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Determinants of dividend payout decisions – the case of publicly quoted food industry enterprises operating in emerging markets

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ABSTRACT

The paper examines the factors influencing dividend payout decisions. Our analysis is based on unbalanced panel data with 799 observations of companies from 15 countries over a period of 14 years. The study develops eight research hypotheses and uses a modelling approach based on the random effects panel probit model. An important conclusion reached in our study is that a company's financial situation in preceding year influences the dividend payout decision. In addition, the key significant determinants of dividend payout decision in the period covered by our study include free cash flow, growth, liquidity, profitability and size. These important research results are confirmed by other studies in the field. They are therefore essential for determining dividend policies. Individual effects across investigated enterprises also played an important role in the dividend policy.

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1. Introduction

Dividend is a price that a company pays to investors for the capital invested by them in the company. For this reason, dividend payout decisions do not depend solely on financial results and cash flow distribution. Managers' decisions on dividend payments may be dictated by the hedging of funds in a situation of economic downturn, increased profit volatility, limited external financing or high future capital needs. Thus, the 'dividend puzzle' has been the object of an ongoing investigation. However, a study of the emerging markets could shed more light on the topic, contributing to the growing body of research on dividend policy (Glen, Karmokolias, Miller, & Shah, 1995).

The issue of dividend payout in a given company, called the 'dividend puzzle', gives rise to several research problems that could be studied at various levels of detail. One of these problems relates to the companies' financial condition. In this case, the

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importance of dividend payouts manifests itself in the value creation of publicly quoted enterprises or in the investors' recommendations (Carleton, Chen, & Steiner, 1998). The second issue linked to the dividend puzzle is the relationship between the company dividend policy and the operations, transfers and risk characteristics of the emerging markets.

The discussion on the 'dividend puzzle' in literature took the form of a 'disappearing dividend puzzle', which is still an important problem linked to the following issues: the trend to lower transaction costs for stock sales, the growing role of stock options for managers who prefer capital gains to dividends, the improvement in corporate governance technologies as compared with the lower value of the benefit of dividend payments in the management of agency problems between stockholders and managers (Fama & French, 2001), and the level of earnings that affects managerial decisions on payout policy (Shapiro & Zhuang, 2015). This approach builds on theories which seek to explain managerial motivation in a situation of a decreasing relevance of agency costs (Bahreini & Adaoglu, 2018). Our model provides a comprehensive framework for the main determinants of payout decisions as part of the 'dividend puzzle' evaluation approach. In this regard, the study contributes to international business research that has established models and furnished crucial knowledge about the economy of the emerging markets, as the nature and characteristics of dividend policies differ between the developed and emerging countries.

The main purpose of this study is to identify the factors that influence the dividend payout decisions in relation to the companies' financial situation among publicly listed food industry companies operating in emerging European markets. Understanding the dividend policy is crucial for further forecasts of possible dividend payouts. The panel data analysis was used to identify factors influencing the dividend policy of companies in different financial situations. The following variables were considered: net income, liquidity, growth, profitability, free cash flow, leverage, company size and the price per earnings (P/E) ratio. These data cover only internal analyses of the dividend policy. We examined the characteristics of dividend payers and non-payers which are common across the countries under study, by using international data from the food sector. The panel sample comprises 799 observations of a changing number of companies from 15 countries in the period 2003–2016. In our analysis, particular attention was paid to dividend payments in the developing economies. The availability of investment capital is, in fact, one of the essential (and necessary, if not sufficient) conditions for a given company's further development. This issue is important in case of countries in transition (Skare & Sinković, 2013), where financial liquidity is the key variable associated with dividend payout.

Our paper contributes to the relevant literature to intra-industry research with respect to dividend policy. Our paper adds new evidence to the literature on dividend policy by showing that there are different dividend responses with some of the effects occurring with a one-year delay with respect to intra-industry research. These results stand in contrast to the statement that dividend decisions in emerging markets are not predicated upon long-term payout targets. We tested the model according to two dimensions: the influence of the global financial crisis on the dividend payout decision process and the differences in the determinants of dividend payout in case of

small and big companies. Our results might help investors gain a comprehensive understanding of the impacts of the dividend decision mechanism on the financial health of food sector companies.

The article is structured as follows. [Section 1](#) deals with the theory of dividend policy decisions. [Section 2](#), which is based on a review of relevant literature, introduces the determinants of dividend payout decisions. [Section 3](#) illustrates the study sample, sets out the methodology and defines the basic measures used in the selected panel model. [Section 4](#) sums up the empirical results and the results of the robustness tests, while [section 5](#) presents results and the general conclusions with limitations of the study and further research issue.

2. Theoretical background

The corporate determinants of dividend policy have become a fixed element of the modern theories of finance. We can distinguish three principal theories that help illuminate the dividend policy, that is: information asymmetries, tax-adjusted theory and behavioural theories. The information asymmetries theory comprises signalling models, agency cost, and the free cash flow hypotheses (Amidu & Abor, 2006). According to the agency costs theory, undistributed profit will be consumed in the company as an extra benefit or such retained earnings will be invested (Jensen & Meckling, 1976). Second, capital markets are imperfect mostly because of unequal access to information: insiders are better informed about the firm's future cash flows than investors are. In such a situation, dividend payouts might convey information about the firm's future earnings (Allen & Michaely, 2003).

The decision to pay out dividends may be influenced by investors if the shareholders wish that this should be the case. This view is supported by Frankfurter and Lane, who conclude that dividend payouts could increase the attractiveness of equity issue. In such a scenario, a dividend payout to a shareholder will enhance the future stability of the company. When understood in this way, dividend payouts could be a method of calming investors (Frankfurter & Lane, 1992). The catering theory explains the demand-driven approach to dividend payouts by defining the role of the dividend policy as a tool for catering to investors' desires.

3. Internal and market determinants of dividend policy

The 'dividend puzzle' may have multiple underlying determinants. Most studies on this topic focus on investigating the determinants of dividend payments in developed economies.

3.1. Profits

Dividend policy depends on current or future earnings of the firm and the percentage share of retained earnings. According to DeAngelo, DeAngelo and Stulz, dividend payment correlates positively with the ratio of retained earnings to total equity (DeAngelo, DeAngelo, & Stulz, 2006). Fama and Blahnik (1968) identify the impact of

income from previous years on current dividends. This significant relation between dividends and past earnings was also confirmed by Benartzi, Michaely and Thaler (1997). These findings are consistent with the signalling theory, according to which a significant increase in earnings in the current and previous years affects subsequent dividend payout decisions. Hence, we propose the following hypothesis:

H1: There is a positive correlation between dividend payment and net income value.

3.2. Profitability

The level of profitability is a determining factor in dividend payouts. High ROE and ROA tend to correspond to high dividend payouts (Benavides, Berggrun, & Perafan, 2016; DeAngelo, DeAngelo, & Skinner, 1996; DeAngelo et al., 2006; Denis & Osobov, 2008; Fama & French, 2001). The results of the study by Kaźmierska-Jóźwiak (2015) indicate that there is a significant but negative relationship between profitability (ROE) and the dividend payout ratio. In the research sample, in the case of ROA there was a stronger correlation with dividend payouts than in the case of ROE, which could point to a specific capital structure correlation among listed companies operating in emerging markets. ROA serves as a proxy for the availability of internal funds, growth opportunities, the scale of agency problems and information asymmetry. This study recognises that the dividend payout correlates positively with profitability.

H2: There is a positive correlation between dividend payment and profitability (ROA).

3.3. Free cash flow

The free cash flow theory is based on the idea that managers rely on the dividend policy as a means of communication with the investors to signal income growth levels and future prospects of the company growth as well (Bena & Hanousek, 2008). Firms that predict declining investment opportunities are more inclined to increase dividends (Grullon, Michaely, & Swaminathan, 2002).

The dividend policy of a given company can be used as a monitoring tool to reduce free cash flows in order to decrease the agency costs associated with the separation of ownership and control in companies (Brunzell, Liljeblom, Löflund, & Vaihekoski, 2014). We hypothesise that:

H3: There is a positive correlation between dividend payment and Free Cash Flow.

3.4. Growth

Dividend policy is strongly linked to fundamental firm characteristics such as growth opportunities (Denis & Stepanyan, 2011). Growth in sales and in the market-to-book value is used as predictors of investment opportunities. However, in the effect of growth opportunities on the possibility of dividend payouts has been shown to be inconsistent. Allen and Michaely's results and other researchers show that firms with

a high degree of information asymmetry and high growth opportunities should avoid paying dividends (Allen & Michaely, 2003; Chen & Steiner, 1999; Jensen, Solberg, & Zorn, 1992; Rozeff, 1982). However, low-growth firms could pay out relatively high dividends in the situation of limited opportunities for profitable investment (Alli, Khan, & Ramirez, 1993). Our hypothesis is:

H4: There is a positive correlation between dividend payment and company growth.

3.5. Company size

The size of the company matters, as in all countries dividends were paid by the biggest and most profitable firms (Denis & Osobov, 2008). However, this factor is related to profitability, as bigger and more profitable firms are more likely to pay dividends (Consler & Lepak, 2016; DeAngelo et al., 2006). According to Authors, the size of a firm has a significant impact on the relation of retained earnings to total equity. This correlation was also evidenced in Fama and French's study (Fama & French, 2001). In this study, we hypothesise that larger food sector companies are more likely to pay dividends.

H5. There is a positive correlation between dividend payment and company size.

3.6. Financial leverage

In the long run, variation in dividends is significantly related to the capital structure of the firm (Belo, Collin-Dufresne & Goldstein, 2015). The higher the leverage that the company relies on, the lower the likelihood that this company will pay dividends (Von Eije & Megginson, 2008). Firms which increase dividend payouts by a large amount subsequently increase their leverage (Cooper & Lambertides, 2018). A high level of debt could be related to the decision not to pay out dividends, which could be explained by the need to maintain higher levels of free cash to meet the creditors' demands. Therefore, higher debt ratios are related to lower dividend payouts or lack of dividends (Chay & Suh, 2009). Hence, our hypothesis is:

H6. There is a negative correlation between dividend payment and leverage.

3.7. Liquidity

The level of liquidity and the structure of current assets affect the decisions on dividend payments in a firm. High cash surpluses could translate into the distribution of retained earnings in the form of dividends to shareholders or into investments in the firm's capital stock as part of reinvestment in the firm (Alstadsaeter, Jacob, & Michaely, 2017). Many studies provide evidence of the relationship between the current ratio, or the working capital level (as proxy for liquidity), and the possibility of dividend payouts (Ho, 2003; Kaźmierska-Jóźwiak, 2015). Companies which make a decision to disburse cash from profit retain a higher level of financial liquidity (Franc-Dąbrowska, 2007). The positive correlation between dividend payouts and

liquidity is supported by the signalling theory. In this study, we propose the following hypothesis:

H7: There is a positive correlation between dividend payment and liquidity.

3.8. Market risk

The market ratios explain the investors' attitude to a given firm's dividend policy. The value of price per earnings ratio can be interpreted as a risk measure. The increase of the P/E value may suggest an growth of future earnings expectations (Al-Malkawi, 2008). In this manner, business risk is also used as an indicator of future profitability (DeAngelo et al. 2006). Overall, this study recognises that dividend payout correlates positively with company value on the market, represented by stock price.

H8: There is a positive correlation between dividend payment and the P/E ratio.

3.9. Dividend payers and non-payers

According to the study by Baker et al. on developing markets, growth opportunities, low profitability and cash constraints are the main reasons not to pay dividends (Baker, Chang, Dutta, & Saadi, 2012). According to Ferris, Sen and Unlu, the large proportion of non-payers can be explained by an increase in the percentage share of firms that have never paid dividends (Ferris, Sen, & Unlu, 2009). Furthermore, firms that pay dividends are more attractive for investors, who choose to invest in these firms rather than in the non-dividend-paying ones (Goldstein et al., 2015). Dividend payers tend to be mature firms, while young, high-growth firms do not usually pay dividends (Baker, 2009).

3.10. Industry characteristics

The industry effect on the dividend policy verifies that industries with high-growth options pay fewer dividends (Gaver & Gaver, 1993; Ho, 2003; Smith & Watts, 1992). The statement that dividend and investment decisions are not independent and that they are dependent on industry effects is advanced in a study by Michel and Shaked and Al-Malkawi (Al-Malkawi, 2008; Michel, 1979; Michel & Shaked, 1986). Different firms have various possibilities of achieving high income and, thereby, high return. This information is transmitted to the market in the form of various signals that a dividend payout is likely to happen in the immediate future (Bhattacharyya, 2007). Furthermore, Van Caneghem and Aerts' study, showed that firms paying dividends are more similar in their dividend payout strategy to firms from the same sector than to companies from other sectors (Van Caneghem & Aerts, 2011).

The food industry produces primary products and responds to a relatively inflexible demand in at times turbulent economic conditions. In addition to the seasonality of the production process and the dependence on natural and political conditions, the unfavourable price developments in the long run or a relatively low profitability

Table 1. Comparison of dividend policies across developed and emerging economies.

Developed economies	Emerging economies
Dividend behaviour is similar in companies operating in developed and emerging economies (Aivazian et al., 2003). Dividend policy is influenced by such factors as: leverage ratio, institutional ownership, profitability, business risk, asset structure, growth rate and firm size (Al-Najjar, 2009). The share of firms that pay dividends is lower in the US as compared with other economies (Bildik, Fatemi, & Fooladi, 2015).	
Stronger governance of firms contributes to profitability and thereby to higher dividend payouts (Mitton, 2004).	Larger, more profitable, and mature firms in emerging markets that provide few investment opportunities are much more likely to pay dividends (Al-Malkawi, 2008).
The developed markets of the European and the US stock market noted different patterns of dividend payments, which demonstrated the diversity of dividend behaviours in developed economies (Engsted & Pedersen, 2010).	Dividend change in an emerging market provides relevant information for market investors (Miletić, 2011).
Listed companies operating in developing countries tend to reduce dividends during slumps (Chemmanur & Tian, 2014).	Companies increase dividend payouts during economic recession, which aims to calm investors' anxiety (Jabbouri, 2016).

of investments can contribute to discouraging investment levels (Mądra-Sawicka 2017; Pasek, 2015).

4. Different approaches to developed and emerging markets

The dividend policy of corporations which operate in emerging markets is significantly different from the widely studied dividend policy behaviour of corporations in developed economies (Adaoglu, 2000). The results of relevant research are presented in Table 1

5. Methodology

5.1. Sample, variables and data collection

The study uses a firm-level panel data set comprising all publicly traded firms operating in emerging European food industry markets. We collected firm data (expressed in millions of USD) from consolidated and individual financial statements. The financial (end-of-year) data were collected from three sources. Our primary source is the Emis Intelligence database. Additional items were collected from Datastream. Finally, we also used data published by the stock exchanges.

We use a three-step level of selecting the data to enhance the data quality. In a first step, we select countries that are in EMIS Intelligence databased and were included in the MSCI Emerging Markets index of Thomson Reuters in Europe region. Then in the second-step the companies were selected according to databased industry classification. We identified firms by means of the sector variable that based on Worldscope Industry Classification Benchmark (ICB) codes. In the third-step the generated list contained the individual code for all firms and home country code of the company (identification code assigned by Datastream). We construct portfolios that contain the selected companies. The investigated period was limited by number of observation that enables to establish panel models. The sample was checked according to duplicated data. We eliminate these observations for which the price or

Table 2. Variable definitions.

Variables	Symbol	Description
Dividend payment	DIV	Binary variable – equals 1 if the firm pays a dividend and zero otherwise
Net income	NI	Net income or loss reported by companies in research period
Size	SIZ	Natural logarithm of total sales
Liquidity	LIQ	Current assets over current liabilities
Leverage	LEV	Market leverage is the ratio of the book value of debt to the sum of the book value of debt and the market value of equity
Growth	GRO	Percentage rate of sale change y/y
FCF	FCF	Free cash flow (net cash flows from operating activities less average capital expenditures)
ROA	PROF	Net income to total assets
P/E	PE	Price per earnings ratio

market-capitalisation data was missing. The observations for firms that are cross-listed in more than one country were kept in a sample only in the country of incorporation.

The period under study covers the years 2003–2016. The verification of the data was performed by auditors and by the Authors by means of an expert method. A multidirectional verification of the calculations performed did not reveal any errors or raise any doubts as to the quality of the data.

We examined the characteristics of dividend payers and non-payers which are common across several countries by relying on the data for the food industry. The database has 799 observations of companies from the following 15 countries: Bosnia and Herzegovina, Bulgaria, the Czech Republic, Croatia, Hungary, Latvia, Lithuania, Macedonia, Poland, Russia, Romania, Serbia, Slovakia, Turkey and Ukraine. We add to the sample companies from Russia and Turkey to increase counterpoise and in research period between dividend payers and non-payers.

Table 2 presents the description of the variables used.

A robustness test was carried out to verify the stability of results for different sub-samples. The study period has been spanned into two sub-periods: 2003–2009 and 2010–2016. The first sub-period covers the years before the consequences of the global financial crisis could influence dividend payout decisions. The second sub-period is the longest possible time series that could be investigated after the financial crisis and due to the extensive – economic and temporal – consequences of that crisis.

5.2. Methods

To examine the determinants of dividend payments, we used a panel regression model with a binary dependent variable. Our results supplement those of Fama and French (2001) and the models proposed by Denis and Osobov (2008) which average the coefficients of the logit regression for annual cross-section data (Denis & Osobov, 2008; Fama & French, 2001). Other examples of longitudinal data analyses of dividend payout decisions were highlighted in several previous studies (Al-Malkawi, 2008; Jabbouri, 2016; Kim & Jang, 2010).

We had the advantage of being able to use longitudinal data and test whether there were significant unobservable individual effects that influenced the dividend payment policy. Using cross-sectional time-series data gave us an opportunity to examine

issues that could not be studied in one-dimension data sets. Every individual effect covered all the time-invariant characteristics of every object (firm), which influenced the dependent variable, but which was not explicitly comprised in the vector of explanatory variables (usually because it was not observable).

The mechanism of decision-making with regard to the dividend payment policy¹ can be described by the binary-choice model. Kim and Jang (2010) underline that there are different mechanisms underlying the decision to pay dividends and the decision about the exact payment amount (Kim & Jang, 2010). Since we were interested in the description of the decision-making process only with respect to whether dividends were paid out or not, and bearing in mind the unique characteristics of the dividend payout ratio (a relatively large proportion of firms with a rather small dividend payout ratio and a considerable fraction of observations censored at exactly zero usually gives biased OLS estimates), we considered the binary choice model, where the choice involved the decision on whether or not to pay out dividends. For these reasons, we used as the dependent variable the binary variable DIV_{it} , which equals 1 if the i -th firm pays dividends in the year t , and which equals zero otherwise.

$$DIV_{it} = \begin{cases} 1 & \text{if } DIVIDEND > 0 \\ 0 & \text{if } DIVIDEND = 0 \end{cases}$$

The dependent variable in the model is an unobservable latent variable y_{it}^* , which can be interpreted as an inclination to take action corresponding to $y_{it} = 1$ (dividend payout). Hence, we can observe $y_{it} = 1$ if $y_{it}^* > 0$ and $y_{it} = 0$ if the i -th firm does not pay dividends in the year t . Consequently, the basic regression takes the form of a binary-choice panel model given by Equation (1):

$$y_{it}^* = \beta \mathbf{x}_{it} + c_i + \varepsilon_{it},$$

$$DIV = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{if } y_{it}^* = 0 \end{cases} \quad (1)$$

where: superscript i represents the i -th firm, t – denotes time ($t = 2003, \dots, 2016$), β – is the vector of K structural parameters ($K \times 1$), ε_{it} – the vector of disturbance term, c_i – individual effects, \mathbf{x}_{it} – vector of explanatory variables, including the following series: $\mathbf{x}_{it} = [FCF_{it}, GROWTH_{it}, LEVERAGE_{it}, LIQUIDITY_{it}, NI_{it}, ROA_{it}, PE_{it}, SIZE_{it}]'$,

If the omitted unobservable individual effect c_i is correlated with the included explanatory variables, the difference across groups can be captured in differences in the constant term, $y_{it}^* = \alpha_i + \beta \mathbf{x}_{it} + \varepsilon_{it}$, where each α_i is treated as an unknown parameter to be estimated (fixed effect model). If the individual effects are strictly uncorrelated with regressors, then it might be appropriate to model the individual specific constant term as randomly distributed across cross-sectional units $y_{it}^* = \beta \mathbf{x}_{it} + (\alpha + u_i) + \varepsilon_{it}$, where α is a single constant term and where the component u_i is the random heterogeneity specific to the i -th observation and is constant through time (random effect model) (Greene, 2012; Wooldridge, 2005). The

Table 3. Descriptive statistics of selected variables for whole sample.

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
FCF	6.77	0.89	409.70	-1 412.99	76.04	-8.57	166.94
GRO	536.69	106.42	157555.60	0.00	5794.51	25.19	677.49
LEV	0.44	0.30	16.52	-22.46	1.55	-2.38	107.88
LIQ	2.55	1.60	121.75	0.07	5.56	15.45	301.12
NI	22.28	4.00	1498.30	-4.55	73.19	11.82	214.14
PE	37.99	13.01	2600.00	0.09	154.32	12.26	180.36
PROF	7.30	5.00	571.48	-9.49	21.20	237.81	629.90

Source: Own computations.

distinction between the fixed and random effects models is usually based on the Hausman specification test (Hausman, 1978).

6. Results

6.1. Descriptive statistics

Table 3 presents the statistics of the variables examined. Some of them show a fairly high level of variability. However, as further analyzes (model tests) have shown, outliers carry a large dose of information on the phenomena investigated. It is therefore not necessary to eliminate them from this particular study. On the other hand, questionable cases of dividend payments were explained or not considered in the study.

Detailed information about the number of enterprises from individual countries is provided in Appendix 1. The fewest companies analyzed in our study operated in Bosnia and Herzegovina, the Czech Republic, Slovakia and Ukraine, while most observations pertained to firms operating in Poland and Turkey.

There was a variation in the number of observations of dividend-paying and non-dividend paying companies across individual countries. It turned out that there is only a small majority of companies being non-payers (detailed data are provided in Appendices 2 and 3).

Comparing the mean characteristics (see: Appendix 4) for dividend payers and non-payers it was confirmed that the mean values of *SIZE*, *FCF*, *GRO* and *NI* were statistically significantly different between analyzed groups. In case of *LEV*, *LIQ*, *PE* and *PROF* we did not find a statistically significant difference in the means.

6.2. Fixed effects logit model and the random effects Probit model

Initially, binary-choice panel regression models with all the explanatory variables were estimated to evaluate the influence and statistical significance of all the potential causes of dividend payment and to examine whether there were significant individual effects of the dividend payment policy. In Table 4, we compare the results obtained for the fixed effects logit model and the random effects probit model. The results obtained are comparable, the estimates from both equations tell a consistent story. The signs of the coefficients are the same across models, but they differ when we consider the statistical significance of individual variables. At 10% significance level² we can confirm the significant positive influence of *GRO* and *SIZE* on the explained variable. Current levels of *LEV*, *LIQ* and *PE* do not have a significant influence on *DIV* in either of the models. Moreover, in the case of the logit regression, we can also confirm a positive influence of

Table 4. Estimation results for logit FE model and probit RE model.

Detailed	Conditional fixed-effects logistic regression		Random-effects GLS probit regression	
	Coefficient	<i>p</i> -value <i>z</i>	Coefficient	<i>p</i> -value <i>z</i>
FCF	0.00341	0.289	0.00324	0.094
GRO	0.00079	0.051	0.00030	0.013
LEV	-0.54166	0.238	-0.03058	0.719
LIQ	-0.00867	0.725	-0.00163	0.898
NI	0.00210	0.768	0.00788	0.063
PROF	6.23749	0.076	0.01538	0.974
P/E	0.00369	0.238	0.00140	0.142
SIZE	2.82237	0.005	0.85610	0.012
cons	-	-	-2.32524	0.001
Number of observations	356		799	
Number of groups	42		119	
Number of observations per group	min 2 average 8.5 max 14		min 1 average 6.7 max 14	
Interclass correlation (ρ)	-		0.835	
Hausman's test (<i>p</i> -value)	10.22 (0.2498)			

Source: own computations in STATA 15.

PROF, while the results for the probit regression prove a positive impact of *FCF* and *NI*, but do not let us reject the null in the case of *PROF*.

Based on the F test for the linear approximation³ of the fixed effects model, we can reject the null hypothesis that all individual effects equal zero (*p*-value = 0.000). Also, according to the Breusch and Pagan Lagrangian Multiplier test for the linear approximation of random effects, the evidence is strongly in favour of an individual-specific effect (*p*-value = 0.000). Therefore, individual effects should be included in the model. The Hausman specification test indicates that the random effects estimator is preferable (*p*-value = 0.25) to the fixed effects model. Moreover, in the case of the random effects model, the interclass correlation coefficient indicates that more than 85% of variance is due to differences across the panel, which confirms that individual effects across firms play an important role in dividend payout decisions.

Subsequently, we tried to examine if there were any significant lags in the relationships between the explanatory variables and the decision on dividend payout. Successive models were estimated according to the from-general-to-specific principle. Finally, we have obtained the following probit model with random effects (the results are presented in Table 5):

Based on the Breusch and Pagan Lagrangian Multiplier test for random effects, we can reject the null hypothesis that the individual random effects are not significant (*p*-value = 0.000). Therefore, our decision to include individual effects was justified. The interclass correlation coefficient indicates that more than 93% of variance results from the differences across the panel, which confirms (with *p*-value = 0.000 of the LR test for the null hypothesis that the correlation coefficient equals zero) that individual effects across firms play an important role in the dividend payment policy. The following individual variables have a significant influence on the explained variable:

- *SIZE* has a significant and positive influence on the dividend payout policy, which supports H5. Larger firms are more likely to pay dividends.
- *LIQ* has a significant and positive influence on the dividend payout policy with a one-year lag (H7),

Table 5. Random effects probit regression⁴.

Detailed	Coefficient	Std. Error	z	$P > z $	95% Confidence Interval	
FCF _{t-1}	0.007	0.002	2.850	0.004	0.002	0.012
GRO	0.004	0.001	4.320	0.000	0.002	0.005
LIQ _{t-1}	0.248	0.108	2.300	0.021	0.037	0.460
PROF _{t-1}	4.841	2.129	2.270	0.023	0.668	9.013
SIZE	2.271	0.604	3.760	0.000	1.086	3.455
cons	-6.473	1.398	-4.630	0.000	-9.214	-3.732
Number of observations	680					
Number of groups	104					
Number of observations per group	min 1					
	average 6.5					
	Max 13					
Interclass correlation (rho)	0.93					
LR test of rho = 0	336.13 (p-value 0.000)					
Wald chi ²	37.96 (p-value 0.000)					
Breusch and Pagan	868.51 (p-value 0.000)					

Where: superscript $t - 1$ indicates one-year lag of the variable.

Source: own computations in STATA 15.

Table 6. Marginal effects at the average, assuming that the random effect for that observation's panel is zero.

Variables	dy/dx	Std. Error	z	$P > z $	95% Confidence Interval	
FCF _{t-1}	0.0013	0.0005	2.7900	0.0050	0.0004	0.0022
GRO	0.0007	0.0002	4.1600	0.0000	0.0004	0.0010
LIQ _{t-1}	0.0468	0.0202	2.3200	0.0200	0.0073	0.0863
PROF _{t-1}	0.9121	0.3862	2.3600	0.0180	0.1551	1.6691
SIZE	0.4279	0.0855	5.0100	0.0000	0.2603	0.5954

Source: own computations in STATA 15.

- the *PROF* is also found to significantly and positively affect the likelihood of paying dividends with a one-year lag, which supports H2.
- *FCF* has a significant and positive influence on the dividend payout policy with a one-year lag, which supports hypothesis H3,
- *GRO* has a significant and positive influence on the probability of paying dividends (supporting H4),

The Wald chi² test confirms that all the variables included in the model have a statistically significant influence on dividend payments. The current and lagged values of other explanatory variables under discussion (*LEV*, *P/E*, *NI*) are not significant determinants of the dividend payment policy; the hypotheses H1, H6, H8 could not be confirmed based on the estimated models.

We estimated the marginal effects for the probit model (under the condition that the random effect for that observation's panel was zero) and the mean values of explanatory variables. The results are presented in Table 6. All the results confirm the significant influence of: *FCF*, *GRO*, *LIQ*, *PROF* and *SIZE* of the firm.

6.3. Robustness of the results

The objective of this section is to verify whether the results obtained in the previous section are robust for different model specifications. We have investigated the stability

Table 7. Estimation results for probit RE model for before crisis and after crisis subsamples.

Detailed	2003–2009		2010–2016	
	Coefficient	$P > z $	Coefficient	$P > z $
FCF _{t-1}	0.008	0.041	0.015	0.005
GRO	0.002	0.047	0.006	0.000
LIQ _{t-1}	0.469	0.024	0.075	0.661
PROF _{t-1}	5.199	0.126	6.641	0.119
SIZE	1.535	0.013	1.810	0.045
cons	-4.852	0.002	-6.396	0.000
Number of observations	252		428	
Number of groups	80		99	
Number of observations per group	min 1 average 3.1 max 6		min 1 average 4.3 max 7	
Interclass correlation (rho)	0,82		0,96	
LR test of rho = 0	51.49 (p -value 0.000)		231.14 (p -value 0.000)	
Wald chi ²	15.27 (p -value 0.009)		23.41 (p -value 0.000)	
Breusch and Pagan	73.29 (p -value 0.000)		523.39 (p -value 0.000)	

Source: own computations in STATA 15.

of the results in two dimensions. Based on a literature review we distinguish two periods that includes financial crisis effect and company SIZE as a factor that matters thus the bigger and more profitable firms are more willing to pay dividends.

6.3.1. Effect of the financial crisis on dividend payout policy

Abreu and Gulamhussen (2013) suggest that the agency cost theory influenced the dividend payouts decision both before and during the financial crisis. It can be confirmed that the global financial crisis, which spread all over the world at the turn of 2008/2009, has changed the financial conditions of firms operating on the emerging markets. Given the deterioration of the conditions in which companies operate, it may be supposed that the dividend payment policy may also have changed. In order to compare the results for the pre-crisis and post-crisis model, the model was estimated for two subsamples for which the stability of the parameters was verified. The results are set out in Table 7.

The analysis of the results confirmed the previous results related to *FCF*, *GRO* and *SIZE*. In the case of the pre-crisis period, only the *PROF* values are not significant; in the post-crisis period, both *PROF* and *LIQ* lose their significant impact on dividend payment decisions. This confirms that the financial measures after the crisis lost their influence on dividend payment policies. These results indirectly support the conclusion that after the financial crisis bigger companies and companies with more growth potential decided to signal their favourable market position by paying dividends. Company size, the rate of growth and the *FCF* values continued to be the most reliable indicators of the financially stable condition of the food sector companies.

6.3.2. Effect of company size on dividend payout policy

Related studies, such as Coulton and Ruddock (2011), DeAngelo, DeAngelo and Stulz (2006) and Fama and French (2001), formed the background for this check. The hypothesis that 'Large' firms have different dividend payout policies than smaller firms has been verified. Listed companies operating on emerging markets differ

Table 8. Estimation results for probit RE model for two subsamples of companies according to SIZE measure: Small and Large.

Detailed	Small		Large	
	Coefficient	$P > z $	Coefficient	$P > z $
FCF_{t-1}	0.048	0.176	0.007	0.004
GRO	0.002	0.076	0.005	0.000
LIQ_{t-1}	0.295	0.035	0.184	0.237
$PROF_{t-1}$	4.922	0.097	9.716	0.010
SIZE	2.808	0.022	3.242	0.003
cons	-8.232	0.000	-9.604	0.001
Number of observations	315		365	
Number of groups	67		50	
Number of observations per group	min 1		min 1	
	average 4.7		average 7.3	
	max 13		max 13	
Interclass correlation (rho)	0.97		0.89	
LR test of $\rho = 0$	168.16 (p -value 0.000)		155.09 (p -value 0.000)	
Wald χ^2	13.67 (p -value 0.018)		28.75 (p -value 0.000)	
Breusch and Pagan	(p -value 0.000)		(p -value 0.000)	

Source: own computations in STATA 15.

according to size, therefore the full sample was divided according to their revenues value into two groups, named ‘Small’ (the size of the company was smaller than the median size of all companies) and ‘Large’ (the size of the company was bigger than median size of all companies). The investigated sample of companies significantly differed according to their SIZE which could be one of the consequences of emerging markets characteristics. The results of the estimations performed for the two subsamples are presented in Table 8.

The analysis of the results confirmed that bigger firms noticed the influence of all the estimated variables for the whole sample, apart from *LIQ*, which is an essential factor mostly for ‘Small’ companies that do not have flexible access to short-term debt. In the case of ‘Small’ firms only two variables – *LIQ* and *SIZE* – had a significant impact on dividend payout policy.

We find that the core findings of the estimated model are consistent after the verification of the panel model results.

7. Discussion

The analysis of the estimated marginal effects (see: Table 6) substantiates the following conclusions: the increase of FCF_{t-1} by 1 unit causes an increase of probability of dividend payouts by circa 0.0013 percentage points one year later, while an increase in *GRO* should cause an about 0.0007 percentage-point increase of the likelihood of dividend payouts. A one-unit increase in LIQ_{t-1} leads to an increase in the likelihood of dividend payouts in the following year by almost 0.05 percentage points; a 1 unit increase in $PROF_{t-1}$ leads to an almost 1-percentage-point increase in the probability of dividend payouts in the following year, while a 1 unit increase in *SIZE* should cause an approximately 0.4 percentage-point increase in the probability of dividend payouts. One of the important factors influencing the decision to pay dividends was the level of liquidity from the previous period. This is related to the need to

accumulate cash for dividend payments in such a way as not to cause a deterioration of financial liquidity.

The second variable confirming this observation is the level of free cash flows, which also turned out to be a statistically significant explanatory variable characterising the period one year before the payment of the dividend took place. Similar results were obtained by Consler and Lepak (2016) who investigated the phenomenon of dividend payments during the financial crisis (though without taking into account the changes over time). The variable explaining the impact on dividend payments in the surveyed companies was *GRO*. This factor had been previously analyzed in research on the dynamics of dividends conducted by Jinho on a sample of Korean companies (Jeong, 2011) and Yarram and Dollery (2015), who also took into account its variability over time. The factors conditioning the development of an enterprise are the hit investments and their effect in the form of growth in profitability. *ROA* is therefore another factor determining the payment of dividends. Our study shows that it is important to shift the effectiveness of total assets over time in relation to the payment of dividends. This means that the owners of companies make decisions to pay dividends in a situation in which they notice a positive rate of return on total assets. The variables in the model studies were also taken into account by Dereeper and Turki (2016). In turn, delayed variable *PROF* in relation to the explained variable (similarly to the solutions adopted by us) were used by Van Caneghem and Aerts (2011). An interesting explanatory variable is *SIZE* (with a coefficient of 0.1560), which was also included in research conducted by Al-Najjar, who, in subsequent models, obtained effectiveness values ranging from 0.1429 to 0.1903 (Al-Najjar, 2009), which are similar to our test results.

The research hypotheses regarding the relationship between dividend payments and leverage, P/E ratio and net income have not been confirmed.

8. Conclusions

We have estimated a random effects probit panel model which confirms the significant influence of free cash flow, company growth, liquidity, profitability ratio and the logarithm of the size on the decision concerning dividend payments. The higher the values of these variables, the greater the probability of dividend payments. There are significant unobservable individual firm-specific effects that determine the dividend policy.

We also investigated the robustness of the results for the outlier observations that were included in the sample. The removal of outlier observations did not change the overall results, which is why we can suppose that the significantly higher values of individual observations are the result of the same data-generating process as underlies all other observations.

The results indicate that highly profitable firms with more stable earnings can afford larger free cash flows, which increases the likelihood of dividend payouts. A similar conclusion was also reached by Naceuer et.al. and Kim and Jang (Kim & Jang, 2010; Naceur, Goaid, & Belanes, 2006). The results of Kaźmierska-Jóźwiak's research (2015) substantiate the conclusion that it is necessary to further investigate

the correlation between dividend payout and profitability. Furthermore, high-growth firms are more likely to resort to dividend payout when these conditions are fulfilled (Denis & Osobov, 2008; Fama & French, 2001).

In order to perform a robustness check, we repeated the analysis using different subsamples. The empirical results show that food industry companies apply an unstable dividend policy and that liquidity is the main factor which determines dividend payout decisions in the case of smaller firms. The analysis corroborates the results obtained by Kuo, Philip, and Zhang (2013) and Jabbouri (2016), and stresses the same factors enhancing the forecast of dividend payout that could boost market activity of a company and attract more potential investors. After the financial crisis period, the main factors that influence dividend payout decisions are growth, size and free cash flow, which is consistent with Aivazian, Booth and Cleary (2003), Denis and Osobov (2008) and Mahdzan, Zainudin and Shahri (2016). The model for the whole period and our robustness tests point to the same correlation between the variables studied.

9. Limitation of the study

Limitations of the interpretations of the study results are mainly the consequence of the limited number of sample observations and the irregularity of decisions on dividend payout in the sector under study. The risk of obtaining unstable results was mitigated by data quality verification, which was performed as a three-step process.

The interpretation of the results may be burdened with some limitations. First of all, the risk of unstable results of estimated binary choice model on panel data may be an effect of the characteristics of the investigated sample size and data quality. The decisions on dividend payout are irregular. Moreover, this irregularity increases in the case of emerging markets and food industry, which can be seen in the unbalanced panel data. However, we can assume that the panel data are incomplete due to randomly missing observations. In this case standard procedures are appropriate (Baltagi, 2005). Moreover, the stability of the results was widely verified for different subsamples and the verification of data quality was performed. It should also be underlined that the estimated binary-choice model points to significant factors which may influence the decision on dividend payout, but it does not specify the value of the dividend (a two-stage decision process). One more problem with the interpretation of the model results may arise in the case of endogeneity of the explanatory variables. It was assumed that in the course of the dividend policy process, the financial indicators do not depend simultaneously on the positive or negative decision concerning the dividend payout. They may, however, depend on the value of the dividend payout with a lag of one or more years.

10. Further research

Our study results could be usefully supplemented by further research. With the increasing pace of financial operations and the growing flow of information, it is necessary to consider other factors that may affect the decrease in dividend payment

levels. These could include behavioural determinants or macroeconomic variables that make it possible to predict a financial crisis or a bull market in a global perspective. Further research may investigate dividend payment policies in companies operating in other sectors by use of tobit panel model.

Notes

1. Dividend payment policy refers to the payout policy that a firm follows in determining the size and the pattern of cash distributions to shareholders (Baker et al., 2012; Jabbouri, 2016).
2. In all the results presented in this study, the p-value z is a two-tail p-value based on the hypothesis that each coefficient is different from zero.
3. Wooldridge (2005) suggests that linear models are usually good approximations of non-linear binary-choice models, it was also supported by Greene (2012) (Greene, 2012; Wooldridge, 2005).
4. Due to an insufficient number of observations, it was impossible to estimate the logit FE model (the conditional fixed-effects logistic estimator requires only objects for which at least one observation of the binary variable is different from others; in the sample, 72 groups (423 observations) were dropped because of all positive or all negative outcomes).

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Appendix 1

Number of companies depending on the country listed market

Countries	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Bosnia and Herzegovina				1	1			1						2	5
Bulgaria	3		6	3	4	6	3	6	5	1	10	2	3	4	56
Czech Republic				1	1		3	1	2	4	1			1	14
Croatia	2	6	9	8	11	9	19	21	9	8	10	6	18	13	149
Hungary	1	1		2	1			1	1	2			1	2	12
Latvia	3		2	4	3	2	5	6	3	2	2	1	1	3	37
Lithuania	1	3	2	4	5	8	1	5	8	6	4	9	2	2	58
Macedonia		1	1	1	4	2		1	1	3			1	2	17
Poland	7	6	6	9	13	10	9	14	8	12	12	12	13	13	144
Russia	1	1	3	4	3	1	3	4	2	4	3	7	1	3	40
Romania	2	5	3	4	7	1	8	5	4	2	3	6	6	5	61
Serbia	3	1	2	3	5	3	4	2	5	6	4	5	4	1	48
Slovakia			1		3	2	1	1	1	2	2			1	14
Turkey	5	8	8	6	10	9	14	9	7	15	13	11	13	6	134
Ukraine			2		1		1	2	1		1			2	10
Total sample	28	32	45	50	72	53	71	79	57	67	65	59	63	58	799

Source: Own computations.

Appendix 2

Number of observations depending on the country listed market

Countries	Dividend non-payers	Dividend payers
Bosnia and Herzegovina	2	3
Bulgaria	28	28
Czech Republic	8	6
Croatia	73	76
Hungary	2	10
Latvia	23	14
Lithuania	30	28
Macedonia	13	4
Poland	80	64
Russia	21	19
Romania	33	28
Serbia	23	25
Slovakia	7	7
Turkey	64	70
Ukraine	6	4
Total sample	413	386

Source: Own computations.

Appendix 3

Descriptive statistics of selected variables in group of dividend payers and non-payers

Variables	Mean	Std. Dev.	Minimum	Maximum
Divided non-payers (413 observations)				
FCF	-5.31	82.97	-1412.99	210.5
GRO	128.64	302.88	0	6127.79
LEV	0.43	2.10	-22.46	16.52
LIQ	2.59	7.22	0.07	121.75
PE	32.96	70.02	0.09	670.27
PROF (%)	7.01	28.97	-9.49	571.47
SIZE	1.83	0.60	0.23	3.37
Divided payers (386 observations)				
FCF	19.69	65.52	-366.77	409.70
GRO	9.73	8314.25	0.01	15755.6
LEV	0.44	0.55	0	3.61
LIQ	2.50	2.90	0.49	25.14
PE	43.36	209.89	1.24	2600.00
PROF(%)	7.59	5.75	0.00	43.29
SIZE	2.10	0.70	0.14	4.02

Source: own computations in STATA 15.

Appendix 4

The results of the two-sample t tests on the equality of means.

The null hypothesis is that the mean values of variables are equal for dividend payers and dividend non-payers

Variables	p-value
DIV	0.0000
FCF	0.0000
GRO	0.0468
LEV	0.9010
LIQ	0.8104
PE	0.3543
PROF(%)	0.6874
NI	0.0000
SIZE	0.0000

Source: own computations in STATA 15.