Impact of the Financial Crisis on Dividend Payout: Evidence from Portuguese Market

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Biographical Note

Lassana Dafé was born on the 11th of August 1980 in Guinea-Bissau. He earned his Bachelor`s degree in Accounting and Auditing from Institute of Accounting and Administration of the Coimbra in 2009. In the same year he enrolled into Master Degree on Finance on School of Economics and Management, University of Porto. One year later he went to London where he worked in operational areas of TESCO and Pret a Manger. He is completing the second year of master degree above mentioned and upon successful completion, he hopes to return to his home country to apply all acquired knowledge on development of the Guinea-Bissau.

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Abstract

This dissertation focusses on the study of the consequences of the current financial crisis on dividend policy of Portuguese companies.

The data used in this dissertation are data collected during a time period of the 8 years, between 2005 and 2012.

The study follows a panel data model with fixed effects approach. This analysis shows that during the crisis the companies in the sample have not changed their dividend payout significantly. Thus, it can be concluded that the current financial crisis have no impact on dividend payout policies.

Many listed companies on PSI-20 are less profitable during financial crisis period and experience lower amounts of net income, and they just had to rescue their own funds to maintain the level of the dividend payment in order to handle the financial crisis. We believe that managers took into account the fact that decreasing dividend payment could create uncertainty among investors which could lead to large negative stock price reactions.

The dissertation also concludes that large firms can maintain their dividend payout levels more easily. Furthermore, we found that large companies increase dividend payout during 2010, they are motivated by extraordinary and anticipated dividend payment by companies from possible changes to the tax regime as suggested in the national budget for 2011.

Key-words: Corporate finance, dividend payout, financial crisis, tax regime, stock prices, investors.

Table of contents

Index of tables

1. Introduction: motivation, aim and research question

A financial crisis that began in 2007 as a result of consumers default on sub-prime mortgages has had dramatic effect on the United State (US) market and was the starting point for a domino effect affecting the global economy. Due to the difficult business environment companies took different measure in order to manage the crisis and one of the measures was to adjust the dividend payout.

We expect that financial crisis affects too much a firm from a different perspective, for example decreasing sales, decreasing earnings, and reduce firm liquidity. In fact, the value of the firms depends on its cash flows, and the value of shares is a function of the expectation of obtaining dividends in corporate finance decision.

Dividend policy is considered to be one of the main corporate finance decision, together with investment and financing decision that a firm have to make, as a states byDamodaran (2010). It has been one of the most debated subjects in finance. Finance scholars have involved in wide research to describe why firms should pay and it is disappearing phenomenon, as noted byDenis and Osobov (2008), Fama and French (2001), Fatemi and Bildik (2012) and Hoberg and Prabhala (2009).

Normally managers are not willing to decrease the dividends since it may be interpreted as a negative signal. Usually they try to keep or increase dividend payout. But during financial crisis periods this tendency could be abandoned. The most of the largest companies in Portugal maintained a stable dividend payout and a few companies increased the dividend payout to the shareholders.

The level of the current financial crisis gives emphasis to understand how dividend policy affects company's value. This study will provides evidence on this issue by studying the impact of financial crisis on corporate dividend policy. In this paper we will attempt to examine the relationship between dividend payout and firm's value under financial crisis periods in Portugal. The purpose of this dissertation is to present a fair view towards this long debate about dividend policy and introduce new approach

regarding the achievement of the financial crisis on corporate dividend policies in Portugal.

The methodology we use it is the same one proposed by Smits (2012), the multivariate analysis which is an approach to panel data model to explain the relationship between variables and dividend distribution policy, given that, dividend payout is a proxy for this policy. This model is the most used technique in this kind of assessment when we account the occurrence of the temporal and longitudinal variations. The model estimation was made by using GRETL program. Gretl is uprising Econometric Analysis software that has been gaining traction in the most prominent Universities in the World.

We use various variables from information sources including the accounting and financial information to measure whether there are any factors that produced (caused) increases or decreases in dividend payments these times. We will use a very large database of Portuguese companies listed on PSI-20 from 2005 to 2012. We collect all the information from DataStream at school of Economics and Management, University of Porto.

This paper will proceed as follows. Sections 2 will present the review of the literature related to financial crisis. While in Section 3 the data description and hypothesis will be developed. Methodology and empirical results will be discussed in sections 4 and 5 whereas section 6 will deal with the conclusion.

2. Literature review

The purpose of this chapter is to provide a review of relevant research on dividend policy, particularly on stages of firm´s characteristic theory suggested by Fama and French (2001) and its impact on dividend payout.

The literature suggests that the financial crisis is a situation in which the supply of cash cannot keep up with the demand for cash. So this means that liquidity is quickly evaporated, available cash is withdrawn from banks and forcing banks to sell other investments to offset the deficit.

According to Hull (2012), the financial crisis was triggered in 2006, as a result of the breakdown of credit institutions in the United States (US), which granted high risk mortgage loans, leading several banks to insolvency and impacting heavily on stock exchanges worldwide.

The financial crisis was revealed to the public in February 2007. With the exposure to housing market, it led to a gross reduction in market liquidity of these assets and generalized increase in risk premiums; causing tensions in the interbank market, as referred by Hull (2012). The crisis spread rapidly from the United States to other countries, including Portugal and from financial markets to the real economy.

Leary (2009) point out that the collapse of Lehman Brothers, a renowned global bank, in September 2008 almost brought down the world´s financial system. The financial crisis has compromised liquidity; in fact the values of securities in the market were falling. Credit becomes harder to obtain and most firms expect to reduce their dividend payments and repurchase less stocks.

Gorton (2012) and Gorton and Metrick (2012) have supported the idea that the financial crisis that happened in 2008 was a liquidity crisis. Ryan (2012), states that financial crisis could be the great opportunities to firms strategically participate and rationalize changes on their dividend payout. Further he states that when firms feel that they have less cash liquidity it could limit the capacity to maintain their current dividend policies. Therefore, companies can argue that they need to reduce their dividend payout to guarantee that they will be able to deal with financial crisis without problem. On the other hand, they could decide to increase their dividend payout in order to make their

investors comfortable and reinforce their confidence, while the stock prices were depressed.

In Europe in general, and the euro area in particularly, among the countries that were most contaminated by the financial crisis over the past are Portugal, Italy, Spain, Ireland and Greece.

During the financial crisis period, the business cycle was increasingly marked by false expectations created in major's international markets and quickly causing major difficulties in the investment and in the funding level of companies. However, financial instability was a cause to change the policy followed by companies and particularly increase and/or improve the performance of the variables that were linked to the economic-financial capacity in order to generate more cash flows and sustain consequent dividend payment.

Firms can retain its free cash flow, either investing or accumulating it, or pay it out through a dividend or share repurchase. The choice between these options is determined by the firm's payout police as stated by Hillier et al. (2010). The most significant method for distributing cash from the firm to shareholders is via cash dividend. On the other hand, stock dividends represent additional stock given to actual shareholders to increase the number of shares held by the existing shareholders. Berk and DeMarzo (2011) argue that dividend policy is one of the most important parts of the firm's long-run financing strategies and still remains as one of the great puzzles in finance.

Modigliani and Miller (1961) model has become the gold standard of dividend theory. The progress on the field of dividend theory occurred when the authors on their seminal academic paper illustrated that, under perfect capital market *(PCM*) and rational investors the dividend policy is irrelevant and does not create or destroys value to the shareholder. Under perfect capital market, the following conditions are assumed:

- Information is costless and available to everyone equally.
- Transaction costs do not exist.
- No conflict of interest between managers and shareholders;
- No taxes exists

However, real world financial markets do not come close to satisfying the strict condition of *PCM* by *M&M*. Therefore Lintner (1956) and Gordon (1959) emphasize that in an absence of *PCM* conditions we cannot refuse the possibility that dividend policy is relevant. In other words, dividend policy may have impact on the wealth of the shareholder.

Lintner (1956)and Gordon (1959) argue that the cost of capital of the company increases as the dividend decreases, because investors are less sure of receiving future capital gains than to receive current dividends. So these capital gains result from the reinvestment of the profits. However, literature considers that investors prefer dividends. Thus current dividend would be less risky than capital gains. Further Lintner (1956) supported that the main indicator of a firm's capacity to pay dividend its previous dividend payment as it is and assumed that management would more likely to maintain a stable dividend policy.

Al-Malkawi et al. (2010) corroborate with arguments of Gordon and Lintner. They claim that investors will only be available to replace a current income right for an uncertain future if it is necessarily superior. Thus, if companies adopt low dividend policy rates, investors can prefer to sell the shares if they are not satisfied with the dividend policy applied by the company and this behaviour can lead to a fall in stock prices. According to these arguments it is reasonable to assume that dividend payment reduces uncertainty about future cash flows; a high payout ratio will reduce the cost of capital. Fisher (1961) got a similar finding - he argues that dividends have greater impact on firm share prices than retained earnings.

Literature provides some empirical characteristics that distinguish firms that pay dividends from those who do not. Fama and French (2001) provide an excellent comprehensive survey of "why dividends have been disappearing?" They used firm's characteristic variables, such as profitability, investment opportunities and size of the firm; they found out that the percentage of firms which paid cash dividend decreased from 67% in 1978 to 21% in 1999. Their results also suggest that the variables above mentioned seem to affect the decision to pay dividends. Another reason pointed out by the authors about this reduction is that the companies started dividend payments as an attempt to compensate investors for the fact that the dividends were never distributed, when they did not have capacity to continue distributing it. They concluded that the

main reason for this reduction "is due in part to the changing characteristics of public traded companies that have never paid dividend", Fama and French (2001, p.3). In summary, their results reveal that lately companies have become less likely to pay dividends and those that never paid dividends feared and began to pay it, because they are more profitable than those that have been paying dividends. They also concluded that larger firms with high profitability and low growth rates tend to pay dividends while low-profit and higher growth rates firms try to retain earnings.

Evidence of the dividend abandonment phenomenon is also documented by Denis and Osobov (2008), who examine the dividend payment over 1994-2002 in Canada, France, Germany, Japan, the UK and the US. They reported that, although the magnitude of the decline in propensity to pay dividend differs across the six countries, the fraction of dividend-payers always shows a downward trend. Despite this decline, the probability of paying dividends is associated with the firm's characteristic theory suggested by Fama and French (2001); they also found out that in all countries, the likelihood of paying dividend is strongly associated with the ratio of retained earnings to total equity. The fraction of firms that pays dividends is high when firm's equity consists primarily of retained earnings and is low when retained earnings are negative. This finding is consistent with the theory of maturity from DeAngelo et al. (2006) that argue that firms with financial stability are more likely to pay dividends because they have higher profitability and fewer attractive investment opportunities. The authors observe a highly significant relation between the decision to pay dividends and the earned/contributed capital mix, controlling for profitability, growth, firm size, total equity, cash balance and dividend history. They report that the disappearing dividend is larger than the one reported by Fama and French (2001).

Grullon et al.(2002) use the theory of maturity to argument that the dividend conveys information to the outside the marginal information that only managers have. They suggested that increases in dividend convey information about changes in a firm's life cycle, specifically, as to the firm's transition from a higher growth phase to a lower growth phase, which they call as a mature phase. When firms become more mature, their investment opportunities set becomes smaller. They used systematic risk as key variables to define firm`s maturity. They refer that mature firms have more capacity to pay dividends, because they have less risk. They establish that dividend changes are

accompanied by changes in systematic risk and the increase in dividends leads to a decline in the firm's systematic risk. On the other hand, Xu and Malkiel (2003) point out that the increased specific risk of the firm reflects the potential growth of firms in the future, indicating that firms with an increase risk may decrease their dividend payment for future growth. Hoberg and Prabhala (2009) examine disappearing dividends puzzle through the risk perspective. They find that risk is a significant determination of the propensity to pay dividends in the US and it could explain approximately 40% of the disappearing dividends.

Firms adopt the optimal dividend policy in accordance with the evolution of their opportunity set. Young firms pay fewer dividends as their investment opportunities exceed their internally generated capital, so they retain cash as an alternative of distribution of dividend to shareholders. However, mature firms pay more dividends to mitigate the possibility of free cash flows being wasted due to internal funds exceeding investment opportunities.

Salminen (2008) reported that in an economically troubled time, most of the investors assume that dividends are more important, especially high dividend companies are assumed to be valued higher during recession time. Ryan (2012) stated that normally these kinds of companies' increase dividend payout over time to convey a really good value of companies.

Smits (2012) analyses the impact of the recent financial crisis on US firm's dividend payout policy, using variables like size, liquidity, investor composition and spread of bid/ask. Overall his findings show that the financial crisis did not affect dividend payout ratios, despite the evidence that dividend payout increases during crisis for larger firms with higher percentage of institutional owners. The author argued that maybe the firm wants to communicate to their shareholders that the crisis does not affect the firm too much as it does with others, in order to convey information that a firm is still strong. Hauser (2013) uses models proposed by DeAngelo et al. (2006) to investigate whether corporate payout policy changed during the financial crisis in the US between 2006 to 2009. He found out that the likelihood of paying dividends was reduced in 2008 and 2009. This reduction on dividend payment was statistically significant at 1 percent. He

also point out that an average probability of dividend cut increased from 13.6 percent in 2006 to 32.1 percent in 2009.

Banerjee et al. (2007) found that the liquidity could in part take account for the changes in dividend-payers. Meanwhile, rational investors prefer firms with high liquidity and they usually ask for high discount rates when evaluating firms with low liquidity. In market with low liquidity, the high transaction cost inclines investors to receive dividends rather than get the same amount of homemade dividend by selling their investment.

Fatemi and Bildik (2012) use data from a large sample for more than 17000 firms to investigate the pattern in dividend payments in 33 different countries over the 1985-2006 periods. They found out a substantial variation in the propensity to pay dividend at the global level. Nevertheless, the common tendency across all these markets is a decline to pay dividend. They argue that this decline is persistent and consistent over sub-periods and across all 33 countries and it seems that dividend is disappearing. They justified this decline with the evolution of stock markets around the world, because their preference to become more developed and better capable of facilitating the investor's preferences to switch their investment allocations among corporations, and the expanded opportunities made available to firms for the sale and repurchase of their shares, has played a significant role in reducing the importance attached to the dividend by corporate sector. They also find that larger firms with higher profitability and lower growth opportunities have a bigger propensity to pay dividends. This finding is consistent with Fama and French (2001)

Lease et al. (1999, p.81) *cit*. in Easterbrook (1984), refer that firms with low leverage, the payment of dividends will have little impact on the value of the debt. When the firm is highly leveraged, every dollar counts and dividend payments can greatly increase the risk of debt. Incentive for shareholders to pay dividends is stronger when their firm´s leverage is high than when it is low. He argues that dividend payments force managers to raise funds in the financial markets more frequently than they would without paying dividends. Firms with high leverage also are those where value shifting is potentially costly. He expects those firms to pay larger dividend. His analyses suggest a positive relationship between leverage and dividend payout.

In a market characterized by asymmetric information, a change in dividend policy is considered by many authors as one of the ways used by managers to convey to the outside this marginal information only they have.

Many previous authors investigated the dividend signaling effects and provided supports to the role of dividend payout as signals to the market participants (e.g. Gurgul et al.(2003), Ross (1977), Bhattacharya (1979), Bozos et al.(2011)). Actually Ross (1977)develops a one-period incentive signalling model in the context of capital structure; supposing that managers have private information about the firm´s future cash flows. Bhattacharya (1979) takes Ross (1977) model and structured it in a two period and shows that under conditions where outside investors have imperfect information about firms' changes on dividends transmit the information to managements about future prospects to the market. His model contains the main argument that dividend payment is a costly signal, and thus only good firms that have the funds for it, can declare them. Therefore, firms with pessimistic prospects are not capable of using dividends to convey such a signal. This argument result that managers in order to attract some investors with goal to obtain financing for new projects, convey false information to signalize the market prospectus for future growth. This information could cost a lot to companies, if they do not have money to meet the expectations, management may ask for financing to homer their commitments to pay dividends. That financing leads to a cost of signalling (e.g. cost relating to a greater differential in interest rates and transaction costs for such funding). The author refers these differentials as dissipative costs.

Bozos et al.(2011) investigated dividend signalling under economic adversity, using London stock data from 2007 to 2008. Theirs finds reveal that information content of dividend varies with stage of the economy situations, there is less than earning in the period of economic stability but more than earnings in the period of crisis, thus supporting the role of dividend as a signal from management in bad financial times.

The most of the studies on dividends policy associated with financial crisis and other aspects of dividend disappearing is listed on the following table 2.1.

Table 2.1 – Similar studies

Most of the previous studies regarding determinants of firms dividend polices during financial crisis have been conducted in the United States. Studies are presented in chronological order and the results are also presented.

Author (s) of study	Parameter examined	Sample	Main Finding
Fama and French (2001)	Disappearing dividends: changing firm characteristic or lower propensity to pay?	1926 - 1999	The percentage of firms which paid cash dividend decreased around from 67% in 1978 to 21% in 1999.
Denis and Osobov (2008)	Why do firms pay Dividends: International evidence on the determinants of dividends policy	1994 - 2002	The fraction of dividend-payers shows a downward trend.
Smits, R. (2012)	Effects of the financial crisis on the dividend pay-out policy of the firm.	2005- 2010	The crisis did not affect dividend pay-out ratios. He found that dividends increase during the crisis for larger firms.
Hauser, R. (2013)	Change of dividend policy during the financial crisis.	2006-2009	The likelihood of paying dividends is reduced in 2008 and 2009.The reduction is statistically significant at 1 percent in 2009. Dividend policy changed during the financial crisis.

Despite of a wide range of studies concerning dividend payout, we have not found studies in Portugal which concentrated only dividend payout during the financial crisis. We could not either find many articles on dividend payout related to the financial crisis.

The aim of the next chapter is to explain how we are going to conduct the research. The first part of the chapter will discuss the sampling process. We will thereafter discuss how we collected the variables and processed the necessary hypothesis in order to answer our research question.

3. Data description and hypotheses development

This chapter we do data description and framing research questions to be developed.

3.1 Sample selection and data description

This subsection briefly describes the construction of our sample and key variables. All data used in this study are annual and covers firms listed on 29th May 2014 on PSI-20 that have announced any change on dividends payout from fiscal years 2005 to 2012, which cover the financial crisis period from 2008.

In this study index analysis is PSI-20, which represents the twenty mostly liquid companies in Portugal. We follows Fama and French (2001) and DeAngelo et al. (2006) our analysis will not fall on the five financial institutions since the rules and forms of financing that apply are significantly different from non-financial mainly, restrictions on capital structure imposed by Basel agreements. Thus, the sample included non-financial companies listed on PSI-20, with the exception of EDP-Renovaveis, because it is owned 77.5% by EDP-Energia de Portugal, being substituted by Brisa that just left in this index in August 2012, REN, SonaeCom and Sonae Industria do not have record of dividend payment during three consecutive years. These requirements result in 12 non-financial companies, which are listed in appendix-1that provides all the information about the main variables for study also figured in table 3.2. The sample is constructed using DataStream, and all the data are collected via Faculty of Economic of University of Porto, firm´s annual reports for the period 2005-2012 and Securities Commission (CMVM) site, and processed through the Gretl Software. The choice of these programs is all due to their recent use in the academic world statistical analysis since it gives the great informational consistency.

Table 3.1 Sample Selection

Firms listed on PSI20	20
financial institutions	5
data of dividend distribution	3
Observation after elimination	12

Table 3.2 – Description of the variables used in Analysis

	symbol	Description	Signal
Dividend payout	*Div*	Dividend cash	N/A
Market to Book Ratio	*Mtb*	Market capitalization divide by book value of equity	+/-
Firm size	*Log(Size)*	Logarithm of assets	+
Log dividend lagged	*Div(1-t)*	Is equal to the dividend paid last year *Div(1-t)*	+
Leverage	*Lev*	Total liabilities divide by shareholders equity	+/-
Risk	*Beta*	The relationship between the return of a stock *i* and the return of a market	-
Quick ratio	*Qr*	Ratio between quick assets to currents liabilities.	+
Dummy 2008	*dum2008*	Dummy variable that takes the value of 1 if firms change their dividend payout in 2008 and the value 0 otherwise.	N/A
Dummy 2009	*dum2009*	Dummy variable that takes the value of 1 if firms change their dividend payout in 2009 and the value 0 otherwise.	N/A
Dummy 2010	*dum2010*	Dummy variable that takes the value of 1 if firms change their dividend payout in 2010 and the value 0 otherwise.	N/A

3.2 Variables and hypotheses development

The dependents and independents variables used in the regression are based on assumptions of the authors referenced in the literature review.

3.2.1 Dependent Variable

In literature there are several variables to measure the dividend policy for example: dividend payout ratio, dividend yield and dividend payout. In the present research, the choice of variable which allows measuring the impact of the financial crisis falls on firm's dividend payout *(Div)* in year *t.* In order to examine whether listed companies on PSI- 20 change their dividend payments due to the financial crisis, the following hypothesis is developed.

Does the impact of the financial crisis on dividend payout?

3.2.2 Independent variables

The independent variables included in this study are variables identified in previous literature related to the dividend payout.

Mature firms are likely to be presented with fewer opportunities and also are likely to be in a position to generate free cash flows which may be distributed as dividend to shareholders. DeAngelo et al .(2006) considered market to book ratio *(Mtb)* as a proxy of investment opportunities measure; authors argue that firms that have higher investment opportunities and less free cash are less likely to distribute dividends. Lower investment opportunities lead to lower external financing needs and consequently result in a higher likelihood of dividend payments. Therefore we expected a negative relation between investment opportunities and dividend payout.

H1: Dividend Payout is negatively associated with firm market to book ratio.

Fama and French (2001) note that firm size plays a role in explaining the dividend payout of firms. They found that larger firms tend to be more mature and they have easier access to the capital markets, which permits reduce their dependence on internally funding and allows for high dividend payout ratio. They also state that larger firms have less information asymmetry, but they have a lot of cash flows and lower

financing costs. Authors use market capitalization percentile as a proxies of firm *Size.* We use logarithm of the book assets as proxies of firm size variables. We predict positive relationship between dividend payout with firm size.

H2: Dividend payout is positively associated with firm size.

Lease et al. (1999) emphasizes that dividend payments make managers to raise funds in the financial markets more frequently than they would without paying dividends. Firms with high financial leverage *(Lev)* also are firm that any change of the value is potentially costly. His analysis suggests a positive relationship between *Lev* and dividend payout. In contrast to them we think in Portugal higher level of the debt would be the reason to companies do not distributed dividend. The companies with higher degree of debt in its capital structure discloser larger risk and as a result higher interest expenses with the debt service. In this case we predict a negative relation between *Lev* and dividend payout.

H3: Dividend payout is negatively associated with financial leverage.

The volatility of the stock price in the context of the recent financial crisis has been concerning the market participants**.** Hoberg and Prabhala (2009) found that dividend changes are accompanied by changes in systematic risk. Authors use standard deviation of the predicted values as a measure of the systematic risk.

We follow Hoberg and Prabhala (2009) using eight-year daily prices and the proportional change for all 12 companies firms listed on PSI20 and the PSI20 returns, which we take as proxy for the stock market as a whole. In order to determine the riskiness of the stocks we used beta which describes the relationship between the return of a stock and the return of a market. Therefore we had to calculate the historical beta manually for each company listed on PSI20. When calculating the historical beta we used the formula provided by Hoberg and Prabhala (2009). We predict negative relationship between *Beta* and dividend payout.

$$\beta_y = \frac{Co\,\mathrm{var}\,iance(Rm, Ri)}{Variance(Rm)} \qquad \textbf{equation} \quad (3.2.1)$$

Where:

ri = Return on stock i

rm = Market return

H4: Dividend payout is negatively associated with beta.

Liquidity is ability of a firm to meet its obligations and recurring operating expenses, such as dividend payout. Several ratios provide information on liquidity. We follow Smits (2012), who's use Quick (acid-test) ratio as a proxy of the liquidity. Author shows that the firms with less liquid have less probability to meet its obligations. In the quick ratio, the numerator includes quick assets (cash, short-term marketable securities, and accounts receivable). The denominator consists of current liabilities. We expect positive relationship between dividend payout and Quick ratio as a liquidity measure.

H5: Dividend payout is positively associated with liquidity.

We also include *dummy* variable in regression in order to investigate the impact of the financial crisis. We have taken 2005 as base year; we considered *dum2008*, *dum2009*, *dum2010* (equal to one if the observation was in, 2008, 2009 and 2010 years, and zero otherwise).

In the next section we provide a summary of the methodological considerations and assumptions fundamental the research process.

4. Methodology

4.1 Model

In this study we use multivariate analysis to expect the impact of financial crisis on dividend payout an approach to panel data model. In the first place, we transform dividend cash and book assets into logarithm, in order to make a good interpretation of coefficients and to try eliminating possible heteroscedasticity that would exist in the model. The basic form of the model is as follow:

$$Log(Div)_{it} = \alpha + \beta_1 \log(size)_{it} + \beta_2(Mtb)_{it} + \beta_3(Beta)_{it} + \beta_4(Lev)_{it} + \beta_5(Qr)_{it} + \beta_6 Dtimes_{it} + u_{it}$$

Equation 1- (Model.1)

Where,

i = 12 firms: *Altri, Brisa, Cofina, EDP energias, Galp Energias, J. Martins. M. Engil, Portucel, PT. Telecom, Semapa, Sonae SGPS and Zon Optimus; t= 8 years: 2005-2012.*

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 – regression coefficients;

$Log(Div)_{it}$ - dependent variable;

$Mtb_{it}, \log(size)_{it}, Beta_{it}, Qr_{it}, (Lev)_{it}$ and $Dtimes_{it}$ - independent variables and; u_{it} – term includes other factors that may influence the dividend payout.

Assuming that the model mentioned above is well specified, the main objective is to analyse the specific effects of the financial crisis that began in 2008. We follow Hauser (2013) and we introduced the dummies variables for three years in model (1) in order to capture which years of financial crisis dividend suffer change.

$$Log(Div)_{it} = \alpha + \beta_1 Log(size)_{it} + \beta_2(Mtb)_{it} + \beta_3(Beta)_{it} + \beta_4(Lev)_{it} + \beta_5(Qr)_{it} + \beta_6 Dtimes_{it} + \beta_7 dum2008_{it} + \beta_8 dum2009_{it} + \beta_9 dum2010_{it} + u_{it}$$

Equation 2- (Model.1)

Where

dum2008, dum2009 and dum2010 are defined as time dummy variable that considers the financial crisis beginning in the year 2008 until 2010, inclusive.

The main objective of this dissertation is to test the null hypothesis that had not suffered from impact of the financial crisis on dividend payout.

$H_0: \beta_{12} = 0$ for 2008		$H_1: \beta_{12} \neq 0$ for 2008
$H_0: \beta_{13} = 0$ for 2009	against alternative	$H_1: \beta_{13} \neq 0$ for 2009
$H_0: \beta_{14} = 0$ for 2010	hypothesis	$H_1: \beta_{14} \neq 0$ for 2010

If we reject the null hypothesis for any of the years, based on the *T-Statistic* and β estimated, obtained by usual regressions we can conclude that the financial crisis has impact on dividend policy.

The dynamic economic relations suggest that the current behaviour depends on its past. As referred by Lintner (1956), the historical dividend trend is significant enough to influence the current dividend payment. We took out the variable with less significance and we include the dividend payout of the previous year (Div_{t-1}) as independent variables in our model. The model takes form as follow:

$$Log(Div)_{it} = \alpha + \beta_1 \log(size)_{it} + \beta_2 (Mtb)_{it} + \beta_3 (Beta)_{it} + \beta_4 (Qr)_{it} + \beta_5 Log(Div)_{it-1} + \beta_6 Dtimes_{it} + u_{it}$$

Equation 3 (Model. 2)

Where,

$(Div)_{it-1}$is a lagged dividend variable.

After the theoretical presentation of how impact of the financial crisis on dividend payout should be modelled, we analyse the data and investigate the economic relations that may explain what influences the dividend payout, and take into account many factors – economic, financial, etc. In this context, models of panel data are presented as the method par excellence for analysing the impact of financial crisis since it allows the inclusion of several variables, which characterize the different factors mentioned and of reduced time series, featuring our study.

4.2 Panel data models

4.2.1 Panel data models overview

According to Gujarati (2006), the use of panel data has advantages because it takes into account the occurrence of temporal and longitudinal variations. Moreover, by using temporal data sectional, the number of observations increases and consequently increases of the number of degrees of freedom as well, allowing a reduction of the collinearity. Second Greene (2012) noted that there are some limitations on panel data usage the design of the database the distortion caused by the error measures, the selection problems of the series and the size of the time series. There is also additional data due to heterogeneity of data, because the companies have different economic structures, which complicates the model estimation process, Marques (2000).

To simplify, we will assume that models (1 and 2) related in previous section are given by the following generic model.

$$\gamma_i = \alpha_i + \mathscr{b}_i' X_{it} + \mu_{it} \ , \qquad \text{equation (4)}$$

Where i=1, 2, 3 … N companies and t=1, 2, 3...T time periods

In panel data model, α represents the individual effects of each firm which are constant over time, $\mathscr{b}'$is transposed matrix represents the individual marginal effects of each firm and μ_i is the error term.

According to Greene (2012), the panel data models may have different specifications, such as Pooled, fixed effects and random effects.

$$\gamma_i = \alpha + \mathscr{b}' X_{it} + \mu_i \qquad \text{equation (4.1)}$$

$$\gamma_i = \alpha_i + \mathscr{b}' X_{it} + \mu_i \qquad \text{equation (4.2)}$$

$$\gamma_i = \alpha + \mathscr{b}' X_{it} + e_{it} \text{ with } e_{it} = \alpha_i + \mu_{it} \qquad \text{equation (4.3)}$$

Where α and $\mathscr{b}$ represent vectors of parameters.

In the specification of the pooled panel data model consideration that equation (4), α and $\mathscr{b}_i'$is common to the different companies and the firms have the same intercepts and the index of the variable disappears. Thus the equation (4) should be rewrites as it present the equation (4.1) and can be estimated by the least squares method ordinary (OLS - Ordinary Least Squares).

The major problem of this model is that it does not distinguish the various companies listed on PSI20. By combining all the companies by pooling, it rejected the heterogeneity or individuality that may exist among them.

In the specification of panel data with fixed effect model whereas the equation (4), $\mathscr{b}_i{}'$ is considered common to the firms that constitute the panel and α_i different for all the firms. Thus the index of the variable disappears. As a result the equation (4) has been rewrite as it presents the equation (4. 2).

Finally, in specification of the panel data model with random effect, taking into account the equation (4), α_i it is assumed that are independent of errors μ_{it} and also assume that α_i and μ_{it} are independently distributed, the errors take the form of $e_{it} = \alpha_i + \mu_{it}$ and the equation (4) has been rewritten as it presents the (4.3).

4.2.2 Panel diagnostic

Testing the model specification is used to analyse effects that are present in the data panel. In this sense, to find which model is adequate between fixed effects and pooled, we use the Pooled test. According to Watson (2012, p.403) this test is also known as *F-test.*

$$F\ (N-1, NT-N-K) = \frac{(RSS_{R2} - RSS_{R1})/(N-1)}{(1-RSS_{R2})/(NT-N-K)}$$

Equation (5)

Where

RSS_{R1} and RSS_{R2}, are sum of the squares of the residues of pooled and fixed model, respectively.

$(N-1)$ and $(NT-N-K)$ are the degrees of freedom, where N is the number of firms, *T* is the number of period and K is the number of variables we have in our study.

The null hypothesis *(Ho)* is pooled against alternative Hypothesis *(H1)* fixed effects.

According Marques (2000) is very important to choose one of these models, because they can generate different estimated coefficients. The fixed effect model permits heterogeneity or individuality among all the twelve companies that we have in our sample. The term fixed in this case refers to the fact that the intercept may differ across

companies, but it does not vary over time. We use Hausman test to select which model fit better our sample.

Hausman test for fixed effect model versus random effects model (Watson 2012, p. 421):

$$H = \left(\hat{b}_{fe} - \hat{b}_{re}\right)'\left[Var\left(\hat{b}_{fe}\right) - Var(\hat{b}_{re})\right]^{-1}\left(\hat{b}_{fe} - \hat{b}_{re}\right) \sim \varkappa_k^2$$

Equation (6)

Where,

$\hat{b}_{fe}$ – is the vector of estimators of the model with fixed effects;

$\hat{b}_{re}$ – is the vector of estimators of the model with random effects;

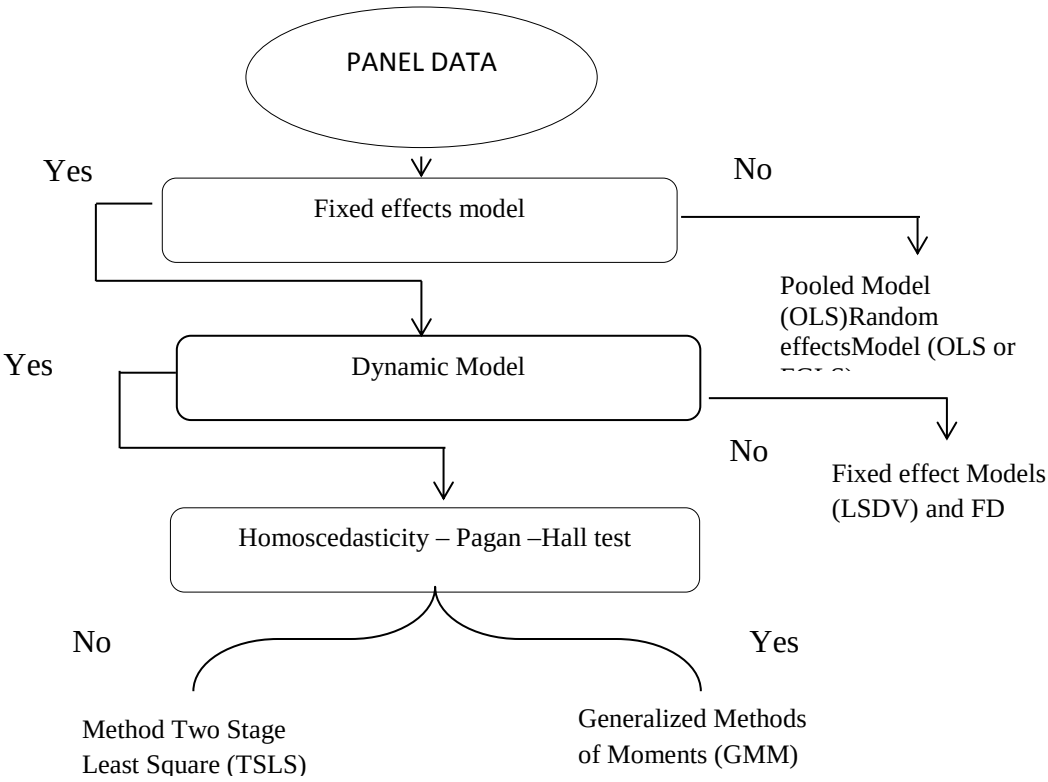
$Var\left(\hat{b}_{fe}\right)$ – is the matrix of variances-covariance of the estimators $\hat{b}_{fe}$;

$Var\left(\hat{b}_{re}\right)$ – is the matrix of variances-covariance of the estimators $\hat{b}_{re}$;

k – Number of regression coefficients.

If $H > \varkappa_k^2$ or *p-value*< 0.05, rejected null hypothesis that the random effect model is adequate against alternative hypothesis (fixed effects).

Figure-4.1: The process of estimating the static and dynamic panel data model



Source: Author

5. Empirical results

In this chapter we are going to assess the impact of the financial crisis on companies' dividend payout, therefore showing an empirical work which is dividend in three sections. In the first section the main descriptive statistics for the overall samples are analysed in order to realise the evolution of dividend payout during the period 2005-2012.In the second, we would analyse the critical assumptions of the regression model and in the third section we will end up with the discussion of the results.

5.1 Univariate analysis

Table 5.1 - Descriptive statistics

These tables provide the value of mean, standard deviation, median, minimum and maximum. The data set contained a total of 96 observations for 12 Portuguese companies over a period of 8 years for 6 variables.

		Log(Div)	Mtb	Log(Size)	Beta	Lev	Qr
A	Mean	10.661	2.67677	15.053	0.8771	5.8830	0.78167
	St. Dev	2.3094	1.85504	1.2964	0.3173	8.7009	0.48655
	Median	11.090	2.34500	15.116	0.8800	3.6122	0.66500
	Min	4.6308	-1.84000	11.826	0.08000	0.8136	0.21000
	Maximum	14.188	8.30000	17.560	1.67000	65.551	3.0800
	N	90	96	96	96	96	96
		Log (div)	**Mtb**	**Log(Size)**	**Beta**	**Lev**	**Qr**
B	Mean	10.561	2.7678	14.874	0.83972	3.5046	0.8558
	St. Dev	2.1953	1.7666	1.2665	0.43303	2.1277	0.4555
	Median	10.975	2.5050	15.006	0.77500	3.3631	0.7200
	Min	5.5428	0.6800	12.276	0.08000	1.0032	0.2800
	Maximum	13.273	8.300	17.243	1.6700	8.7196	2.2600
	N	35	36	36	36	36	36
C	Mean	10.7253	2.6222	15.159	0.8995	6.6443	0.7372
	St. Dev	2.39693	1.9800	1.3128	0.2223	9.1755	0.5027
	Median	11.1232	1.9187	14.100	0.91000	4.0722	0.6550
	Min	4.63084	-1.8400	11.826	0.43000	0.8136	0.2100
	Maximum	14.1884	6.7700	17.560	1.34000	65.551	3.0800
	N	55	60	60	60	60	60

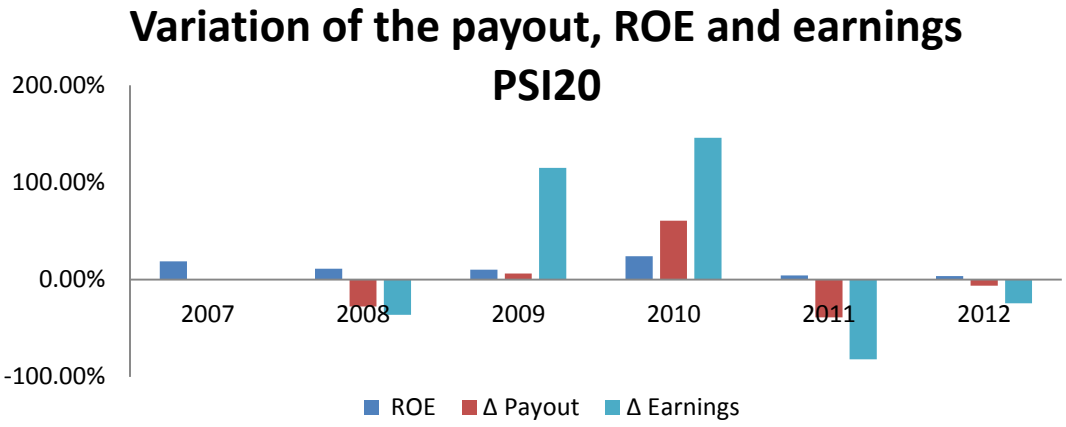
The sample was divided into three panels the years of namely, Panel – A (2005-2012) representing the overall sample, panel-B (2005-2007) referring to the period before the financial crisis and, panel C (2008-2012) which correspond to the years of the financial crisis. The descriptive statistics for the OLS can be seen in table above. This table

allows us to understand the distribution of values that constitute the variables. As it can be seen the means of all six variables included in this study are very close to their median, therefore implying that the sample data tends to the average. It is also reveals that the data is normally distributed (panel-A). The maximum and minimum values of all variables have got a reasonable difference except for financial leverage ratio. The standard deviation of leverage ratio is the highest whereas the quick ratio variables experience the lowest standard deviation.

According to dependents variables for entire sample (panel-A) from 2005 to 2012, on average companies 10.7 of dividend payout, while the median value indicates that 50% of the samples in our study show a dividend equal or above 10.10. When we compare the perspectives before financial crisis and after financial crisis, the dividends have just a little different outlook. Whilst in that of after crisis the dividend payout increase 0.2% (table 5.1); this is obviously due to the fact that the companies in our sample have distributed extraordinary and anticipated dividend.

The two largest differences compared to standard deviation are panel-B and Panel-C. The standard deviation is very high which indicates that difference between the two periods is large and also the financial leverage variables is exceptionally high in the years of the crisis and we think that is partly due to the unstable financial environment during the time period.

Graphs 5.1 - Annual variation of the payout, earnings and ROE of the PSI 20 companies

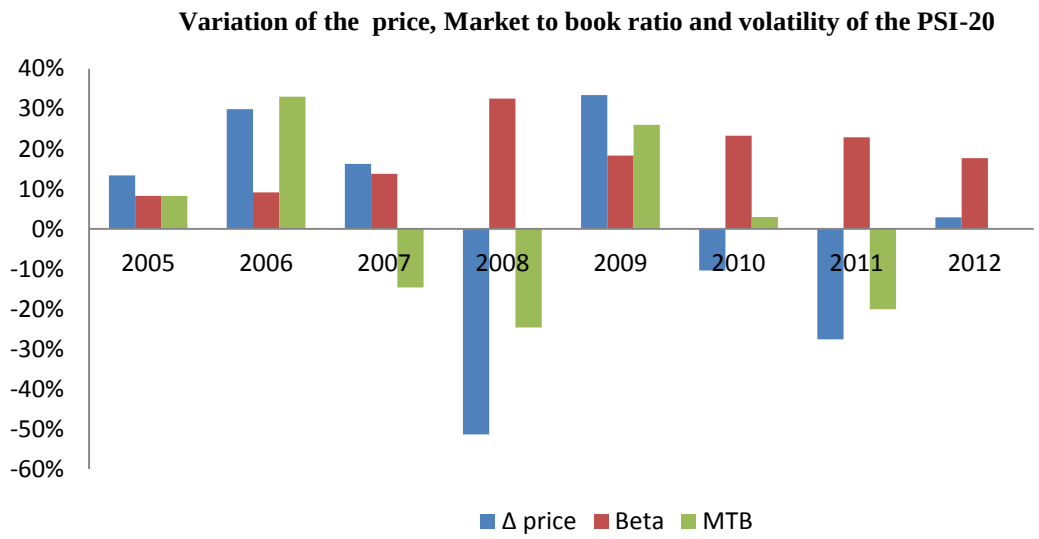


According to chart 5.1 we can see that 2010 was the year when companies distributed large amounts of dividend. This progress is explained by the increase in the payout ratio of the 60% in comparison with 2009 and the increase in company results which

contributed toward the increase in the distribution of dividends. However, the performance of the value of the earnings was not constant throughout the financial crisis period. The average value of the earnings the all non-financial companies on PSI20 registered a decrease in the value under beginning of the crisis. Moreover, companies in our sample were marked by high volatility, the stock prices dropped, consequently leading to losses in market capitalization (See graph 5.2).

The market-to-book ratio also decreased in comparison with 2008, due to the effect produced by the drop in stock price. This drop could be explained by the factors that were related to the Portuguese capital market, the adoption of restrictive measures of economic policy and the contagion effect suffered by the Greek sovereign debt crisis.

Graph 5.2: variation of the price, market to book ratio and volatility



We predict that the market-to-book value should be lower during the financial crisis. As we can see in graphs 5.1 and 5.2 the increase/decrease in dividend payout is corresponding to increase/decrease in market-to-book ratio value respectively. More especially, where *Mtb* value fall down in 2008, the total dividend cash and reaches peak in 2009. Thus, on the basis of these charts, the decrease/increase market-to-book value could have an indication for the decreasing and increasing dividend payout, respectively. The *Mtb* value in 2008 has a negative influence on the total dividend payout in 2009.

The correlation matrix displays that there exist reasonable relationship between all variables. The variance-covariance among variables is not too high.

Table 5.2 - Correlations between Key Variables

Log(size)	Mtb	Beta	Lev	Qr	Dtimes	
1.0000	-0.1474	0.3059	-0.2925	0.0752	0.0469	Log(size)
	1.0000	-0.0946	0.0397	-0.2854	0.0063	*Mtb*
		1.0000	-0.0222	-0.0978	0.1659	Beta
			1.0000	0.0190	0.1236	*Lev*
				1.0000	-0.0849	Qr
					1.0000	Dtimes

From the table 5.2we can see that we did not find any strong correlation between the independent variables, being the strongest correlation equal to 0.3059 between firm assets and riskiness *(Beta).*In advantaged it can be seen that our model presents absence of the multicollinearity.

5.2 Models Test

Before analysing the multivariate regression model, the consistency of the model was tested through several regression assumptions.Gujarati (2006) teaches us that there are four critical assumptions for a regression model: collinearity, normality, homoscedasticity and linearity.

Before we start the analysis of the regression assumptions mentioned above, we run an equation by Ordinary Square linear (OLS) model to check the features[1] of the good regressions. The results are presented on appendix 2.

- [1] Regression line must be fitted to data strongly;
- Most of independent variables should be individually significant to explain dividend pay-out;´
- Given independents variables should be jointly significant to explain or influence dividend pay-out;
- No serial or autocorrelation in the residual (u_{it}) and variable of the u_{it} should be constant, meaning homoscedastic and
- The (u_{it}) should be normally distributed.

From estimation we can see that the elasticity of coefficients is well determined by conventional standards. There is individual statistical significance of the majority independent variables at the level of 99% (***), except financial leverage variables that not present significance. Also, there is statistical significance of the overall model for the p-value (F) is less than 0.05. This is consistent with Smits (2012) and Fama and French (2001). Thus we reject the null hypothesis that our independents variables do not influence the dividend payout. In this model we can see that the determination coefficient (R-squared) has a value superior (0.74) which is quite good, meaning that the model is nicely fitted. Switching words, the independent variables in the model explain more than 74% of the dividend payout.

We also used Ramseys's Reset test to assess the specification of our model for the period 2005-2012. The null hypothesis is that our model is adequate. There is a good specification. The alternative is that it is not. Since the *P-Value* of the test is less than 0.05 (see appendix 2) we reject null hypothesis, which is not desirable. The model should be adequate. This could be due to the sample size, the amount of variables in the model or even to the sheer form of the variables.

The Variation Inflation Factor *(VIF)*[2] is use as collinearity diagnostic, refers Adkin, (2013). He suggested that the benchmark limit is 10. Thus, when the *VIF* present a value higher than 10 we are in the presence of multicollinearity.

[2] $VIF_j = \frac{1}{1-R_j^2}$, variance inflation factor actually reports the same information with R_j^2, but in a less straightforward way.

The results are shown in the following table 5.3.

5.3. Variance Inflation Factors

	R	R^2	1-R^2	*VIF*
Mtb, Size	-0.15	0.02	0.98	1.02
Mtb, Beta	0.09	0.01	0.99	1.01
Mtb, Lev	0.04	0.00	1.00	1.00
Mtb, Qr	-0.29	0.08	0.92	1.09
Mtb, Dtimes	0.05	0.00	1.00	1.00
Size, Beta	0.31	0.09	0.91	1.10
Size, Lev	-0.29	0.09	0.91	1.09
Size, Qr	0.08	0.01	0.99	1.01
Size, Dtimes	0.05	0.00	1.00	1.00
Beta, Lev	-0.02	0.00	1.00	1.00
Beta, Qr	-0.10	0.01	0.99	1.01
Beta, Dtimes	0.17	0.03	0.97	1.03
Lev, Qr	0.02	0.00	1.00	1.00
Lev, Dtimes	0.12	0.02	0.98	1.02
Qr, Dtimes	-0.08	0.01	0.99	1.01

We find that there is no collinearity between the variables of the model because the VIF's are within the benchmark values, as we had referred to when we were doing the analysis of the correlation matrix.

Wooldridge (2012) states that heteroscedasticity is a term used to define the situation when the variance of the residuals is not constant for all individuals. The white heteroscedasticity test was run for the residuals to check if the model is healthy or not. As we can see in appendix 2, we have a P-*value* of (0.14) which is more than 5 percent; therefore the null hypothesis cannot be rejected. Meaning, that the residual is homoscedasticity, as wanted.

Gujarati (2006), state that the most models have assumed that qualitative variables affect the intercept and not the slope coefficient of the regression sub group. Testing the differences of the intercepts can result in a misrepresentation of the results when the slopes are different.The structural changes happen when we split our sample into two sub periods N1 and N2, for example data before crisis and after crisis, and we estimating parameters for each sub periods and then testing the equality of the two sets of the parameters. The structural changes have being tested by the Chow test. Once again we look at the p-value (0.0006) see appendix 2. We reject the null hypothesis,

which means that the model does not represent structural changes. This issue is classically linked to the sample size.

Since we have a panel dataset and the conditions of regressions are being covered. It is necessary to test out which modelling technique is adequate for analysing our sample. So, we applied the panel diagnosis tests. The Hausman test was run to determine the use of fixed effect model or random effects model. This test explores the consistency of the random effects estimator. The null hypothesis which is a random effect model against the alternative hypothesis which is a fixed effect model, the results obtained by the Hausman test, as shown in the table present on the appendix-3, show that the p-value calculated is less than 0.05, so we reject the null hypothesis which suggest that the random effects estimator is consistent. Therefore we will estimate our model using a fixed effects approach. Since our sample is small, it is natural that some issues may arise in the model; nevertheless, and from an Economic point of the view, we will cover every aspect that we think plausible, so our results are the most consistent possible.

5.3 Multivariate results

The model estimation was made by using Gretl program. The dataset is a panel dataset with information regarding 12 companies for the period 2005-2012; we started by re-estimate the model under the assumptions of the fixed effects specifications.

5.3.1 Static panel data model

Regarding explanatory variables of the dividend policy, defined in the previous chapter, the fixed effects estimation of static model can be presented by the following equation:

$$Log(Div)_{it} = \alpha + \beta_1 Log(size)_{it} + \beta_2 (Mtb)_{it} + \beta_3 (Beta)_{it} + \beta_4 (Lev)_{it} + \beta_5 (Qr)_{it} + \beta_6 Dtimes_{it} + u_{it}$$

We begin the analysis of the regression model (I) by computing fixed effect estimates of the parameters.

Bear in mind that, as stated before, we could find negative impact of the financial crisis on the dividend payout. To make sure of this, we have run the model using annual effects aiming to capture which of the years of the financial crisis could have impact.

$$Log(Div)_{it} = \alpha + \beta_1 Log(size)_{it} + \beta_2 (Mtb)_{it} + \beta_3 (Beta)_{it} + \beta_4 (Lev)_{it} + \beta_5 (Qr)_{it} + \beta_6 Dtimes_{it} + \beta_7 dum2008_{it} + \beta_8 dum2009_{it} + \beta_9 dum2010_{it} + u_{it}$$

The estimated static panel data model results are summarized in table 5.4.

Table 5.4estimated static panel data model using fixe effect estimator model (1)

The table reports the results from estimating the unbalanced panel fixed effects model of the PSI-20 non-financial companies on dividend payout during the period 2005-2012. The explanatory variable is as defined in section 3. The t-statistic is presented as well. *, **, and *** denote significance at 10%, at 5% and 1% respectively. Standard error in parenthesis

Variables	**Expect Sign**	**Model (I)**		
		OLS	Fixed Effects	Annual effects
Const	±	-7.589 ***	2.0240 **	1.9402*
		(1.7810)	(2.0684)	(1.8813)
Log Size	+	14.39 ***	3.2412 ***	3.8135 ***
		(0.1134)	(0.1477)	(0.1363)
Mtb	±	2.844 ***	-2.5481 **	-2.8897 ***
		(0.07159)	(0.03009)	(0.0273)
Beta	-	-3.452 ***	-0.3572	-0.4216
		(0.4312)	(0.29823)	(0.2943)
Lev	±	-0.9116	-2.26676 **	-2.4534 **
		(0.00543)	(0.00439)	(0.0087)
Qr	+	1.852 *	0.4417	0.5101
		(0.268)	(0.1056)	(0.1184)
Dtimes	±	1.067	1.0461	-
		(0.2673)	(0.0988)	
D2008	±	-	-	0.15652
				(0.1605)
D2009	±	-	-	0.6378
				(0.0776)
D2010	±	-	-	(0.1583)
				(0.1769)
R^2		0.751290		
R^2 adj		0.73331		
F-*Stat*		41.787		
N		90		

According to the fixed effect model regression (equation 4.2.1) we observe: that firm size is positively correlated with dividend payout at 1% level of significance. In addition, market–to-book values have a negative and significant influence on dividend payout at 5% level of significance. Our result is partially in agreement with the findings from preview literature, such as Smits (2012), Hoberg and Prabhala (2009) and Fama and French (2001).

We also found that firm leverage have a negative and significant influence on dividend payout at 5% level of significance meaning that non-financial companies in Portugal have higher debt level. To a certain extent this explains the smaller return on equity for the shareholders (see graphs 5.1). The companies with higher degree of debt in its capital structure discloser larger risk and as a result higher interest expenses with the debt service and consequently lower dividend payout.

The most important variable is dummy variable. The coefficient associated with this variable present positive signal and insignificant. This result proposing that the financial crisis has no impact on dividend policy. In contrast which Hauser (2013) who's found a decrease of dividend payout in 2008 and 2009 and statistically significant at 1%. Our finding is consistent with Smits (2012). The author found that financial crisis did not affect dividend payout; despite there was increase of the dividend payout by institutional investors.

5.3.2 Dynamic panel data model

To assess whether firms have reasonable and well defined dividend policies in terms of the speed which the adjust dividend towards a long run target payout ratio and to compare the results obtained with the application of static panel models, we took out the variable with less significance in previous model (1) and we introduce in it the lagged variables, which turns our analysis into a dynamic analysis.

$$Log(D)_{it} = \alpha + \beta_1 Log(size)_{it} + \beta_2 (Mtb)_{it} + \beta_3 (Beta)_{it} + \beta_4 log(Div)_{it-1} + \beta_5 (Qr)_{it} + \beta_6 Dtimes_{it} + u_{it}$$

Where u_{it} represent heterogeneity of each firm.

The dynamic panel data models can have autocorrelation issues due to the presence of the lagged variables within the regressors side, since $(logDiv)_{it}$ is a function of the u_{it} and $(logDiv)_{it-1}$ is also a function of the (u_{it}). Moreover, to fix this problem, we estimated the following dynamic panel data model using Arellano and Bond's (1991) estimator, such as Generalized Method of Moments (GMM).

In the first estimation of the model (equation 4.2.2), when we run model by OLS to check model features, we found again significance in firm size, lagged dividend and market-to-book ratio, this could induce us a wrong results because, OLS does not assume individuality between the companies. From this estimation we found that model present good specification, through the RESET test than model (I) it can be seen on (appendix 3.1) that p-value is higher than 0.05, so the model (II) is most adequate in comparison with model (I) and also presented an R-Squared of 86 % (R^2) and an adjusted (R^2) of 85%.

Table 5.5 Estimated dynamic panel data model using fixe effect estimator.

The table reports the results from estimating the unbalanced dynamic panel fixed effects model of the PSI20 non-financial companies on dividend payout during the period 2005-2012. Standard error reported in parenthesis. ***, ** and * stand for statistical significance at 1%, 5% and 10% level respectively.

		Model II – Dynamic Model		
variables	Expect signal	OLS levels	Fixed effect	GMM(SYST)
constant	±	-1.8976* (2.4192)	2.2747 ** (6.01132)	-0.7940 (6.5039)
Log size	+	2.0426 ** (0.2848)	0.4696 (0.3295)	2.5191 ** (0.4117)
Mtb	±	1.8295 * (0.0377)	-2.4726 ** (0.0486)	0.6185 (0.078)
Beta	-	-1.4886 (0.53593)	-0.4029 (0.3136)	-0.2552 (0.4526)
Qr	+	1.6299 (0.10503)	1.1144 (0.14494)	1.7047 * (0.1693)
Lagged Dividend	+	3.9143 *** (0.16517)	2.3457 ** (0.17059)	0.0245 (0.2256)
Dtimes	N/A	0.0859 (0.1496)	-	-
Dum2008	N/A		1.7872 * (0.1705)	0.1715 (0.1444)

Dum2009	N/A		0.7529 (0.1474)	-0.0226 (0.159)
Dum2010	N/A		0.5557 (0.2460)	-0.5589 (0.1967)
R^2		86%		
R^2 adj		85%		
N		75		
F-Sta.		69.70		

The table 5.5 shows that dynamic model parameter estimates which are much closer to reality. Considering a dynamic model, in which past experience can affect current dividend payout. The coefficient on the lagged dividend, varies from 0.64, obtain in OLS estimation, to 0.0055, when GMM (sys) is used (appendix 4). Thus, the speed of adjustment (1-α) is located within [0.995, 0.354]. Obviously, speeds of the adjustment coefficient of a magnitude of the 0.354 make less economic sense than a coefficient of 0.995. Because most of the firms in our sample have not changed their dividend payout;

The inclusion of the lagged variable could make the possible existence of the endogeneity in our model. This issue is present when the independent variables are not exogenous; they can be related to other independent variable, to account for this possible issue, we use instrumental variables technique.

We test whether the variables present endogeneity through the Hausman test, we also used the Sargan test and the Week instrumental test to check for the validity and strength of the instruments used to test the independent variables. Bear in mind that the entire chosen instruments were exogenous. The best instruments in panel data and time series analysis are lags of the tested variables.

Eventually existence of the correlation in the model, we use instrumental variables to correct problem of the endogenety. According Marques (2000) the regressor is endogenous when it is correlated with the error term. The term error is affecting the regressor of our variables and therefore indirectly affecting dividend payout.

We tested whether the variables through the Hausman and Sargan test, obtained by regression with instrumental variables, in this case (return on equity and ratio between retained earnings to total assets) by Two-stage last squares estimators. We regress

individually each independent variables suspected of being correlated with the error on all of the instruments. We found that any variables present endogeneity and finally through the Sargan test the results obtained allows us to conclude that we cannot reject the null hypothesis for a significance level of 1%, so we conclude that all the instruments are valid (Sargan test output on appendix 4).

Considering the results of the second order autocorrelation tests and given the validity of the instruments, as well as the absence of second order autocorrelation, we conclude that the results of the GMM model (1991) may be considered valid.

In this case, the variables that are the most significant to explain dividend payout were: logarithm of the firm size and Quick ratio variables. The firm size coefficient associated with the dividend payout was positively and statistically significant as it been presented in previous model. Therefore, may be at the financial crisis stage the large firms tending to have higher probability to pay dividends.
According to the lagged dividend payout, the hypothesis from Lintner (1956) and DeAngelo et al. (2006), which dividend payment in the previous years is a strong predictor of dividend payment in current year. Against our expectation the causal relationship between previous dividend and current dividend is significant at 5% of the significance when we run fixed effect in model (2). It turns insignificant on GMM estimation, contrast with Lintner (1956). It could be due to our size, or even due to the characteristic of the Portuguese market; it is seems that the actual context the dividend was no present for the majority of companies. Other fact, on Portuguese dividend is the high incidence of unchanged dividends every year. Just in 2010 we can see a little increase in dividend payout (see graphs 5.1).

Regarding the dummies of the dynamic model is positive and not statistical significant and this finding came to reinforce an idea that have not impact of the financial crisis on dividend payout. There was little increase was associated with extraordinary dividend distribution occurred specially at the end of the year 2010 in various companies on results from eventual changes to the tax regime suggested in the national budget for 2011 that would make the dividend distribution more costly for shareholders in the subsequent years.

It is also important to notice the extraordinary dividend distribution by Portugal Telecom, which remunerated its shareholder for the sale of a financial stake in the company (Vivo)[3].This allowed a substantial increase in dividend distribution. Despite this increase, we cannot prove that there was impact of financial crisis on dividend payout in Portuguese capital market.

The short-term elasticity is given by the direct coefficients of the variables, e.g. a 1% of the increase in short term in firms assets expected to induce a change of 1.03728 in the dividend payout, ceteris paribus. On the other hand the long term elasticity is given by the direct coefficients of the independent variables divided by 1 minus the lagged dependent variable coefficient.
After the previous estimations, we can conclude that both consider model (static and dynamic) the financial crisis have not affect dividend payout.

From table 5.2, we can sum up: In view of our results, we can be concluded that have not impact of the financial crisis on dividend payout. The structural levels of the dividend payout have not change. Despite the year 2010 were atypical years in the matter of distribution of dividend as we mentioned in the univariate analysis, the most of the companies increase their payout.
In 2010, the return on equity of the Portuguese companies listed on PSI20 increase in comparison with years 2009. The year 2010 also was marked by high volatility, loss in market capitalization and dropped stock prices. This may be the reason why some of the companies decided to increase dividends in order to give some guarantee to the investors and also avoid accentual fall in asset prices.

[3]is the largest telecommunications company in Brazil

6. Conclusion

This section will firstly provide a discussion of the results, comparing the similarities and differences with previous literature. In the section 5.1 conclusions will be drawn and the main research question will be answered. Subsequently, section 5.2 the limitations of this research along with suggestions for future research regarding the impact of the financial crisis on dividend payout policies will be presented.

6.1 Discussion of the results

Dividend policy is one of the most important parts of the firm's long-run financing strategies. More, still remains as one of the great puzzles in finance; refer Berk and DeMarzo (2011).

The financial crisis triggered in 2006, from the breakdown of credit institutions in United States (US), which granted mortgage loans high risk, leading several banks to insolvency and impacting heavily on the stock exchanges worldwide. The crisis was revealed to the public from February 2007, as a financial crisis. During the start of a crisis, specific market conditions affect normal relationship between dividend payout and shareholder return, financing costs increase and free cash flows dropped. These conditions let to several consequences including the lack of the liquidity. Firms can take measures to safeguard the interest of the investors. One of these measures is to pay out dividend to investors.

Our study comprehends a dataset composer of 12 PSI-20 companies. We decide to exclude financial institutions, since these corporations are governed by different regulation in regard to their dividend policies. All data used in this study are an annual frequency and ranges from 2005 to 2012, which eliminates the problem of the seasonality. So, the sample is an unbalanced panel data.

We estimate our model by using panel data regressions which combined time-series and cross-sectional observations and estimated together. The main advantage of the panel data methodology is the elimination of the heterogeneity, namely the unobservable characteristic of the contracting environment. To analyze the impact of the financial

crisis on dividend payout we use the two common techniques for estimating model with panel data, which are: Pooled ordinary least squares and the fixed effects model.

The choice of the model to the data that we intend to analyses is done based on the results of appropriate tests. We use appropriate test statistics, namely the F-statistic and the Hausman test to choose the most appropriate model for the particular sample. The F-statistic tests the null hypothesis that the efficient estimator is the pooled ordinary least squares compared to the fixed effects model. The Hausman statistic tests the null hypothesis that random effects model is appropriated for the particular sample compared to the fixed effects model.

The dependent variable used to measure the impact of the financial crisis on dividend policies is dividend payout of the each company.

The variable of greater importance it is dummy variable. The coefficient associated with the dummy variable present positive signal and insignificant in both models, proposing that have no impact of the financial crisis on dividend. In contrast with Hauser (2013); the author found a decrease of the dividend payout in 2008 and 2009. He argues that this decrease on dividend payout is because of the financial crisis effects. On the same subject while Smits (2012) found that the financial crisis did not affect the dividend payout.

Our empirically results arising from the different proposed models, univariate analysis show that there is increase on the dividend payout, as we can see in 2010, almost all companies increased their dividend payout The main reason for this increase, is due, in part, to the some of the companies wanted to let their investors comfortable and reinforce confidence, while the stock market prices were depressed. It is also important to notice the extraordinary dividend distribution by Portugal Telecom, which remunerated its shareholders for the sale of a financial stake in the company (Vivo)[4]. The payout increase was also associated with the extraordinary dividend distribution that occurred at the end of the year 2010 in various companies resulting from changes to tax regime suggested in the national budget for 2011. This would make the dividend distribution more costly for shareholders in the subsequent years.

[4]is the largest telecommunications company in Brazil

In our results the others main factors that determine the dividend payout are firm size variable, Market-to-book ratio, financial leverage variable and quick ratio.

In terms of the firm size in both of the model our find is corroborate with previous studies such as Fama and French (2001). In addition, market–to-book values have a negative and significant influence on dividend payout at 5% level of significance just in model (1). Our result is partially in agreement with the findings from preview literature, such as Smits (2012), Hoberg and Prabhala (2009).

We also found that firm leverage have a negative and significant influence on dividend payout at 5% level of significance meaning that non-financial companies in Portugal have higher debt level. To a certain extent this explains the smaller return on equity for the shareholders (see graphs 5.1). The companies with higher degree of debt in its capital structure discloser larger risk and as a result higher interest expenses with the debt service and consequently lower dividend payout.

6.2 Limitations

The principal limitation of this dissertation is the sample size and especially the number of missing values in the dataset. In the future this problem could be solved by examining the impact of the financial crisis on the dividend payment policy on a greater scale. For example, this dissertation focusses just on listed companies on PSI20 and future research could also look at other companies in Portugal even in Spain in order to get bigger time period. Additionally, in the future it could be interesting to study the impact of financial crisis on dividend payout of the industry sector. Unfortunately, that was not possible in this dissertation because of the limited sample size and amount of the missing values.

Bibliography

Al-Malkawi, H. A. N., et al. (2010). "Dividend Policy - Review of Theories and Empirical Evidence." *International Bulletin of Business Administration:* 30.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies* 58(2), 277-297.

Banerjee, S., et al. (2007). "Stock market liquidity and firm dividend policy." *Journal of Financial and Quantitative Analysis* 42(02): 369-397.

Berk, J. and P. DeMarzo (2011). *Corporate Finance* (Vol. 2), Boston: Pearson Education.

Bhattacharya, S. (1979). "Imperfect information, dividend policy and 'the bird in the hand' fallacy." *The Bell Journal of Economics* Vol. 10, No. 1.: 259-270.

Bozos, K., et al. (2011). "Dividend signaling under economic adversity: Evidence from the London Stock Exchange." *International Review of Financial Analysis 20*(5): 364-374.

Damodaran, A. (2010). *Applied corporate finance*, John Wiley & Sons.

DeAngelo, H., et al. (2006). "Dividend policy and the earned/contributed capital mix: a test of the life-cycle theory." *Journal of Financial Economics* 81(2): 227-254.

Denis, D. J. and I. Osobov (2008). "Why do firms pay dividends? International evidence on the determinants of dividend policy." J*ournal of Financial Economics* 89(1): 62-82.

Easterbrook, F. H. (1984). "*Two agency-cost explanations of dividends*." The American Economic Review: 650-659.

Fama, E. F. and K. R. French (2001). "Disappearing dividends: changing firm characteristics or lower propensity to pay?" *Journal of Financial Economics* 60(1): 3-43.

Fatemi, A. and R. Bildik (2012). "Yes, dividends are disappearing: Worldwide evidence." J*ournal of Banking & Finance* 36(3): 662-677.

Fisher, G. (1961). "Some factors influencing share prices." *The Economic Journal* 71(281): 121-141.

Gordon, M. J. (1959). "Dividends, earnings, and stock prices." *The Review of Economics and Statistics:* 99-105.

Gorton, G. (2012). Misunderstanding Financial Crises: why we don't see them coming, Oxford *University Press.*

Gorton, G. B. and A. Metrick (2012). Getting up to speed on the financial crisis: a one-weekend-reader's guide, *National Bureau of Economic Research*.

Grullon, G., et al. (2002). "Are Dividend Changes a Sign of firm maturity?" *Journal of business* vol. 75, no. 3.

Gujarati, D. (2006). *Econometria básica econometria básica,* Rio de Janeiro: Elsevier. 819 p.

Gurgul, H., et al. (2003). "Stock market reactions to dividend announcements: Empirical evidence from the Austrian stock market." F*inancial Markets and Portfolio Management* 17(3): 332-350.

Hauser, R. (2013). "Did dividend policy change during the financial crisis?" *Managerial Finance* 39(6): 584-606.

Hillier, D., et al. (2010). *Corporate finance:* 1st european edition, McGraw-Hill.

Hoberg, G. and N. R. Prabhala (2009). "Disappearing dividends, catering, and risk." *Review of Financial Studies* 22(1): 79-116.

Hull (2012). *Risk Management and Financial Institutions* , John Wiley & Sons.

Leary, M. T. (2009). "Bank loan supply, lender choice, and corporate capital structure." T*he Journal of Finance* 64(3): 1143-1185.

Lease, R. C., et al. (1999). "*Dividend Policy*:: I*ts Impact on Firm Value." OUP Catalogue.*

Lintner, J. (1956). "Distribution of incomes of corporations among dividends, retained earnings, and taxes." *The American Economic Review:* 97-113.

Marques, L. D. (2000). "Modelos dinâmicos com dados em painel: revisão de literatura." *Centro de Estudos Macroeconômicos e Previsão,* Faculdade de Economia do Porto.

Modigliani, F. and M. H. Miller (1961). "Dividend Policy, Growth, and the Valuation of Share." *Journal of business* 34(4): 411-433.

Ryan, V. (2012). *Dividend Rising.* CFO. pp. 17-18

Ross, S. A. (1977). "The determination of financial structure: the incentive-signalling approach." *The Bell Journal of Economics:* 23-40.

Salminen, J. (2008). *Abnormal Returns od Dividend Announcements* During a Boom and Recession Master -thesis

Smits, R. (2012). Effect of a Financial Crisis on the Dividend Payout Policy of a Firm, Thesis.

Wooldridge, J. (2012). *Introductory econometrics: A modern approach*, Cengage Learning.

Xu, Y. and B. G. Malkiel (2003). "Investigating the Behavior of Idiosyncratic Volatility*." *The Journal of Business* 76(4): 613-645.

Appendix – 1 – List of firms include in our study

Name	emails
Altri, SGPS, SA	www.altri.pt
Brisa - Auto Estradas de Portugal, SA	www.Brisa.pt
Cofina - SGPS, SA	www.cofina.pt
EDP - Energias de Portugal, SA	www.edp.pt
GALP Energias - SGPS, SA	www.galpenergia.com
Jerónimo Martins - SGPS, SA	www.mediacapital.pt
Mota-Engil, SGPS, SA	www.mota-engil.pt
Portucel - Empresa Produtora de Pasta e Papel, SA	www.telecom.pt
Portugal Telecom, SGPS, SA	www.ptmultimedia.pt
Semapa - Sociedade Investimento e Gestão, SGPS, SA	www.semapa.pt
Sonae - SGPS, SA	www.sonae.pt
Zon Optimus - Serviços de Telecomunicações e Multimédia - SGPS, S.A	www.nos.pt

Appendix -2- Static panel data model

Model 4: Pooled OLS, using 90 observations
Included 12 cross-sectional units
Time-series length: minimum 5, maximum 8
Dependent variable: l_Div

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-13.5162	1.78106	-7.5889	<0.00001	***
l_Assets	1.63187	0.113425	14.3872	<0.00001	***
Mtb	0.203648	0.0715983	2.8443	0.00560	***
Beta	-1.48905	0.431299	-3.4525	0.00088	***
Lev	-0.00494787	0.00542774	-0.9116	0.36462	
Qr	0.496828	0.268319	1.8516	0.06763	*
Dtime	0.285323	0.267355	1.0672	0.28897	

Mean dependent var	10.62533	S.D. dependent var	2.300523
Sum squared resid	119.5970	S.E. of regression	1.200386
R-squared	0.746092	Adjusted R-squared	0.727737
F(6, 83)	40.64827	P-value(F)	1.03e-22
Log-likelihood	-140.4988	Akaike criterion	294.9975
Schwarz criterion	312.4962	Hannan-Quinn	302.0540
rho	0.453430	Durbin-Watson	0.907129

RESET test for specification -
Null hypothesis: specification is adequate
Test statistic: F(2, 81) = 8.05676
with p-value = P(F(2, 81) > 8.05676) = 0.000643897

White's test for heteroskedasticity -
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 33.502
with p-value = P(Chi-square(26) > 33.502) = 0.148028

Chow test for structural break at observation 6:8 -
Null hypothesis: no structural break
Test statistic: F(7, 76) = 6.50187
with p-value = P(F(7, 76) > 6.50187) = 5.15791e-006

2.1 Panel data diagnostic

```
Fixed effects estimator
allows for differing intercepts by cross-sectional unit
slope standard errors in parentheses, p-values in brackets

       const:         4.1865        (4.6602)       [0.37199]
    l_Assets:          0.479       (0.31928)       [0.13792]
         Mtb:      -0.076687      (0.048846)       [0.12081]
        Beta:       -0.10653       (0.27148)       [0.69591]
         Lev:     -0.0099586     (0.0078053)       [0.20610]
          Qr:        0.04665       (0.17087)       [0.78562]
       Dtime:        0.10344       (0.14014)       [0.46284]

12 group means were subtracted from the data

Residual variance: 25.5008/(90 - 18) = 0.354178
Joint significance of differing group means:
 F(11, 72) = 24.1523 with p-value 6.47274e-020
(A low p-value counts against the null hypothesis that the pooled OLS model
is adequate, in favor of the fixed effects alternative.)


Breusch-Pagan test statistic:
 LM = 69.7423 with p-value = prob(chi-square(1) > 69.7423) = 6.75824e-017
(A low p-value counts against the null hypothesis that the pooled OLS model
is adequate, in favor of the random effects alternative.)

Variance estimators:
 between = 0.329595
 within = 0.354178
Panel is unbalanced: theta varies across units

                        Random effects estimator
           allows for a unit-specific component to the error term
           (standard errors in parentheses, p-values in brackets)

         const:        -9.6986        (2.4696)       [0.00018]
      l_Assets:         1.4099       (0.16013)       [0.00000]
           Mtb:      -0.010078      (0.057931)       [0.86232]
          Beta:       -0.56597       (0.31986)       [0.08049]
           Lev:      -0.011358     (0.0066609)       [0.09189]
            Qr:         0.1069       (0.20177)       [0.59767]
         Dtime:       0.098869       (0.17235)       [0.56774]

Hausman test statistic:
 H = 63.9602 with p-value = prob(chi-square(6) > 63.9602) = 7.03237e-012
(A low p-value counts against the null hypothesis that the random effects
model is consistent, in favor of the fixed effects model.)
```

2.2 – fixed effects Model

Model 6: Fixed-effects, using 90 observations
Included 12 cross-sectional units

Time-series length: minimum 5, maximum 8
Dependent variable: l_Div
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	4.18651	2.06846	2.0240	0.04668	**
l_Assets	0.478996	0.147785	3.2412	0.00180	***
Mtb	-0.0766867	0.0300951	-2.5481	0.01296	**
Beta	-0.106533	0.298239	-0.3572	0.72198	
Lev	-0.00995863	0.00439176	-2.2676	0.02636	**
Qr	0.0466499	0.105614	0.4417	0.66003	
Dtime	0.103442	0.098886	1.0461	0.29903	

Mean dependent var	10.62533	S.D. dependent var	2.300523
Sum squared resid	25.50078	S.E. of regression	0.595128
LSDV R-squared	0.945861	Within R-squared	0.090470
LSDV F(17, 72)	73.99470	P-value(F)	1.30e-38
Log-likelihood	-70.95494	Akaike criterion	177.9099
Schwarz criterion	222.9065	Hannan-Quinn	196.0551
rho	-0.432738	Durbin-Watson	2.577412

Joint test on named regressors -
Test statistic: F(6, 72) = 1.19363
with p-value = P(F(6, 72) > 1.19363) = 0.319552

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(11, 72) = 24.1523
with p-value = P(F(11, 72) > 24.1523) = 6.47274e-020

2.2.1 – fixed effects Model with annual effects

Model 7: Fixed-effects, using 90 observations
Included 12 cross-sectional units
Time-series length: minimum 5, maximum 8
Dependent variable: l_Div
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	3.6501	1.88131	1.9402	0.05639	*
l_Assets	0.519956	0.136345	3.8135	0.00029	***
Mtb	-0.0788586	0.0272897	-2.8897	0.00513	***
Beta	-0.124099	0.294339	-0.4216	0.67459	
Lev	-0.0112304	0.00457747	-2.4534	0.01664	**
Qr	0.0603937	0.118399	0.5101	0.61160	
Dum2008	0.229884	0.160504	1.4323	0.15652	
Dum2009	0.0495306	0.0776553	0.6378	0.52567	
Dum2010	0.0280065	0.176954	0.1583	0.87470	

Mean dependent var	10.62533	S.D. dependent var	2.300523
Sum squared resid	25.24186	S.E. of regression	0.600498

LSDV R-squared	0.946411	Within R-squared	0.099705
LSDV F(19, 70)	65.06476	P-value(F)	6.78e-37
Log-likelihood	-70.49571	Akaike criterion	180.9914
Schwarz criterion	230.9876	Hannan-Quinn	201.1528
rho	-0.468070	Durbin-Watson	2.651725

Joint test on named regressors -
Test statistic: F(8, 70) = 0.969034
with p-value = P(F(8, 70) > 0.969034) = 0.467263

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(11, 70) = 23.4594
with p-value = P(F(11, 70) > 23.4594) = 2.76902e-019

Appendix 3 - model (II) – dynamic panel data model

3.1 pooled OLS

Model 8: Pooled OLS, using 75 observations
Included 12 cross-sectional units
Time-series length: minimum 3, maximum 7
Dependent variable: l_Div
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-4.59072	2.41919	-1.8976	0.06199	*
l_Assets	0.581846	0.284854	2.0426	0.04497	**
Mtb	0.069025	0.0377281	1.8295	0.07170	*
Beta	-0.797798	0.53593	-1.4886	0.14121	
Qr	0.171208	0.105039	1.6299	0.10774	
Dtime	0.0128548	0.149672	0.0859	0.93181	
l_Div_1	0.646533	0.165174	3.9143	0.00021	***

Mean dependent var	10.81018	S.D. dependent var	2.159520
Sum squared resid	48.43984	S.E. of regression	0.844009
R-squared	0.859636	Adjusted R-squared	0.847251
F(6, 68)	69.40898	P-value(F)	4.77e-27
Log-likelihood	-90.02668	Akaike criterion	194.0534
Schwarz criterion	210.2758	Hannan-Quinn	200.5308
rho	-0.595451	Durbin-Watson	2.546665

RESET test for specification -
Null hypothesis: specification is adequate
Test statistic: F(2, 66) = 3.592
with p-value = P(F(2, 66) > 3.592) = 0.1330535

3.2 FIXED –EFFECT BASIC

Model 11: Fixed-effects, using 75 observations
Included 12 cross-sectional units
Time-series length: minimum 3, maximum 7
Dependent variable: l_Div
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	13.9381	6.0331	2.3103	0.02452	**
l_Assets	0.126801	0.330436	0.3837	0.70260	
Mtb	-0.114865	0.0471281	-2.4373	0.01794	**
Beta	-0.100864	0.299807	-0.3364	0.73778	
Qr	0.152835	0.127187	1.2017	0.23446	
Dtime	0.192018	0.159554	1.2035	0.23377	
l_Div_1	0.452386	0.203752	2.2203	0.03039	**

Mean dependent var	10.81018	S.D. dependent var	2.159520
Sum squared resid	19.48622	S.E. of regression	0.584691
LSDV R-squared	0.943535	Within R-squared	0.219740
LSDV F(17, 57)	56.02766	P-value(F)	2.84e-29
Log-likelihood	-55.87862	Akaike criterion	147.7572
Schwarz criterion	189.4720	Hannan-Quinn	164.4135
rho	-0.119830	Durbin-Watson	2.073567

Joint test on named regressors -
Test statistic: F(6, 57) = 2.67543
with p-value = P(F(6, 57) > 2.67543) = 0.0233943

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(11, 57) = 7.69941
with p-value = P(F(11, 57) > 7.69941) = 5.9607e-008

3.3 FIXED EFFECT WITH ANNUAL EFFECTS

Model 12: Fixed-effects, using 75 observations
Included 12 cross-sectional units
Time-series length: minimum 3, maximum 7
Dependent variable: l_Div
Robust (HAC) standard errors

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	13.674	6.01132	2.2747	0.02684	**
l_Assets	0.154735	0.329532	0.4696	0.64053	
Mtb	-0.120348	0.0486718	-2.4726	0.01653	**
Beta	-0.126355	0.313648	-0.4029	0.68861	
Qr	0.161522	0.144943	1.1144	0.26996	
Dum2008	0.304878	0.170593	1.7872	0.07942	*
Dum2009	0.110955	0.147376	0.7529	0.45474	
Dum2010	0.136707	0.246003	0.5557	0.58066	
l_Div_1	0.464497	0.198021	2.3457	0.02263	**

Mean dependent var	10.81018	S.D. dependent var	2.159520
Sum squared resid	19.25692	S.E. of regression	0.591714
LSDV R-squared	0.944199	Within R-squared	0.228922
LSDV F(19, 55)	48.98151	P-value(F)	1.16e-27
Log-likelihood	-55.43472	Akaike criterion	150.8694
Schwarz criterion	197.2192	Hannan-Quinn	169.3764
rho	-0.143981	Durbin-Watson	2.115056

Joint test on named regressors -
Test statistic: F(8, 55) = 2.04109
with p-value = P(F(8, 55) > 2.04109) = 0.0581823

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(11, 55) = 7.55118
with p-value = P(F(11, 55) > 7.55118) = 1.00951e-007

APPENDIX 4- DYNAMIC ESTIMATION

]

Model 18: 2-step dynamic panel, using 75 observations
Included 12 cross-sectional units
Time-series length: minimum 2, maximum 6
Including equations in levels
H-matrix as per Ox/DPD
Dependent variable: l_Div
Asymptotic standard errors

	Coefficient	*Std. Error*	*z*	*p-value*	
l_Div(-1)	0.00553679	0.225619	0.0245	0.98042	
const	-5.16396	6.50391	-0.7940	0.42721	
l_Assets	1.03728	0.411769	2.5191	0.01177	**
Mtb	0.0483566	0.0781829	0.6185	0.53624	
Beta	-0.115525	0.452696	-0.2552	0.79857	
Qr	0.288549	0.169267	1.7047	0.08825	*
Dum2008	0.024769	0.144431	0.1715	0.86384	
Dum2009	-0.00360367	0.159124	-0.0226	0.98193	
Dum2010	-0.109917	0.196666	-0.5589	0.57623	

Sum squared resid	125.6968	S.E. of regression	1.380035

Number of instruments = 35
Test for AR(1) errors: z = -2.2128 [0.0269]
Test for AR(2) errors: z = 0.687053 [0.4920]
Sargan over-identification test: Chi-square(26) = 4.76061 [1.0000]
Wald (joint) test: Chi-square(8) = 36.0254 [0.0000]