Determinants of Return on Equity in the Czech Agric and Forest Industry

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Abstract: This study was to examine the factors that determine return on equity (ROE) in the Czech Agric and Forestry Industry over a 10-year period of 2005 to 2014. A combination of firm level variables (DuPont model) and macroeconomic variables (Multifactor Arbitrate Pricing Theory-APT) was used to analyze data obtained from Amadeus Bureau van Dijk and the World Bank database respectively. The results obtained from the panel regression analysis indicated that only profit margin is significantly impacting positively on ROE in the industry. Regarding the macroeconomic indicators, variables such as GDP Growth and Interest rate, Unemployment rate and Inflation rate all have a negative impact on ROE whilst Exchange Rate have no impact on the ROE in the Czech Agric and Forest Industry. These results suggest that the firms can improve their ROE by engaging in cost leadership strategies and increasing sales revenue.

Keywords: return on equity, company performance, industry, Czech Republic

INTRODUCTION

Performance analysis of financial results is very important to every organisation especially firms in the private sector. It basically involves an examination of financial performance indicators of the results achieved to enhance and improve decision making. One important indicator of financial performance which helps every firm to grow is the return on equity (ROE). The ROE focuses on the economic theory of "maximizing thJe wealth of the firm's owners" (Gitman, 1998; Mubin et al. 2014). The ROE is also one of the measures that is used in measuring the profitability of a business in relation to the book value of shareholder equity according to Lazonick and O'Sullivan (2000).

In recent years, quite a number of researchers have analysed the factors that determines the ROE in an organisation (Cole, 1973; Liesz, 2002; Majed et al. 2012). The most common model which has been used is the DuPont Model. The DuPont Model is a technique that allows all the stakeholders of a firm to understand ROE in three (3) areas (Profitability, Operational Efficiency and Financial Leverage) and provides a structure which can help determine a firm's strengths and weaknesses.

This paper basically uses the DuPont Model and some other macroeconomic indicators to examine the determinants of Return on Equity in the Czech Agric and Forest industry. The paper is organised as follows: Section 1 introduces briefly the title of the study as well as the objective. Section 2 discusses the relevant literature review mostly empirical review. Section 3 focuses on the data and method used to achieve the objective of examining the factors that determine ROE in the Czech and Agric Industry. Section 4 presents and discusses the results of the analysis of the data while section 5 concludes and makes recommendations.

LITERATURE REVIEW

Return on Equity (ROE) is defined as the measure of return for the investments from equity that has been placed in the company by the shareholders (Portes and Rey, 2005). The below writers have argued on the topic of return on equity in different jurisdiction based on empirical findings of their work.

Dating back from 1978, Hagerman & Ratchford examined the economic and political variables that may affect the rate of return on equity allowed in electric utilities by using a variance components model. Their results indicated that both the risk and the size of the firm are positively related to the allowed return on equity. Also their results suggested that use of book value in determining the rate base and the term of the commissioners were also positively related to the allowed return.

In 2000, Lombardo & Pagano investigated whether international differences in legal institutions also help explain the international cross-section of expected stock returns. It was found out from their results that first, total stock market returns were positively correlated with overall measures of the quality of institutions, such as judicial efficiency and rule of law, but have no relationship with measures of shareholder rights, controlling for risk. Secondly, dividend yields and earning-price ratios were also correlated positively with judicial efficiency and rule of law, but negatively with shareholder rights' protection, controlling for risk and expected earnings growth. Thirdly, the excess return on new issues was negatively associated with the quality of accounting standards.

Boyd et al. (2007) examined the determinants of Return on Equity in U.S. local farm supply and grain marketing cooperatives with the objective of identifying financial variables that are determinants of return on equity in these cooperatives. Their results proved that the estimated coefficient on asset size was not statistically significant, suggesting that return on equity is invariant to size over this time period.

Also in 2012, Dissanayake carried a study to ascertain the significant determinants of Return on Equity in Sri Lankan Microfinance Institutions. The author concluded based on the study results that the Cost per Borrower and Debt/Equity ratios are statistically significant predictor variables in determining return on equity in a MFI.

Lastly, Kijewska (2016) recently presented the possibilities of analysing popular among investors ratio of ROE and identification the determinants of its growth or decline. The analysis was conducted on the example of two Polish companies from mining and metallurgy sector. It was found from the results that using various financial and operational strategies one can influence ROE.

MATERIALS AND METHODS

This study examines the determinants of ROE in the Agric and Czech with a total of 373 firms for a 10 year period of 2005 -2014. To achieve a strongly balanced data, all firms with assets valuing 5000 and above in the industry were considered. In all the sample consisted of 3730 observations.

Variables

Most writers on this topic have relied on ROE as the dependent variable (Boyd et al. 2007; Hagerman & Ratchford, 1978; Ndlovu and Alagidede, 2015) in examining the factors the determines equity returns of a firm. This paper follows the work of Ndlovu and Alagidede (2015), to use ROE as the dependent variable and the study first considers the micro level independent variables which is the DuPont model to include Profit Margin (PM), Asset Turnover (AT) and Financial Leverage (FL).

$$ROE_{it} = \alpha + \beta_1\, PM_{it} + \beta_2\, AT_{it} + \beta_3\, FL_{it} + \mu_{it} \ \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where ROE is the dependent variable, $i\ and\ t$ both represent the firm and time, α represents the constant in the study and the coefficients of the variables are the $\beta_1, \beta_2, \beta_3$. The error

term is represented by μ. The micro-level data were extracted from European micro database AMADEUS provided by Bureau van Dijk. The Amadeus database contains annual accounts for about 1.5 million firms in Europe. The data extracted were already in a computed ratios of the firms. However, a firm's performance and profitability is not only affected by the internal factors but external factors as well. This study also adopts the APT model in other to include the Macro level variables in the DuPont model (Ndlovu and Alagidede, 2015). The model is specified below;

$$ROE_{it} = \alpha + \beta_1 PM_{it} + \beta_2 AT_{it} + \beta_3 FL_{it} + \beta_4 UMP_t + \beta_5 EXR_t + \beta_6 GDP_t + \beta_7 NTR_t + \beta_8 NFR_t + \mu_{it} \ .... (2)$$

Macro-economic variables have been included in the second model above and they are the Unemployment Rate (), Exchange Rate (), GDP growth Rate (), Interest Rate-REPO () and Inflation Rate (). This macro-level data were also extracted from the databank of the World Bank. The panel level of the data sample allows the the application of fixed-effects methods on the micro level (Dischinger, 2010).

$$ROE_{it} = \alpha + \beta_1 PM_{it} + \beta_2 AT_{it} + \beta_3 FL_{it} + \beta_4 UMP_t + \beta_5 EXR_t + \beta_6 GDP_t + \beta_7 NTR_t + \beta_8 NFR_t + \rho_t + \emptyset_i + \mu_{it} .... (3).$$

New terms included in the model third model above are representing year effect dummy and firm fixed effect dummy respectively. The year effect dummy controls the unobserved common changes in the profitability of all firms in a given year and the firm fixed effects controls the unobserved characteristics of the firm that do not change over time (Dharmapala, 2014). According to the Hausman-Test, the fixed-effects model is more preferable than the random-effects model. The following are the definition and description of the data variables;

Return on Equity: The ROE is one of the traditional profitability ratio that measures the ability of a firm to generate profits from its shareholders investments in the company.

$$ROE \ (DuPont \ formula) = \frac{Net \ Profit}{Revenue} * \frac{Revenue}{Total \ Assets} * \frac{Total \ Assets}{Shareholde'sEquity}$$

Therefore ROE= Net profit margin * Asset Turnover * Financial leverage

Profit Margin: the profitability ratio which indicates the amount by which revenue from sales exceeds costs in a business.

Net Asset Turnover: The efficient way a company can use its assets to generate sales.

Financial Leverage (Equity Multiplier): the equity multiplier shows the percentage of assets that are financed or owed by the shareholders.

The World Bank definition of the Macro-level data are as follows;

Unemployment, total (% of total labour force): Unemployment refers to the share of the labour force that is without work but available for and seeking employment.

Exchange rate (CZK per US$, period average): The exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

GDP growth (annual %): Annual percentage growth rate of GDP at market prices based on constant local currency.

Interest rate (%): Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector.

Inflation, consumer prices (annual %): Inflation as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

RESULTS AND DISCUSSION

Descriptive statistics

Descriptive statistics is first presented showing both the financial variables and the macroeconomic indicators.

Table 1. Descriptive Statistics for Variables

Variable	OBS	MEAN	STD. DEV.	MIN	MAX
ROE	3,719	4.880115	16.90282	-398.574	215.845
PM	3,698	5.1489	10.0397	-95.508	69.242
NAT	3,716	1.140341	2.365909	0	85.633
FL	3,727	6.331056	280.3192	-796.262	17086.46
UMP	3,730	6.548	0.9774723	4.39	7.93
EXR	3,730	19.969	1.975701	17.07	23.96
GDP	3,730	2.16	3.418704	-4.8	6.9
NTR	3,730	5.61	0.4721862	4.6	6.3
NFR	3,730	1.25	1.42655	-1.5	3.5

Source: Authors' calculations

Table 1 above depicts the mean, standard deviation, minimum and maximum values. On the average, the dependent variable (Return on Equity-ROE) has a mean of 4% of all our sample firms operating in the Agric and Forest Industry in Czech Republic for a period of 10 years. The standard deviation also recorded a value of 16% with the minimum ROE of – 398 in a year and a maximum is 215%. This indicates the average returns equity shareholders are getting which can deviate to either way by 16%. With the independent variables, the average the amount by which revenue from sales exceeds costs in a business (profit margin) is 5% but can deviate by 10%. The minimum and maximum amount by which revenue from sales exceeds costs is -95% and 69% respectively. Net asset turnover which is a proxy for measuring the firm's efficiency also recorded an average of 1.1 and the standard deviation 2.3. The maximum level that the firms can generate sales from its assets 85.6. Also the firm's financial leverage (debt ratio) which is the proxy measuring the use of debt to acquire additional assets had an average of 6.3 with the minimum and the maximum level reaching -796.262 and 17086.46 whilst the deviation of the debt can also be 280.31. Also, Table 1 also shows the averages of the macroeconomic variables over the year 2005 through 2014. The average

unemployment rate is 6.54% (minimum 4.39% in year 2005 and maximum 7.93% in year 2014). When the mean of exchange rate is 19.9%, real interest rate has a 5.61 mean value for 2005-2014 periods. Also GDP growth is 2.16% for the 10 year-period from 2005-2014 whilst inflation is 1.25%. Correlation matrix

Secondly, correlation matrix for the variables is presented below in Table 2 to measure the degree of association between them. Correlation between ROE and an independent variable which shows a positive would mean that the two variables move together, on the other hand a negative correlation between ROE and an independent variable would indicate the opposite. From the Financial (Micro) variables, table 2 shows in the correlation matrix that ROE has a positive correlation with both profit margin (PM) and net asset turnover. This is not surprising because when both indicators goes up, it tends up to increase the overall profitability of the firm and this is consistent with the several results (eg. Almazari, 2012; Ndlovu & Alagidede, 2015). The correlation between ROE Financial Leverage (FL) was positive at a significance level. This goes contrary to the theory of finance where we expected the relationship to be negative but is consistent with the empirical findings of Vintila and Duca's (2012), where a significant positive impact between high debt levels and ROE was found. Moreover, on the Macro level indicators, ROE is positively correlated with unemployment rate, GDP growth, inflation rate and exchange rate while the correlation between ROE and interest rate was negative.

Table 2: Correlation matrix with Significance levels

	ROE	PM	NAT	FL	UMP	EXR	GDP	NTR	NFR
ROE	1.0000								
PM	0.4764*	1.0000							
	0.0000								
NAT	0.0685*	-0.0622*	1.0000						
	0.0000	0.0002							
FL	0.1061	-0.3941*	0.0274	1.0000					
	0.14	0.5748	0.0945						
UMP	0.0094	-0.0219	0.0050	0.0099	1.0000				
	0.5657	0.1838	0.7600	0.5452					
EXR	0.0374*	-0.0193	0.0208	0.0211	0.6309*	1.0000			
	0.0227	0.2407	0.2043	0.1985	0.0000				
GDP	0.0641*	0.0460*	0.0302	0.0230	0.0755*	0.5567*	1.0000		
	0.0001	0.0051	0.0654	0.1603	0.0000	0.0000			
NTR	-0.0967*	-0.1972*	0.0005	0.0017	-0.3088*	-0.2672*	0.0932*	1.0000	
	0.0000	0.0000	0.9778	0.9183	0.0000	0.0000	0.0000		
NFR	0.0277	0.0187	-0.0028	-0.0079	-0.5665*	-0.0769*	-0.2086*	-0.1567*	1.0000
.	0.0909	0.2551	0.8638	0.6284	0.0000	0.0000	0.0000	0.0000	

Source: Authors' calculations

Empirical Results from Panel Data Analysis

Three different models were ran to analyze the empirical results in other ascertain the impact of the selected micro and macro indicators on ROE in the Czech Agric and Forest industry. First the Fixed Effect model was ran where we assume that unobserved effects are correlated with our macro and micro level indicators. Secondly we run and specify a Random Effects model where the initial assumptions of correlation are reversed on the same covariates. The Hausman specification test was performed to select the best model among the three (3) models. This was to select one model that best suits the scenario in the Czech Agric and Forest Industry. Our final model tries to look at the averages of the dependent variable for all the Czech Agric and Forest firms as one. In this case the research is able to gauge the effect of an average ROE on the interest indicators.

The table below (table 3) indicates the parameters of estimation and standard errors obtained from the application of fixed effects model, random effects model and the between effects model with the ROE as the dependent variable.

Table 3: Determinants of Return on Equity

VARIABLES	(1) FE_Model ROE	(2) RE_Model ROE	(3) BE_Model ROE
PM	0.981***	0.873***	0.636***
	(0.0303)	(0.0251)	(0.0452)
NAT	-0.124	0.791***	1.220***
	(0.241)	(0.143)	(0.181)
FL	-0.0373	-0.0101	-0.172
	(0.073)	(0.0652)	(0.151)
UMP	1.750**	1.747**	30.57
	(0.654)	(0.66)	(23.43)
EXR	-0.321	-0.421	-42.93***
	(0.305)	(0.307)	(12.16)
GDP	0.307*	0.355**	19.86***
	(0.126)	(0.126)	(5.487)
NTR	1.906***	1.339*	-29.76*
	(0.57)	(0.567)	(15.12)
NFR	1.110***	1.109***	24.42
	(0.324)	(0.327)	(13.15)
_cons	-17.73***	-13.14**	751.2***
	(5.043)	(5.002)	(177.2)
R-sq	0.259		0.439
Observations	3690	3690	3690
Number of id	373	373	373

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculations

We begin with the FE model which was observed that with the micro level variables, profit margin (PM) is highly significant and positively related to ROE. This positive relationship is telling us that the Profit Margin (PM) have significant positive impact on Equity return. Net Asset Turnover (NAT) on the other hand is found not to be impacting on the return of equity (ROE) in the Czech Agric and Forest Industry although it is negatively correlated. The results shows that the impact of Financial Leverage (FL) which is a proxy measuring the debt amount in the firm's capital structure has a negative relationship and does not impact on ROE. On the macro level indicators only exchange rate was found not to impacting on ROE but the remaining indicators (Unemployment, Inflation rate, GDP Growth and Interest rate) were all found to be significantly impacting positively on ROE.

For the RE model the research observes that with the micro level variables, there is a significant positive relationship between Profit Margin (PM) and ROE. This indicates that Profit Margin of are impacting positively on ROE in the Czech Agric and Forest Industry. Net Asset Turnover (NAT) is also impacting significantly positive on ROE. However Financial Leverage (FL) was found not to be impacting on ROE. On the macro level indicators only exchange rate was found not to impacting on ROE but the remaining indicators (Unemployment, Inflation rate, GDP Growth and Interest rate) were all found to be significantly impacting positively on ROE.

For the BE model the results showed that with the micro level variables, there is a significant positive relationship between Profit Margin (PM) and ROE. This indicates that Profit Margin of are impacting positively on ROE in the Czech Agric and Forest Industry. Net Asset Turnover (NAT) is also impacting significantly positive on ROE. However Financial Leverage (FL) was found not to be impacting on ROE. On the macro level indicators, Unemployment rate and Exchange rate were found not to impacting on ROE but the remaining indicators (Inflation rate, GDP Growth and Interest rate) were all found to be significantly impacting on ROE.

The Hausman test performed the Fixed and Random effect model calculated a chi^2 of 61.39 (p>chi2=0.000). With this result the study confidently rejected the alternative hypothesis for the null which confirms the results for the Fixed Effects model.

CONCLUSIONS

Return on Equity is one of the most important measure of a firm's performance. This paper therefore examines and analyzes the factors that determines ROE in the Czech Agric and Forest industry. A panel data consisting of 366 firms were considered for a 10-year period of 2005-2014 in the industry. The fixed effect model was accepted and applied in this study after conducting the Hausman specification test. It was found that among the firm level variables, profit margin (PM) impacts significantly positive on ROE. This can however be improved when the firms employ more cost efficient strategies and increasing the level of sales either through price adjustment or increasing the quantity. The results also shows that Net asset turnover and Financial Leverage does not have any impact on ROE in the Czech Agric and Forestry industry. However, on the macroeconomic indicators, variables such as GDP Growth and Interest rate, Unemployment rate and Inflation rate all have a negative impact on ROE whilst Exchange Rate have no impact on the ROE in the Czech Agric and Forest Industry.

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