Determinants of Accounting and Market-based Performance Measures – Case of Croatian Non-financial Listed Companies

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Abstract.

Research background: Profitability and the factors that determine it have always intrigued the scholars. Despite the large number of studies dealing with this topic at the international level, this paper sheds a new light on the issue since it deals with the listed companies in an emerging economy confronting two performance measures.
Purpose of the article: The aim of this paper is to provide evidence on the performance of Croatian non-financial firms listed on the Zagreb Stock Exchange (ZSE).
Methods: The analysis encompassed firms that operated in the 2015 – 2019 period. For this purpose, the authors confronted two performance measures, i.e. accounting-based performance measure represented with return on assets (ROA) whereas Tobin's Q stands for the market-based measure of performance or firm value. Independent variables that served as potential determinants of listed companies' performance include inventories management, productivity, liquidity measured with both current and quick ratio, and size calculated on the basis of total assets, and sales.
Findings & Value added: After employing static panel analysis, the results reveal statistically significant influence of size variable based on assets in both models though it takes negative sign in the model where performance is measured with Tobin's Q, whereas its positive impact on performance is recorded in ROA model. Furthermore, size based on total sales also positively affects performance when measured with ROA.

Keywords: *ROA; Tobin's Q; listed companies; performance*

JEL Classification: *L21*; *L25; G32*

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1 Introduction

In the year 2019 shares of publicly traded companies on Zagreb Stock Exchange (ZSE) in Croatia had market capitalization of 19.492 million of euros which is an increase of 11% compared to the previous year suggesting the importance of corporate sector performance hence the importance of analysing the determinants of performance of such companies.

There are several theories on the determinants of companies' profitability as well as numerous studies that are mostly based on structure-conduct-performance (SCP) paradigm stemming from industrial organization economics as suggested by [1]. SCP paradigm presupposes causal relationships between market structure, the conduct or behaviour of firms operating in the market and their economic performance. As pointed out by [1] citing Storey (1991) traditional managerial/entrepreneurial research including finance and accounting is rather focused on the firm – level of analysis.

Therefore, we base our analysis on the firm level encompassing non-financial firms listed on ZSE in the period 2015-2019. Although, an extensive empirical research on the determinants of companies' performance has evolved over the last decades this paper still extends the research on companies' performance in several ways. First of all, the sample deals with Croatian non-financial listed firms only. By excluding financial institutions with specific financial statements structure as well as specific activities they perform we have obtained more reliable results. Furthermore, the performance is measured with market-based performance measure as well as with accounting-based one in order to check the robustness of the model. Furthermore, several non-extensively used firm-specific variables, at least in the context of empirical research dealing with Croatian companies' performance, have been employed in the analysis in order to find out their potential influence on performance.

Due to the fact that there is a vast body of literature on determinants of corporate performance, for the purpose of this study we have selected several papers dealing with corporate profitability on the samples of cross-industry firms.

[2] has studied the influence of working capital management on corporate profitability using the sample of 1,009 large Belgian non-financial firms in the 1992-1996 period. Working capital management is measured with the cash conversion cycle while trade credit policy as well as inventory policy is measured by number of days accounts receivable, accounts payable and inventories. Size variable calculated as the natural logarithm of sales, sales growth, the financial debt ratio, the ratio of fixed financial to total assets and variability of net operating income are included as control variables in the regressions. The findings of the analysis reveal that managers can improve corporate performance by reducing the number of days accounts receivable and inventories.

[3] has examined the determinants on firm profitability on the sample of US cross-industry companies listed in US stock exchanges in the period 1987 – 2006 paying special attention to the firm size. Regression results suggest positive influence of size on profitability as well as statistically significant impact of market share, R&D intensity and inventory to sales ratio. It is worth noting the finding that industry-specific fixed effects has insignificant role when observed together with firm-specific fixed effects.

[1] have investigated determinants of profitability on a multi-industry firm level in 15 Western European countries in the period 2004-2011. The authors have applied static and dynamic econometric models employing a number of firm-specific variables including leverage, liquidity expressed as net working capital to total assets ratio, growth rate of sales, size calculated as natural logarithm of total assets, industry-country average opportunity cost of capital as well as majority shareholder commitment level expressed as a dummy variable. Macroeconomic variables include GDP growth rate, inflation and financial market returns whereas ROA acts as a dependent variable. Results of the analysis reveal negative

effects of leverage, size and inflation on performance whereas liquidity, growth rate of sales, opportunity cost of capital, shareholder commitment level and GDP growth rate positively affect performance.

The remaining of the paper is structured as follows. After the introductory part that gives a background on the topic being investigated, second section describes the sample covered by the analysis as well as the variables used. Results including the findings of the analysis follow afterwards while the fourth part discusses the findings and concludes.

2 Methods

The authors wanted to test the determinants of corporate performance on the sample of all non-financial companies listed on the ZSE including all segments of the regulated market, i.e. prime, official and regular market in the period 2015-2019. There were 91 non-financial companies listed on ZSE, however, after adjusting for companies whose shares were not traded for at least three consecutive years in the analysed period our sample has been reduced to 67 companies making a total of 323 observations. Due to the fact that not all companies covered by the sample were listed in the entire observed period, our sample is unbalanced.

Furthermore, due to the specific features of financial institutions, banks, insurance companies and investment funds are not encompassed with the analysis. This approach is also applied by e.g. [4], [5] as well as by [6] who excluded financial firms from the sample of listed companies stating that financial statements of the companies in financial sector "have a strikingly different structure from those of nonfinancial companies".

The data for variables employed with the analysis were obtained from annual reports publicly available through web pages of ZSE.

The research papers dealing with determinants of firm performance can be classified into two groups, i.e. the papers using market-based measure of performance such as Tobin's Q (e.g. [6]; [7]; [8]; [9]) and those using accounting-based measures of performance, mostly return on assets (ROA) and return on equity (ROE). Among those employing accounting-based measure of performance papers using ROA are e.g. [9]; [10]; [11]; [12]; [13]; [14]; [15]), while papers employing ROE encompass e.g. [11]; [12] and [15].

Since we are dealing with the listed companies in our research we have opted for the use of Tobin's Q (**TOBIN_Q**), market-based measure of performance, calculated as the sum of market value of shares and book value of debt over the book value of total assets. It can be used as a proxy of firm value while the additional rationale for employing this approach is given below. Specifically, according to [6], Tobin's Q shows whether companies are capable to create value by exploiting existing resources effectively. Moreover, as stated by [7], accounting – based performance measures are misled by not taking into consideration differences in "systematic risk, temporary disequilibrium effects, tax laws, and accounting conventions regarding R&D and advertising" whereas Tobin's Q encompasses all of these biases. Another reason lies in the fact that accounting-based measures of performance are backward-looking whereas Tobin's Q is forward-looking ([8]). However, as stated by [8], since higher accounting rates are generally accompanied by higher share price and since both accounting and market-based performance measures have their own advantages and disadvantages we have employed ROA in our study as a robustness check. ROA variable has been calculated as net profit after tax over total assets as it is done in e.g. [5], [12] and [15], to name a few. This approach including both firm value expressed with Tobin's Q as well as accounting based performance measure expressed with ROA has also been employed by e.g. [5], [9], [16], [17] and [18].

We have employed inventories management (**INV_MAN**) variable following [3] which is calculated as the inventory stock to total sales ratio. Negative sign of this variable is

expected, i.e. lower inventory stock to sales ratio is associated to higher profits reflecting company's efficiency in managing inventories. This is explained by [15] stating that inventories tie up cash which is consequently not available for alternative profitable use.

Productivity measures how efficient company is in converting inputs into outputs. Though it is usually calculated by dividing output with costs or resources such as capital, labour, material etc., it can be expressed by measuring a company's net sales relative to labour costs. Therefore, the authors have employed productivity (**PROD**) as dependent variable following [19] approach who investigated profitability determinants in an insurance industry. Although they have found insignificant effect of this variable on performance measured with ROA, ROE and return on total premium variable, we expect its positive sign since higher levels of sales are associated with higher profitability. Furthermore, [20], while exploring firm performance determinants in selected transition economies, have also employed similar variable of labour productivity.

Liquidity is also employed with our analysis using two liquidity indicators, i.e. current ratio (**LIQ_CURRENT**) expressed as short-term assets divided with short-term liabilities and quick ratio (**LIQ_QUICK**) calculated as cash over short-term liabilities. Current ratio is employed in empirical papers by e.g. [14], [21], [22] while quick ratio is used in study by e.g. [23]. Since both these indicators show how successfully companies meet their short-term liabilities we might expect positive influence of these variables on performance as found by [21] and [22]. Furthermore, [1] find liquidity, tough measured by net working capital to positively affect profitability. Specifically, as stated by [21], higher levels of liquidity diminish exposure to the risk of not being able to meet short-term financial commitments. However, the same authors point out that too high proportion of assets in liquid form may prevent company from exploiting available profitable investment opportunities. Furthermore, a number of research papers find insignificant influence of liquidity on performance (e.g. [14]). Therefore, we can conclude that influence of liquidity is ambiguous.

Size variable has been included in the analysis based on both total assets (**LN_ASSETS**) and total sales (**LN_SALES**). Size variable based on total sales is employed by e.g. [5], and [13] while size measured on the basis of total assets is used by e.g. [3]; [12], [18]. As stated by [3], firm size raises the market power of a company and size is therefore expected to positively impact performance. Moreover, [5] citing Ghosh (1998) add that larger companies are in general better performers since they are more capable to diversify risks. However, the same authors citing Hannan and Freeman (1989) state that smaller companies are perceived as "more creative, innovative and change more readily to enhance corporate value". In this sense, negative sign of this variable might be expected.

3 Results

Descriptive statistics for all variables employed in research is provided in Table 1. As mentioned before 67 companies made maximum 323 observations. Because not all companies covered by the sample were listed in the entire observed period sample is unbalanced.

Table 1. Descriptive statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
PROD	326	7.2011	8.5446	0.4305	56.9155
LIQ_CURRENT	332	3.0540	7.1400	0.0316	76.3664

LIQ_QUICK	332	0.6580	1.5381	0.0000	12.7306
INV_MAN	332	0.9556	15.2876	0.0000	278.6397
LN_ASSETS	332	20.1883	1.3305	16.5794	23.8182
LN_SALES	327	19.1559	1.8592	10.8887	23.7724
TOBIN_Q	332	1.1408	0.9689	0.2034	7.9638
ROA	332	0.3448	10.5055	-96.6555	20.2424

Source: Authors' work

The static unbalanced panel model (1) with i = 1,…,67 and t = 1,…5 was used for empirical analysis:

$$Y_{it} = c + \sum_{k=1}^{K} \beta_k X_{it}^k + \varepsilon_{it} \quad (1)$$

Yit is presented by TOBIN_Q in one model and with ROA in the second panel model and *Xit* are k independent variables as discussed and described before.

Before the static panel model was implemented in research stationarity in panel dataset was tested. The presence of unit root test was tested in all variables using a Fisher-type unit-root test based on an augmented Dickey Fuller test. The results showed that variables TOBIN_Q, LIQ_CURRENT and LN_ASSETS were not stationary. After finding the first difference for not stationary variables, the same unit-root test was conducted again. Result showed that the first differences of aforementioned variables were stationary. After conducting testing for stationarity differenced variables (D_TOBIN_Q, D_LIQ_CURRENT and D_LN_ASSETS) were used in research. Table 2 presents results of conducted Fisher-type unit-root test based on an augmented Dickey Fuller test.

Table 2. Fisher-type unit-root test.

Variable	Inverse chi-squared	Inverse normal	Inverse logit	Modified inverse chi-squared
	p-value	p-value	p-value	p-value
TOBIN_Q	0.0000	0.9168	0.0845	0.0000
ROA	0.0000	0.0000	0.0000	0.0000
PROD	0.0000	0.0592	0.0000	0.0000
LIQ_CURRENT	0.0000	0.1238	0.0000	0.0000
LIQ_QUICK	0.0000	0.0000	0.0000	0.0000
INV_MAN	0.0000	0.0336	0.0000	0.0000
LN_SALES	0.0000	0.0002	0.0000	0.0000
LN_ASSETS	0.0056	0.9978	0.9748	0.0029

Source: Authors' work

Next step in research was to check the problem of multicollinearity between independent variables. The matrix of Pearson correlation coefficients and Variance inflation factors for independent variables (VIF) were implemented to test the problem of multicollinearity. Since there was no problem with multicollinearity between independent variables (Table 3 and Table 4) so all variables were included in research.

Table 3. Correlation matrix.

	PROD	D_LIQ_CU-RRENT	LIQ_QUICK	INV_MAN	LN_SALES	D_LN_ASS-ETS
PROD	1.0000					
D_LIQ_CU-RRENT	-0.0955	1.0000				
LIQ_QUICK	-0.0385	0.0013	1.0000			
INV_MAN	-0.0686	0.0162	-0.1618	1.0000		
LN_SALES	0.3238	0.0432	0.0082	-0.0813	1.0000	
D_LN_ASS-ETS	-0.0383	0.0846	0.1776	-0.0631	0.0765	1.0000

Source: Authors' work

Table 4. Variance inflation factors for independent variables (VIF).

Variable	VIF	1/VIF
PROD	1.1400	0.8768
LN_SALES	1.1400	0.8797
LIQ_QUICK	1.0600	0.9437
D_LN_ASSETS	1.0500	0.9526
INV_MAN	1.0400	0.9635
D_LIQ_CURRENT	1.0200	0.9787
Mean VIF	1.0700	

Source: Authors' work

At the end of empirical analysis static panel with fixed effects (FE) and static panel with random effects (RE) were used in research. Hausman test indicated that most appropriate model was static panel model with random effects when analyzing both models. Breusch-Pagan test was also used to test for heteroscedasticity in each model and results showed that problem of heteroscedasticity is present in both models. The first, and most common, strategy for dealing with the possibility of heteroscedasticity is to use robust errors, which was done in research. Final results are shown in Table 5.

Table 5. Parameter estimates of static panel model with random effects.

Variables	D_TOBIN_Q	ROA
PROD	0.0000046 (0.0004274)	-0.0098864 (0.0128252)
D_LIQ_CURRENT	-0.0000146 (0.0021131)	0.2216588 (0.2224211)
LIQ_QUICK	-0.0077838 (0.0107744)	0.4713966 (0.3144003)

INV_MAN	-0.004269 (0.074248)	-1.641047 (1.974236)
LN_SALES	-0.0001241 (0.010799)	0.6496485** (0.2816057)
D_LN_ASSETS	-0.6387577*** (0.2286382)	21.88204** (10.30166)
R2 within	0.0176	0.1181
R2 between	0.1093	0.3849
R2 overall	0.0340	0.2215
Model p value	0.0158	0.0050
Lagrangian multiplier test for random effects	chi = 3.90	chi = 6.84
	p value = 0.0484	p value = 0.0089
Hausman test	chi = 1.64	chi = 6.39
	p value = 0.9497	p value = 0.2703
Breusch-Pagan test for heteroskedasticity	chi2 = 52.05	chi2 = 329.81
	p-value = 0.0000	p-value = 0.0000

,,*** Statistically significant at the; 10%, 5%, 1% level, respectively. Robust standard errors are between parentheses.*

Source: authors' work

The results of the analysis when performance is expressed with Tobin's Q indicate that size based on total assets is significantly associated with corporate performance in the observed period. Negative sign of size variable is consistent with the findings of [5], [16] and [17] indicating that the smaller companies are perceived as better performers compared to their larger counterparts. The rationale for such findings can be found in [24] stating that companies with substantial book value of assets find it extremely harder to yield higher stock returns as compared to smaller companies.

Moreover, when using accounting-based indicator of performance, i.e. ROA statistically significant influence of size variable is evident again, however, it takes the positive sign. Such finding supports analyses of e.g. [3] and [25]. The positive firm size – ROA relationship can be explained by exploiting advantages arising from economies of scale as suggested by e.g. [3], [21] and [25]. It can be added that the more assets the firms possess, the more income they generate by exploiting more assets that consequently results in higher levels of profitability.

Identical influence of size variable depending on the performance measure used is also obtained in [5], [16] as well as in [17]. Specifically, in all of these studies size is negatively associated with Tobin's Q whereas positive influence of size is found when ROA is employed as dependent variable. It is important to emphasize that in model where performance is measured with ROA both size variables, specifically size calculated on the basis of total assets as well as size calculated based on total sales prove to have statistically significant and positive impact on performance.

4 Discussion and concluding remarks

Factors that determine corporate performance still occupy the interest of researchers and scholars, thus, this paper also contributes to scientific thought by providing new evidence on this topic in the context of emerging economy. Specifically, this paper deals with profitability determinants of Croatian non-financial listed firms in the period 2015-2019 employing both Tobin's Q as well as ROA that serve as proxies for market and accounting performance. As suggested by [5], ROA indicates how effectively companies' assets are used in order to serve shareholders' economic interests while Tobin's Q, as stated by [7], stands for "a market measure of firm value that is forward-looking, risk-adjusted, and less susceptible to changes in accounting practices".

The authors performed static panel analysis on the sample of non-financial firms whereas financial institutions were not covered due to their specific features. Due to the fact that there are potentially numerous factors that might affect firm performance the authors have employed several variables that are quite often used in empirical studies as well as those that are often neglected or underused in previous literature. Therefore, independent variables comprise inventories management, productivity, current ratio, quick ratio, size based on assets as well as size based on sales.

The results of the analysis reveal that size variable plays significant role in explaining corporate performance in both models regardless of performance measure used. To be more specific, size calculated on the basis of total assets negatively affects performance in Tobin's Q model whereas its positive influence is evident in ROA model. This is additionally confirmed by size variable calculated on the basis of total sales that also has statistically significant and positive influence on ROA.

The authors are also aware of the limitations of this study, thus, directions for future research are to include other performance measures in order to compare and check the robustness of results. Furthermore, other factors that might affect performance could also be considered and employed in the analysis.

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