IMPACTS OF INFLATION ON THE EFFECTIVENESS OF ECONOMIC VALUE ADDED SCALE

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This study is to investigate the influence of inflation on the effectiveness of the Economic Value Added (EVA) which an investor may employ to quantify the value generated by a company. However, inflation can distort EVA and potentially result in inefficient allocation of resources and policy on rewards. This study will look into the adjusted and nominal EVA in order to measure the business performance as reflected in stock returns, stock market prices and operating cash flows. Some 142 non-financial companies have been invited to join this study and 332 observations were undertaken from 2007 to 2009. The findings have shown that the adjusted EVA seems more sensitive to inflation than the nominal EVA. In other words, the latter is distorted by inflation. Thus, Vietnamese business managers should consider thoroughly before integrating EVA into measuring the business performance, especially when inflation rate has galloped over the past few years.

Keywords: Economic Value Added (EVA), inflation, business performance

1. Introduction

There are a lot of scales to measure the business performance of a company and each will provide different information useful for forming and assessing projects and evaluating the business performance. We may exemplify some such as the return on assets (ROA), the return on equities (ROE) and the economic value added (EVA) which is described as a multi-functional scale that can serve as a replacement for others (Trường, 2007). The most striking strength of EVA is that it also considers the cost of capital which may be construed as the opportunity cost. Through that, we can exactly identify the true return on investments. Yet, when inflation surges ahead, it may distort EVA and result in the inefficient allocation of resources and compensation. Hence, this study will investigate impacts of inflation on the significance of EVA to assessment of business performance, thereby helping investors and managers set up and review projects precisely, assess the business performance and design policies on rewards.

2. Theoretical framework

a. The Economic Value Added:

Since the 18th century, the term EVA has been employed by economists to estimate the net profit of a company (Ali & Nooredin, 2010). However, it was not much attended to until September 2003 when Stern Stewart had a detailed paper on *Fortune* in light of the so-called EVA and its successful application in some American big corporations. Since then, many empirical researches on EVA have been conducted with a view to estimating the business performance, deciding investments and designing policies on rewards. As Stern Stewart put it, EVA is just a measure of economic profit; it is calculated as the difference between the Net Operating Profit After Tax (NOPAT) and the oppor-

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tunity cost of invested capital which is determined by the Weighted Average Cost of Capital (WACC) and the amount of capital employed.

EVA is calculated according to the basic formula as follows:

EVA = NOPAT – WACC x capital employed

b. Empirical researches on EVA:

Biddle et al. (1997) compared information content of EVA, the operating cash flow and the net profit; and found that EVA is not superior to the net profit for explaining changes in stock returns. De Villiers (1997) examined the effect of inflation on EVA in a modeling framework. He concluded that a major disadvantage of EVA is that it is based on accounting profits, which, indeed, there exists a discrepancy between the accounting profit and the true economic profit. Thus, under the conditions of inflation, the nominal EVA cannot be employed to estimate the actual business performance; and an adjusted EVA is required.

Warr (2005) investigated the sensitivity of EVA to the level of inflation in a hefty number of the USA companies. His results indicated that within a period of 28 years (1975 to 2002), the nominal EVA has been significantly distorted by inflation. During this period, inflation escalated from 1.13 to 9.7 percent. Then, he just analyzed part of his samples from 1990 onwards during which inflation ranged from 1.13 to 4.15 percent; and found that the identical results to the full samples were remained. This is to say, even in the low inflation environment, inflation is also able to distort EVA. Hence, for companies relying on the nominal EVA as a measure of business performance, the distorting impacts of inflation will result in the misallocation of capital and wrong design of reward policies.

Ali and Nooredin (2010) have compared the capability of nominal EVA and EVA adjusted to inflation to explain the business performance. They found that inflation does not change the significant impacts of EVA on stock prices, stock returns and operating cash flows. In their research, they utilize the linear monovariable regression model, in which EVA is labeled as the independent variable and the dependent ones include stock prices, stock returns and operating cash flows.

c. Hypotheses:

In this research, we will examine the discrepancy in the significance of the nominal EVA and the adjusted EVA for the business performance. Accordingly, we have developed three hypotheses as follows:

H_1: The association between rates of return on stock and the adjusted EVA is stronger than that of the nominal EVA.

H_2: The association between stock prices and the adjusted EVA is stronger than that of the nominal EVA.

H_3: The association between operating cash flows and the adjusted EVA is stronger than that of the nominal EVA.

3. Data and methodology

a. Data:

Data are collected from companies listed in the HCMC Stock Exchange in the years 2007-2009.

Table 1: Description of observed samples

Fields	2007	2008	2009	Percent	Total
Realty	4	8	8	6.00%	20
Technology	2	5	6	3.90%	13
Manufacturing	27	39	41	32.20%	107
Petroleum	3	3	3	2.70%	9
Public services	5	6	7	5.40%	18
Consumer services	2	5	5	3.60%	12
Consumer goods	2	5	5	29.20%	97
Basic materials	11	17	5	13.60%	45
Healthcare	3	3	5	3.30%	11
Total	81	122	129	100%	332

Table 2: Descriptive stat of variables

	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis
EVA_{nom}	-2073.435	1306.537	-92.29	323.728	-2.542	14.408
EVA_{adj}	-1730.71	1084.411	-30.328	300.373	-1.944	11.247
RET	-92.82%	508.41%	5.28%	0.8201	1.536	4.616
PRICE	5.8	340	42.258	44.022	2.718	10.117
OCF	-607.881	3155.166	125.291	378.289	4.976	31.906

NB: EVA_{nom}, EVA_{adj} and OCF are calculated in million dongs; PRICE in thousand dongs; and RET in percentage.

In the Table 2, it is apparent that although the variables have a quite high kurtosis, i.e. the peakedness of probability distribution of a real-valued random variable, most of them have the low skewness. This is to say, probability distributions of a real-valued random variable are nearly symmetric.

EVA variables have the mean smaller than zero. This may be explained that the cost of capital, which has appreciated over the past few years according to the rise in inflation rate, is got into calculating EVA. Moreover, the cost of equity also goes up in accordance with the rate of return on stock (capital asset pricing model). The Vietnam's economy has just undergone a rough period, causing the market rate of return to fluctuate profoundly, especially in 2009 when the stock market rate of return rose over 54%. Due to the fact that the cost of capital goes up, the mean of the nominal EVA and the adjusted EVA goes down. This is to render that the calculation of EVA produces the smaller-than-zero mean.

b. Research variables:

- The nominal EVA:

The basic formula for the calculating the nominal EVA is as follows:

$EVA_{nom,t} = NOPAT_t - WACC_{nom,t} \times Capital_{t-1}$

Where,

$EVA_{nom,t}$: the nominal Economic Value Added

$NOPAT_t$: the net operating profit after taxes

$WACC_{nom,t}$: the weighted average cost of capital

$Capital_{t-1}$: the invested capital by the company in the year t-1.

- The adjusted EVA:

According to Warr (2005), the adjusted EVA is as follows:

$$EVA_{adj,t} = \frac{NOPAT_t}{1+P_t} - \frac{WACC_t}{1+P_t} x\, Capital_{t-1} + pD_{t-1} - DA_t$$

Where,

$EVA_{adj,t}$: the adjusted Economic Value Added

P_t: the annual inflation rate

pD_{t-1}: the gain from depreciation of debt

DA_t: the depreciation adjustment according to the GDP deflator (DGDP)

- The weighted average cost of capital (WACC):

The WACC is calculated as follows:

$WACC = [W_d \times K_d (1-T)] + (W_e \times K_e)$

Where,

W_d: the weight of debt capital

K_d: the cost of debt

T: corporate income tax

W_e: the weight of equity capital

K_e: the cost of equity capital which is estimated by the capital asset pricing model (CAPM)

In the CAPM, the rate of government bonds is utilized for the risk-free rate of return.

c. Regression model:

Like the research by Ali and Nooredin (2010), this research also runs the linear monovariable regression model as follows:

H_1 testing models:

$RET_{it} = \alpha + \beta.EVA_{adj.it} + \varepsilon_{it}$ (Model Y1)

$RET_{it} = \alpha + \beta.EVA_{nom.it} + \varepsilon_{it}$ (Model Y2)

Where, RET_{it} is the annual rate of return on stock; $EVA_{adj,it}$ the economic value added adjusted for inflation, and $EVA_{nom,it}$ the nominal economic value added.

H_2 testing models:

$PRICE_{it} = \alpha + \beta.EVA_{adj.it} + \varepsilon_{it}$ (Model Y3)

$PRICE_{it} = \alpha + \beta.EVA_{nom.it} + \varepsilon_{it}$ (Model Y4)

Where $PRICE_{it}$ is the stock market value.

H_3 testing models:

$OCF_{i,t+1} = \alpha + \beta.EVA_{adj.it} + \varepsilon_{it}$ (Model Y5)

$OCF_{i,t+1} = \alpha + \beta.EVA_{nom.it} + \varepsilon_{it}$ (Model Y6)

Where OCF_{it} is the operating cash flow.

d. Model evaluation:

This study is about to investigate the appropriateness of the nominal EVA and the adjusted EVA, and these two are the non-nested models explaining the same dependent variable. Some recent model selection techniques have been developed and employed widespread, for example, Vuong test (1989), and the J-test by Davidson MacKinno (1981), etc. This study utilizes the J-test via the R software to compare the significance of models.

4. Research results and remarks

a. Results of testing H_1:

The results of the estimation of the two models for H_1 show that the R^2 values are not high. This means that the association between the nominal EVA and the rate of return on stock is as weak as that of the adjusted EVA. The J-test points out that the adjusted EVA is superior to the nominal EVA for the year 2008 when inflation rate and GDP deflator reaches 21.7% and 23.1% respectively.

Table 3: The appropriateness of models in H_1

Years	Model Y_1		Model Y_2	
	R^2	P-value	R^2	P-value
2007	0.0564	0.0328	0.0702	0.0169
2008	0.0356	0.0375	0.0626	0.0055
2009	0.0531	0.0086	0.0486	0.0121

Table 4: The J-test for models of H1

Years	$Y_1 + \hat{Y}_2$	$Y_2 + \hat{Y}_1$	H_1 results
	(P-value)	(P-value)	
2007	0.2534	0.6888	Rejected
2008	0.0301	0.2467	Accepted
2009	0.6768	0.3783	Rejected

NB: $\hat{Y}_1$ and $\hat{Y}_2$ are the average estimation of Y_1 and Y_2 respectively

b. Results of testing H_2:

In general, the R^2 of models in H_2 is higher than that in the H_1. In other words, the stock market price reflects the business performance better than the rate of return on stocks. The J-test for H_2 also produces the same results as H_1, i.e. for the year 2008, the association between the stock market price and the adjusted EVA is stronger that of the nominal EVA. For the remainder, there is not discrepancy in significance of the two models.

Table 5: The appropriateness of models in H_2

Years	Model Y_3		Model Y_4	
	R^2	P-value	R^2	P-value
2007	0.2418	0.0000	0.1720	0.0001
2008	0.0611	0.0060	0.2327	0.0000
2009	0.0125	0.2065	0.0063	0.3730

Table 6: The J-test for models of H_2

Years	$Y_3 + \hat{Y}_4$	$Y_4 + \hat{Y}_3$	H_2 results
	(P-value)	(P-value)	
2007	0.0952	0.0019	Rejected
2008	0.0000	0.3662	Accepted
2009	0.0468	0.0293	Rejected

NB: $\hat{Y}_3$ and $\hat{Y}_4$ are the average estimation of Y_3 and Y_4 respectively

c. Results of testing H_3:

The R^2 of models in H_3 is quite high. Thus, EVA can explain well the business performance as reflected by the operating cash flows. For the year 2007, even though the R^2 of the adjusted EVA is much higher than that of the nominal EVA, the J-test has shown the unsubstantial discrepancy between them. For the remainder, the H_3 is accepted.

Table 7: The appropriateness of models in H3

Years	Model Y_5		Model Y_6	
	R^2	P-value	R^2	P-value
2007	0.1107	0.0024	0.3069	0.0000
2008	0.0452	0.0187	0.4724	0.0000
2009	0.3096	0.0000	0.3407	0.0000

Table 8: The J-test for models of H_3

Years	$Y_5 + \hat{Y}_6$ (P-value)	$Y_5 + \hat{Y}_6$ (P-value)	H_3 results
2007	0.0000	0.0000	Rejected
2008	0.0000	0.4795	Accepted
2009	0.0053	0.1606	Accepted

NB: $\hat{Y}_5$ and $\hat{Y}_6$ are the average estimation of Y_5 and Y_6 respectively

5. Conclusion

The estimation results show that when inflation rises, the adjusted EVA seems superior to the nominal EVA in estimating the business performance. It is quite apparent for the year 2008 when inflation rose by over 21%, three hypotheses are entirely accepted by J-test. In the event that inflation is at the mediocre level like in 2007 and 2009, the study does not show that the adjusted EVA is superior to the nominal EVA. The relationship between EVA and operating cash flows is stronger than that between the EVA and rate of return on stocks. Result of the J-test is quite appropriate to the studies by Warr (2005) and De Villiers (1997). However, this result is contrary to findings by Ali and Nooredin (2010) which show that the nominal EVA is superior to the adjusted EVA.

In a word, this study proves that the high inflation will distort the nominal EVA; and utilization of an adjusted EVA must be required■

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