

Development of Dividend Payout Model Using Logistic Regression: The Case of Croatian Non-Financial Companies

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Abstract: *When making dividend payout, companies must be aware of the impact that this decision can have on their future activities. It can affect the shareholders opinion and consequentially price of the company, but also investing ability and growth potential. This indicates the necessity of finding adequate measure when considering this issue. The main intention of this paper is to develop an efficient model which predicts company's decision to make dividend payout represented as dichotomous variable using different financial ratios. In the model developing process logistic regression will be applied as a statistical methodology to predict company's decision to pay dividends to shareholders or to keep the profit in the retained earnings form. The financial data for the sample was gathered from financial statements publicly available on Zagreb Stock Exchange (ZSE) website and the dividend payout data was collected from MojeDionice.com and ZSE website. The sample consists of non-financial companies because financial companies have certain differences in financial reporting comparing to non-financial companies. Also, besides companies listed on regulated ZSE market, companies from ZSE Multilateral Trading Facility will also be included in the sample.*

Keywords: *dividend payout, logistic regression, Croatia, Zagreb Stock Exchange*

Introduction

Public limited companies (PLC) can pay cash to their shareholders in two ways: pay dividends or repurchase part of the shares owned by shareholders (Brealey, Myers, Marcus, 2007) [5]. Dividends represent the part of a profit which public limited company allocates to its shareholders on the basis of their participation in the ownership of the company. General shareholders' assembly brings the decision on the allocation of dividends which then becomes obligatory for company's management. In addition to regular dividends, companies can also pay an extra dividend, special dividend or liquidation dividends in shares (Vidučić, 2004) [21].

The fundamental task of the management is to increase the value of the public limited company, that is, to increase the shareholder's assets. Therefore, the dividend policy, alongside with the investment policy and seeking the optimal capital structure, is the most important policy in the public limited company. The question is how that dividend payment decision affects the future value of the company. There are different views regarding this question. Miller and Modigliani (1961) developed the so-called modernist theory and they claimed that the dividend policy has no impact on the value of the public limited company in perfect conditions [16].

The effect of clientele provides an alternative argument for the irrelevance of dividend policy. Namely, investors have different investment appraisal. There are investors who want to invest in companies whose dividend policy corresponds to their preferences. It is expected that investors who pay high taxes and investors who don't need cash will invest in companies that pay low dividends or companies which do not pay them at all. Conversely, investors who pay low taxes and need cash will most likely invest in companies that pay high dividends. The connection between different types of investors and dividend policy is called the effect of clientele. Research conducted by Pettit (1977) showed that older and poorer investors prefer to invest in companies that pay high dividends in contrast to younger and wealthier investors [19].

In contrast, Gordon (1959) and Lintner (1956) advocate the traditionalist theory by which certain gains today are favoured more than the uncertain gains from dividends and capital gains in the future [8] [13]. This theory is popularly called the "bird in the hand". According to them, companies that regularly pay dividends send a clear message that they create real earnings. In addition to these two

theories, there is a theory of tax preferences (Litzenberger and Ramaswamy, 1979) [14], which examines differences between taxes on dividends and taxes on capital gains.

The asymmetry of information between managers and shareholders in terms of dividend payout includes three aspects: signalling, agency costs, and free cash flow. The signalling theory can suggest investors a bright future of a public limited company. Dividend payout indicates the future of the company while reducing the dividend payout is usually considered as negative information and consequently the stock market also reacts negatively. Some companies are willing to increase the debt in order to finance an increase in dividend payouts, because they are of the opinion that the benefits of signalling are greater than the risks that come with increased borrowing (Myers and Bacon, 2004) [17].

Dividend payout sends a strong positive signal that increases the company's reputation and enables easier access to capital. It is important to emphasize that the aspect of signalling is much more emphasized in market-oriented economies such as the United States of America and Great Britain, while in the bank – oriented economies banks have a very good insight into the company's operations because of which their dividends as a signal are not essential. Companies that operate in market-oriented economies generally have a lot of shareholders who don't have significant control over the management and there is a high possibility that managers work in their own interest and not in the interest of shareholders. Such companies don't have a high concentration of ownership and the possibility of conflict between large and small shareholders is negligible.

Although amount of the dividend is important to investors, they are particularly interested in the dividend change. The dividend changes can cause movements of stock prices in both directions, depending on the investors' interpretation. When a company decides to pay the dividend, it must have enough cash to cover the dividend payout. If a public limited company conducts the so-called creative accounting which inflates earnings, management may find their self in trouble in the long run.

The relationship between shareholders (principals) and management (agents) is called the agency problem. The agency costs are costs which incur as a result of the agency problem and the result of the interest conflict between principals and agents. According to the agency theory, optimal level of dividend payout is level which minimizes agency cost structure in relation to external borrowing. Dividend payout, at the same time, reduces information asymmetry and agency costs because the dividend payout reduces the cash flow under the control of management (Frankfurter and Wood, 2002) [7]. Free cash flow can have crucial importance for dividend payout. The dividend payouts are often more depend on the availability of cash flows than on the company's profits (Alli, 2003) [2].

If, however, the company's management decides to pay the dividend, it is important to adjust the dividend policy to the circumstances that are most suitable to the financial situation of the company.

Vidučić (2000) distinguishes most frequent dividend policies [20]:

- a) The residual dividend policy – the company should pay dividends only when there are no projects whose profitability is higher than the cost of capital,
- b) Policy of regular (stable) dividends – payment of a fixed amount of dividends per share in each period,
- c) Multiple dividends increase policy – target growth rate of dividends on the level of long – term inflation rate,
- d) Continuous payment ratio policy – the establishment of a certain percentage of profits to shareholders, and
- e) Regular plus extra dividend policy – a combination of stable dividends policy and the policy of residual dividends.

1. Literature Review

Previous researches about dividend payout policy mainly used multiple regression analysis (Zeng, 2003 [22], Agrawal and Jayaraman, 1994 [1], Amidu and Abor, 2006 [4] and Amidu, 2007 [3]) or logistic regression (Fama and French, 2001 [6] and Mancinelli and Ozkan, 2006 [15]) as a method to determine the reasons and motives of such decisions. Size of the public limited company, ownership structure, liquidity, investment ability, profitability, indebtedness and net profit were used as factors

which affect the dividend policy. Also, the dividend policy may be affected by the legal regulations as well as culture of a certain country.

Amidu (2007) conducted a research on a sample of companies listed on Ghana Stock Exchange in eight years interval [3]. The aim of the study was to analyze whether and how dividend policy affects the performance of the company. Regression analysis was used as a statistic method to determine the positive relationship between dividend policy, return on assets and sales growth. The results have also shown a negative relationship between return on assets and dividend payout ratio as well as the amount of financial leverage.

The value of company's assets is usually used as a measure of company size. The studies that have been conducted (Fama and French, 2001 [6], Mancinelli and Ozkan, 2006 [15] and Kim and Gu, 2009 [12]) demonstrated a positive correlation between the size and the dividend payout. The reason for this is, among other things, the fact that large companies have easier access to capital markets. Large companies are much more likely to decide to carry out the dividend payout in comparison to small companies.

Mancinelli and Ozkan (2006) investigated the relationship between dividend policy and ownership structure of the company on the sample of 139 listed Italian companies [15]. Given the high concentration of ownership in the analyzed companies (bank – oriented economy of Italy) agency problem emerges between large shareholders and minority shareholders. Particularly, large shareholders have a number of ways which can disburse the funds from company and are not primarily interested in big dividends payout because the dividends also have to be paid to smaller shareholders.

Liquidity is also a factor that is positively correlated with the dividend payout. The underlying assumption is that liquid company can pay dividends. Alli, Kahn and Ramirez (1993) [2] have analyzed a sample of 105 firms listed on New York Stock Exchange and founded out that companies with high liquidity had lower systematic risk and they also have signaled to investors that they can pay high dividends. However, there are studies that have found a negative relationship between high liquidity and dividend payments (Kania and Bacon, 2005 [11], Kim and Gu, 2009 [12]).

The possibility of investment is an opportunity to generate revenue. According to MM theory, the company should accept all projects with positive net present value (NPV), and decline those with negative NPV. Kim and Gu (2009) founded a negative relationship between investment and dividend payouts [12].

Profitability is an indicator of profit generating capacity of the company. Kim and Gu (2009) examined the factors which affect the dividend payout made by catering companies in the United States of America using logistic regression analysis [12]. The sample comprised catering companies (a total of 69 companies including 25 restaurants, 14 hotels and 30 casino hotels) in the United States of America, which were listed on the capital markets in USA. They concluded that the size of a company and the profitability are significantly associated with the dividend payout. In contrast, the possibility of investment is negatively related to the dividend payout. However, some studies have founded a negative relationship between profitability and dividend payout (Kania and Bacon, 2005) [11].

Because debt is a fixed obligation to creditors, greater use of financial leverage reduces the cash flow available to the management. Therefore, greater use of financial leverage can be a powerful tool in solving the agency problem. However, it can also mean a greater risk. However, company with the highest financial leverage usage ratio will avoid paying high dividends for the purpose of generating cash reserves needed to pay liabilities to creditors (Jensen, 1986) [10].

2. Data, Methodology and Results

2.1. Data and Methodology

Sample consists of 150 companies majority of which were listed on regular Zagreb Stock Exchange (ZSE) in financial year 2013 (134 companies) and remainder of companies (16 companies) were also listed, but on ZSE's Multilateral Trading Facility in 2013. There are 120 companies in sample which haven't made dividend payout in 2014, and 30 companies which made dividend payout in 2014.

Logistic regression will be applied to develop classification model based on financial ratios whose purpose is to predict whether or not company will make dividend payout. Financial ratios were calculated using the financial statements for the financial year 2013 that are publicly available on ZSE official website. Analysis included 51 financial ratios which can be divided into 4 groups: liquidity ratios, profitability ratios, solvency ratios and investment ratios. Only three ratios were incorporated in model because “some researchers have recommended minimum sample size of at least 50 observations per predictor for logistic regression” (Hancock and Mueller, 2010.) [9]. There are 150 observations included in the sample and 3 predictors included in logistic regression model equation which means that there are exactly 50 observations per predictor in this research. Statistical Package for Social Sciences (SPSS) was used for statistical methodology application.

2.2. Results

Abbreviations for financial ratios which will be used in this research are listed in Table no. 1 below:

Table no. 1. Logistic Regression Financial Ratios Abbreviations

Abbrev.	Ratio	Formula
DPS	Dividend per Share (in 2013)	Amount of Common Share Dividends / Number of Common Shares
DR	Debt Ratio	Total Debt / Total Assets
OE	Operating Efficiency	Sales Revenues / Operative Expenses

When developing model for dividend payout prediction based on logistic regression it is important to check multi-collinearity issue and verify that there isn't high correlation between independent variables. “Multi-collinearity exists when the independent variables are highly correlated ($r = .9$ and above).” (Pallant, 2007) [18].

Table no. 2. Correlations between Financial Ratios Included in Research

		DPS	DR	OE
DPS	Pearson Correlation	1	-,019	,151
	Sig. (2-tailed)		,817	,066
	N	150	149	148
DR	Pearson Correlation	-,019	1	-,243
	Sig. (2-tailed)	,817		,003
	N	149	149	147
OE	Pearson Correlation	,151	-,243	1
	Sig. (2-tailed)	,066	,003	
	N	148	147	148

Results from Table no. 2 show that negative weak correlation between DPS and DR, as well as positive weak correlation between DPS and OE, isn't statistically significant. Negative correlation between DR and OE, is statistically significant, but it is weak ($r = - .243$). It can be concluded that there isn't multi-collinearity problem between analyzed variables. All three financial ratios used in model belong to different categories of financial ratios. DPS belongs to investment ratios, DR belongs to solvency ratios and OE belongs to profitability ratios.

Table no. 3. Coefficients Table (Tolerance and VIF)

Model		U.C.		S.C.	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Cons.)	-0,20	0,09		-2,17	0,03	-0,38	-0,02		
	OE	0,45	0,10	0,35	4,46	0,00	0,25	0,64	0,92	1,09
	DR	0,00	0,00	0,03	0,37	0,71	-0,01	0,01	0,94	1,06
	DPS	0,00	0,00	0,23	3,08	0,00	0,00	0,00	0,98	1,02

* U.C. – Un-standardized Coefficients

** S.C. - Standardized Coefficients

Other method which can be used to determine whether there is a problem of multi-collinearity is by analyzing values of “Collinearity Statistics” presented in last two columns (Tolerance” and “VIF”) in Table no. 3. If tolerance is lower than 0,1 or VIF is higher than 10, multi-collinearity problem exists (Pallant, 2007) [18]. Data from table 3 indicate that there isn’t multi-collinearity problem because tolerance is higher than 0,1 and VIF is lower than 10 for every analyzed financial ratio.

Hosmer and Lemeshow Test (Table no. 4) indicates model fit and it is important that the “Sig. value” is higher than 0,05 (Pallant, 2007) [18]. “Sig. value” for developed model is 0,761 and indicates good model fit.

Table no. 4. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	4,968	8	,761

Table no. 5. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	67,589	,402	,646

Cox & Snell R² and Nagelkerke R² can show value of a model or, in other words, how much variability is explained by OE, DR and DPS which are included in model (Pallant, 2007) [18]. As we can see in Table 5, Cox & Snell R² amounts 0,402 and Nagelkerke R² amounts 0,646.

Table no. 6. Classification Table

	Observed	Predicted			
		Dividend Payout (0 - no, 1 - yes)		Percentage Correct	
		0	1		
Step 1	Dividend Payout (0 - no, 1 - yes)	0	115	4	96,6
		1	10	18	64,3
	Overall Percentage				90,5

Model has very high overall classification efficiency of 90,5% for all companies regardless of dividend payout decision. In other words, 96,6% of companies which haven't made dividend payout were classified correctly, while 64,3% of companies which made dividend payout have been classified correctly. (Table no. 6).

Table no. 7. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP (B)	
								Lower	Upper
Step 1	DPS	,087	,034	6,672	1	,010	1,090	1,021	1,165
	DR	-5,687	1,869	9,264	1	,002	,003	,000	,132
	OE	5,516	2,176	6,425	1	,011	248,631	3,493	17695,536
	Constant	-5,317	2,190	5,897	1	,015	,005		

DPS, DR and OE are financial ratios included in model. B values indicate the positive or negative contribution of financial ratios or, in other words, increased or decreased likelihood to make a dividend payout (Pallant, 2007) [18].

According to the values in Table no. 7, logistic regression equation for the generated dividend payout model is as follows:

$$DP = 0,087 * DPS - 5,687 * DR + 5,516 * OE \quad (1)$$

Legend:

- DP – Dividend Payout in 2014,
- DPS – Dividend per Share in 2013,
- DR – Debt Ratio in 2013,
- OE – Operating Efficiency in 2013.

As presented in Table no. 7, DPS and OE have positive contribution to the dividend payout, while DR has negative impact on dividend payout. That means that it is more likely that company will make dividend payout in 2014 if it had higher values of DPS ratio and OE ratio in 2013. It also indicates lower likelihood of dividend payout in 2014 to their shareholders if DR is higher in 2013. The fact that all “Sig. values” are less than 0,05 indicates that all variables included (DPS, DR and OE) make a significant contribution to the logistic regression model predictive ability (Pallant, 2007) [18].

Conclusions

Significant number of investors considers dividend payout policy as fundamental factor when making decision whether to invest or not in the shares of a particular company. Logistic regression is statistic method appropriate for purpose of determining whether the public limited company would decide to make a dividend payout. Applied statistical methodology generated very efficient dividend payout model with classification accuracy of 90.5%. Financial ratios included in model which make a significant contribution to dividend payout model’s predictive ability are dividend per share ratio, debt ratio and operating efficiency ratio. Some ratios have positive and some negative impact on the overall value of the model. It is very important to highlight that algebraic signs of variables included in model, which show the direction of impact that predictor variables have on dependent variable, correspond to expectations based on economic theory. Higher dividend per share ratio (in 2013), as well as higher operating efficiency, indicates the higher probability of company’s dividend payout in financial year 2014. On the other side, lower debt ratio, leads to higher probability of dividend payout in financial year 2014.

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