test for groupwise heteroskedasticity** with the hypothesis:

**$H_0$: Not detected heteroskedasticity**

**$H_1$: detected** heteroskedasticity

**Modified Wald test for groupwise heteroskedasticity in fixed effect regression model**

**H0: sigma(i)^2 = sigma^2 for all i**

chi2 (40) = 19780.56

Prob>chi2 = 0.0000

With Significance α = 5%, the Wald test gives the result Prob = 0.0000

Thus, Prob < α should reject the hypothesis: $H_0$ and accept the hypothesis: $H_1$infer that the model has heteroskedasticity with significance = 5%.

**Random Effect Model (REM)**

The Random Effect Model (REM), the residual (standard errors between the forecast model and the actual value) of the linear regression model is separated into 2 components ($\boldsymbol{u_{it} = \mu_{it} + \varepsilon_{it}}$). The component $\boldsymbol{\mu_{it}}$ represents unobservable factors that vary between subjects change over time. The component $\boldsymbol{\varepsilon_{it}}$ represents unobservable factors that vary between subjects and change over time and the standard error factors are not correlated with each other $\boldsymbol{E(\mu_{it}\varepsilon_{it}) = 0}$.

**Table 1. The Results of Random effects Model (REM)**

| RANDOM EFFECTS MODEL | | |
|---|---|---|
| **VARIABLES** | **ROA** | |
| | Coef. | Std. Err. |
| LNTA | -0.0356*** | 0.00576 |
| LNREV | 0.0453*** | 0.00608 |
| FLEV | 0.140*** | 0.0185 |
| OLEV | 0.360*** | 0.0272 |
| OPER | -0.0814 | 0.0504 |
| G | -1.685** | 0.714 |
| CPI | -0.108* | 0.0583 |
| IIP | 0.515*** | 0.172 |

| | | |
|---|---|---|
| cLNREV | -0.00821** | 0.00416 |
| P | 0.00308 | 0.00490 |
| Constant | -0.0320 | 0.0359 |
| **Observations** | **520** | |
| **Number of names** | **40** | |
| **R-squared** | **Within** | **0.388** |
| | **Between** | **0.8261** |
| | **Overall** | **0.5673** |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Beta of **LnTA** = (-0.0356) that means Total **Asset** has an inverse relationship with ROA. This is showed by the following financial formula:

**ROA = Net incomes / total asset**

Beta **LNREV** = 0.0453 has a positive relationship with ROA, Net incomes increase and the others constant then ROA also increases accordingly.

**FLEV is** financial leverage. FLEV = Equity/ Total asset with Beta = 0.14, that means Equity increases then ROA also increase accordingly.

**OLEV-Operating leverage** is GrossProfit /Revenue. OLEV with Beta =0.360, that means Gross Profit / Revenue increase then ROA will increase accordingly.

**CPI** is consumer price index has a inverse affect ROA of a business. Beta CPI = - 0.108, That means CPI increases1% then ROA will decrease 0.108%.

**IIP** is **Index of industrial production has** a positive affect **ROA** of a business. Beta **IIP = 0.515,** that means IIP increases 1% then ROA will increase 0.515%.

***Choosing the Models***

| | RANDOM EFFECTS MODEL | | FIXED EFFECTS MODEL | | POOLED - OLS | |
|---|---|---|---|---|---|---|
| **VARIABLES** | **ROA** | | **ROA** | | **ROA** | |
| | Coef. | Std. Err. | Coef. | Std. Err. | Coef. | Std. Err. |
| LNTA | -0.0356*** | 0.00576 | -0.0507*** | 0.0111 | -0.0337*** | 0.00454 |
| LNREV | 0.0453*** | 0.00608 | 0.0446*** | 0.00980 | 0.0453*** | 0.00486 |
| FLEV | 0.140*** | 0.0185 | 0.153*** | 0.0288 | 0.135*** | 0.0151 |
| OLEV | 0.360*** | 0.0272 | 0.351*** | 0.0293 | 0.372*** | 0.0264 |
| OPER | -0.0814 | 0.0504 | -0.00128 | 0.0651 | -0.134*** | 0.0451 |
| G | -1.685** | 0.714 | -0.932 | 0.800 | -1.745** | 0.729 |
| CPI | -0.108* | 0.0583 | -0.126** | 0.0591 | -0.105* | 0.0606 |
| IIP | 0.515*** | 0.172 | 0.349* | 0.187 | 0.526*** | 0.177 |
| cLNREV | -0.00821** | 0.00416 | -0.00429 | 0.00467 | -0.00848** | 0.00423 |
| P | 0.00308 | 0.00490 | 0.00602 | 0.00567 | 0.00392 | 0.0046 |

| | RANDOM EFFECTS MODEL | | FIXED EFFECTS MODEL | | POOLED - OLS | |
|---|---|---|---|---|---|---|
| VARIABLES | ROA | | ROA | | ROA | |
| | Coef. | Std. Err. | Coef. | Std. Err. | Coef. | Std. Err. |
| Constant | -0.0320 | 0.0359 | -0.00401 | 0.0421 | -0.0339 | 0.0361 |
| **Observations** | **520** | | **520** | | **520** | |
| **Number of name** | **40** | | **40** | | | |
| **R-squared** | **within** | **0.388** | **within** | **0.398** | **0.568** | |
| | **between** | **0.8261** | **between** | **0.6825** | | |
| | **overall** | **0.5673** | **overall** | **0.5128** | | |

***Standard errors in parentheses***

****** p<0.01, ** p<0.05, * p<0.1***

**Choosing Models between Pool -OLS and REM**

Making a choice between OLS and REM research using the LM test (Breusch-Pagan Lagrange Multiplier).

***Breusch and Pagan Lagrangian multiplier test for random effects***

***ROA [name,t] = Xb + u[name] + e[name,t]***

**Estimated results:**

| | Var | sd = sqrt(Var) |
|---|---|---|
| ROA | 0.0092 | 0.0960 |
| E | 0.0036 | 0.0601 |
| U | 0.0003 | 0.0184 |

Test: **Var(u) = 0**

chibar2(01) = 20.22

Prob > chibar2 = **0.0000**

With Significance α = 5%, the Test of Breusch and Pagan Lagrangian multiplier test gives the result Prob = 0.0000

Thus, Prob < α should reject the hypothesis: $H_0$. "The variability of unobserved effects is zero". In other words, the REM model is more accurate and efficient than the Pool-OLS model in analyzing ROA.

**Choosing between REM and FEM Model**

| | Coefficients | | | |
|---|---|---|---|---|
| | (b) FEM | (B) REM | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
| LNTA | -0.0507 | -0.0356 | -0.0151 | 0.00944 |
| LNREV | 0.0446 | 0.0453 | -0.0007 | 0.00769 |
| FLEV | 0.1533 | 0.1398 | 0.0135 | 0.02205 |
| OLEV | 0.3510 | 0.3598 | -0.0088 | 0.01108 |

| | | | | |
|---|---|---|---|---|
| **OPER** | -0.0013 | -0.0814 | 0.0801 | 0.04121 |
| **G** | -0.9318 | -1.6854 | 0.7536 | 0.36074 |
| **CPI** | -0.1263 | -0.1079 | -0.0183 | 0.00992 |
| **IIP** | 0.3491 | 0.5149 | -0.1658 | 0.07420 |
| **cLNREV** | -0.0043 | -0.0082 | 0.0039 | 0.00212 |
| **P** | 0.0060 | 0.0031 | 0.0029 | 0.0028 |

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

**Test: Ho: difference in coefficients not systematic**

chi2(10) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B)

= 20.08

Prob>chi2 **=** ***0.0285***

( V_b-V_B is not positive definite)

Hausman Test gives the result Prob > $chi^2$ = 0.0285 < 0.05 so reject hypothesis H0 “the difference in the estimation coefficients is unsystematic” and accept H1: “the difference in the estimation coefficients is systematic”. **In other words, accept the FEM Model.**

**Test the stability of models**

| Estimation method | Kinds of Test | Statistic Chi2 | Prob >Chi2 | Results of Test |
|---|---|---|---|---|
| OLS | Breusch-Pagan | 43.91 | 0.000 | Heteroskedasticity is present |
| FEM | Modified Wald | 19780.56 | 0.000 | Heteroskedasticity is present |
| REM | Breusch and Pagan Lagrangian | 20.08 | 0.0285 | Heteroskedasticity is present |

(Source: The Results from the analysis Stata)

Most models have the phenomenon of heteroskedasticity so we will find out to overcome this.

**Test of Auto-correlation phenomenon**

The phenomenon of auto-correlation can be defined as the phenomenon in which the components of observed sequences arranged in time or space and they are closely related to each other. And if there is a correlation between the errors, it can lead to the estimation results from the OLS method no longer being reliable.

This study will use Wooldridge test to test the autocorrelation phenomenon in the model with two hypotheses:

$H_0$: **No first − order auto − correlation**

$H_1$: **first-order auto-correlation**

***Wooldridge test for auto-correlation in panel data***

H0: no first-order auto-correlation

F (1,39) = 4.962

Prob > F = **0.0318**

With significance α = 5%, Wooldridge test gives Prob = 0.0318.

Thus, Prob < α should reject the hypothesis $H_0$and accept the hypothesis $H_1$,inferring that the model has first-order autocorrelation with significance = 5%

**Overcome by FGLS model**

As mentioned above, the research model has met the problems of the phenomenon of heteroskedasticity and the auto-correlation phenomenon. However, it does not change the estimated results of the coefficients. But these problems can make the estimation results ineffective, specially making the standard errors of the coefficients no longer the smallest. And to overcome those defects, the researcher will use the FGLS estimation method that has handled the violation of the phenomenon of heteroskedasticity and the auto-correlation phenomenon by FGLS.

**Cross-sectional time-series FGLS regression**

Coefficients: generalized least squares
Panels: heteroskedastic
Correlation: common AR (1) coefficient for all panels (0.3551)

Estimated covariances = 40
Estimated autocorrelations = 1
Estimated coefficients = 11

Number of obs = 520
Number of groups = 40
Time periods = 13
Wald chi2(10) = 1100.01
Prob > chi2 = 0.0000

| ROA - GLS model | | | | | | |
|---|---|---|---|---|---|---|
| | Coef. | Std.Err | Z | P>\|z\| | [95% Conf. | Interval] |
| **LNTA** | -0.04 | 0.00 | -11.74 | 0.00 | -0.04 | -0.03 |
| **LNREV** | 0.04 | 0.00 | 14.10 | 0.00 | 0.04 | 0.05 |
| **FLEV** | 0.12 | 0.01 | 11.00 | 0.00 | 0.10 | 0.14 |
| **OLEV** | 0.40 | 0.02 | 18.78 | 0.00 | 0.36 | 0.45 |
| **OPER** | -0.24 | 0.04 | -6.65 | 0.00 | -0.31 | -0.17 |
| **G** | -1.15 | 0.33 | -3.47 | 0.00 | -1.80 | -0.50 |
| **CPI** | -0.08 | 0.02 | -3.39 | 0.00 | -0.13 | -0.03 |
| **IIP** | 0.28 | 0.07 | 3.71 | 0.00 | 0.13 | 0.42 |
| **cLNREV** | -0.01 | 0.00 | -3.48 | 0.00 | -0.01 | 0.00 |
| **P** | 0.01 | 0.00 | 3.96 | 0.00 | 0.01 | 0.02 |
| **_cons** | -0.03 | 0.02 | -1.89 | 0.06 | -0.06 | 0.00 |

**The results of the FGLS model, all coefficients are statistically significant**

$$\mathbf{ROA} = -0.03 - 0.04 * \boldsymbol{LNTA_{it}} + \mathbf{0.04} * \boldsymbol{LNREV_{it}} + \mathbf{0.12} * \boldsymbol{FLEV_{it}} + \mathbf{0.4} * \boldsymbol{OLEV_{it}} - \mathbf{1.15} * \boldsymbol{GDP_{it}} - \mathbf{0.08} * \boldsymbol{CPI_{it}} + \mathbf{0.28} * \boldsymbol{IIP_{it}} - \mathbf{0.01} * \boldsymbol{cLNREV_{it}} + \mathbf{0.01} * \boldsymbol{P_{it}}$$

Beta **LnTA** = (-0.04) it shows that Total asset have an inverse relationship with ROA. This shows by a financial formula:

**ROA = Net incomes / total asset**

Beta **LNREV** = 0.04 has a positive relationship with ROA, because Net incomes increase then ROA also increases accordingly.

**FLEV- financial leverage** = Equity / Total asset with Beta = 0.12, that means Equity then ROA also increases.

**OLEV-Operating leverage** = Gross Profit /Revenue.

OLEV has **Beta =0.4**, that means Gross Profit increases then ROA also increases accordingly.

**CPI- consumer price index** has a inverse effect ROA of a business. Beta **CPI = (- 0.08)**, that means CPI increases 1% then ROA will decrease 0.08%.

**G (GDP)** has an inverse affect ROA from 3 reasons:

1.The first, when the economy develops, small and medium-sized enterprises bloom, making the market more competitive. This has affected the maximum profit that can be earned by large enterprises (enterprises on the stock exchange).

2.Second, When the economy is stable, businesses will increase investment capital, causing total assets increase. ROA is calculated by the formula ROA = Profit/Total assets. Therefore, when newly invested enterprises have not been put into production, their profits have not increased significantly, but total assets have increased significantly, leading to ROA decreases.

3.Third, GDP has a positive relationship with CPI. Therefore, when GDP increases, labor costs will also become more expensive. This also affects the profitability of enterprises.

**IIP - Index of industrial production** has a positive affect ROA of a business. Beta **IIP = 0.28, that means** IIP increase 1% then ROA will increase 0.28%.

**cLNREV (covid * LNREV) = - 0.01** has an inverse relationship with ROA, because when the covid -19 pandemic took place, the revenue (LNREV) decreased, thereby reducing ROA.

**P (Price of stock at the end of the previous period) = 0.01** has a positive relationship with ROA because in the process of business operation, the business reaches more effective than investors will recognize and put their trust in more and more. This result is shown in ROA of that period.

**OPER- operating cost on total revenues** is the ratio of operating expenses to sales and it is calculated by the formula (sales expenses + administrative expenses)/Sales. So, Beta OPER = - 0.24, this means that this ratio increases more, ROA decreases accordingly.

**Estimation SUR - Seemingly Unrelated Regression**

In the system of Seemingly Unrelated Regression, the interrelationship between expressions occurs for the following reasons:

1.Error components in different expressions are related to each other. This happens if there are unobserved common factors that affect the explanatory variables (independent) in the model.

2.The parameters in different expressions are related to each other.

3.This occurs if one or more of the same parameters appear in several expressions, or if one or more parameters in an expression have a linear or nonlinear relationship with other parameters in the expressions. other expressions.

**The expressions of this model are often encountered in economic problems such as:**

1.Functions of supply and demand in investment of firms in an industry.

2.The supply and demand functions in consumption of product groups are formed from utility-maximizing behavior.

3.The supply and demand functions of input materials form from minimizing costs or maximizing profits.

**Assumptions**

This model is based on the following assumptions:

1.The functional form of the general expression is a linear function of the parameters.

2.The error component of the general expression has a mean of 0.

3. The distribution of error in the general expression is nonspherical and satisfies the following assumptions: (a) The variance of the error of each expression is constant. (b) The variance of the error may be different for expressions. (c) The errors of each expression are not autocorrelated. (d) Errors between different expressions are simultaneously correlated.

4.The error component of the general expression is normally distributed

5.The error component of the general expression is not correlated with the explanatory variables in determining the variance - covariance.

**Estimation methods**

To estimate the parameters of the SUR model, it is necessary to choose an appropriate estimation. We consider the following four types of estimations:

**1.Estimation OLS**: OLS estimation is unbiased but inefficient, and not a maximum reasonable estimation (MLE).

**2.Estimation (GLS):** The GLS estimate is an unfeasible one, because the elements of the covariance-variance matrix, W, in the general expression are unknown.

**3.Estimation (FGLS)** According to Zellner method (1962), also known as Zellner's SUR estimation or SUR estimation. The FGLS estimation is asymptotic to the GLS estimation and is also a maximum reasonable estimation (MLE). Therefore, it also has properties asymptotic to unbiased, efficient and consistent

**4.Estimation (IFGLS):** Another estimator that replaces the FGLS estimation is the IFGLS estimation. the IFGLS estimation is used commonly, it is known as Zellner's SUR estimation or ISUR.

The ISUR estimation is asymptotically similar to the SUR (FGLS). However, there are ongoing debates about the effectiveness of better ISUR or SUR estimation for small sample sizes. Most econometricians are more inclined to use ISUR. The degenerate SUR model can explain for this.

**Results of estimation IFGLS**

| Seemingly unrelated regression | | | | | | |
|---|---|---|---|---|---|---|
| Equation | Obs | Parms | RMSE | "R-sq" | chi2 | P |
| ROA | 480 | 6 | 6% | 57.0% | 663.29 | 0.000 |
| LNTA | 480 | 4 | 0.636 | 98.3% | 28294.05 | 0.000 |
| LNREV | 480 | 6 | 0.904 | 44.2% | 393.46 | 0.000 |
| Iteration 101: tolerance = 9.329e-07 | | | | | | |

After 101 iterations, the system of 03 equations has quite high R2 results of 57%, 98.3% and 44.2%, respectively:

1.ROA equation: there are 06 explanatory variables and the coefficient R2 is 57%. That is, 57% of the change of ROA is explained by these 06 variables.

2. LNTA equation: there are 04 explanatory variables and the coefficient R2 is 98.3%. That is, 98.3% of the change in LNTA is explained by these 04 variables.

3.LNREV equation: there are 06 explanatory variables and the coefficient R2 is 44.3%. That is, 44.3% of the change of LNREV is explained by these 06 variables.

All regression coefficients are statistically significant (p-value <10%). This shows that the variables included in each process in the system have explained good.

| Dependent Variable | Independent Variable | Coef. | Std.Err | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|---|
| ROA | | | | | | | |
| | LNTA | -0.041 | 0.004 | -9.36 | 0 | -0.049 | -0.032 |
| | FLEV | 0.147 | 0.016 | 9.44 | 0 | 0.117 | 0.178 |
| | OLEV | 0.352 | 0.025 | 14.28 | 0 | 0.303 | 0.400 |
| | LNREV | 0.052 | 0.005 | 11.09 | 0 | 0.043 | 0.061 |
| | IIP | 0.549 | 0.190 | 2.88 | 0.004 | 0.176 | 0.921 |
| | G | -0.855 | 0.449 | -1.9 | 0.057 | -1.735 | 0.025 |
| | _cons | -0.107 | 0.021 | -4.97 | 0 | -0.149 | -0.065 |
| LNTA | | | | | | | |
| | LNREV | 0.984 | 0.012 | 80.12 | 0 | 0.960 | 1.009 |
| | OPER | 3.285 | 0.402 | 8.18 | 0 | 2.498 | 4.072 |
| | CPI | -1.675 | 0.596 | -2.81 | 0.005 | -2.843 | -0.507 |
| | L1.P | -0.107 | 0.043 | -2.53 | 0.012 | -0.191 | -0.024 |
| LNREV | | | | | | | |
| | FLEV | -0.989 | 0.202 | -4.91 | 0 | -1.384 | -0.594 |
| | CPI | -2.541 | 0.923 | -2.75 | 0.006 | -4.350 | -0.733 |
| | cLNREV | 0.441 | 0.104 | 4.23 | 0 | 0.237 | 0.645 |
| | EBITDA | 0.293 | 0.082 | 3.58 | 0 | 0.132 | 0.453 |
| | covid | -2.040 | 0.539 | -3.78 | 0 | -3.097 | -0.983 |

| Dependent Variable | Independent Variable | Coef. | Std.Err | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|---|
| | **L1.EBT** | **0.009** | 0.001 | 15.7 | ***0*** | 0.008 | 0.010 |
| | **_cons** | **4.826** | 0.130 | 37.16 | ***0*** | 4.572 | 5.081 |

***Seemingly Unrelated Regression:***

**$H_0$:** The residuals of the equations in the system are not correlated.

**$H_1$:** The residuals of the equations in the system are correlated.

Breusch-Pagan test of independence: chi2(3) = 85.290, **Pr = 0.0000**

We have p-value = 0.00 < 5%. Therefore, we reject the hypothesis H0: "The residuals of the equations in the system are not correlated.". Or in other words the equations in the system are related to each other.

**The system of equations consists of 3 equations as follows:**

$$\begin{cases} ROA_{it} = -0.11 - 0.041 * LNTA_{it} + 0.147 * FLEV_{it} + 0.352 * OLEV_{it} + 0.05 * LNREV_{it} + 0.549 * IIP_{it} - 0.855 * GDP_{it} \\ LNTA_{it} = 0.984 * LNREV_{it} + 3.285 * OPER_{it} - 1.675 * CPI_{it} - 0.11 * P_{i,t-1} \\ LNREV_{it} = -0.989 * FLEV_{it} - 2.547 * CPI_{it} + 0.441 * cLNREV_{it} + 0.293 * EBITDA_{it} - 2.04 * Covid + 0.009 * EBT_{i,t-1} \end{cases}$$

**Revenue regression - LNREV:**

**FLEV- financial leverage** = Equity / Total asset with Beta =0.99, this means that when this ratio increases there is a slight effect of decreasing revenue (LNREV). However, this effect is not significant because FLEV is measured in decimal (<1)

**CPI- consumer price index** has a inverse effect LNREV of a business. Beta **CPI = (- 2.54)**, that means CPI increases 1% then LNREV will decrease 2.54%.

**COVID** has a inverse effect LNREV of a business. Beta **CPI = (- 2.04)** that means COVID occurs then LNREV will decrease 2.54.

Beta **EBITDA** (Earnings before interest, taxes, depreciation and amortization) = 0.29, shows that if profit before tax and depreciation increases, LNREV will increase. Or it can be understood that the business invests in technology and machinery a lot (the depreciation increases a lot), the profit will increase correspondence. Specifically, If EBITDA increases by 1 million USD, then LNREV will increase by 0.29.

L1.EBT variable of EBT's lagged progress, that means last year's profit before tax (Lag of EBT) has a positive relationship with LNREV.Beta L1.EBT = 0.01. That is, the previous year's profit is high, next year's revenue will be high. Because the business has accumulated a certain reputation gradually over time with partners and consumers.

**Regression equation of Total assets – LNTA:**

**CPI- consumer price index** has a inverse effect LNTA of a business. Beta **CPI = (- 1.68)**, that means CPI increases 1% then LNTA will decrease 1.68%.

Beta **LNREV** = 0.98 has a positive relationship with LNTA, because larger companies (with larger total assets) usually have higher revenue than smaller companies.

**OPER- operating cost on total revenues** is the ratio of operating expenses to sales and it is calculated by the formula (sales expenses + administrative expenses)/Sales. So Beta OPER = 3.29, this means that LNTA and Operating Cost have a positive affect.It also mean OPER have a negative affect ROA = -0.131 (*3.29 * -0.04*).

L1.P is a variable of lagged price (P), that means, the stock price in the most recent period of the previous year has a negative effect on assets. Beta coefficient L1.P = -0.11 because retained earnings is a component of capital in the balance sheet. When the company pays dividends, it will satisfy investors, causing the market price increases, but this will reduce the total assets of the business holding. Because the balance equation in the balance sheet: Total assets = Total capital

***Regression equation ROA***

Beta **LnTA** = (-0.04) it shows that Total asset have an inverse relationship with ROA. This shows by a financial formula:

**ROA = Net incomes / total asset**

Beta **LNREV** = 0.05 has a positive relationship with ROA, because Net incomes increase then ROA also increases accordingly. In addition, LNREV also has a positive relationship with LNTA (Beta = 0.98). But LNTA has a negative relationship with ROA (Beta = -0.04). For LNREV have a positive affect ROA, we have the following inequality:

***0.05*LNREV – 0.04*LNTA > 0***

***Or:***

*0.05*LNREV – 0.04*(0.98*LNREV +0.329*OPER -1.68*CPI -0.01*L1. P) > 0*

⇔ *0.05*LNREV –0.0392*LNREV -0.1316*OPER +0.0672*CPI +0.044*L1.P >0*

⇔ *0.0108*LNREV -0.1316*OPER +0.0672*CPI +0.044*L1. P >0*

⇔ ***LNREV > 12.18 *OPER – 6.22 *CPI - 0.41 *L1. P***

**FLEV- financial leverage** = Equity / Total asset with Beta = 0.15, that means Equity then ROA also increases.

**OLEV-Operating leverage** = Gross Profit /Revenue.

**OLEV** has **Beta =0.35**, that means Gross Profit increases then ROA also increases accordingly.

**G (GDP) has an inverse affect ROA from 3 reasons:**

1.The first, when the economy develops, small and medium-sized enterprises bloom, making the market more competitive. This has affected the maximum profit that can be earned by large enterprises (enterprises on the stock exchange).

2.Second, When the economy is stable, businesses will increase investment capital, causing total assets increase. ROA is calculated by the formula ROA = Profit/Total assets. Therefore, when newly invested enterprises have not been put into production, their profits have not increased significantly, but total assets have increased significantly, leading to ROA decreases.

3.Third, GDP has a positive relationship with CPI. Therefore, when GDP increases, labor costs will also become more expensive. This also affects the profitability of enterprises.

**IIP - Index of industrial production** has a positive affect ROA of a business. Beta **IIP = 0.55, that means** IIP increase 1% then ROA will increase 0.28%.

| Hypotheses | Measure variables | Sight | Conclusion | NOTE |
|---|---|---|---|---|
| **H1a** | FLEV | **?** | positive affect | Beta =0.15 |
| **H1b** | LNTA | **?** | positive affect (+) if LNREV >0.8* LNTA<br>***Or***<br>LNREV > 12.18 *OPER – 6.22 *CPI - 0.41 *L1. P | |
| | | | negative affect (-) if LNREV < 0.8* LNTA<br>***Or:***<br>LNREV < 12.18 *OPER – 6.22 *CPI - 0.41 *L1. P | |
| **H1d** | OPER | **-** | Accepted | beta =3.29* (-0.04)<br>= -0.131 |
| **H1c** | OLEV | **+** | Accepted | beta =0.35 |
| **H2a** | IIP | **+** | Accepted | beta =0.55 |
| **H2b** | CPI | **-** | Accepted | beta = (-1.68 * -0.04) + (-2.54*0.05)<br>=-0.059 |
| **H2c** | L1. P | **+** | Accepted | Beta =-0.11*-0.04<br>= 0.0044 |
| **H3** | COVID | **-** | Accepted | Beta =-2.04*0.05<br>= -1.02 |

## 4. DISCUSSIONS AND CONCLUSIONS

### Discussions

The study examines firm performance through a comprehensive 365-degree view, incorporating both internal and external factors, and the moderating effects of market disruptions such as COVID-19. Findings indicate negative impacts from inflation and COVID-19, while revenue, operating leverage, industrial growth, and EBITDA positively influence efficiency. Despite the use of debt and foreign exchange volatility affecting firms adversely, strategic recommendations include reorganizing operations, reducing costs, and leveraging assets to enhance return on assets and operational efficiency. For governments, it's suggested to secure essential resources, enforce price stability, provide bailout packages, and maintain exchange rate policies to stabilize the economy post-recovery, fostering a conducive environment for business and economic growth.

### Conclusions

The covid-19 pandemic has significantly disrupted production and investment activities, leading to a shift in investor preferences from traditional business investments to the securities market in search of higher returns. The interruption of production and supply chains has demotivated companies from investing in expansion. Adjustments in dividend policies by firms on the stock exchange have elevated stock prices beyond book values, balancing short-term gains with long-term growth strategies. Financial leverage (flev) positively affects roa as lower debt levels reduce interest costs, but its decrease during the pandemic has limited expansion opportunities. Operating leverage (olev) also supports roa, yet the pandemic has decreased this leverage, impacting profitability. The past earnings before taxes (ebt) positively influence future revenues and roa, reflecting the brand's accumulated value. Industrial production has declined, affecting not just manufacturing but also transport, trade, and services sectors. Lastly, covid-19's disruption of input and labor supply chains has negatively impacted revenues and operational efficiency, especially in industries reliant on complex supply chains and foreign labor.

## REFERENCES


[1] Abate, J.A., Grant, J.L., Stewart, G.B. (2004). The EVA Style of Investing. Journal of Portfolio Management, 30(4), 61-72.

[2] Anh, N.C & Khanh, T.H.T (2020). Analysis of Long-run Return on Performance of Construction and Real Estate Industry in Vietnam. Review of Finance, 760, 47-50.

[3] Anh, N.C (2020), Analysis of Long-run Return on Performance of group of large-scale commercial banks in Vietnam, Economy and Forecast Review, 751(33), 20 -26

[4] Arnold, G. (2023). Financial Times Guide to the Financial Markets. Chicago: Financial Times.

[5] Damodaran, A. (2021). The Dark Side of Valuation. New York: FT Press.

[6] De Villiers, J. (1997). The Distortions in Economic Value Added (EVA) Caused by Inflation. Journal of Economics and Business, 49(3), 285-300.

[7] Fama, E.F. (1965). The Behavior of Stock-Market Prices. Journal of Business, 38(1), 34-105.

[8] Grant, J.L. (1996). Foundations of EVA for Investment Managers. Journal of Portfolio Management, 23(1), 41-48.

[9] GSO of Vietnam (2020). Report on economic situation in the fourth quarter of 2020. Hanoi, Vietnam.

[10] Lintner, J. (1965). Security Prices, Risk, and Maximal Gains from Diversification. The Journal of Finance, 20 (4), 587-615.

[11] Modigliani, F. & Miller, M.H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. American Economic Review, 48 (3), 261-297.

[12] Palliam, R. (2006). Further Evidence on the Information Content of Economic Value Added. Review of Accounting and Finance, 5(3), 204-215.

[13] Rappaport, A. (1983). Corporate Performance Standards and Shareholder Value. Journal of Business Strategy, 7 (4), 58-67.

[14] Rappaport, A. (1987), Linking Competitive Strategy and Shareholder Value Analysis. Journal of Business Strategy, 3(4), 28-38.

[15] Renneboog, L. & Vansteenkiste, C. (2019). Failure and Success in Mergers and Acquisitions. Journal of Corporate Finance, 5(8), 650-699.

[16] Rogerson, W.P. (1997). Intertemporal Cost Allocation and Managerial Investment Incentives: A Theory Explaining the Use of Economic Value Added as a Performance Measure. Journal of Political Economy, 105(4), 770-795.

[17] Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. The Journal of Finance, 19(3), 425-442.

[18] Shrieves, R.E., Wachowicz, J.M. (2001). Free Cash Flow (FCF), Economic Value Added (EVA), and Net Present Value (NPV): A Reconciliation of Variations of Discounted-Cash-Flow (DCF) Valuation. Engineering Economist, 46 (1), 33-52.

[19] Turvey, C.G., Lake, L., van Duren, E. & Sparling, D. (2000). The Relationship between Economic Value Added and the Stock Market Performance of Agribusiness Firms. Agribusiness, 16(4), 399-416.

[20] Young, D. (1996). Economic Value Added: A Primer for European Managers. European Management Journal, 15(4), 335-343.

[21] Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. Journal of the American statistical Association, 57(298), 348-368.


DOI: https://doi.org/10.15379/ijmst.v11i1.3713