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The Effect of Dividend Policy on Share Price Volatility: An Analysis of Mediterranean Banks' Stocks

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Abstract

This empirical study investigates the relationship between share price volatility and dividend payments in the case of Mediterranean Banks. We use the dividend yield and the dividend payout as proxies of dividend policy, and regress these ratios together with other control variables to model share price volatility. The robustness of the results is assessed by re-using a data set which omits the outliers relating to the 2007 financial crisis and by forming sub-samples using a clustering procedure. Our results show that inferences may differ across samples and depending on the treatment of outlier observations. Besides adding new empirical evidence, our results offer insights to academics, stock traders and corporate managers in terms of better understanding the effect of dividend policies on share price volatility and its related risks and opportunities.

Keywords: Banks, Corporate Finance, Dividends, Share Price Volatility, Stock Markets.

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1. Introduction

Corporate financial managers and researchers lay paramount importance on determining the optimal dividend policy of a firm, firstly in view of the ongoing emphasis on maximising shareholder value and secondly because market participants may have heterogeneous preferences regarding the optimal dividend payout. Academic literature in this field has flourished through a comprehensive body of theories and empirical studies, yet the effect of dividend payments on share prices is still considered as a puzzle in view of the mixed overall evidence.

In this paper, we model the relationship between share price volatility and corporate dividend payments for a sample of banks which are active in the Mediterranean region. The data set thus captures tendencies across various countries which stand at different stages in terms of their economic evolution and financial system progress. This offers the advantage of higher robustness of empirical results on the grounds that they emanate from a more representative sample owing to its inherent diversity. A range of small and medium sized banks operate across the Mediterranean, together with larger and more prominent players that are active in countries such as France. The heterogeneity across the sampled countries is enhanced by divergences in their respective economic philosophies which range from market-oriented to more centralised ones, and subsidiary differences in regulations, currency management, financial practices, and cultures. (Bezzina *et al*., 2014; Consiglio *et al.*, 2012; Frewer *et al.*, 2013). Such diversity within the region minimises the likelihood that the empirical results prove sample-specific, whilst still taking advantage of the fact that the respective countries share commonalities due to their relative proximity.

Our focus on banking entities goes beyond the potential of tackling a specific sector which may then permit the future comparison with other sectors. Indeed one may expect bank dividend policies to differ from those of other entities due to the signals which they convey to the markets (Bessler and Nohel, 2000), their respective institutional frameworks and country cultures (Ashraf and Zheng, 2015; Esteban and Pérez, 2001; Lepetit *et al.*, 2017; Zheng and Ashraf, 2014) and due to the more onerous capital adequacy requirements which were implemented by banks in the aftermath of the 2007 credit-crunch (Ashraf *et al.*, 2016). Given that the selected data period includes latter financial crisis which proved particularly intense in case of financial institutions, focusing on banks is likely to yield stronger insights as to whether the nature of the dividend-volatility relationship can change in times of instability.

We model share price volatility as a function of dividend policy which is proxied through dividend yield and dividend payout ratios using data for the period 2001-2016. In compiling the annual observations for our model, we compute averages across all publicly-traded banks which at different points during the period ranged from 95 to 139.

In order to investigate the robustness of the results, we re-estimate the models after omitting the data outliers coinciding with the aftermath of the 2007 financial crisis. We also form sub-groups using a two-step clustering procedure to check whether inferences vary across sub-samples.

The paper is structured as follows: we offer a review of related literature in section 2, discuss the methodology in section 3 and describe the data set in section 4. We present the empirical results obtained when considering the entire sample in section 5, and in section 6 we re-estimate models after forming sub-samples using cluster analysis. We discuss the results in section 7 and section 8 concludes.

2. Literature Review

The relationship between dividend policy and stock price behaviour has attracted the interest of both academics and stock market traders, but despite of numerous academic papers the area is still an unresolved issue (Frankfurter and Wood, 2002). Black (1976) described the firm's decision on the proportion of profits to distribute to shareholders or to retain in the business as the "dividend puzzle". The evolution of corporate dividend policy throughout the last four centuries was examined by Frankfurter and Wood (1997). They observed that the earliest form of corporate dividends dates back to the beginning of the sixteenth century, and over the years, companies adopted a tendency to offer consistent dividend payments, on the grounds that such policies convey favourable signals to market participants. Fama and French (2001) noted a general tendency for US-listed firms to become less likely to pay dividends; partly due to the listing of newer entities pursuing growth-oriented strategies which require extensive cash resources. Ashraf and Zheng (2015) analysed a panel-data set which incorporated banks from 52 different countries and found that banks are likely to pay higher dividends in countries with an effective minority shareholder protection framework. In addition they presented evidence which suggests that the relationship between bank dividend policies and creditor rights tend to be the opposite of that of non-financial firms. Similar evidence that the cultural framework of a country (such as the risk avoidance) may effect bank dividend policies was presented by Zheng and Ashraf (2014) in a study that spanned 51 countries.

Kanas (2013) found evidence of the relationship between dividend policies and risk-tolerance in financial institutions in the sense that banks may reduce dividend payments to strengthen their capital resources which would then enable higher risk-taking. Given that dividends impact on the deposit insurance premiums paid by banks, they may also be used to shift risk from the entity to the deposit insurer (Duan et al., 1992). Different retulatory regimes may effect the likelihood of such behaviour on part of banks (Kanas, 2013) as well as their propensity to pay dividends (Ashraf et al., 2016).

Modigliani and Miller (1961) investigated the effects of dividend policy on share prices, arguing that the latter move independently of dividend policy, on the premise that shareholders may sell shares if they would like to extract higher cash payments, and they can re-invest dividends if they prefer lower cash positions. While one may cite empirical evidence that the impact of dividend announcements on share prices may be of a modest nature (e.g. Gunasekarage and Power, 2006), the assumptions inherent in the Modigliani-Miller framework were criticised on various grounds. For instance, the theory abstracts from management conflicts of interest which may imply that shareholders would prefer higher dividend payments to reduce the amount of funds controlled by management (Easterbrook, 1984; Dempsey and Laber, 1992; Jensen *et al.*, 1992). The Modigliani-Miller framework also abstracts from tax effects - if different stockholders face different taxation rates on dividends, their preferences would vary accordingly (Allen *et al.*, 2000; Coates *et al.*, 1998). Similarly, the Modigliani-Miller framework does not consider the transaction costs involved when shareholders trade shares to re-invest dividends or to extract more cash. For instance, retail investors may prefer higher dividends if they want to minimise the transaction costs incurred when selling stocks to liquidate capital gains (Bishop *et al.*, 2000). In addition, market participants may prefer higher dividend payments as opposed to expected future capital gains, given that the latter are always prone to uncertainty whereas a cash payment is a "bird in hand" (Fisher, 1961; Lintner,1962).

Bhattacharya (1979) proposed a model where cash dividends represent a signal sent by firms regarding future cash flows. Arnott and Asness (2003) presented evidence which suggests that managers signal their earnings expectations through dividends. Lintner (1956) and Lipson *et al.* (1998) argued that only when managers believe that earnings have increased permanently do they increase dividends, and in this sense a dividend increment conveys a signal about the future. McManus *et al.* (2004) focused on the UK stock market and found that the dividend payout ratio significantly influences stock returns while the dividend yield conveys additional signalling information. The information content may vary in between cash dividends and stock dividends, and in addition it may partly depend on subsidiary factors such as reporting standards, as found by Dedman *et al.* (2015) in the context of the Chinese markets. Despite the conclusions of the former studies, Basse et al. (2014) did not find any empirical evidence of signalling in the context of the dividend policies of European banks.

Jiraporn *et al.* (2016) investigated dividend payment data for the period 1989-2011, and based on extensive observations of dividend payouts they concluded that more talented executives have a higher tendency to pay dividends, possibly because they are more confident in their ongoing abilities to generate profits.

Other authors investigated more specifically the connections between dividend policies and securities volatility. Gordon (1963) noted that if a firm paid higher dividends it could reduce volatility, effecting the cost of capital and the stock price. Baskin (1989) contended that managers may reduce stock volatility if they could control security prices through the information content built in the dividend payments. Baskin (1989), Hussainey *et al.* (2011), Profilet and Bacon (2013), and Shah and Noreen (2016) suggested that share price volatility is inversely related to both dividend yields and the dividend payout ratios. The significance of the relationship varied between studies, however this may be due to different samples and time periods.

Different results were presented by Hussainey *et al.* (2011) who found that the dividend yield of the firms listed on the London Stock Exchange were positively related to share price volatility while the payout ratio was negatively related to stock price changes. Similarly, Allen and Rachim (1996), reported significant negative correlation between stock price volatility and the payout ratio when analysing Australian listed companies. Despite this, they found no evidence that dividend yield is correlated with stock price volatility.

Nazir *et al.* (2010), and Suleman *et al.* (2011) studied the association of dividend policy with share price volatility, using data extracted from the Karachi Stock Exchange over the periods 2003-2008 and 2005-2009 respectively. While the former found evidence supporting Baskin (1989), Suleman *et al.* (2011) showed a significant positive relationship between share price volatility and dividend yield. In the context of the Tehran Stock Exchange, Lashgari and Ahmadi (2014) reported a negative relationship between the dividend payout ratio and stock price volatility, whereas Gunarathne *et al.* (2016) reported a positive relationship in case of the Sri Lankan stock market. In case of the latter market, Jahfer and Mulafara (2016) found a positive relationship between dividend yield and share price volatility.

In an empirical study on Nigerian Stock Exchange data, Ilaboya and Omoye (2012) did not find any significant relationships between dividend policies and share price volatility. Hashemijoo *et al.* (2012) used a sample of the highest dividend paying companies listed on the Bursa Malaysia over a six year period. They reported a significant negative relationship between the share price volatility and the two proxies of dividend policy: the dividend yield and the payout ratio.

Bong-Soo (1996) and Kanas (2003) reported that dividends and stock prices are co-integrated. Using Monte Carlo simulation, Hodrick (1992) found that changes in dividend yields can be used to forecast changes in expected stock returns. Acker (1999) reported that volatility may be expected to peak on those days when a dividend reduction is announced.

Robertson and Wright (2006) showed that in case of U.S. stock markets, dividend yields offer a robust predictive power which may be used when forecasting returns. Ap Gwilym *et al.* (2000) concluded that dividend yield and the stability of a firm's dividend policy, explain the distribution of returns for yield-ranked portfolios of UK stocks. Ap Gwilym *et al.* (2005), examined the relationship between dividends and subsequent real earnings growth by looking at eleven international markets. The authors found that higher payout ratios lead to higher real earnings growth, and not to higher real dividend growth. Conroy *et al.* (2000) studied the pricing effects of dividend and earnings announcements in Japan and found that share price reactions are strongly effected by earnings surprises and by earnings forecasts communicated by management.

Bessler and Nohel (1996) reported that an announcement of dividend cuts can be more severe for banks than for non-financial firms. In a subsequent study they found that dividend reduction announcements by money-centre banks result in stock price reductions for non-announcing banks as well, since markets may associate dividend reductions with an overall lower quality of loan portfolios across all banks (Bessler and Nohel, 2000).

Finally, one should note that the market reaction to dividend policies is not independent of subsidiary factors; for instance Scott Docking and Koch (2005) reported higher volatility in response to changes in dividend payment patterns, when the changes were not in line with recent market trends and/or when they took place in volatile times. Similarly the relationship between dividend policies and volatility may depend on the ownership structure of the firm; for instance particular owners may be more prone to herding behaviour than others (Azzam, 2010). Lepetit et al. (2017) reported that when ownership strucutre is more concentrated banks tend to pay lower dividends, especially when opportunistic behaviour may be concealed through higher levels of opacity. In addition, the market's reaction to dividend-related announcements may differ across institutional and private investors, as found by Muradoğlu and Aydoğan (2003) in the context of the Istanbul Stock Exchange. The market reaction to dividends may also depend on whether the firm has already paid dividends in the past as opposed to whether it is the first dividend distribution declared by the firm (Dasilas *et al.*, 2009; Desai and Nguyen, 2015; Yu and Webb, 2017). Viera (2011) reported that the markets' reaction to dividend announcements partly depends on investor sentiment, although such influence may vary across countries.

The literature concerning dividend policies and their impacts is extensive, and readers are referred to Ang (1987) and Tanushev (2016) for more detailed reviews.

3. Methodology

In order to model the dividend policy of the sampled banks we used the dividend yield (DY) and dividend payout ratio (DP) in line with prior literature such as Baskin (1989). The dividend yield for each year was taken as the average gross dividend yield across all banks without adjusting for any tax effects. Similarly, we computed a dividend payout ratio for each year by taking an average of the payouts of all sampled institutions for that year.

We modelled share price volatility as per Baskin (1989), shown in Equation 1 below:

$$\sigma_{i,t} = \sqrt{\frac{h_{i,t} - l_{i,t}}{\left(\frac{h_{i,t} + l_{i,t}}{2}\right)^2}} \qquad \textit{[Equation 1]}$$

where $\sigma_{i,t}$ is the share price volatility for stock *i* during year *t*, while $h_{i,t}$ and $l_{i,t}$ are the highest and lowest prices for stock *i* during year *t* respectively. We used stock prices which were adjusted for stock splits, and computed the volatility yardstick for the entire market by taking an average across stocks for the respective period. We used this ratio since it is less sensitive to extreme observations as compared to other yardsticks such as standard deviation. This is particularly important in the case of our sample since the latter includes a considerable number of smaller capitalisation stocks, where the presence of outlier observations may be more common due to lower liquidity levels.

We analysed the relationship between share price volatility and dividend policy by estimating various OLS regressions. We started with a basic model as follows:

$$\sigma_t = \alpha + \beta_1 DY_t + \beta_2 DP_t + \varepsilon_t \qquad \textit{[Equation 2]}$$

where DY_t denotes the average dividend yield across all stocks in the sample during year *t*, *DP* refers to the average dividend payout ratio and ε is a residual term.

Following Hussainey *et al.* (2011), we also used four control variables in subsequent models: bank size (S), earnings volatility (EV), asset growth (G), and bank leverage (LEV). These variables are likely to impinge on dividend policy and/or price volatility and their inclusion is intended to facilitate the distinction of such effects from the underlying dividend-volatility relationship which we seek to investigate.

The control variables were set up as follows:

- *S* was taken as the market capitalisation for any institution during the particular year expressed as a transformation using the base ten logarithm of the share price as at the beginning of the year, multiplied by the total number of ordinary shares in issue.
- *EV* for any particular year was expressed as the standard deviation of the total earnings before interest and taxes (EBIT) over the previous five years. [1]
- *G* was expressed as the percentage change in total assets at the end of the year, to the level of total assets at the beginning of the year.
- *LEV* was expressed as the ratio of the long-term liabilities and total assets for the firm at the beginning of each year.

For each control variable, we computed the average yardstick across all stocks included in the sample for the particular year.

Following this, we estimated Model 2 which included control variables as follows:

$$\sigma_t = \alpha + \beta_1 DY_t + \beta_2 DP_t + \beta_3 S_t + \beta_4 EV_t + \beta_5 G_t + \beta_6 LEV_t + \varepsilon_t \qquad [Equation\ 3]$$

Subsequently, we estimated different versions of the above model in order to test whether the removal of any of the explanatory variables would change the statistical significance of the coefficients.

In order to check the robustness of the inferences from these initial models, we then included a dummy variable denoting the peak of the credit crunch (2008 and 2009) since volatility was considerably higher during these years. Given that the high significance of the dummy rendered the variables of interest insignificant, we estimated further models where we omitted the financial crisis observations entirely. Following this, we split the sample into two groups using a two-step cluster analysis procedure and re-estimated various regressions to check whether we obtain the same inferences for the sub-groups.

4. Data

Our data set was compiled through screening the stocks of banks licensed in the Mediterranean region and traded on an exchange during the period 2001-2016. Our sample includes banks from sixteen countries and states: Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Malta, Monaco, Morocco, Palestine, Republic of Serbia, Spain, Tunisia, and Turkey. [2]

As outlined above, our sample is characterised by considerable heterogeneity across countries. For instance, according to the World Economic Forum (2016) the highest competitiveness ranking across the sampled countries was registered by France and the lowest one was for Egypt (ranking in the 21st place and 115th place respectively out of 139 countries). Similarly, as per the World Economic Forum (2016) four of the sampled countries classify as efficiency-driven economies (Stage 2), seven countries classify as innovation-driven economies (Stage 3), three countries are considered as in transition in between Stage 2 and Stage 3, and another two countries were unclassified. In terms of financial market development, the highest ranking countries in our sample as per the World Economic Forum (2016) were Israel, France and Malta (ranking at the 19th, 31st, 41st, out of 139 countries respectively) whereas the lowest ranking ones were Cyprus, Italy and Greece (ranking at the 120th, 122nd, and 136th place out of 139 countries respectively). Such diversity increases the likelihood of more representative and generalisable empirical results.

As one would expect, the number of banks in the sample varied from year to year - as additional banks get listed on exchanges and as others are occasionally delisted for instance due to merger activity. The minimum number of banks in the sample was 95 (for the year 2001) and the maximum banks in the sample was 139 (for the year 2016). Our annual observations were compiled by taking averages across all banks for the particular year. All data were downloaded via DataStream through Thomson Reuters Eikon.

The statistical characteristics of the variables are shown in Table 1 while their correlation matrix is shown in Table 2.

Table 1: Statistical Description of the Variables

Variable	σ	DY	DP	S	EV	LEV	G
Mean	0.3214	3.2044	0.2930	3.5839	477.0741	0.1121	0.1377
Median	0.3109	2.9503	0.2749	3.5838	439.7776	0.1171	0.1066
Std. Dev.	0.0554	0.9511	0.0460	0.1166	143.0366	0.0201	0.0738
Range	0.2047	3.6756	0.1356	0.3934	446.5818	0.0625	0.2542

The table shows the main statistical properties of the variables.

Table 2: Variable Correlation Matrix

Correlation	σ	DY	DP	G	S	EV	LEV
σ	1						
DY	0.3626***	1					
DP	-0.2472**	0.3312***	1				
G	-0.0781**	0.1975	0.6668**	1			
S	-0.1042	-0.7308*	-0.1482*	-0.0042	1		
EV	0.0464*	-0.3431**	-0.6216**	-0.5249*	-0.005	1	
LEV	0.2455*	0.3849	0.2331*	0.3996	-0.1238	-0.4903	1

Statistical significance at the 99%, 95%, and 90% level of confidence is denoted by ***, ** and * respectively.

As shown in Table 2, the regressor DY is positively correlated with σ and this is significant at the 1% level. In terms of the correlation direction, this is in line with the findings of Hussainey *et al.* (2011), however contradicting the findings of authors such as Baskin (1989), and Noreen (2016) who reported significant negative relationships. The second proxy of dividend policy DP is significantly negatively correlated with σ at the 5% level. This is in line with prior research such as Baskin (1989), Allen and Rachim (1996), Hussainey *et al.* (2011) and Shah and Noreen (2016).

5. Empirical Results (Entire Sample Data)

We first regressed the volatility yardstick (σ) on DY and DP as denoted in Equation 2 above. This yielded a positive relationship between σ and DY (significant at the 10% level) and an insignificant negative relationship between σ and DP (Table 3; Model 1). In the second model, we added the control variables LEV, EV, S and G (as shown in Equation 3) to check whether these result in material changes to the coefficients of DY and DP (Table 3; Model 2). None of the coefficients proved significant, however the positive relationship between DY and σ and the negative relationship between DP and σ remained unchanged. Although the R^2 of Model 2 is higher than that of Model 1, there is a reduction in Adjusted- R^2 and the F-statistic.

Various regressions were then estimated, omitting different variables in order to reduce the possibility of multicollinearity. We specified a series of models where DY was used on its own without DP as explanatory variable. The estimation which proved best in terms of explanatory power is reported as Model 3, where we note a drop in explanatory power as compared to Model 1 (Table 3). Similarly, we estimated different models where DP was used on its own without DY as explanatory variable. The specification with highest explanatory power is reported as Model 4, and this still did not prove better than Model 1 in terms of R^2 (Table 3). This suggests that the dividend-related variables have more explanatory power when used jointly, rather than on their own. We thus estimated further models, where we included both DY and DP but omitted different control variables. The best specification is reported as Model 5, where we note an improvement in R^2 as compared to Model 1, despite a reduction in the Adjusted-R^2 and the F-statistic. Across all the former models, the relationship between σ and DY is positive, whilst the relationship between σ and DP is negative.

Table 3: Regression Estimates (Entire Time Series)

CONST	DY	DP	LEV	EV	S	G
Model 1						
0.3739 ***	0.0291 *	-0.4971	-	-	-	-
(4.367)	(2.006)	(-1.658)				
R^2 : 0.283 ;	*Adjusted-R^2 : 0.173 ;*	*F-Statistic - F(2,13) : 2.566*				
Model 2						
-0.5410	0.0485	-0.5265	0.3678	0.0001	0.2172	0.0670
(-0.645)	(1.826)	(-1.060)	(0.405)	(0.446)	(1.092)	(0.238)
R^2 : 0.396 ;	*Adjusted-R^2 : -0.006 ;*	*F-Statistic - F(6,9) : 0.985*				
Model 3						
-0.3810	0.0358	-	-	-	0.1640	-
(-0.564)	(1.678)				(0.942)	
R^2 : 0.187 ;	*Adjusted-R^2 : 0.062 ;*	*F-Statistic - F(2,13) : 1.495*				
Model 4						
0.3363 ***	-	-0.3879	0.8814	-	-	-
(3.103)		(-1.231)	(1.225)			

R^2 : 0.158 ; Adjusted-R^2 : 0.029 ; F-Statistic - F(2,13) : 1.223

Model 5

-0.3764	0.0449 *	-0.5637 *	0.2967	-	0.1914	-
(-0.579)	(1.927)	(-1.832)	(0.404)		(1.113)	

R^2 : 0.380 ; Adjusted-R^2 : 0.154 ; F-Statistic - F(4,11) : 1.682

Dependant variable is σ. Regressions were estimated using the data period 2001-2016 (sixteen annual observations). Statistical significance at the 99% and 90% level of confidence is denoted by *** and * respectively.

We then estimated a series of models where we included a dummy variable which took the value of 1 during the years 2008 and 2009 and zero otherwise, since volatility was considerably higher during this period due to the credit crunch. These estimations featured a noteworthy improvement in explanatory power and a high significance in the dummy variable, yet all other explanatory variables were insignificant. Despite their higher explanatory power, we do not deem that these models are central to this paper since they focus on crisis-period volatility, rather than dividend-related volatility. One of these estimations is reported in Table 4.

Table 4: Regression Estimates (Dummy Variable Specification)

Model 6

CONST	DY	DP	DUMMY
0.3410 ***	0.0107	-0.2281	0.1033 **
(4.972)	(0.823)	(-0.899)	(2.968)

R^2 : 0.587 ; Adjusted-R^2 : 0.483 ; F-Statistic - F(3,12) : 5.674

Dependant variable is σ. The regression was estimated using the data period 2001-2016 (sixteen annual observations). The dummy variable took a value of one during the financial crisis period (2008 and 2009) and zero otherwise. Statistical significance at the 99% and 95% level of confidence is denoted by *** and ** respectively.

In the subsequent set of regressions we tackled the financial-crisis issue by omitting the observations for the years 2008 and 2009. When excluding these outliers we obtained higher explanatory power as compared to that of Models 1-5. We report three of these models in Table 5 (Models 7-9). Comparing the "full models" (i.e. Model 2 with Model 7), we note that the dividend-related variables have reversed their direction. This was also evident when DY was used as an explanatory variable of σ without DP (Models 3 and 8). When DP was used without DY (Models 4 and 9), it retained its negative sign, despite a reduction in significance.

Table 5: Regression Estimates (Omitting Market Crisis Observations)

Model 7						
CONST	DY	DP	LEV	EV	S	G
1.7225 *	-0.0614	0.1913	0.3495	0.0002	-0.4093 *	0.3950 *
(2.151)	(-1.787)	(0.488)	(0.562)	(1.631)	(-1.983)	(1.984)
R^2 : 0.554 ; Adjusted-R^2 : 0.172 ; F-Statistic - F(6,7) : 1.452						
Model 8						
2.0620 **	-0.0610 *	-	-	-	-0.4508 **	0.3117
(2.743)	(-2.115)				(-2.344)	(1.795)
R^2 : 0.366 ; Adjusted-R^2 : 0.176 ; F-Statistic - F(3,10) : 1.922						
Model 9						
0.2197	-	-0.0964	-	0.0002	-	0.2822
(1.733)		(-0.294)		(1.515)		(1.521)
R^2 : 0.284 ; Adjusted-R^2 : 0.070 ; F-Statistic - F(3,10) : 1.325						

Dependant variable is σ. Regressions were estimated using the data period 2001-2016, omitting the financial crisis years 2008 and 2009 (fourteen annual observations). Statistical significance at the 95% and 90% level of confidence is denoted by ** and * respectively.

It seems that in our sample, the relationship between σ and dividend-related variables can change its direction and / or significance when outliers relating to financial crisis are omitted. In addition DY tends to be a superior explanatory variable of σ in terms of statistical significance - although the sign reversals reported above caution us not to over-rely on these inferences.

6. Re-estimating the Models for the Bank Sub-Samples

In order to inquire whether the above findings are applicable to the sample in general or whether they may differ across categories, we classified the 139 banks into two groups, using a two-step cluster analysis procedure. When forming these clusters, only the dividend-related variables of the banks were taken into account i.e. DY and DP. Table 6 shows the main characteristics of each cluster, and it is evident that the banks comprising the first cluster tend to pay higher dividends than those in the second cluster. In most cases, banks originating from a particular country were grouped in more than one cluster, although in case of Cyprus, Greece, Serbia, Turkey, and Morocco the banks were grouped in a single cluster.

Table 6: Cluster Characteristics

	Cluster 1 (High dividend banks)	Cluster 2 (Low dividend banks)
Minimum Dividend Yield	1.31	0.00
Average Dividend Yield	4.71	1.43
Maximum Dividend Yield	14.01	4.14
Minimum Payout Ratio	6.60	0.00
Average Payout Ratio	43.01	14.39
Maximum Payout Ratio	80.61	44.99
Country of Origin:		
Croatia	1	9
Cyprus	0	2
Egypt	8	5
France	18	2
Greece	0	7
Israel	2	8
Italy	10	7
Lebanon	4	2
Malta	3	1
Monaco	1	0
Morocco	6	0
Palestinian Territories	1	4
Serbia	0	5
Spain	6	3
Tunisia	6	5
Turkey	0	13
Total	66	73

The table shows the main characteristics of the clusters which were formed after classifying the 139 sampled banks using a two-step cluster analysis procedure.

NB. Dividend yield and dividend payout figures in this table do not tally with those shown in Table 1. The reason is that the DY and DP figures in Table 1 were averaged across banks to compute an annual DY and DP to be used when estimating time-series regressions. In this table DY and DP were respectively averaged across years to compute an average DY and DP for each institution to classify the institutions into clusters.

We then re-estimated Models 1-9 specified in Section 5, for both clusters. Despite that the results were somewhat similar to the former estimations, there were noteworthy changes as summarised in Table 7. In most cases, the explanatory power of the models for the clusters was higher as compared to that where the data were based on the whole sample. In case of Model 7, there was a tendency for DY and DP to reverse their sign when re-estimating the model for the separate clusters. As shown in Table 7, there was also a tendency for the relationship between σ and DP to emerge as a more significant relationship as compared to the relationship between σ and DY. This is the opposite of what was noted in the first series of estimations.

Table 7: Re-Estimations following the Classification of Banks in Two Clusters

	DY		**DP**		**Explanatory:**
	Sign	Significance	Sign	Significance	R^2, Adj R^2, F
Model 1:					
Cluster 1	unchanged	no longer significant	unchanged	became significant	higher
Cluster 2	unchanged	still significant	unchanged	became significant	higher
Model 2:					
Cluster 1	unchanged	still insignificant	unchanged	still insignificant	higher
Cluster 2	unchanged	became significant	unchanged	became significant	higher
Model 3:					
Cluster 1	unchanged	still insignificant	-	-	higher
Cluster 2	unchanged	still insignificant	-	-	lower
Model 4:					
Cluster 1	-	-	unchanged	became significant	higher
Cluster 2	-	-	unchanged	became significant	higher
Model 5:					
Cluster 1	unchanged	no longer significant	unchanged	still significant	higher
Cluster 2	unchanged	still significant	unchanged	still significant	higher
Model 6:					
Cluster 1	unchanged	still insignificant	unchanged	became significant	lower
Cluster 2	unchanged	still insignificant	unchanged	became significant	higher
Model 7:					
Cluster 1	unchanged	still insignificant	changed	still insignificant	higher
Cluster 2	changed	still insignificant	changed	still insignificant	higher
Model 8:					
Cluster 1	unchanged	no longer significant	-	-	lower
Cluster 2	unchanged	no longer significant	-	-	lower
Model 9:					
Cluster 1	-	-	unchanged	still insignificant	higher
Cluster 2	-	-	unchanged	still insignificant	higher

The table summarises the main changes across all models when these were estimated for the two bank clusters, as compared to the original ones estimated on the whole sample.

The main models of interest from the second series of estimations are reported in detail in Table 8, which shows both versions of Model 1 (being the most succinct specification), both versions of Model 6 (owing to a high explanatory power), and both versions of Model 7 (where dividend-related variables tended to change their direction as compared to the same model estimated on the entire sample).

Table 8: Regression Estimates using Separate Clusters

	CONST	DY	DP				
Model 1 - Cluster 1							
	0.7112 ***	0.0106	-0.0122 ***				
	(4.460)	(1.035)	(-3.154)				
R^2 : 0.434 ; Adjusted-R^2 : 0.347 ; F-Statistic - F(2,13) : 4.991							
Model 1 - Cluster 2							
	0.3394 ***	0.0432 *	-0.0081 ***				
	(7.021)	(1.991)	(-3.235)				
R^2 : 0.480 ; Adjusted-R^2 : 0.400 ; F-Statistic - F(2,13) : 6.004							
	CONST	DY	DP	DUMMY			
Model 6 - Cluster 1							
	0.6084 ***	0.0020	-0.0091 **	0.0799 *			
	(4.065)	(0.201)	(-2.425)	(2.119)			
R^2 : 0.588 ; Adjusted-R^2 : 0.485 ; F-Statistic - F(3,12) : 5.716							
Model 6 - Cluster 2							
	0.3486 ***	0.0102	-0.0064 ***	0.1315 ***			
	(9.913)	(0.557)	(-3.367)	(3.564)			
R^2 : 0.747 ; Adjusted-R^2 : 0.684 ; F-Statistic - F(3,12) : 11.837							
	CONST	DY	DP	LEV	EV	S	G
Model 7 - Cluster 1							
	0.2822	-0.0200	-0.0017	0.4616	2.4E-7	-1.3E-5	-0.0608
	(0.866)	(-0.855)	(-0.243)	(0.803)	(1.721)	(-0.826)	(-0.116)
R^2 : 0.587 ; Adjusted-R^2 : 0.233 ; F-Statistic - F(6,7) : 1.657							

Model 7 - Cluster 2

0.2794	0.0081	-0.0070	-0.0837	7.8E-8	1.7E-5	0.1489
(1.118)	(0.197)	(-1.466)	(-0.046)	(0.848)	(0.343)	(0.986)

R^2 : 0.599 ; Adjusted-R^2 : 0.255 ; F-Statistic - F(6,7) : 1.741

Dependant variable is *σ*. Regressions were estimated using the data period 2001-2016 (sixteen annual observations) - except in Model 7 where the observations for the years 2008 and 2009 were omitted due to crisis-related volatility. Statistical significance at the 99% and 90% level of confidence is denoted by *** and * respectively.

7. Discussion

Prior empirical evidence suggests that *σ* is related to both DY and DP in both industrialised countries (Baskin, 1989; Hussainey *et al.*, 2011), and developing ones (Hashemijoo *et al.*, 2012; Nazir *et al.,* 2010). In view of the fact that such studies differed in terms of the direction of these relationships, our results offer an interesting insight into this puzzle, since they show that such direction can change over time. For instance, when we omitted the crisis-related outliers from our sample we noted reversals in the signs of the coefficients, which could be due to the possibility that market reactions or sensitivity may change during more volatile periods (Scott Docking and Koch, 2005).

In our first series of estimations conducted on the entire sample, DY seems to feature a more significant relationship with *σ* as compared to DP. The estimations which omitted the financial-crisis observations suggest that DY is negatively related to *σ*. This could be due to the fact that firms which pay lower dividends in order to re-invest earnings may witness higher volatility, since the value of the entity will be more sensitive to the market's view about the additional re-investments undertaken by the firm. Conversely, when firms pay out higher dividends, a larger proportion of earnings are realised in terms of payouts and capital gains may become less significant; the latter entail higher price changes by their very nature. On the other hand, as shown in Models 1, 2, 3, 5, and 6 where the financial crisis period observations were included, DY emerges as positively related to *σ*, but this may be merely due to the fact that the pronounced higher volatility during 2008 and 2009 is "disguising" DY as a volatility contributor. There is a possibility that the differing results obtained when eliminating the financial crisis observations, emanate from the markets' tendency to behave differently across bull and bear periods, as shown for instance by Scott Docking and Koch (2005) or from to changes in dividend policies during the particular period (Hauser, 2013). This suggests that such relationships should not be assessed merely on the basis of statistical significance; DY was positively related to σ at the 90% level in Models 1 and 4 whereas it turned out to be negatively related to σ at the 90% level in Model 8.

When we used a dummy variable to denote crisis-related volatility, the significance of the dummy was much higher than that of the dividend-related variables and the model was superior in terms of explanatory power. This insight helps us to place the issue into perspective - in the sense that the dividend-volatility relationship may only constitute a minor component which contributes to overall stock price volatility. Indeed, research about securities volatility suggests that stock prices move due to a variety of factors including the trading setup (Camilleri, 2015; Henderschott and Moulton, 2011), liquidity factors (Gold *et al.*, 2017), seasonality (Camilleri, 2008; Heston and Ronnie, 2010), and due to movements in other markets (Shahzad *et al.*, 2017).

We also inquired whether the results are robust across sub-samples by re-estimating the regressions on two different bank groups, which were formed through a two-step cluster analysis procedure. The estimations for the sub-samples featured higher explanatory power, and this may be attributed to the fact that the heterogeneity of the clusters is lower than that within the whole sample, and therefore subsidiary characteristics become more discernable since they are no longer concealed by heterogeneity noise.

When re-estimating the models on the clusters, we noticed a tendency for DP to become a more significant explanatory variable as compared to DY - whereas in the first set of estimations the opposite was true. In addition we noted further peculiarities with reference to the direction of the coefficients, in the sense that the reversal in signs reported when the crisis outliers were first eliminated did not materialise again when the procedure was then repeated on the sub-samples (when re-estimating Model 7 for the clusters, the signs were still in line with Model 2). Overall, these findings suggest that the relationship between σ and dividend-related variables may be fluid and can be sensitive to the treatment of outliers and sampling procedures.

8. Conclusion

The relationship between dividend policies and stock price movements constitutes a central issue in finance research since such insights can prove useful to managers and stock market traders in their decision making. In this paper, we considered dividend yield (DY) and dividend payout ratio (DP) as proxies of dividend policy, and investigated their effects on share price volatility through a sample of Mediterranean region bank stocks which were publicly traded during the period 2001 to 2016.

Estimations on the whole sample suggest that DY is more significant than DP when explaining volatility; DY was generally positively related to volatility, yet it changed sign when the observations related to the 2008-09 instability were eliminated from the sample. When re-estimating the models on the clusters, we noticed the tendency for DP to become a more significant explanatory variable as compared to DY, which is the opposite of the results obtained from the estimations for the entire sample. In addition, we noted further peculiarities in that the reversal in signs reported when the crisis outliers were eliminated did not materialise when the procedure was repeated on the sub-samples.

The observation that DY and DP were not consistent throughout our estimations (in terms of the coefficient direction and significance) adds further evidence that the direction of these relationships can change over time and also suggests that there may be sensitivity to the treatment of outlier observations and sampling procedures. In this way one should avoid relying exclusively on statistical significance when assessing such relationships. In addition, these factors can potentially aid in reconciling the mixed evidence in the context of this area. We also expect these results to be useful from the point of view of corporate financial managers in order to better understand the effects of their dividend policy decisions on share price volatility.

As regards the limitations of this study, we recognise that the results may be sample-specific particularly since the data period comprises events such as the 2007 credit-crunch, the European sovereign debt crisis and the oil price crash. In addition we abstracted from the possibility that the market's reaction to dividends may differ in between investor categories, since such differences may not be captured when analysing data for the aggregate market. For instance Chiang *et al.*, (2006) reported differences in terms of dividend preferences across sub-groups of professional investors. This study does not account for the intricacy that the volatility induced by dividend-related news could vary in the context of interim dividends and final dividends (Balachandran, 2003). The modelling of such features offers an interesting avenue for future research in order to permit a more thorough understanding of the dividend-volatility relationship.

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Notes

1 We took Earnings before Interest and Taxes (EBIT) data for each bank and then estimated the standard deviation on a trailing 5-year basis. In order to do this, we used data starting from the year 1996.

2 Mediterranean countries were defined as those countries having a border with the Mediterranean Sea. The Republic of Serbia was also included, since it still formed one country, along with Montenegro at the start of the data collection period.