The Impact of Profitability on Market Value Added: Evidence from Turkish Informatics and Technology Firms

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ABSTRACT

The purpose of this study is to examine empirically the relationship between economic value added (EVA), return on assets (ROA), and return on equity (ROE) with market value added (MVA) in Istanbul stock exchange (BIST). This study also examine the performances implemented by Turkish Informatics and Technology Firms during the global financial crisis of 2008–2009. Using the experimental data were drawn from a panel consisting of 13 Turkey firms listed in the BIST, from informatics and technology companies, observed over the 10-year period. Multicollinearity various regression models were examined in order to test the hypotheses included in the examined literature. In the research methodology such as fixed effects and random effects were examined in order to test our hypotheses proposed. Finally, evidence is presented that EVA has a negative and significant relationship with MVA, while ROA and ROE have no significant relationship with MVA in the long-term.

Keywords: Market Value Added, Economic Value Added, Financial Crisis, Return on Asset, Return on Equity
JEL Classifications: G32, M40, M41

1.INTRODUCTION

Information technology projects and technological capabilities is of vital importance to the initiatives connecting business process in order to catch up with such technological companies. Thus, informatics and technology frontier can effect on a business performance in the listed firms (Li et al., 2006), which is generated competitive advantage for a company. Despite these corporate benefits, the ability of informatics and technology to generate competitive advantage in the Turkey has been questioned as the technological capabilities shift from unique resources to financial markets. Similarly, advances in informatics and technology in the world have made it increasingly for business to make decisions regarding business performance. Business performance play an important role in the financial reporting besides providing value relevance information users such as shareholders and investors in the listed firms of Turkey.

Today, value and value creation for shareholders are among the most important goals of firms and owners (Hajiabbasi et al.,

2012). Maximizing shareholder value has become the new corporate paradigm. Different metrics are used for accounting and financial performance. Accounting based income is very important traditional performance evaluation criteria. However, the accounting based income can be manipulated through different methods (Abdoli et al., 2012). Therefore, firms need more reliable and accruate performance measures than traditional accounting performance measures.

In the recent years, value based measures have been received a lot of attention (Thenmozhi, 2000). During the last two decades, value based economic value added (EVA) is paid close attention by several accounting, business and finance researchers, corporate professionals, and consultant firms and thus they accept the limitations of traditional measures of performance (Bhasin, 2013; Sharma and Kumar, 2012). Thus, many scholars criticize traditional measures (e.g., Hunt, 1985; Verrecchia, 1986; Dyl, 1989; Jensen and Murphy, 1990; Gomez-Mejia and Balkin, 1992). Their findings suggest that traditional measures are not proper guidance to make strategic decision (Panahi et al., 2014) according to value based metrics.

Therefore, we can say that traditional measures still play an important role as instruments for assessing the economic and accounting performance of firms. However, traditional measures only provide information from judgments on past performance (Pinto and Santos, 2011). The purpose of this study is to investigate the impact of profitability on market MVA, which is a external performance measure, as compared to three accounting performance measures such as EVA, return on assets (ROA) and ROE of firms listed on BIST during the pre and post global financial crisis.

EVA is an value based financial measure, which deals with the benchmark of cost of capital and it provides a road map to the critical target of improving MVA (Rajesh et al., 2012). EVA is an internal measure of performance that drives market value added (MVA). Stewart (1991) is defined as EVA takes into account the full cost of capital, including the cost of shareholders' equity (Wet and Hall, 2004). According to Bhasin (2013), EVA is the financial performance measure that comes closer than any other traditional measures in capturing the true economic profits of an enterprise. Similarly, EVA is a important method of measuring the economic value of a business after considering cost of capital including debt cost and equity cost. Thus, EVA encourages managers to optimize the use of resources for business. EVA provide investments to choose low-risk options in order to evaluating the company value (Nakhaei and Hamid, 2013). EVA is the performance measures most directly linked to the creation of shareholders wealth over time in business (Acma, 2009). Therefore, EVA is recognized as an important tool of business performance measurement and management. However, there are still mixed evidences regarding the superiority of EVA over traditional performance measurement tools (Sharma and Kumar, 2010).

Unlike traditional measures, EVA is superior to accounting profits as a measure of value creation because it recognizes the cost of capital (Lehn and Makhija, 1996). Stewart (1994) examined general accounting measures variables with EVA. The findings suggest that EVA is a strong and efficient measure to describe the companies' operation. It is stronger than general and traditional measures to describe companies' shares value (Fathabadi et al., 2014). Thus, EVA is the most important metrics for measuring corporate operating value in order to evaluate firms' assets.

MVA is a measure of external performance, which is considered the best indicator of shareholder value creation (Khan et al., 2012). The positive MVA indicates that the value and investment created by the management is more than the capital supplied by the investors, vice versa (Wibowo and Berasategui, 2008). This study analyze whether the impact of profitability have any link BIST listed firms' MVA. These study also examine and correlates ROA and ROE variable with MVA as an market based value performance so as to test whether EVA has provide over traditional accounting performance metrics.

Our research motivation is to examine the impact of MVA metrics on measures of performance of business as profitability indicator. One example of this motivation is Errunza and Senbet (1981) where they test the hypothesis that a firm's operations can affect its performance depend on market value. Their empirical result suggest that the growth of investment is positively related to excess value in the capital market. To do so, performance measure the incidence of profitability on listed firms of Turkey such as traditional and value based metrics. We conclude that there is a correlation between EVA and business performance as measured by MVA. Hence, the purpose of these study is to explore two main research question:

RQ_1=How role and contribute to the profitability on MVA of BIST listed informatics and technology companies?

RQ_2=How does impact of MVA on global financial crisis selected companies in Turkey?

To explore the above-stated main research questions, these paper begins by re-examining the issues related to the business performance. The current study combines prior methodologies in order to explore certain causal relationships considering the MVA of BIST listed informatics and technology firms. The value of these study is determining to empirical analysis of these relationships in the context of the Turkish economy and the follows value-added relevance for the measurement of MVA.

The remainder of these study is organized as follows. Section two discusses the literature review and hypothesis development. Section three discusses the research design. Section four shows the empirical results of robustness. Finally, section five summarizes the findings and concludes.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review
The value relevance of both traditional accounting and value based performance measures has long been debated in the recent years. Stewart (1991), for example, investigated the relationship between EVA and MVA of US companies and he found a positive and strong relationship between EVA and MVA. Similarly, Lehn and Makhija (1996) found that both EVA and MVA were correlated positively with stock returns (Maditinos et al., 2006). Kramer and Pushner (1997) implied that MVA and NOPAT were positive result but EVA over the period was negative outcomes on average. Ferguson et al. (2005) found that EVA and MVA have the most relationship compared convenient and as per availability of selected data (Prasad and Shrimal, 2005).

Prior studies show that impact of profitability on MVA has still mixed evidences regarding the accounting based performance measure and value based measures in the literature. Maditinos et al. (2006), for example, examined if EVA is more highly link with stock returns than accounting performance measures. They provided mixed and controversial results in their sample. Reddy and Reddy (2011) suggest that EVA is the best appropriate metric for measuring the value of shareholders. Bernier and Mouelhi (2011) investigated the relationship between MVA and EVA, ROA and ROE in the 24 U.S. stock listed insurance firms. They found the relationship between EVA and other value based performance

measures with MVA. Kangarlouei et al. (2012) investigated the relationship between EVA and ROA in Tehran stock exchange (TSE). They found that there was no relationship between EVA and ROA in TSE.

Khan et al. (2012) examined whether EVA of the companies listed firms in BSE securities market creating value for shareholders. Nakhaei and Hamid (2013) observed that there were significant relationship between EVA, and ROE with MVA, but there was not significant association between ROA and MVA. Likewise, Bhasin (2013) found that EVA is not excellent measures in its link with MVA.

Prasad and Shrimal (2015) examined the relationship between selected accounting measures and MVA of infrastructural companies in India. They found that there is significant relationship between ROCE, ROE and EPS with MVA. Yaqub et al. (2015) examined the significance of EVA among other traditional accounting measures in determining stock returns. They implied that there is a positive and direct relationship between EVA and MVA during the selected period. Kashinant and Kanahalli (2015) focused on whether the EVA would drive the MVA or not in select Indian public sector banks during the period of 2010–2014. Their findings suggest that EVA has an impact on MVA.

2.2. Hypothesis Development

Information technology is best defined not only as a traditional capital investment but also as a universal purpose technology. More importantly, using information technologies in companies are economically beneficial mostly because they provide complementary innovations (Brynjolfsson and Hitt, 2000). Therefore, such firms of value based performance measure are an important value driver in the economy. Finding a superior measure to evaluate a business's value based performance is one of the important issues of recent accounting and financial researches as most of business diversify such as banks industry and informatics and technology firms.

MVA is an option to estimate the shareholder value creation. MVA is a difference between market value of company and capital supplied by the investors over a period of time. Therefore, MVA is linked to EVA because of the present value of future EVA value. Moreover, EVA is a measure of business performance in a given fiscal year, while MVA is a market generated number that we calculate by subtracting the capital invested in a firm from sum of the total market value of the firm's equity and the book value of its debt (Nakhaei, 2016. p. 434-436). This study also examines the economic crisis to be an exogenous interference, and attempts to establish a fundamental relationship between the performance of the Turkish informatics and technology firms, the moderating effect of the crisis and MVA.

Alipour and Pejman (2015) concluded that return on sales (ROS) and ROA are more powerful than EVA in explaining firm market value for the period 2003–2008. Kramer and Peters (2001) argueed that the marginal cost of using EVA as a proxy for MVA are not justified by any marginal advantages. Misra and Kanwal (2007) findings that traditional accounting measures cannot predict

business performance and that EVA is significantly associated with MVA.

Thus, MVA is particularly useful proxy in evaluating shareholder value, considering the opportunity cost of capital as well as Turkish informatics and technology firms' performance. The most recent global financial crisis of 2008–2009 concerned particular attention from researchers, since it led to dramatic structural changes in certain companies such as Turkish informatics and technology firms. However, research into the core strategies of a company which successfully survives a global financial crisis has not been frequently undertaken. Cipollini and Fiordelisi (2012), Berger et al. (2009) and Beck et al. (2011) find a negative link between bank market power and distress. Their results suggest that the overall risks taken by banks do not necessarily increase probably due to sound risk-mitigating techniques. Likewise, Shakina and Barajas (2016) findings suggest that a lower drawdown in MVA and EVA has been observed with a negative moderation effect both pre and post the financial crisis for high-performing companies.

Thus, the following hypotheses are considered relevant for the study:

H_1: There is a significant relationship between EVA and MVA.

H_2: There is a significant relationship between ROA and MVA.

H_3: There is a significant relationship between ROE and MVA.

H_4: There is a significant relationship between EVA and MVA before global financial crisis.

H_5: There is a significant relationship between ROA and MVA before global financial crisis.

H_6: There is a significant relationship between ROE and MVA before global financial crisis.

H_7: There is a significant relationship between EVA and MVA after global financial crisis.

H_8: There is a significant relationship between ROA and MVA after global financial crisis.

H_9: There is a significant relationship between ROE and MVA after global financial crisis.

3. RESEARCH DESIGN

3.1. Sample Selection

Information and technology can be considered the important factor driving economic growth in industrial societies. Investing in this area is commonly regarded as having huge potential for reducing costs, enhancing productivity, and improving living standards (Hajli et al., 2015) for individual and business context. More importantly, informatics and technology firms has faced greater modification due to changes in technological, as well as having to respond to rapid changes in the needs of shareholders such as costumers, employee, communities and other information users. In highly uncertain external variation, the use of accounting performance measures may not be sufficient for performance evaluation and planning for the business's future. Thus, we focus on value based performance measures for informatics and technology firms.

Our sample comprises all listed informatics and technology firms in the İstanbul Stock Exchange (BIST). The data set was created from firms' financial statements. The sample consisted of 156 observation

of informatics and technology firms for financial statements data that have all data for 12-year period. Thus, to be included in the sample, a firm has to satisfy the criteria: has complete financial data reported in data stream for the year 2004 and 2015.

3.2. Measure of Business Performance

We use MVA as a market-based measure of business performance. For the additional test, we employ ROA, ROE and EVA as an accounting-based measure of firm performance. In this study, we use value based performance meausures MVA as the external performance measure, while we use internal performance measures such as EVA, ROA and ROE. In this study, the model of research considers as we use EVA, ROA and ROE as independent variables.

Prior studies have extensively used MVA as a proxy for market based business performance. It has been shown robust to different selected sample time-periods and countries.

MVA is calculated as the difference between the firm's market value and the total capital invested in the business (Young and O'Byrne, 2000). It is an external value-based performance measure, which is considered to be the best index of creation shareholder value. MVA has presented a new shareholder value measure by Stewart (1991) which describes the market based value adds over the book value of invested capital. Likewise, MVA, studied by Stewart (1991) and Alipour and Pejman (2015) is used as a depent variable and displays the value-added created for the shareholders and investors. In this context, the MVA is the difference between market capitalization of the company and total common shareholders equity as shown follows:

Market value added (MVA)=Market capitalization-total common Shareholder's equity or total shares outstanding×current market price-total common equity (1)

EVA, which is an first proxy independent variables, measures residal income as calculating the difference between a firm's cost of capital and return on capital, which is expressed as positive or negative result (Young and O'Byrne, 2000). EVA can be calculated in the following equation (Sharma and Kumar, 2010):

$$EVA=NOPAT-(TCE\times WACC) \qquad (2)$$

Where, NOPAT=Net operating profit after tax,

TCE=Total capital employed,

WACC=Weighted average cost of capital.

Second proxy as an independent variables, ROA is an indicator of how profitable a company is relative to its total assets. That is;

$$ROA=Net\ income/Total\ assets \qquad (3)$$

Third proxy as an independent variables, ROE is a profitability ratio that measures the ability of a firm to generate profits from its shareholders investment in the company. That is;

$$ROE=Net\ income/Shareholder's\ equity \qquad (4)$$

Consequently, ROA is one of the most important traditional profitability ratio. ROA evaluates firm's ability in profit making according to total investments in assets (Kangarlouei, et al., 2012). Similarly, ROE is equal to profit division after tax deduction by average of total equity; and it shows the management efficiency (Fathabadi et al., 2014). Although ROA and ROE variables can give a general view of management efficiency, they are not perfectly accurate (Bernier and Mouelhi, 2011).

3.3. Empirical Model

We employ panel data techniques to estimates the regression models in the hypotheses. We focus on two techniques use to analyze panel data such as fixed effects and random effects for sample firms over time which can impact of business performance. We also estimate analyze panel data correcting for heteroscedasticity. Our methodology is based on similar study of Torres (2007), and Alipour and Pejman (2015). We use fixed effects and random effects models for panel data enabling and emperical estimate of link between EVA, ROA, ROE and MVA during the pre and post financial crisis. To investigate the relationship between MVA and its explanatory variables, the following model is developed:

$MVA_{it}=\beta_0+\beta_1EVA_{it}+\beta_2ROE_{it}+\beta_3ROA_{it}+u_{it}$

Where: MVA is market value added,

EVA is economic value added,

ROE is return on equity,

ROA is return on assets,

μ_{it} is a random disturbance term.

4. EMPIRICAL RESULTS

4.1. Descriptive Statistics

This section contains the descriptive statistics and the results of regression analysis of 13 samples informative and technology firms listed on BIST during the 10 years of period from 2004 to 2015. The interpretations of the empirical findings are also presented in this section.

Descriptive statistics of study are given in Table 1. Table 1 provides statistics of the collected variables. The values of minimum, maximum, mean, standard deviation of dependent variables (MVA) and independent variables (EVA, ROA, and ROE) of sample 13 firms are calculated from 2004 to 2015. Total observations come to 156 for informative and technology firms.

The table reports descriptive statistics for all variables used in the paper's main analyses for the sample of 13 informative and technology firms. MVA is the Market Capitalization less Total Common Shareholder's Equity, and EVA is the difference between a firm's cost of capital and return on capital. ROE (ROA) is the informative

Table 1: Summary of descriptive statistics

Variable	N	Mean±SD		Minimum	Maximum
MVA	56	1.5608	6.3708	−1.5708	5.5909
EVA	156	−0.9526	3.7607	−3.0408	4.4607
ROA	156	0.04698	0.0879	−0.2167	0.7227
ROE	156	0.10801	0.1894	−0.8085	0.7898

SD: Standard deviation, MVA: Market value added, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity

and technology firms' cumulative net income over the years 2004 and 2015, divided by the book value of equity (total assets).
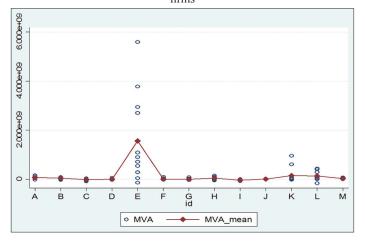
According to Table 1, MVA, our measure of market valuation, has a mean value of 1.5608 and ranges from −1.5708 to 5.5909. EVA, our measure of market valuation, has a mean value of −0.9526 and ranges from −3.0408 to 4.4607. Firms' profitability, as measured by ROA, varies between −0.2167 and 0.7227%, with a mean of 0.4698%. Additionally, firms' profitability, as measured by ROE, varies between -.8085 and 0.7898%, with a mean of 0.1080 %. More importantly, descriptive statistics shows that EVA has a negative and significant relationship with MVA. The other descriptive statistics do reports statistically significant differences between MVA, ROA, and ROE for the period as a whole.

For each firm, the distribution and average MVA values for firms are presented in alphabetical order (A=Alcatel, B=Anel, C=Arena, D=Armada, E=Aselsan, F=Datagate, G=Escom, H=Indeks, I=Karel, J=Link, K=Logo, L=Netaş, M=Plastic) a graph was generated as shown in Figure 1. In the Figure 1 shows that E=Aselsan's MVA average is a high and negative value, so it bumps among other firms.

4.2. Impact of Profitability on Business Performance
The generally accepted way of choosing between fixed and random effects is running a Hausman test (Alipour and Pejman, 2015). To run a hausman test comparing fixed with random effects in Stata, we need to first estimate the fixed effects model, save the coefficients so that we can compare them with the results of the next model, estimate the random effects model, and then do the comparison. Run a fixed effects model and save the estimates, then run a random model save the estimates, then perform the test. This setting seen as follow in Table 2.

Figure 1: Distribution and average market value added values for firms

Table 2: Coefficients

Variables	(b)	(B)	(b−B)	Sqrt (diag (V$_b$-V$_B$))
	Fe	Re	Difference	SE
EVA	0.9124	−11.4842	−12.3966	1.3747
ROA	2.9308	4.0308	1.1108	3.3608
ROE	−2.3908	1.3408	3.7308	1.8908

Chi^2 (2)=(b−B)'[(V$_b$−V$_B$)$^{-1}$](b−B)=1.78, Prob>Chi^2=0.4102, SE: Standard error, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity

Prob>Chi^2=0.4102. If this number <0.05 then our fixed effects model is accepted. Thus, we used random effects model. According to random effect model, we found that modified Bhargave *et al*. Durbin watson=0.396070 and Baltagi- wu LBI=0.734378 (Tatoğlu, 2013, p. 226). The values of DW test show that there is a problem of auto-correlation. On the other hand, we found a heteroskedasticity problem as the follow:
W0=37.97720 df (12, 143) Pr>F=0.00000000
W50=33.82810 df (12, 143) Pr>F=0.00000000
W10=35.60473 df (12, 143) Pr>F=0.00000000

The existence of heteroscedasticity is a major concern in the application of regression analysis, including the analysis of variance. Thus, we added the option robust estimator' to control for heteroscedasticity problem. The results are presented in Table 3.

Two-tail *P*-values test the hypothesis that each coefficient is different from 0. To reject this, the p-value has to be lower than 0.05 (95%, you could choose also an alpha of 0.10), if this is the case then we can say that the variable has a significant influence on our dependent variable.

According the results that there is a negative and significant relationship between MVA and EVA in the long-term. Thus, the first hypothesis (H1) is accepted. This indicates that increasing the amount EVA will result in a decrease in the market value added. On the other hand, there are no significant relationship between ROA, ROE and MVA. Thus, the second (H2) and third (H3) hypothesis are rejected. This indicates that increasing the amount ROA and retun on equity will not effect market value.

Many papers examined relation between MVA and EVA, ROA. ROE for manufacturing and textil sectors. However, we did not find the study about informative and technology sector.

If we don't consider about the difference between sectors, we can say the findings of our results is consistent with prior empirical studies Bhasin (2013) found that do not support the claim of Stern Stewart's that EVA is excellent to the traditional performance measures in explaining MVA. The finding of this study is consist of with prior emprical evidence on Nakhaei and Hamid (2013) found that there are meaningful correlation between EVA. The result also indicate that BIST informative and technology firms show significant association between EVA and MVA, evidence supporting the prior study Kashinant and Kanahalli (2015); Kramer and Pushner (1997). On the other hand, the findings of our paper are not consistent with prior empirical studies (Stewart, 1991; Lehn and Makhija, 1996; Prasad and Shrimal, 2015; Yaqub et al.; Bernier and Mouelhi, 2011; Ghanbari and More, 2007).

4.3. Impact of Global Financial Crisis on MVA
Run a fixed effects model and save the estimates, then run a random model save the estimates, then perform the test for before global financial crisis (Table 4).

Prob>Chi^2=−5.15. If this number <0.05 then our fixed effects model is accepted. Thus, we used random effects model. According to random effect model, we found that modified Sargan–Hansen=−0.9241,

Table 3: Robust estimatortest results

MVA	Coefficient	Robust SE	Z	P>|z|	(95% CI)	
EVA	−12.3967	0.9795	−12.66	0.000	−14.3165	−10.4768
ROA	1.1108	5.4308	0.20	0.839	−9.5408	1.1809
ROE	3.7308	1.7408	2.15	0.032	3.2407	7.1308
_Cons	−0.7318	2.7807	−0.26	0.793	−6.1907	4.7307
Sigma_u	0					
Sigma_e	4.41808					
Rho	0 (fraction of variance due to u_i)					

Wald Chi^2 (3)=348.40. Prob>Chi^2=0.0000. MVA: Market value added, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity, CI: Confidence interval

Table 4: Coefficients before global financial crisis

Variables	(b)	(B)	(b-B)	Sqrt (diag (V_b−V_B)
	Fe	Re	Difference	SE
EVA	5.0834	−0.3191	5.4025	0.3377
ROA	−3.5307	−0.8853	−2.6407	0
ROE	−4.8407	4.8007	−9.6307	0

Chi^2 (2)=(b−B)'[(V_b−V_B)$^{-1}$](b-B), Prob>Chi^2=−5.15. EVA: Economic value added, ROA: Return on assets, ROE: Return on equity, SE: Standard error

Durbin–Watson=1.32815 and Baltagi-wu LBI=1.96741. The values of Sargan-Hansen test show that there is a problem of auto-correlation. On the other hand, we found a heteroskedasticity problem as the follow:

i=13.04 df (12, 49) Pr>F=0.00000000

The existence of heteroscedasticity is a major concern in the application of regression analysis, including the analysis of variance before global financial crisis. Thus, we added the option robust estimator' to control for heteroscedasticity problem. The results are presented in Table 5.

Two-tail P-values test the hypothesis that each coefficient is different from 0. To reject this, the P-value has to be lower than 0.05 (95%, you could choose also an alpha of 0.10), if this is the case then we can say that the variable has a significant influence on our dependent variable.

Using a sample of 65 Turkish Informatics and Technology Firms from 13 companies over the period 2004 to 2008, we present the following key findings: According the results that there is a positive and significant relationship between MVA and EVA in the pre-financial crisis.Thus, the hypothesis H4 is accepted. This indicates that increasing the amount EVA will result in a decrease in the market value added. On the other hand, there are no significant relationship between ROA, ROE and EVA. Thus, the H5 and H6 hypothesis are rejected.This indicates that increasing the amount ROA and retun on equity will not effect market value.

Run a fixed effects model and save the estimates, then run a random model save the estimates, then perform the test for after global financial crisis (Table 6).

Prob>Chi^2=−5.15. If this number <0.05 then our fixed effects model is accepted. Thus,we used random effects model. According to random effect model, we found that modified Sargan-Hansen=−0.9241, Durbin-Watson=1.32815 and Baltagi-wu LBI=1.96741 The values of Sargan-Hansen test show that there is a problem of auto-correlation. On the other hand, we found a heteroskedasticity problem as the follow:

i=13.04 df (12, 49) Pr>F=0.00000000

The existence of heteroscedasticity is a major concern in the application of regression analysis, including the analysis of variance after global financial crisis. Thus, we added the option robust estimator' to control for heteroscedasticity problem. The results are presented in Table 7.

Two-tail P-values test the hypothesis that each coefficient is different from 0. To reject this, the P-value has to be lower than 0.05 (95%, you could choose also an alpha of 0.10), if this is the case then we can say that the variable has a significant influence on our dependent variable.

Using a sample of 91 Turkish Informatics and Technology Firms from 13 companies over the period 2009 to 2015, we present the following key findings: According the results that there is a negative and significant relationship between MVA and EVA in the post-financial crisis.Thus, the hypothesis H7 is accepted. This indicates that increasing the amount EVA will result in a decrease in the market value added. On the other hand, there are significant association between ROE and EVA, while there are not significant relationship between ROA and EVA. Thus, the H8 hypothesis are accepted and H9 hypothesis are rejected. This indicates that increasing the amount ROA and retun on equity will not effect market value (Table 8).

Finally, we examined the values of coefficients, standard error of dependent variables (EVA) and independent variables (MVA, ROA, and ROE) of sample 13 firms are calculated from 2004 to 2015 during the pre and post gloabal financial crisis.

According the results that there is a negative and significant relationship between EVA and MVA in the post-financial crisis, while there is a positive and significant relationship between EVA and MVA in the post-financial crisis. In the contrary, there are no significant relationship between ROA, ROE and EVA during the pre and post global financial crisis.

5. CONCLUSION

This study examined the financial information content of MVA and three traditional accounting performance measures. Furher, these study also examines the profitability and its effect on market value added of Turkish informative and technology firms listed on the BIST, covering a 10 years period in Turkey (2004–2015). Based on the findings of this paper EVA has a negative and significant relationship with MVA, while ROA and ROE have no significant relationship market value added.

Table 5: Robust estimator test results before global financial crisis

MVA	Coefficient	Robust SE	Z	P>|z|	(95% CI)	
EVA	5.0834	0.2272	22.38	0.000	4.58841	5.57833
ROA	−3.5307	5.5707	−0.63	0.539	−1.5708	8.6207
ROE	−4.8407	4.8107	−1.01	0.334	−1.5308	5.6407
_Cons	9.7707	447399	21.84	0.000	8.8007	1.0708
Sigma_u	2.11808					
Sigma_e	498945					
Rho	0 (Fraction of variance due to u_i)					

Wald Chi² (3)=228,42. Prob>Chi²=0.0000. MVA: Market value added, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity, CI: Confidence interval

Table 6: Coefficients after global financial crisis

Variables	(b)	(B)	(b−B)	Sqrt (diag (V_b−V_B))
	Fe	Re	Difference	SE
EVA	5.0834	−0.3191	5.4025	0.3377
ROA	−3.5307	−0.8853	−2.6407	0
ROE	−4.8407	4.8007	−9.6307	0

Chi² (2)=(b−B)'[(V_b−V_B)⁻¹](b−B), Prob>Chi²=−5.15. EVA: Economic value added, ROA: Return on assets, ROE: Return on equity

Table 7: Robust estimator test results after global financial crisis

MVA	Coeffficient	Robust SE	Z	P>|z|	(95% CI)	
EVA	−16.6071	1.0469	−15.86	0.000	−18.6589	−14.5553
ROA	−1.5408	6.1808	−0.25	0.803	−1.3709	1.0609
ROE	5.9708	2.7008	2.21	0.027	6.8207	1.1209
_Cons	6.0307	5.5507	1.09	0.278	−4.8507	1.6908
Sigma_u	1.56808					
Sigma_e	3.14608					
Rho	0 (fraction of variance due to u_i)					

Wald Chi² (3)=569.20. Prob>Chi²=0.0000. MVA: Market value added, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity, CI: Confidence interval

Table 8: Impact of global financial crisis on EVA

Variables	After financial crisis			Before financial crisis		
	Coefficients	SE	n	Coefficients	SE	n
MVA	−0.0432	0.0038	91	0.1278	0.0134	65
ROA	2363091	3.5807	91	1.3607	2.6307	65
ROE	2.4107	2.0307	91	1.1107	89617	65

SE: Standard error, MVA: Market value added, EVA: Economic value added, ROA: Return on assets, ROE: Return on equity

The empirical study results findings that there are significant relationship between EVA and MVA, evidence supporting the prior study Kashinant and Kanahalli (2015); Kramer and Pushner (1997). However, the findings of our paper are not consistent with prior empirical studies by Stewart (1991).

It can be concluded that the EVA of the firm's impacts their market value added negatively. On the other hand, we can say that there is no relationship between MVA and traditional performance measures of ROA and ROE. Likewise, the findings of this paper suggest that there negative and significant relationship link with MVA and EVA in the post global financial crisis period, while positive and significant relationship between MVA and EVA in the pre global financial crisis period.

The study is limited to sample of Turkish informative and technology industry firms. This study of informatics and technology companies of economic activity and the relatively narrow 12-year period of 12 years from 2004 to 2015 was selected for data collection are the principal limitations of the current study. Future research should investigate generalizations of the finding beyond Turkish informative and technology firms.

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