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DO PEER FIRMS AFFECT CORPORATE PAYOUT DECISION: EVIDENCE FROM THE JSE

by

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Declaration

I hereby declare that this research report is my own unaided work. It is being submitted in partial fulfilment of the degree of Master of Commerce in Finance to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

Signed---------------------------------- Date ---------------------------------------

ABSTRACT

This study explores the effects of peer influence on payout decisions of South African listed firms. In recent years, the dividend puzzle debate has shifted to providing alternative stylised payout determinants, that gives more precise quantitative models which have power to reject weak theories, whilst reducing the gap between theoretical propositions and actual payout decisions. The study departs from a micro-environment perspective of firm-specific approach and adopts a holistic approach of peer effects which considers the market and macro environment of a firm, where integration, technological advancement and sophistication of markets have led firms to benchmark their decisions to peers as they battle for survival. Instrumental Variable Probit (IVP) regressions are used to estimate the potential peer effects dividends payments or share repurchase decisions. Additionally, Instrumental Variable Tobit (IV-Tobit) regressions are applied to evaluate peer effects on the amount of dividend, share repurchase and total payout. Instrumental variables (IVs) based on peers' stock price shocks (peer idiosyncratic equity shock and peer idiosyncratic equity risk) are employed in the study to curb endogeneity problems. The residuals from the Five-factor model are used in the first stage regression, which gives the peer instrumented fitted value for predicting a firm's pay out decisions in stage two regressions. Both instruments predict peers' repurchases negatively (positively) and significantly, even after the control variables. Firms benchmark their dividend (repurchases) payments, dividend (repurchases) amount and payout ratios to those of their peers. Using Vector Autoregressive Models (VAR) models to check the robustness of peer influence on payout ratio adjustments, it is reported that a shock in peers indirectly affects a firm payout decision, significantly. Evidence from the eleven-day cumulative abnormal returns CAR (-5,+5) around dividend announcements shows that the CAR are more pronounced in firms whose payout ratios are closer to peers. The study found that peer influence is more pronounced on the JSE compared to Nasdaq due to higher risk premiums associated with the market. The significant peer influence documented for JSE firms is more pronounced for dividends than share repurchases.

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Definition of Terms and Abbreviations

Id.Equity.Shock: Residuals obtained from monthly stock returns regressions on predicted Fama-French and Carhart factors and average industry excess returns, composited each year.

Id.Equity.Risk: Logarithm of the standard deviation of Id.Equity.Shock residuals.

Peer Id.EquityShock: Peer idiosyncratic returns (residuals)

Peer Id.EquityRisk: Peer idiosyncratic volatilities

Peer firms: all other firms in the same Industry Classification Benchmark (ICB), which correspond to the DataStream Global Equity Indices level 2 code, in a given year.

Instrumental Variable: is an econometric variable employed in the study to account for unexpected returns of the endogenous variables in the study.

Instrumented variable probit (IVP): is the estimated binary dependent variable that is derived from the first regression's fitted value.

VAR: Vector autoregressive models are multivariate time-series models that utilise both lagged independent and dependent variables in explaining time-series data

IRF: Impulse response functions is a VAR model that shows the marginal effect of a shock in one variable and its effect on another.

Variance Decompositions: It is the forecast error variance decomposition that allows one to decompose the variation in a forecasted variable due to a shock in another Variable.

VECM: Vector Error Correction Model used to estimate the long-term relationships in non-stationary data based on cointegration between the variables in a VAR

Cointegration: If a combination of the non-stationary variables yields a stationary time series, the variables are regarded as cointegrated of order one.

CAPM: The capital asset pricing model of Sharpe (1964)

CAR: Cumulative Abnormal Returns

Table of Contents

CHAPTER 1 1

INTRODUCTION 1

1.1 Background 1

1.2 Problem statement 3

1.2 Research Objectives 5

1.3 Research Hypotheses 5

1.4 Contribution of the study 7

1.5 Outline of the study 9

CHAPTER 2 10

LITERATURE REVIEW 10

2.1 Introduction 10

2.2 Theories on dividends 10

2.2.1 Irrelevance Theory 10

2.2.2 Tax models 11

2.2.3 Asymmetric models 12

2.2.4 Agency models 13

2.2.5 Firm age models 14

2.3 Managers' views on payout policy 14

2.4 Payout policy developments in the past three decades (Share repurchases) 15

2.5 Summary of the Control Variables 16

2.7 Peer effects 19

2.7.1 Peer influence 19

2.7.2 Motivations behind peer effects in payouts/ heterogeneity in peer effects 20

2.7.3 Payout waves and identification challenges 21

2.7.4 Identification challenges and Instrumental variables 22

2.8 Literature on Instrumental Variable factors (Explanatory variable) 24

CHAPTER 3 26

DATA AND METHODOLOGY 26

3.1 Introduction 26

3.2 Data 26

3.2.1 Sample Selection Criteria 27

3.3 Empirical methodology 28

3.3.1 Peer effects on payout 28

3.3.2 Constructing Instrumental variables 31
CHAPTER 4 35
ANALYSIS OF RESULTS 35
4.1 Summary statistics 35
4.2 Unit root test 40
4.3 Regressions 44
4.3.1 Five-factor Model 44
4.3.1 Validity of the Instrumental variables 45
4.3.2 Payout Decision models/ Sub- Empirical models 48
4.3.2.3.1 Model 3.1 - 55
5. SUMMARY AND CONCLUSION 64
6. REFERENCES 66
7. APPENDICES 75
Appendix 1 – firm and peer dividend correlation for the 8 different sectors 75
Appendix 2 – descriptive statistics 78
Appendix 3 – Unit root test 79
Appendix 4 – Instrumental Validity test 79
Appendix 5 – Cross sectional regressions 84

Table 1: Summary of Control Variables 18
Table 2: Industry classification codes from the JSE 27
Table 3: Firm-specific variables 30
Table 4:Factors Variables 31
Table 5: Descriptive Statistics of Firm-specific and Peer-average variables 38
Table 6:ADF Unit root Test- five factor variables 41
Table 7:ADF Unit root test – Explanatory Variables 42
Table 8: Mean, median and standard deviation of Factor Regression Results 44
Table 9:Relevance of the IVs for dividends 46
Table 10:Propensity to pay dividends or repurchases Panel A 48
Table 11:The amount of Payment Panel A 51
Table 12: Speed of adjustment 54
Table 13: Cointergration Test 59
Table 14:Announcement effect of annually dividend changes and proximity to peer averages 62

Figure 1:Firm vs peers' correlation 23
Figure 2: ADF Inverse Roots - Five factor variables 43
Figure 3: ADF Inverse roots - Explanatory Variables 43
Figure 4: Impulse Response 56

Figure 5: Accumulated Impulse Response 56
Figure 6: Variance Decomposition 57

CHAPTER 1

INTRODUCTION

1.1 Background

The pioneering work of Miller and Modigliani (MM) (1961) stated that in perfect capital markets, financing decisions and dividend decisions do not affect the value of a firm (Dividend Irrelevance Theory). This proposition stimulated an intense debate on payout policy, resulting in a riddle that is yet to be solved (the dividend puzzle). Market imperfections in the real world stirred an evolution of various contrasting theories and hypotheses positing that payout policy is relevant or vital to firm value. Among these 'Relevant theories' are the Agency Theory (Jensen & Meckling, 1976), Tax Theories and Signalling Theories (Allen, Bernado & Welch, 2000), Clientele Theories (Allen & Michaely, 2003) and Life Cycle Theories (DeAngelo, DeAngelo & Stulz, 2006). Subsequently, payout policy has emerged to be a significant topic in Corporate Finance for more than fifty years. The amount and form of payout distribution have evidently affected other policies of a firm such as risk and cash management (Gordon, 1963), financing and capital structure decisions (Myers & Majluf, 1984), mergers and acquisitions (Jeon, Ligon & Soranakom, 2010) and employee compensation over the years (Hsieh & Wang, 2008).

Whilst those following the MM theory believe that dividend decisions are irrelevant to firm value, there seems to be a consensus on the Relevant Theories which assert that payout policy has significant signalling and disciplinary control implications. However, there is diversion of views on the significant factors affecting the level, form and stability of payout policy among the relevant theories. This stirred what seems to be an endless conundrum and it baffles many, that after decades of research and voluminous quantity of studies, researchers still do not have convincing answers for the dividend puzzle.

Significant factors affecting the level, form and stability of payout policy distribution remain a puzzle that is yet to be solved (Baker, Powell & Veit, 2002). Survey evidence shows that prior models, hypotheses and theories fail to precisely reflect firms' payout policies (dividends and share repurchase policies) as they fail to explain the secular changes in these policies (Brav, Graham, Campbell, Harvey & Michaely, 2005; Farre-Mensa, Michaely & Schmalz, 2014). Moreover, Allen and Michaely (2003) and Michaely and Roberts (2011) highlighted that most of the economic factors affecting payout policy are not well understood yet, thus new initiative studies that go beyond the extant literature are relevant. Equally, Coles and Li (2019) stipulated that existing payout explanations, which focus on factors such as tax advantages, clientele preferences, signalling motives, and agency problems, account for a small fraction of the observed variation in dividend policy. Similarly, Lemmon, Roberts & Zenders (2008) posit that unobserved time-invariant effects drove most variations in leverage ratios, and one wonders if studies with more relevant payout determinants might also unearth some unobserved effects in payout policy.

Barclays and Smith (1999) documented that a fruitful theory should be consistent with facts and should be able to predict actual behaviour. In view of this, it seems like previously identified determinants and empirical models have not progressed completely towards fruitful theories, as theoretically stylised facts on payout policy have not explained the actual payout policy in firms adequately. Subsequently, identifying more significant determinants of payout policy can be a promising avenue to resolve the puzzle.

Determinants that are more significant might result in comprehensive models that consider competing frictions on a firm-specific basis (Baker *et al*., 2002). Exhuming better proxies for the key drivers of payout policy might enhance the designing of more precise quantitative models which have power to reject weak theories, whilst reducing the gap between theoretical propositions and real stylised facts of payout policy.

Brav, Graham, Harvey & Michaely (2005: p.523) concluded that there are six rules with respect to payout policy[1]. However, of the six rules, the "*do not deviate far from the competitors"* rule and the consequences thereof have been barely investigated in literature. Under this rule, one finds three hypotheses in literature that try to explain why firms in the same industry resemble each other's payout policy. First, The Peer effects hypothesis, states

[1] The six rules of the game are: "expect a severe penalty for cutting dividends; do not deviate far from competitors; maintain a good credit rating; have a broad and diverse investor base; maintain flexibility; and, given that an important portion of investors price stocks using earnings multiples, do not take actions that reduce EPS" (Brav et.al., 2005)

that a firm's behaviour depends on the behaviour of the industry. Second, the Contextual hypothesis posits that the characteristics of the industry determine a firm's behaviour. Lastly, the Correlated hypothesis alludes that a firm tends to behave in a certain way depending on firm characteristics. However, most research studies focused on the last two hypotheses and evidence on the first hypothesis barely exists. Recent evidence by Leary and Roberts (2014) shows that, in capital structure determinants, peer effects are more significant than the majority of previously identified determinants. If comparable evidence can be documented for payout decisions, it could be a step closer to deciphering the dividend puzzle. This study, therefore, seeks to examine if peer influence can be a promising determinant of payout decisions.

1.2 Problem statement

To date, there is no single unifying theory that offers any conclusive explanation or evidence on what determines a firm's payout policy. Thus, currently there is a plethora of anecdotal evidence for each factor affecting payout policy, but the theories based on these factors are mutually exclusive. The study, therefore, implement comprehensive models that include Instrumental Variables and the majority of prior payout determinants (as control variables). Moreover, existing theories on payout policy are mainly focused on dividends and exclude share repurchases, whilst recent trends indicate that there is need to include them, given their increasing role and usage over the past two decades. It is therefore imperative to find a theory that adequately explains firms' payout policy in solving the dividend puzzle, the decisions of firms in paying out and the possibility of timing effect.

The study implements Instrumental Variable Probit and Logit models to investigate peer effects on payout policy. This comprehensive model which includes most prior payout determinants as control variables has not been applied on payout studies on the JSE. Significant effects of these IVs might help in understanding the rational and behavioural payout decision-making process.

Prior research has focused extensively on payout policy of a firm in isolation, analysing firm-specific factors only (see DeAngelo, DeAngelo & Skinner, 1996; Fama & French, 2001; Grullon et al., 2002). However, firms do not operate in isolation, but in competitive markets fuelled by financial markets developments, globalisation, technological advancement and deregulations. Consequently, firms' survival instincts are vigilant, and are fully aware of the activities of their peer firms in the market and macro environment. The survival instinct has resulted in firms' decisions being influenced by the activities of their peers, including payout decisions. This necessitates peer firm studies on payout policy, as the extant literature which focus on firm-specific factors have failed to adequately decode some significant determinants of payout decision in firms (where integration, technological advancement and sophistication of markets have resulted in a world which is like a global village, where investors and rivals are proactive).

Thus, peer studies on payout policy are essential and Finance studies recognize the importance of peers in payout policies. However, of all the macroeconomic (and otherwise) factors, peer effects have not been extensively investigated despite research showing evidence of convergence of payout policy. Adhikari and Agrawal (2018), postulate that the response of firms to common industry shocks have been examined mostly by empirical models which use industry fixed-effects and industry averages, that barely demonstrate the underlying effect of peer influence on payout policy, especially the significant factors in peer effect. However, most research studies are on developed markets with scant literature on emerging markets. It is even more pressing or important to focus on the previously neglected emerging markets such as the JSE.

Leary and Roberts (2014) pioneered a study on the causal effects of peer firms using engrained IVs that are conceivably idiosyncratic shocks (independent of common industry shocks). They demonstrated how peers' capital structure is a significant determinant of capital structure of a firm as the decisions are inter-reliant. Grennan (2019) and Adhikari and Agrawal (2018) extended the concept further, by analysing peer effects on payout policy and found comparable results of significant peer effects on firms' payout policy.

Although the two studies show evidence of peer effects in payout policy, evidence is still scarce on a global basis. For example, to the knowledge of the author, there has not been any evidence of peers' effects on payout policy in South Africa or emerging countries. The existing literature on peers' effects only focused on developed countries. It therefore becomes imperative to do a study on the JSE, as African markets are less developed, less transparent and have a higher degree of asymmetric information than developed markets (Ramli, 2010; Al-Najjar & Kilincarslan, 2016). To the best knowledge of the author, this is the first study that attempts to fill this research gap, by identifying the causal effects of peer firms on a firm's payout policies in South Africa.

1.2 Research Objectives

The central objective of this study is to measure the extent to which peer influence explains payout policy of firms listed on the Johannesburg Security Exchange (JSE), over a period of twenty years spanning from 1998 to 2018. Furthermore, the study seeks:

- to observe the extent to which industry peers' policies affect a firm's decision on dividend payment or repurchasing shares
- to examine how a firm's dividend (repurchases) amount level is influenced by its peers.
- to analyse if firms are inspired by their peers' decisions to adjust their target payout ratio than they would otherwise.
- to analyse whether the dividend and share repurchase announcements returns show evidence of peer effects anticipation.

1.3 Research Hypotheses

Testable hypotheses are founded from the problem statement and objectives in this chapter. This section provides a general exploration of the empirical validation for each hypothesis.

Hypothesis one

In ambiguous environments where information asymmetry and fast-paced sophisticated technological advancement are prominent, Milliken (1987) documented that younger firms are prone to imitate payout policy of their better-informed counterparts (mature peers whom they believe have better information about product markets and investors). Lieberman and Asaba (2006) classified this under the information-based theory. Small firms whose resources are constrained to undertake environmental research, learn about their peers' policy from systems used for benchmarking and rationally update their decision-making process subsequently (Grennan, 2019). Peer effects seem inevitable as small firms rely on peer-based information, this prompts the following null ($H_{0)}$ hypothesis and alternative hypothesis ($H_{1)}$:

H_0: Industry peers' payout policies have no effect on a firm's decision on dividend payment or repurchasing shares.
$H_{1:}$ Industry peers' payout policies affect a firm's decision on dividend payment or repurchasing shares.

Hypothesis two

Hypothesis two is formulated on the assumption that a firm's dividend (repurchases) amount level is influenced by its peers. This research analyses this phenomenon, to provide further insight on the magnitude of peer effects. Under the reputation-building model, executives aiming to improve their future employment prospects and rents are motivated to employ decisions that make them appear more reliable. An executive will, therefore, adopt peers' dividend policy if it will make them appear mature and reliable (Scharfstein & Stein, 1990). The industrial organisation model generates peer effects when weak firms (financially constraint firms) feel obliged to respond to strong peers (cash-rich firms or industry leader) to sustain their competitive edge with peers (Bolton & Scharfstein, 1990; Fudenberg & Tirole, 1986). Lieberman and Asaba (2006) classify this model under the Rilvary-based theory. In a competitive market, if the peer group leader is aware that his peer rivals are compelled to imitate his payout policy, he might exploit this tendency to push their competitor into insolvency. However, in a low competitive environment, all firms can cluster to non-dividend payments resulting in peer effects.

Ho: Industry peers' payout policies have no effect on the amount of dividend (repurchase) decision.
$H_{1:}$ Industry peers' payout policies affect the amount of dividend (repurchase) decision.

Hypothesis three

Hypothesis three is formulated on the presumption firms are inspired by their peers' decisions to adjust their target payout ratio than they would otherwise. Interviews from Lintner (1956) revealed that peer effects were among the most important factors that determined different target payout ratios and adjustment rates. Building on this phenomenon Brav et al (2005) documented the "do not deviate far from the competitors" as one of the rules of the game regarding payout policy. Accordingly, managers might be limited by their peers if investors expect the firm to be aligned with its peers' payout policy. This is consistent with earlier findings of Scharfstein and Stein (1990), who documented evidence of herding, as rational managers who are concerned about their reputation in the labour market may mimic the decisions of other managers, ignoring substantive private information. Lieberman and Asaba (2006f2 a) grouped Brav et al's (2005) rule "do not deviate far from your competitors" into the rivalry-based theory. From the abovementioned arguments, it is hypothesised that:

H_0: Firms are not inspired by their peers' decisions to adjust their target payout ratio than they would otherwise.

H_1: Firms are inspired by their peers' decisions to adjust their target payout ratio than they would otherwise.

Hypothesis four

Hypothesis four is formulated on the assumption that the dividend and share repurchase announcements returns show evidence of peer effects anticipation. Bhana (1997, 2007) found significant abnormal returns around dividend announcement and share repurchase announcements. Additionally, Kadioglu, Telçeken, & Ocal (2015) documented that dividend increases are associated with positive abnormal returns, whilst dividend decreases are associated with negative abnormal returns around the time of the dividend announcement. The information signaling theory, the free cash flow hypothesis and the dividend clientele effect hypothesis attempt to explain the relationship between the dividend changes and firms' share prices. Thus, the evidence proffered above prompts the following null (H_0) hypothesis and alternative hypothesis (H_1):

H_0: The dividend and share repurchase announcements returns show no evidence of peer effects anticipation.

H_1: The dividend and share repurchase announcements returns show evidence of peer effects anticipation.

1.4 Contribution of the study

This study adds to the extant body of knowledge in the arena of Finance. If a causal relationship between peer influence and payout decisions is identified and explored, this can provide novel insights on the episode of firms deciding to change their payout decisions concurrently and the motivations on the propensity to pay dividends (share repurchases). The study also attempts to explore whether imitation of industry peers can explain the sensation of disappearing dividends, reappearing dividends, dividend concentration and persistence of dividends (which can even push firms with insufficient funds to borrow, just to smooth dividends payments), (Fama & French, 2001; Hoberg & Prabhala, 2009; Julio & Ikenberry, 2004; DeAngelo, DeAngelo & Skinner, 2004). Significant peer effects reflect that sometimes managers do not have a lot of discretion, as their hands would be tied by market and macro expectations, and they need a better understanding of their peers to keep up with trends and secular changes in payout policy.

The study implements Instrumental Variable Probit and Logit models to investigate peer effects on payout policy. This comprehensive model which includes most prior payout determinants as control variables has not been applied on payout studies on the JSE. Significant effects of these IVs might help in understanding the rational and behavioural payout decision-making process. In addition to existing literature (which explains payout policy confined to a micro-environment or firm specific view only), the study gives an alternative view on how firms set payout policies, taking into consideration market and macro-economic factors.

Since South Africa is one of the leading emerging economies in the global market, a causal relationship between peer firms' activities and firm's payout decisions will aid investors in anticipating and assessing relative corporate payout policies in emerging countries.

Additionally, the literature and evidence from this study might assist academics to solve the dividend puzzle since the study provides a significant, additional missing piece to the puzzle. The study might also assist practioners in the Finance field to draft and time payout policies to meet investors' expectations whilst maximising firm value. For example, the study enables practioners to draft a policy with an understanding of how peer effects and market expectations impact their policy and subsequently how they will adjust their target ratio or speed of adjustments, taking into consideration the consequences thereof.

The J.P Morgan (2011, p.9) guide to dividend policy shows that peer influence plays an integral role as it is one of the five dimensions ensuring that firms' decisions to increase, cut or initiate dividends are best-in-class dividend policy. "The five CLIMB dimensions: Capital planning, Long-term sustainability, Investor preferences, Materiality and Benchmarking to peers" represent an umbrella standard to which the policy must be aligned. Moreover, the study shows that most Boards and senior management's analysis relating to payout decisions start with in-depth peer benchmarking. Therefore, understanding the role of peer influence on payout policy becomes essential given the limited prior research on the topic.

1.5 Outline of the study

Chapter 1 is an introductory chapter that introduces the background of the study, where in the problem statement, research objectives, research questions and significance of the study are clarified.

Chapter 2 reviews the literature of past researchers and prior empirical models. In addition, the theoretical framework and hypotheses development are presented.

Chapter 3 provides a detailed research methodology that describes the procedures and methods that have been used to carry out this research in terms of data collection methods, model instruments construction method, research design, sample and sampling techniques, and data analysis.

Chapter 4 Run regressions and interprets the overall results and the analysis of data. Tables and graphs are used to present and explain the research results by using E-views and R-studio in order to provide the reader a clearer explanation.

Chapter 5 discusses the overall analyses from the previous chapter. Major findings and the implication of the study are discussed and summarised. The limitations and weaknesses of this research are identified and recommendations for future research are provided.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter investigates the theoretical background with respect to the determinants of payout policy (that is agency, clientele, signalling, taxes and earnings per share and liquidity). Subsequently, the gap between the theoretical framework on payout policy and managers' views will also be analysed. Recent payout determinants which have emerged in an endeavour to close the gap between theoretical work and managers' views on payout policy are examined. Once a foundation centred on the theoretical framework has been established, the attention is shifted to look at peer effects.

2.2 Theories on dividends

2.2.1 Irrelevance Theory

Miller and Modigliani's (1961) irrelevance theory postulates that in perfect and complete capital markets, only earnings (which are a direct result of optimal investments) drive firm value and corporate payout policy do not affect firm value. Farre-Mensa, Michaely & Schmalz (2014, p.93) state that, the MM proposition is founded on "six main assumptions: no taxes; symmetric information among all market participants; complete contracting possibilities; no transaction or issuance costs; competitive product and financial markets and rational investors and managers". Farre-Mensa ,et al., (2014) derived three conclusions from the MM irrelevance proposition; first, in perfect complete markets, firm value is derived from the present value of firms' earnings only; second, net payout is a residual of cash flows after investment decisions and changes to the payout do not affect firm value; and finally, the proposition does not hold if any of the assumptions are disregarded.

In view of the third conclusion, all the six assumptions rarely hold in the real world, and this has resulted in a terrain of contrasting theories (relevant theories) which intensified the controversy surrounding the proposition. Relevant theories highlight the taxes, asymmetric information and agency costs as the three main market frictions that have subsequently relaxed MM's six assumptions, resulting in the significance of the payout policy decision. These developments are reviewed in the next section and the success of these developments in explaining the payout policy is analysed.

2.2.2 Tax models

In tax models, differential taxations on dividends and capital gains impose different tax liability on investors. An increase in these liabilities increases the shareholder's pre-tax return and shares with high payout tax liability are lowly priced. Jacob and Jacob (2013) classified the theoretical framework of taxation impact on payout policy into two groups; the traditional view (which supports tax effect on firm's value and investors' clientele) and the new view (which nullifies taxation impact on dividend supply).

Under the traditional view, Capital Asset Pricing Model-based studies show that double taxation on dividends reduces return on investment and financing of investments from new equity, whilst reduction in dividend tax increases investment, profits, dividend payments and firm value (Poterba, 2004; Litzenberger & Ramaswamy, 1979, 1980). Additionally, behavioural studies such as ex-dividend day studies support the clientele effect and show that comparative dividends and capital gains taxes led to higher ex-dividend-day abnormal returns, and dividends should be minimised for value maximisation (Elton & Gruber, 1970; Barclay, 1987). However, evidence from these two studies (CAPM and behavioural ex- dividend day studies) has been classified as of second order importance in payout decisions, because taxes are significant in explaining, low-taxed bracket individual investors who account for 5% of the portfolio and less important in explaining the whole clientele effect. Moreover, literature shows that, the exogenous shocks did not have a permanent first-order effect on payout decisions (Allen & Michaely, 2003; Graham& Kumar, 2006). In this study, institutional holdings will proxy investors' tax clientele, as many institutions are tax exempt.

Under the new view, a number of studies using taxes as exogenous shocks supported the tax effect before and after-tax shocks. Higher taxes on dividends and a reduction of capital gains caused investors to discount dividend value and premium (Poterba & Summers, 1984; Barclay, 1987; Graham, Michaely & Roberts, 2003). However, later developments from the JGTRRA of 2003 and the fiscal cliff at the end of 2012, show that taxes were not the main drivers of relative changes in increased ex-day trading and pricing of dividends. Several alternative factors like: lower transactions costs, cheaper hedging instruments, prior postponement of dividend initiations, momentary dividend initiations and special dividends acceleration in firms with high inside ownership influenced the increases in ex-day dividend trading (Chetty & Saez's, 2005; Brav et al., 2008b; Kim & Kronlund, 2014).

In support, survey studies of Brav et al. (2005); (2008a,b) show that two thirds of managers consider tax effect to be of second order importance. Additionally, 13% posit that reduction of tax only influences hesitant firms to initiate a dividend, but for the majority of firms, permanent stability of cash flows and liquidity are more important than taxation. Concisely, these findings imply that, taxation has no substantial effect on firm behaviour, and taxation effect on the supply of dividends and its effect on a firm's real decisions are yet to be resolved entirely.

2.2.3 Asymmetric models

In asymmetric information models, managers have more inside information than other market participants and managers aim to reveal this information for fair evaluation. In contrast to the Efficient Market Hypothesis (EMH) where share price reflect all the relevant information concerning future cashflow and investors' future expectations, Akerlof (1970) shows that prices can be overvalued or undervalued if one of the market participants have more information than the other. Under the signalling rationale, due to the conservative nature of dividends, undervalued firms use payout policy to signal private information such as, sustainable earnings, firm quality, expected cash flows and low cash flow volatility (Lintner, 1956; Allen, Bernardo & Welch, 2000 & Mitchell & Kodongo, 2016).

Deshmukh (2005) extended the pecking order theory of Myers (1984) and documented a negative relationship between dividends and asymmetric information level, as shares may be mispriced due to adverse selection problem and this gives rise to the need for payout policy to act as a signalling devise. However, most of these empirical models produced weak evidence on the signalling phenomenon, especially on future earnings and Miller (1987) concluded that "….dividends are better described as lagging earnings than as leading earnings" (as cited in Allen and Michaely, 2003, p.392). Despite the signalling dividend motivation being weak, dividends payment's persistence shows that there are other motivations that need to be unearthed. In reducing the information asymmetry, market to book ratio (MTB) and tangible assets are used as proxies, as the MTB captures the future expectations of the shareholders regarding realized investments and tangible assets makes it easier for investors to measure firm value (Harris & Raviv, 1991).

Bhana (2007) shows that South Africa's experience of payout policy is similar to that of the US. However, evidence shows that South African literature complements and contradict each other on the signalling model (Knight &Affleck-Graves, 1987; Botha, Bosch & Van Zyl, 1987; Auret & De Villiers, 2000; Bhana, 1991, 1997; Firer, Gilbert & Maytham, 2008)). Thus, there is a need for more powerful empirical tests that will conclude on these theories.

2.2.4 Agency models

Fama and French (2002) posit that value firms (highly profitable firms with few growth opportunities) are prone to agency costs as they are likely to have surplus cash relative to positive net present value investment opportunities. Jensen and Meckling (1976) define an agency-principal relationship as a contract wherein one or more principal(s) engage an agent to work on their behalf. However, Hart (1995) show that the contracts which bind this relationship are incomplete (as they have gaps, missing provisions and ambiguities) and managers can take advantage of these, resulting in private benefits, entrenchment, empire building, hubris, consumption of benefits and suboptimal investments (Jensen, 1986 & Zwiebel, 1996). Principals then incur agency costs (defined as the sum of monitoring, bonding, agents' risk aversion and residual loss expenditures) as they try to align the agency interest to those of the principal.

Agency problems seem inevitable in the face of rational agents' attempt to maximise job security and compensation versus rational principals who try to maximise their wealth. Due to the rigidity of dividends, payout policy is seen as a behavioural control device that curbs agency cost by reducing free cash flow, aligning agents, attracting monitoring by external capital markets and principal interests and subsequently impacting firm value (Easterbrook, 1984; Michaely & Roberts, 2011).

Although there have been vast empirical tests to support the agency explanation of payout policy, in recent years, the role of dividends as a disciplinary mechanism has diminished as the previously weak control mechanisms which were substituted by payout policy have emerged to be strong. Strong internal corporate governance, effective boards, institutional shareholders' ability and mechanisms to monitor, anti-takeover laws, investor protection laws and high management ownership and incentives in recent years overrides the disciplinary role (Laporta, Lopez-de-Silanes & Shleifer,2000; Holmstrom and Kaplan, 2001; Hall & Liebman, 2000; Bill, Iftekhar, Kose & Liang, 2011; Ntim, 2013). Overall, the agency role in explaining payout policy has lessened over the years. However, dividends are still viewed as a sacred cow. Profitability and Cashflow risk are adopted as proxies in the study. Additionally, sales growth, mtb and return on equity (RE/BE) proxy the growth opportunities of a firm where free cashflow can be optimally used.

2.2.5 Firm age models

The best dividend policy of a firm is determined by the firm's phase in its life cycle. For example, a growth value-maximising firm in its rapid growth phase will return all earnings and forgo pay-outs, whilst a value firm with limited growth opportunities may payout all its earnings at maturity (Mueller, 1972). This optimal policy comes from a trade-off of a costs and benefits analysis of raising capital for new investments. The empirical evidence show that dividends payment tendencies are related to life-cycle characteristics (such as growth opportunities and profitability) and dividend payers are mature firms with high earnings while young, high growth firms do not pay dividends (Fama & French, 2001;Grullon et al., 2002; DeAngelo & DeAngelo, 2006). Log of firm age proxy life cycle in the study.

Botoc and Pirtea (2014) examined a database of 2,636 companies from sixteen developing countries over the period 2003 to 2011 and documented evidence that emerging countries firms' payout patterns are relatively similar to those of developed countries. However, they found contradicting evidence on the life-cycle theory which might have been influenced by different levels of investor protection, but the sensitivity to these variables differs due to country factors, hence the need to assess emerging countries.

2.3 Managers' views on payout policy

This section analyses the views of managers on the theoretical motivations for payout policy outlined above. Managers' views are drawn from Brav et al.'s (2005, 2008b) survey and interview findings from the CFOs and executives.

Consistent with the signalling theory, managers suggested that they are the ones who determine the suitable level of payout based on the inside information they have Vis-à-vis the market perception of the firm. However, there is little support for the theory, as more than 95% of managers state that they do not use dividends as a costly mechanism to signal value or differentiate themselves from their peers. Moreover, contrary to the agency theory's disciplinary role by executives, executives only authorise managers' decisions, but do not derive dividend decisions. Contrary to MM irrelevance proposition, managers support the dividend relevant theories of payout policy, and they show that dividend choices are made at par with investment decisions and are highly prioritised, as managers would rather forego profitable NPV projects than cutting dividends. However, in line with MM, managers view share repurchases as residuals which are considered after investment decisions. Lastly, there is less evidence on clientele, as executives indicated that they could not attract institutional shareholders with their dividend policy, as institutional shareholders are indifferent.

Concisely, managers' views demonstrate that the empirical models on payout policy do not adequately describe firms' payout policy. The secular changes in payout policy have been barely explained by these theories. For example, the factors deriving the increase in aggregate dividends, the decline in dividend payers, the growing concentration in the supply of dividends and the upsurge of share repurchases over dividends, have not yet been explored adequately. This necessitates the need to derive innovative empirical models with more significant explanatory variables.

2.4 Payout policy developments in the past three decades (Share repurchases)

The classical theories do not say much about the secular trend of repurchases (Farre-Mensa et al., 2014). In the past twenty years, changes in corporate payout policy have been witnessed in the form of reckonable increases in share repurchases and their cumulative impact as a form of corporate payouts. Among the alternative explanations derived on share repurchases, the interaction between payout and compensation is at the forefront.

Managerial compensation contracts where incentives are based on certain threshold of Earnings per share (EPS) motivate managers to influence the payout policy as they aim to maintain EPS above target levels. They prioritise this motive to the extent that real investments might be passed up for repurchases to bring down the EPS level (Bens, Nagar, Skinner & Wong, 2003). When a firm falls short of an EPS threshold and management bonuses are linked to the (EPS), firms are motivated to buy back shares to increase the EPS, trying to undo EPS dilution created by share issues through the exercise of stock options (Harford and Zhang 2015). EPS is used as a determinant of share repurchase in this study.

Inside ownership is another control variable as firms with high stakes of inside ownership have a high propensity to repurchase stock, to reduce the effects of stock option compensation. These firms pay less dividends and are more likely to repurchase stock when management is compensated more with stock options (Fenn & Liang, 2001; Hsieh & Wang, 2008).

Liquidity is also adopted as a control variable in this study. Evidence after the 1987s'market crash shows that firms repurchased their stock to boost the liquidity of their stock in the market while reducing transaction costs, (Farre Mensa et al., 2014). This is in line with prior literature where the announcement and timing of repurchases increased the liquidity of a firm, when convertible bonds issuers simultaneously repurchase shares to facilitate short selling of their shares by arbitrageurs (Cook, Krigman & Leach, 2004; Chemmanur, Cheng & Zhang, 2010; Ben-Raphael, Oded &Wohl, 2014; Jong, Dutordoir & Verwijmeren; 2011).

The Market-to-book is also controlled as significant empirical evidence of the initial market responding to repurchases shows that mispricing (mainly undervaluation) motivates share repurchases when firms try to maximise value or to stabilise stock price (Brav et al., 2005; Jagannathan, Stephens & Welsbach, 2000). Louis and White (2007) concluded that repurchase announcement programmes are done with the hope that the mispricing will be corrected while actual repurchase is done to exploit the mispricing.

2.5 Summary of the Control Variables

Founded on these models and the theoretical framework above on asymmetric information, agency costs and taxes; peer firms and firm specific characteristics that have been dominant determinants of payout policy are controlled in order to come up with an unbiased outcome on peer influence. The determinants are detailed below:

a) **Profitability** - Raya (2008) shows that profitability is a very strong determinant of dividend payout ratio. Firms with negative retained earnings and limited cash are unlikely to pay dividends (DeAngelo et al., 2006).
b) **Cash Flow risk** – This involves cash flow uncertainty due to variations, which does not signal good future prospects. It is denoted by the standard deviation of cash flow to assets ratio.
c) **Firm Age** - Life-cycle-related changes evolve with a trade-off on costs and benefits analysis of raising capital. For example, a growth value-maximising firm in its rapid growth phase will return all earnings and forgo pay-outs, whilst a value firm with limited growth opportunities may payout all its earnings at maturity (Mueller, 1972).
d) **Market-to-book** - Proxy for undervaluation or over-valuation. Highly profitable firms with low MTB ratios pay dividends as they have surplus cash relative to positive NPV investment opportunities (Fama & French, 2002).
e) **Liquidity** - Firms with high levels of liquidity and free cashflows are inclined to pay dividends or buy back shares to avoid sub-optimal investments (LA Porta et al., 2000).
f) **Firm size** - Al-Kuwari (2009) documented a significant positive relationship between dividend policy and firm size, where firm size increases, dividend ratio will be increased.
g) **Tangible assets** - Tangible assets reduce the information gap about a firm's fundamental value as they are easier for investors to value than intangible assets (Harris & Raviv, 1991)
h) **Sales Growth** - investment opportunities measured as Annual change in Log of sales. A significant negative relationship between sales growth and dividend payout is expected as funds are reserved to support growth opportunities (Rozeff 1982).
i) **Research and Development** - Research and Development expenditure proxy for investment opportunities.
j) **Earnings per share** - Managerial Compensation contracts where incentives are based on certain threshold of Earnings per Share motivate managers to influence the payout policy as they aim to maintain (diluted) EPS above target levels such as analysts' forecasts.
k) **Institutional holdings** - Institutional holdings will proxy investors' tax clientele, as many institutions are tax exempt. (Grinstein and Michaley, 2005).

l) **Leverage** - Leverage is negatively related to dividend payout ratio; as highly levered firms maintain cash in a bid to boost their ability to honour future financial obligations (Al-Kuwari, 2009).

m) **Inside ownership** - Firms with high stakes of inside ownership are inclined to repurchase shares than paying dividends (Hsieh & Wang, 2008).

n) **RE/BE** – Under the life cycle model, firms with high retention of income have significant growth opportunities, therefore, a negative relationship is expected DeAngelo et al. (2006).

Table 1: Summary of Control Variables

PROXIES	CALCULATIONS	SOURCE	EXPECTED SIGN
MTB	Market Value of Assets/Book Value of Assets	Fama and French (2002).	+
Size	Logarithm of total assets	Kouki and Guizani (2009).	+
Log Firm Age	Log of (current fiscal year – fiscal year of first appearance in ALSI).	Mueller (1972).	-
Sales Growth	Change in log of sales	Amidu & Abor 2006	-
RE/BE	Retained Earnings/Common Stock	DeAngelo et al. (2006)	-
Profitability	Operating income before depreciation divided by total assets	Amidu& Abor 2006	+
Book Leverage	(Debt in Current Liabilities + Long Term Debt) / Assets	Bowman (1980)	-
Cash Flow Risk	Standard deviation of cash flow to assets ratio.	Bradley, Capozza & Seguin, (1998)	-
R&D/Assets	Research & Development cost/ Assets	Jensen & Solberg (1992)	-
Earnings per share	Net Income / No. of common stocks outstanding	Bens, Nagar, Skinner & Wong (2003)	+
Inside ownership	Total percentage of equity shares directly held by the board of directors of	Ullah et al., (2012).	- (dividends) + (repurchases)
Tangible assets	Fixed assets/ total assets	Harris and Raviv, (1991)	- (repurchases)
Institutional holdings	Institutional ownership percentage from I-ress	Grinstein & Michaley, 2005, (Bokpin, 2011).	+
Liquidity	Share turnover is used as a proxy for liquidity	Chan & Faff 2003	+

The emerging image from the theoretical and empirical framework supports the significance of firms' payout policy. Table 1 summarises the results of previous research on the relationship of control variables and payout policy. Recent trends discussed earlier show that some theories and motivations for the significance of payout policy have weakened overtime and cannot explain payout policy in today's firms sufficiently. This has left a gap between theoretical framework on payout policy and firms' actual payout policy. The unearthing of new powerful determinants of payout policy thus seems relevant to close the gap. Peer effects can be a promising determinant that will add a significant piece to the dividend puzzle.

2.7 Peer effects

2.7.1 Peer influence

Dividends peer effects are formally defined by Grennan (2019) as "the propensity of a firm to alter its dividend policy in a way that varies with the prevalence of the same action in some reference group containing the firm". Peer firms are defined as all other firms in the same Industry Classification Benchmark (ICB), which is equivalent to the DataStream Global Equity Indices level 2 code in a given year. Evidence on the indirect influence of peer firms on payout policy dates back to 1956, where Lintner's interviews revealed that peer effects were among the most important factors that determine different target payout ratios and adjustment rates. This was later on supported by Brav et al (2005), who, building on the benchmark of Lintner (1956), documented the "do not deviate far from the competitors" as one of the rules of the game regarding payout policy. Accordingly, managers' hands might be tied by peers' decisions if investors expect the firm to be aligned with its peers. This is consistent with earlier findings of Scharfstein and Stein (1990), who documented evidence of herding, as rational managers who are concerned about their reputation in the labour market may mimic the decisions of other managers, ignoring substantive private information. Although these survey findings provide evidence of peer influence, the empirical evidence is still limited.

Milliken (1987) documented that, the imitation process by managers is most stimulated in ambiguous environments, where managers might lack some relevant information on causality effects to assign probabilities and predict possible outcomes. Lieberman and Asaba (2006f2 a) grouped Brav et al's (2005) rule, "do not deviate far from your competitors" into the rivalry-based theory, whilst Milliken's (1987) imitation under ambiguous environments falls under the information-based theory. Looking at the high frequency of imitation behaviour and negative societal outcomes thereof, Lieberman and Asaba (2006) did emphasise that it is vital for business researchers, managers and policy makers to understand why imitation occurs and when it may have harmful implications. Consequently, this research analyses this phenomenon to provide further insight on the magnitude of peer effects, the causality of such effects and some pointers on how firms can account for such effects in their decision making.

2.7.2 Motivations behind peer effects in payouts/ heterogeneity in peer effects

In this section, the reasons why firms imitate their corresponding peers' payout decisions will be analysed. Founded on the economic theory, Grennan (2019) proposed four channels through which dividend peer effects occur, namely learning, overconfidence, reputation-building and industrial organisation with predatory behaviour. These channels will be analysed below.

Under the learning model, peer effects are a result of firms relying on peer-based information (Bikhchandani, Hirshleifer & Welch, 1992; Bursztyn, Ederer, Ferman &Yuchtman, 2014; Foucault & Fresard, 2014). Lieberman and Asaba (2006) classified this learning model under the information-based theory, where firms, usually younger ones, imitate payout policy of their better-informed peers (mature peers whom they believe have better information about product markets and investors). Such firms learn about their peers' policy from systems used for benchmarking and rationally update their decision-making process subsequently (Grennan, 2019).

The behavioural models are stirred by executive overconfidence with the alignment of their firm performance with the information learned from the peer firms. The executive ends up relying excessively or insufficiently on peer actions. It ends up weighting its firm performance irrationally, underestimating the variance that might arise between peer performance and firm-specific performance (Malmendier & Tate, 2005;2015). The dependence on relative position results in peer effects as overconfident executives misinterpret peers' successes as a signal that their own success is on its way.

The industrial organisation model generates peer effects when weak firms and financially constraint firms feel obliged to respond to strong peers which are cash-rich firms or industry leaders, to sustain their competitive edge with peers (Bolton & Scharfstein, 1990; Fudenberg

& Tirole, 1986). Lieberman and Asaba (2006) classify this model under the Rilvary-based theory. In a competitive market, if the peer group leader is aware that his peer rivals are compelled to imitate his payout policy, he might exploit this tendency to push their competitor into insolvency. However, in a low competitive environment, all firms can cluster to non-dividend payments resulting in peer effects.

Under the reputation-building model, executives aiming to improve their future employment prospects and rents are motivated to employ decisions that make them appear more reliable. An executive will, therefore, adopt peers' dividend policy if it will make them appear mature and reliable (Scharfstein & Stein, 1990).

2.7.3 Payout waves and identification challenges

Prior literature show that firms' payout decisions tend to occur at the same time. The first wave observed in the 1980s and 1990s, reflected an outstanding increase in share repurchases, especially in 1997, when aggregate repurchases dollar value triumphed dividends value. The second wave resulted in a concurrent decline in the proportion of dividend payers, specifically during the 1990s, where the number of dividend payers reached a record low of 24% (Dittmar & Dittmar, 2008). Despite this decline in the overall dividend payers, dividend payments have been persistent as shown by the increase in the aggregate volume of payments (DeAngelo, DeAngelo, & Skinner, 2003).

The factors that drive payout waves are grouped into two classes; direct influences of macroeconomics factors (common factors) and indirect influences of peer effects. Under the common factors, Dittmar & Dittmar (2008) documented that repurchase waves overlap with financing waves. Extant literature clearly shows how the first class of the common factors have led to a decline in propensity to pay dividends and simultaneously upsurge in dividends concentration due to earnings concentration, and how these factors have resulted in waves. However, there is narrow evidence on the indirect influences of peer effects that goes beyond the variations explained by the common factors' impact on payout waves.

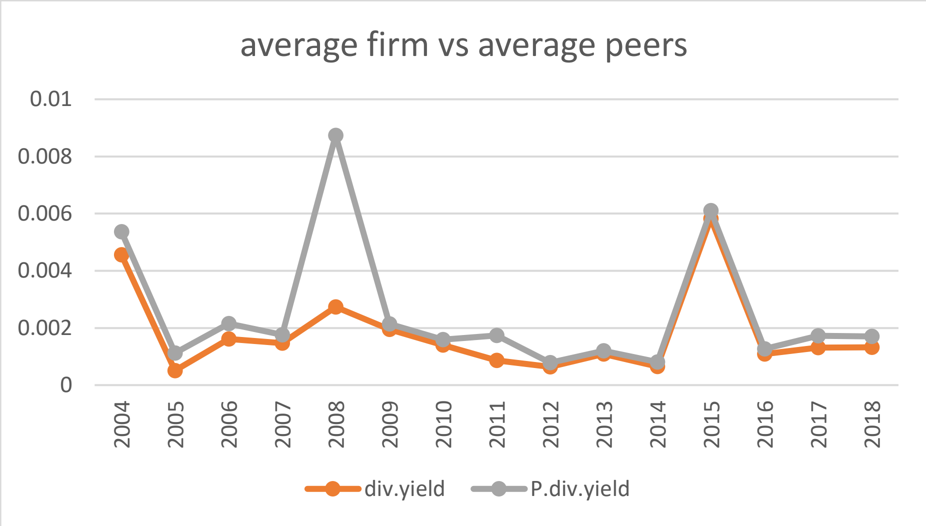
The challenge in distinguishing between the first and second class is delicate because the strength of idiosyncratic peer effects vary with market conditions. For example, Baker, Ruback &Wurgler (2007) state that peer effects could result from managers' irrational decisions or the result of rational managers' responses to an irrational market. Additionally, Rau and Stouraitis (2011) show that when repurchasing shares, managers are induced to time the market and take advantage of window-opportunities as different industries are overvalued and others undervalued simultaneously, resulting in their share issuance and repurchases waves coinciding at aggregate level. Earlier findings by Baker and Wurgler (2004) support this phenomenon, positing a behavioural influence on waves, as time series variation in payout policies results from time changing preferences for dividends and repurchases, while managers' reaction to these changes may be entirely rational. Overall, corporate waves are driven by a fundamental variable that affects all firms, at least within the same industry.

In differentiating peer effects from common factors effects, Popadak (2012) found evidence of peer effects through using various identification strategies. The author's document that the distinction is elusive as the strength of peer effects varies over business cycle. This study, therefore, employs alternative potential techniques which attempt to make the distinction clearer and examines the extent of the causality of peer effect, as well as the speed of adjustment.

2.7.4 Identification challenges and Instrumental variables

Figure 1 displays the averages of JSE's firm dividend policy (div. Yield) against peer dividend policy (P.div.yield), using dividend yield as a proxy. A strong positive correlation is observed, which shows that if peers increase or decrease their dividend yield, individual firms will do likewise. In appendix 1, eight different figures reflect the graphs for the eight individual firms plotted against their peers respective of the eight sectors they have been classified into. However, history shows that identifying peer effects has been a challenge, and the positive correlation between a firm's payout policy and its industry peers' policy may be subdued by a simultaneous response to common industry shocks. Manski (1993) defined this as the reflection problem.

Figure 1:Firm vs peers' correlation



The potential of the reflection problem in distorting the results of peer influence is curbed by adopting IVs used in Adhikari and Kagawal (2018). The method analyses peer's payout events (relevant only to peers but irrelevant to firm k's policies) affect firm k. Thus, exploiting how various peer firms' payout decisions driven by their personal equity shocks affect firm k's behaviour, even though firm k is not affected by these shocks.

The IVs is a model that identifies peers' payout decisions' shocks through their share return shocks (idiosyncratic returns) and idiosyncratic volatilities (risk). Firms' monthly stock price changes (which are readily available) are used to obtain information about these events. Using well recognised asset-pricing models of Fama and French (1993) and Carhart (1997), stock price changes are disintegrated into systematic (common factors) components and firm-specific shocks. These asset pricing models are applied as they are universally accepted in extracting cross-sectional returns and anomalies that have been documented as idiosyncratic returns. The model is then augmented with the industry factor to make it a five-factor model. The variables of the models will be briefly explained below.

2.8 Literature on Instrumental Variable factors (Explanatory variable)

Momentum investing is a trend-following strategy derived from an assumption that current trends in returns series will continue. If past performance of a stock is strong (winner), the performance is expected to persist and the stock which had a poor performance in the past (loser) is expected to perform poorly in the future (Jegadeesh and Titman, 2001). As investors are subject to behavioural biases, they tend to overreact to these market trends, taking a long position in high-returning assets (winners) while short-selling losers. The momentum effect refers to the tendency of winner stocks to outperform loser stocks. The momentum effect was officially presented by Jegadeesh and Titman (1993), and has since been extensively explored in various international stock markets, across different types of stocks, industries, and asset classes as well as over different time periods (for example, Rouwenhorst, 1998; Moskowitz & Grinblatt, 1999; Jegadeesh & Titman, 2001; Jostova, Nikolova, Philipov & Stahel, 2013; Barroso & Santa-Clara, 2015; Grobys, Ruotsalainen & Aijo, 2018). The momentum effect has also been found to exist in various capital markets such as the Asian, European and African capital markets and the effect in these emerging markets is comparable to those in developed markets (Hameed & Yuanto, 2000; Kang, Liu & Ni, 2002).

The value effect is the outperformance of stocks with low MTB equity ratios (value firms) relative to stocks with high MTB equity ratios (growth firms) due to their high market values. In finance literature, the strategy can be traced through four research streams; from the strategic view of Graham and Dodd (1934), Fisher (1958), Fama and French (1992) and Lakonishok, Shleifer & Vishny (1994). They recorded that value firms outperform glamour stocks in the long run. The existence of the value premium has been widely documented in stock markets around the world (for example, Capaul, Rowley & Sharpe, 1993; Fama & French, 1998; Abhyankar, Ho & Zhao, 2008; Fama & French, 2012; Asness et al., 2013; Cakici, Tang & Yan, 2016).

The size effect can be defined as the outperformance of low capitalised stocks over large capitalised stocks. Banz’s (1981) analysis on the relationship between size (total market value) and the risk-adjusted return of common stocks listed on the New York Stock Exchange from 1926 to 1975, show that a portfolio comprising of small stocks outperformed a portfolio of large stocks. In line with Banz’s paper, Reinganum (1981) revealed that the small firm stocks listed on both the NYSE and the AMEX outperformed the corresponding large firm stocks.

Many studies following that of Banz and Reinganum in the 1980s confirmed the existence of a significant size effect on the NYSE, AMEX and NASDAQ (Brown, Kleidon & Marsh, 1983; Fama & French, 1992). Comparable results are also documented for emerging markets (Barry, Goldreyer, Lockwood & Rodriguez, 2002; Hodnett, Hsieh & van Rensburg, 2012

CHAPTER 3

DATA AND METHODOLOGY

3.1 Introduction

This chapter outlines the methodology employed by the study to answer the research objective presented in chapter one. Data is presented, the main variables are constructed, and variables are defined. The chapter is organised as follows: Section 3.2 discusses the sample period, sample criteria and the data sources used in the study. Section 3.3 discusses the Empirical Methodology with Section 3.3.1 explaining the main model and Section 3.3.2 focusing on how the study overcomes the endogeneity problem, mainly the portfolio sorting and construction of the Instrumental Variables.

3.2 Data

The sample consists of data for firms listed on the Johannesburg Stock Exchange (JSE), from 1998 through 2018. The sample selection was steered by data availability and data concerns for periods before 1994 (the apartheid era) and 1994 to 1996 periods surrounding the elections. Share price and turnover monthly data (from 1998 to 2016) were obtained from the Findata@Wits database. Monthly share price data (from 2017 to 2018) were obtained from Iress database. Bloomberg database was the main source for dividend, share repurchases and annual accounting data. Consistent with other studies conducted on the JSE, the JSE ALSI is used as the market proxy (Page, 2012, Page, Britten & Auret, 2013; Sayed, Auret & Page, 2017). Moreover, Bloomberg illustrates that companies included in this index represent up to 99% of the total pre free-float market capitalisation of all listed companies on the JSE (Sayed, Auret & Page, 2017).

3.2.1 Sample Selection Criteria

The sample selection was steered by data availability and data concerns for periods before 1994 (the apartheid era) and 1994 to 1996 periods surrounding the elections. In line with Adhikari and Agrawal (2018), a firm should have at least twenty-four months of historical data and up to sixty months of data in estimation for it to be included in the sample, to avoid look-ahead bias in the rolling sample.

Following Fosu (2013), sample firms are classified into eight distinct industries using the Industry Classification Benchmark (ICB) in Table 2 shown below, which is equivalent to the DataStream Global Equity Indices level 2. Firms from financial firms, utility industries, and Real Estate Investment Trusts are excluded from the sample. These firms are excluded as their payout decisions are affected by heavy regulation such as financial leverage and profit retention stipulations. The eight sector indices selected serve as a good proxy for the whole share market as they fulfil the ergodicity principle for the entire All Share Economic Group Indices of the JSE except the utilities and financial index.

Table 2: Industry classification codes from the JSE

JSE Code	Industry
J500	Oil and Gas (OILGAS)
J510	Basic Materials (BMATS)
J520	Industrials (INDI)
J530	Consumer Goods (CGDS)
J540	Health Care (HC)
J550	Consumer Services (CSVS)
J560	Telecom (TELEC)
J590	Technology (TECH)

Source: FTSE/JSE Africa Index Series' ICB 2018

Common industrial classifications are adopted in this study, in preference to other alternatives such as product markets, compensation contract disclosures, analyst coverage and executive's business school (Hoberg, Phillips & Prabhala, 2014; Bizjak, Lemmon & Naveen 2008; Kaustia and Rantala, 2015).

3.3 Empirical methodology

In this section the main model which analyses the effect of peers on payout decisions is presented and the variables of the model are defined. However, due to the reflection problem described earlier, peer effects are isolated first before the main model is tested. To isolate the peer effects, Instrumental Variables are constructed using the Four Factor model of Carhart and Fama and French, augmented by the industry factor. The portfolio sorts methods used to obtain the four factors of the model are presented.

When the Instrumental Variables have successfully isolated the peer effects from the cross-variation returns of the four-factor model and the industry factor, the main model is analysed using the Instrumental Variable Probit and Tobit regressions. The tests are divided into four distinct sub-models that employ different methodologies, depending on the objective under consideration.

3.3.1 Peer effects on payout

To estimate peer effects on payout decisions, the empirical model applied follows that of Adhikari and Agrawal (2018). The estimation model is as follows:

$$Y_{kjt} = \alpha + \beta \bar{y}_{\_kjt} + \gamma' \ddot{X}_{\_kjt} + \acute{\lambda} X_{kijt} + \acute{\omega} vt + \varepsilon_{kjt} \qquad (1)$$

Equation 1 denotes the main model, which is an Instrumented Variable Probit (Tobit) regression model, applied to the cross-sectional regressions to eliminate the potential bias that can ensue when the data has both cross-sectional and time-series properties. Where, Y_{kjt} is the dependent variable that denotes the payout decision of firm *k* in industry j and year t. Y_{kjt} is captured by a dummy variable that equals 1 if the firm pays a cash dividend or repurchases its shares, change its dividend level, adjusts its target ratio or speed of adjustment due to peer influence in a given fiscal year, and 0 otherwise. The variable $\bar{y}_{\_kjt}$ denotes peer firm's average dividend or repurchase decision. Where $\bar{y}_{\_kjt}$ is the fraction of peer firms, changing their payout decision before an individual firm's declaration date. Assuming that $\bar{y}_{\_kjt}$ is endogenous, Instumental Variables are applied consequently. Concurrent $\bar{y}$_kjt measure is adopted, in contrast to lagged measures, as it is easier to identify peer effects if there are insufficient time lags for other variables to have influenced the firm's decision (Leary & Roberts, 2014). The vectors $\ddot{X}\_{kjt}$ and X_{kjt} encompass peer firm averages and firm-specific characteristics, respectively. The control variables vt and ε_{kijt} represent year fixed effects and the firm-specific unobservable error term that is assumed to be correlated within the firm and heteroskedastic, respectively

3.3.1.1 Definition of Variables

a. Dependent Variable

Y_{kjt} (the outcome variable) represents a measure of the payout decision of firm *k* in industry j and year t. Y_{kjt} is captured by a dummy variable that equals 1 if the firm pays a cash dividend or repurchases its shares or change its dividend level or adjusts its target ratio or speed of adjustment due to peer influence in a given fiscal year, and 0 otherwise.

The outcome variable (Y_{kjt}) varies in different models depending on the research questions under consideration. The four alternative models will be explained at a later stage.

b. Independent Variable

The independent variables are divided into two sections, the main explanatory variables and the control variables.

i. Peer instrumental variable

The key explanatory variable is the peer firm's average dividend or repurchases policy denoted by $\bar{y}\_{kjt}$. Peer influence is constructed by quantifying a time series of firm-specific peer payout decisions and calculates the fraction of peer firms, changing their payout decision before an individual firm's declaration date.

Two IVs are used to separate peer effects from common effects. The IV models identify shocks to peers' payout decisions through their stock return shocks (Peer Id.EquityShock) and idiosyncratic volatilities (Peer Id.EquityRisk). In line with Adhikari and Agrawal (2018), the Id.Equity.Shock is calculated as residuals obtained from monthly stock returns regressions on predicted Fama-French and Carhart factors and average industry excess returns, composited each year The Idios. Equity Risk is calculated as the logarithm of the standard deviation of the residuals obtained.

ii. Peer average variables and Firm-specific variables

The variables $\ddot{X}\_{kjt}$ and X_{kjt} encompass peer firm averages and firm-specific characteristics, respectively. Founded on the theoretical framework on asymmetric information, agency costs and taxes, peer firms and firm specific characteristics that have been dominant significant determinants of payout policy are controlled, for an unbiased outcome on peer influence. These include: *life cycle stages, cash flow risk and future growth opportunities, retained earnings to book equity(RE/BE), current profitability, cash flow volatility, size, MTB ratio, sales growth and R&D expenses* are included in the sample (DeAngelo et al., 2006; Grullon & Michaely, 2002; Fama & French, 2002; Grullon et al., 2011).

Table 3: Firm-specific variables

PROXIES	CALCULATIONS	SOURCE	EXPECTED SIGN
MTB	Market Value of Assets/Book Value of Assets	Fama and French (2002).	-
Size	Logarithm of total assets	Kouki and Guizani (2009).	+
Log Firm Age	Log of (current fiscal year – fiscal year of first appearance in ALSI).	Mueller (1972).	+
Sales Growth	Change in log of sales	Amidu & Abor 2006	-
RE/BE	Retained Earnings/Common Stock	DeAngelo et al. (2006)	-
Profitability	Operating income before depreciation divided by total assets	Amidu& Abor 2006	+
Book Leverage	(Debt in Current Liabilities + Long Term Debt) / Assets	Bowman (1980)	-
Cash Flow Risk	Standard deviation of cash flow to assets ratio.	Bradley, Capozza & Seguin, (1998)	-
R&D/Assets	Research & Development cost/ Assets	Jensen & Solberg (1992)	-
Earnings per share	Net Income / No. of common stocks outstanding	Bens, Nagar, Skinner & Wong (2003)	+
Inside ownership	Total percentage of equity shares directly held by the board of directors of	Ullah et al., (2012).	- (dividends) + (repurchases)
Tangible assets	Fixed assets/ total assets	Harris and Raviv, (1991)	- (repurchases)
Institutional holdings	Institutional ownership percentage from I-ress	Grinstein & Michalev, 2005.	+
Liquidity	Share turnover is used as a proxy for liquidity	Chan & Faff 2003	+

However due to the reflection problem or multicollinearity issues associated with the main explanatory variable, IVs are constructed and applied to curb this problem.

3.3.2 Constructing Instrumental variables

Following Adhikari and Agrawal (2018), firm specific stock price shock is analysed, with a model that is augmented with the four factors (market, size, book-to-market and momentum) in order to capture the cross-sectional variation of returns. Equation 1 below is estimated for each firm on a rolling annual basis using historical monthly returns.

The model is as follows:

$$R_{kjt}= \alpha_{kjt}+ \beta^{M}{}_{kjt}*MKT_t+ \beta^{SMB}{}_{kjt}*SMB_t+\beta_{kjt}{}^{HML}*HML_t+ \beta_{kjt}{}^{MOM}*MOM_t + \beta_{kjt}{}^{IND}(\bar{R}\_{kjt}-RFt) + \eta_{kjt} \quad (2)$$

$$Expected\ Return_{kjt} \parallel \hat{R}_{kjt}= \hat{\alpha}_{kjt}+ \hat{\beta}^{M}{}_{kjt}*MKT_t+ \hat{\beta}^{SMB}{}_{kjt}*SMB_t+\hat{\beta}_{kjt}{}^{HML}*HML_t+ \hat{\beta}_{kjt}{}^{MOM}*MOM_t+ \hat{\beta}_{kjt}{}^{IND}(\hat{R}\_{kjt}-RFt) +\dot{\eta}_{kjt} \quad (3)$$

$$Idiosyncratic\ Return_{kjt} \parallel \hat{\eta}_{kjt} = Rkjt - \hat{R}_{kjt} \quad (4)$$

The estimated coefficients from Equation (2) and monthly factor returns from year t are used to calculate the expected and idiosyncratic returns as demonstrated in equation *(3)* and *(4)* above. The variables are explained in the table below where:

Table 4:Factors Variables

R_{kjt}– denotes the total stock return for firm *k* in industry j over the month t	**α_{kjt}** - represents the fixed year effects.
($\bar{R}\_{kjt}$ - RF_t) - is the excess return on an equally weighted industry (ICB code) portfolio, not including firm *k*’s return. Where RF_t is the risk-free rate obtained from the 90-day Treasury bill rate	**MKT_t** - is the excess market return.
η_{kjt} - intends to eliminate any common variation in stock returns across the industry	**SMB_t** - is the size factor
MOM_t - is the momentum factor	**HML_t** - is the book-to-market factor

The letters with hats designate estimated parameters. The return shock, $\hat{\eta}_{kjt}$, displayed in the model above is the firm's return after removing all known sources of the four-factor model (that is, exposure to market, size, book-to-market and momentum factor). Simulating Adhikari and Agrawal (2018), the model augments the four-factor model of Fama and French and Carhart with industry average excess return *($\bar{R}\_{kjt}$ -RFt)*, to eliminate any remaining correlation in the residuals among the firms in the industry.

3.3.2.1 Portfolio formation (Univariate sorts)Sorts – Five-factor model

In this section portfolios are formed, and returns are calculated for the five-factor model that is going to be used in constructing the Instrumental Variables. The Market, Size, Value, Momentum and Industry portfolio sorts are analysed.

a. <u>Monthly Holding Period Returns</u>

The monthly holding period returns of the stocks are calculated as follows:

$$HPRi = \frac{P1 + Div1 - Po}{Po} \qquad (5)$$

Where, HPRi is the monthly holding period return of stock *i*.

Po is the opening price of stock at the of the month

P_1 is the closing price of stock I at the end of the month.

Div_1 is the dividend paid that month.

To obtain the five factors in equation 2, stocks were sorted into different portfolios as illustrated below, using the returns calculated above.

b. <u>Size and Value</u>

Annual portfolio sorts are conducted, where size is proxied by the natural logarithm of market capitalisation (Fama & French, 1993, 1996) and value is proxied by the book-to-market ratio (Fama & French, 1993, 1996; Basiewicz & Auret, 2009). Following Page (2012), shares are sorted into one of three portfolios based on their previous year's median book to market or average size. Portfolio cut-off points founded on the 66th and 33rd percentile for each style variable are inserted on the formation date of the cross-section of shares. The portfolio construction is designed to imitate medium-term (three year), long-term (five year) and extra-long term (seven year) buy-and-hold investment strategy and the average equally weighted returns of these portfolios are calculated. According to Page (2012), the use of three portfolios ensures a lower rate of shares migration between the portfolios, with the intention of containing a larger number of shares at the end of each holding period

c. Momentum

To account for bid-ask bounce and microstructure effects, momentum is proxied by the previous six months cumulative excess return less one month (Jegadeesh & Titman, 1993; Page, Britten & Auret, 2013 and Muller & Ward, 2013). Portfolio cut-off points founded on the 80th, 60th, 40th and 20th percentile for each style variable are inserted on the formation date of the cross-section of shares, resulting in five portfolios. Monthly time series portfolio returns are calculated arithmetically on a buy-and-hold basis assuming equal weighting at portfolio formation. The study did not drop delisted firms to control for survivorship bias and the returns were adjusted accordingly.

The stocks are ranked at each sort date in descending order and quintile breakpoints inserted in the ranking to allow all stocks to be assigned to one of five quantile portfolios (from portfolio 1 (winners) to portfolio 5(losers)) based on six months historical returns. From an analysis on the effects different holding and formation periods, Jegadeesh and Titman (1993) posit that the six months period proved to correspond to the most representative horizon. The total selection of stocks is divided into quintiles based on their historical cumulative returns and stocks that represent the top 20 % returns makes the winner portfolio whilst those representing the bottom 20 % returns from the loser portfolio. In line with Grobys (2016) and Jegadeesh and Titman (2001), equally weighted portfolios are constructed through selection of stocks based on six months historical returns, where the investor buys the best performing stocks (winners) and sells the worst performing stocks (losers) to create a zero-cost portfolio, commonly referred to as WML (winner-minus-losers). The monthly WML return at time t is calculated as the difference between the mean monthly return of the winner and loser portfolio.

Industry

Following a calculation guideline from the FTSE/JSE Africa Index series, industry returns are calculated as the excess return of an arithmetic weighted sector (industry- three-digit Industrial Classification Benchmark code) portfolio, where the weights are the free float market capitalisation of each firm, excluding firm k's return. The performances of the industries were obtained from their indices on Iress. The return component of firm *k* is removed from the total returns of the industry using the equation below:

$$[\left(\frac{shares-in-issue}{index\ divisor}\right) * change\ in\ share\ price * free\ float\ factor]/100 \qquad (6)$$

Where:

-the divisor is an arbitrary number chosen at the starting point of the index to fix the index starting value (say, at 100)

- free float factor is the investability weighting change in share price is the change in share price of firm i

-the price index is the sum of the market values of all firms within the index and each constituent company is weighted by its market value.

When the Instrumental Variables have successfully isolated the peer effects from the cross-variation returns of the four-factor model and the industry factor, the main model is analysed. The tests are divided into four distinct sub-models that employ different methodologies, depending on the objective under consideration. Fixed effects, Probit and Tobit regressions are applied for the cross-sectional regressions to eliminate the potential bias that can ensue when the data has both cross-sectional and time-series properties. The regressions of the models are divided into two stages. The first stage of the IVs regressions, estimate peer firms' payout decisions using peer firms' average share returns shocks and the volatility of these shocks. The IVs are constructed to curb the reflection problem illustrated earlier. The second stage regression uses the peers' estimated (instrumented) payout decisions from stage one to explain firm-specific payout decision. Additionally, time series tests are conducted for robustness check using Vector Autoregressions models.

CHAPTER 4

ANALYSIS OF RESULTS

This section presents the findings of the study, firstly the descriptive statistics and correlation of variables are analysed, followed by the results from the preliminary regressions of the IVs construction. Lastly, the results of the first stage and second stage regressions of the peer effects on firm payout policy are presented. These results are categorized in four different sub-models of the main model.

4.1 Summary statistics

The final sample of 1 928 firm-year observations, consisting of about 241 different firms over a twenty-three-year sample period is analysed. There are eight industries (sectors) identified by their ICB codes and each industry has a median of twenty-nine firms and a mean of thirty-three firms, with a minimum of eleven firms and a maximum of sixty-eight firms in an industry, with a variation of 22.42. The Energy sector (Oil and gas J500) has the minimum constituents. Barriers to entry such as high resource ownership, high capital, strict proprietary and environmental regulations and high operating cost might be limiting the number of firms in this industry. Since South Africa is a resource-based country, it is not alarming to see the to see the Materials sector (J510) with the most constituents. This is in line with Raubenheimer (2010), who posit that the resource sector is a heavily concentrated sector, and if one is to use market capitalisation as a measure, two resource companies can constitute over 20 percent of the JSE All share Index (ALSI) and the top five of the assumed 165 shares in the index make up over 40%. This might have contributed to the positive skew of (+0.597162) among the industries.

The table reports the mean, standard deviation, minimum and maximum observations of the sample with dividend payout ratio as a dependent variable. An average of 65% of firms on the JSE pay dividends, with a variation of dividends paid of 6.4%. The average dividend payout ratio is 39% with a minimum of zero and a maximum of 90.96 and a variation on dividends paid of 386.23. The variance on dividends payout ratio, reflect that, although the firms payout decisions are correlated with their peers as shown in figure 1, the percentage of income distributed as dividends vary significantly amongst different sectors (industries).

In line with DeAngelo et al., (2006), dividends payments are concentrated amongst mature profitable firms with few growth opportunities. Dividends were mainly issued in the Industrial Sector (J520). The industry has mature profitable firms with lower sales growth and cashflow risk, high liquidity and lower leverage levels. The Energy sector (J500) issued less dividends. The sector is characterised with growth firms, higher leverage and cashflow risk, lower levels of liquidity and profitability. Moreover, the J500 sector repurchased the lowest stocks. On the other hand, the telecommunication sector (J560) repurchased more shares. The sector has mature firms with highest level of Earnings Per Share (EPS), profitability, inside ownership and liquidity. Firms in this industry have lower cashflow risk, MTB and sales growth. This is in line with Louis and White (2007) and Harford and Zhang (2015) findings, which stipulates that managers whose compensation is linked to EPS threshold are motivated to repurchase shares in their bid to lower undervaluation and EPS dilution.

An average of 5% share repurchasers contrast the substitution hypothesis of Grullon et al., (2002), as repurchases constitute a small percentage of payouts and dividends remain the main form of payout. On average, the amount of dividend (share repurchases) represents about 4.8% (0.2%) of assets, which makes the mean total pay-out of 5.0% of total assets. Although, the amount of repurchases (0.2%) is smaller compared to the 4.8% of dividends, there has been a significant increase in repurchases over the years. According to Grullon et al., (2002), large firms in different sectors have a propensity to repurchase shares, however, small firms prefer to pay out their excess cash as repurchases which are flexible compared to sticky dividends. Statistical evidence concur with the findings of Le Roux (2006) which stipulates that South African firms prefer to use share repurchases to distribute excess cash than special dividends, which dilute their EPS. In line with the life cycle of DeAngelo et al., (2006), firms in the Technology sector (J590) with high growth opportunities retained the highest percentage of Retained income/Common Equity.

The average annual equity return shock is -4% and the standard deviation idiosyncratic monthly return is 3.2%. The idiosyncratic shock and risk values have the same signs and statistical significance at 1% level. However, their economic significance is lower than that of Adhikari and Agrawal (2018), who obtained -4% equity return shock and 13.2% idiosyncratic risk possibly due to differences in markets. The results are comparable to those of Auret and Page (2019), though the economic significance is still lower due to a smaller sample used in the study. The results are in line with Baker, Bradley and Wurgler (2011) who found evidence of both a low idiosyncratic return and idiosyncratic risk premium.

The peer firm average variables are similar to the firm-specific variables, but the standard deviation of the peer average are lower than those of the firm-specific variables.

Table 5: Descriptive Statistics of Firm-specific and Peer-average variables

Panel A	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P-value
Div Total Assets	0.048	0.028	0.000	0.322	0.059	1.877	6.86	177	0.000
Div Fraction	0.653	0.698	0.809	0.275	0.064	1.540	2.21	NA	NA
Rep Total Assets	0.002	0.000	0.095	0.000	0.010	8.253	75.00	33196	0.000
Total Payout total assets	0.049	0.028	0.000	0.322	0.057	1.928	7.51	214	0.000
Repurchasers	0.051	0.047	0.099	0.000	0.012	0.125	-0.24		
Sales Growth	0.024	0.014	0.195	-0.042	0.033	2.434	11.48	542	0.000
MTB	3.293	2.833	23.380	0.000	2.702	3.168	22.54	2567	0.000
R &D Total Assets	0.001	0.000	0.019	0.000	0.003	4.446	22.29	2746	0.000
Firm Age	1.274	1.449	1.785	0.000	0.462	-0.989	3.20	24	0.000
REBE	0.262	0.247	2.480	-0.254	0.263	4.200	36.18	7127	0.000
Firm Size	4.018	4.087	5.497	0.000	0.900	-1.039	5.19	56	0.000
Profitability	0.188	0.183	0.511	-0.141	0.108	0.180	3.87	5	0.066
Cashflow Risk	0.041	0.025	0.213	0.000	0.042	1.691	5.57	105	0.000
Firm Idios Shock	-0.002	-0.003	0.092	-0.067	0.027	0.554	4.32	17	0.000
Firm Idios Risk	0.062	0.055	0.196	0.014	0.032	1.547	5.93	107	0.000
Insider Ownership	0.019	0.000	0.965	0.000	0.108	7.696	63.60	23781	0.000
Instit Ownership	5.635	0.000	135.070	0.000	22.359	4.295	20.56	2324	0.000
Leverage	0.125	0.115	0.351	0.000	0.103	0.337	1.91	10	0.007
Liquidity	9.784	10.162	11.486	0.000	1.764	-3.719	20.62	2164	0.000
Tangible Assets	0.310	0.289	0.660	0.000	0.205	0.181	1.63	12	0.002

Table 5 Cont……

Panel B	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
Peer Div Fraction	0.667	0.667	1.000	0.100	0.202	-0.648	3.50	12	0.003
Peer Rep Fraction	0.051	0.000	0.750	0.000	0.105	3.031	15.98	1248	0.000
Peer Div Total Assets	-0.029	-0.027	0.000	-0.272	0.027	-4.932	43.83	10734	0.000
Peer total (	-0.029	-0.025	0.000	-0.272	0.027	-5.090	45.52	11629	0.000
Peer Sales Growth	0.033	0.017	1.846	-1.112	0.193	4.453	63.00	22382	0.000
Peer MTB	2.179	2.028	12.614	-20.314	2.886	-4.169	36.20	7126	0.000
Peer RD TA	0.002	0.000	0.048	0.000	0.006	4.827	29.68	4897	0.000
Peer Firm Age	1.359	1.388	1.681	0.853	0.184	-0.445	2.47	7	0.039
Peer RE BE	0.120	0.149	0.344	-0.515	0.149	-1.390	5.63	89	0.000
Peer Firm Size	3.262	3.304	4.356	1.387	0.530	-0.651	3.60	13	0.002
Peer Profitability	0.083	0.142	0.269	-5.035	0.440	-10.938	127.46	97142	0.000
Peer Cashflow Risk	0.085	0.050	1.836	0.007	0.181	7.588	67.30	26555	0.000
Peer Idios Shock	-0.004	0.000	0.062	-0.217	0.032	-2.402	15.98	1166	0.000
Peer Idios Risk	0.059	0.053	0.216	0.002	0.037	1.137	5.61	73	0.000
Peer Insider Ownership	0.015	0.000	0.174	0.000	0.028	2.794	12.02	685	0.000
Peer EPS	5.754	0.024	835.430	-0.054	69.138	11.959	144.01	124434	0.000
Peer Instit Ownership	0.204	0.000	0.680	0.000	0.228	0.479	1.65	17	0.000
Peer Leverage	0.226	0.155	7.023	0.060	0.573	11.566	137.75	113707	0.000
Peer Liquidity	8.289	8.419	10.357	3.944	1.110	-1.564	7.00	157	0.000
Peer Rep Total Assets	0.001	0.000	0.028	0.000	0.003	7.654	72.66	30945	0.000
Peer Tangible Assets	0.321	0.304	0.574	0.074	0.125	-0.032	2.24	4	0.172

4.2 Unit root test

In regression models, testing for the present of unit root is important to avoid "spurious regression" problems stated by Granger and Newbold (1974). A unit root test will therefore, determine whether trending data in the study should be first differenced or regressed on deterministic functions of time to render the data stationary. A joint test of stationarity is run on the factors to ascertain the stability of the IVs. The Augmented Dickey Fuller (ADF) test is applied as it is appropriate where there are additional lags of the first difference. The results presented in Table 6 indicate that the variables (HML, IND, MKT, MOM and SMB) are stationery at 1% level of significance. Furthermore, the ADF results are supported by the AR unit root test which shows that the data is stationary as the roots for all the factors are close to zero and inside the circle.

In addition Table 7 shows that some of the explanatory variable, namely, cashflow risk, firm age, inside ownership, profitability, sales growth, retained income and research development are stationary in level terms. However, size, institutional ownership, leverage, MTB and tangible assets variables had to be logged and are thus stationary after first differencing at 1% level of significance. The table shows the importance of ADF unit root test, as the First Differencing I(1) de-trended the data and made the variables to be stationary, thus, spurious results are avoided. For these variables, their first difference or logged variables are used in the regression models.

Table 6:ADF Unit root Test- five factor variables

Augmented Dickey-Fuller Unit Root Test					
Null Hypothesis: the variable has a unit root					
At Level					
	HML	IND2	MKT	MOM	SMB
With Constant	-12.965***	-26.638***	-23.142***	-31.259***	-6.987***
With Constant & Trend	-12.977***	-26.684***	-23.142***	-31.249***	-6.983***
Without Constant & Trend	-12.163***	-25.613***	-21.165***	-9.882***	-5.634***
MacKinnon prob-values	0.000	0.000	0.000	0.000	0.000
At First Difference					
	d(HML)	d(IND2)	d(MKT)	d(MOM)	d(SMB)
With Constant	-17.499***	-23.004***	-15.912***	-16.383***	-14.601***
With Constant & Trend	-17.494***	-22.998***	-15.907***	-16.374***	-14.607***
Without Constant & Trend	-17.504***	-23.009***	-15.916***	-16.388***	-14.603***
MacKinnon prob-values	0.000	0.000	0.000	0.000	0.000

*a: (***,**,* indicates significance at the 1,5,10% level of significance, respectively)*

b: Lag Length based on SI

Table 7:ADF Unit root test – Explanatory Variables

At Level													
	cashflow_risk	firm_age	firm_size	insider_ownership	instit_ownership	leverage	liquidity	mtb	profitability	r_d_ta	re_be	sales_growth	tangible_assets
With Constant	0.0714**	0.0001***	0.9054	0.2889	0.2389	0.0673	0.8985**	0.7905	0.6364	0.4700***	0.7505	0.0367**	0.5910
With Constant & Trend	0.2277	0.0001***	0.0435	0.5191	0.4416	0.2080	0.3690	0.6364	0.0303**	0.0351***	0.0794*	0.0679*	0.1489
Without Constant & Trend	0.0437	0.9999***	0.9359	0.1632**	0.5133	0.6168	0.8686	0.8374	0.8032	0.7712***	0.6491	0.0039	0.6219
	At First Difference												
	d(cashflow_risk)	d(firm_age)	d(firm_size)	d(insider_ownership)	d(instit_ownership)	d(leverage)	d(liquidity)	d(mtb)	d(profitability)	d(r_d_ta)	d(re_be)	d(sales_growth)	d(tangible_assets)
With Constant	0.0322**	0.0001***	0.1081*	0.2850**	0.0335**	0.0243**	0.1846	0.0443***	0.0030***	0.0016***	0.0136	0.0014***	0.0895***
With Constant & Trend	0.2436**	0.0001***	0.1490	0.4648*	0.0981	0.1260**	0.3840*	0.1372***	0.0275**	0.0146***	0.0412	0.0079**	0.5621**
Without Constant & Trend	0.0016***	0.0001***	0.0150***	0.0391**	0.0029***	0.0013***	0.0291***	0.0136**	0.0010***	0.0012***	0.0121***	0.0001*	0.0074***

Figure 2: ADF Inverse Roots - Five factor variables

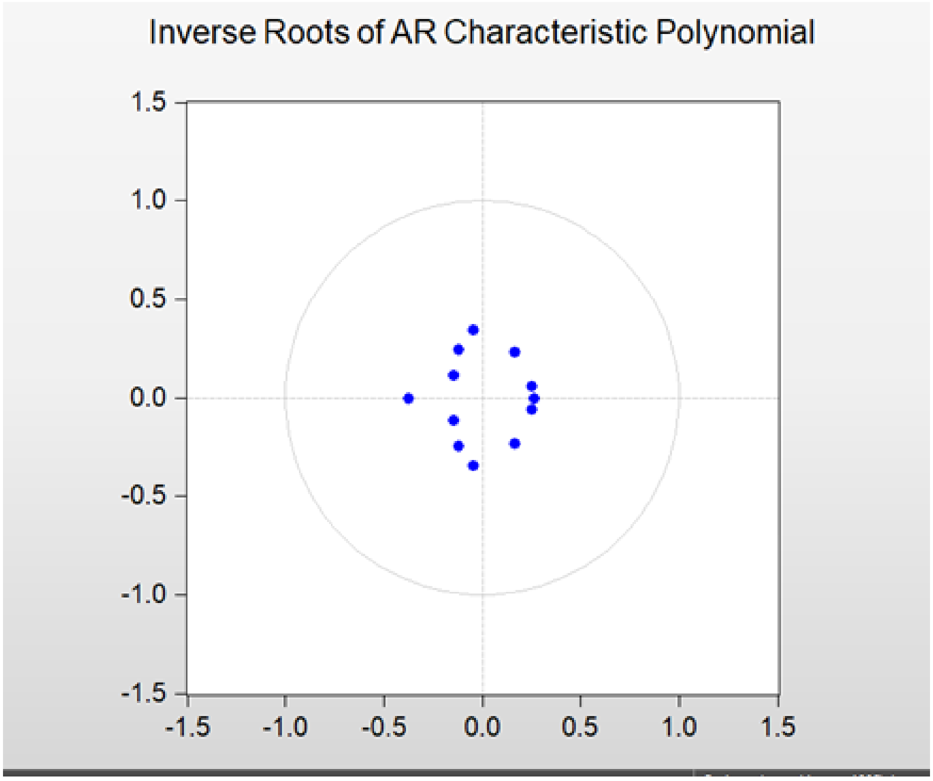
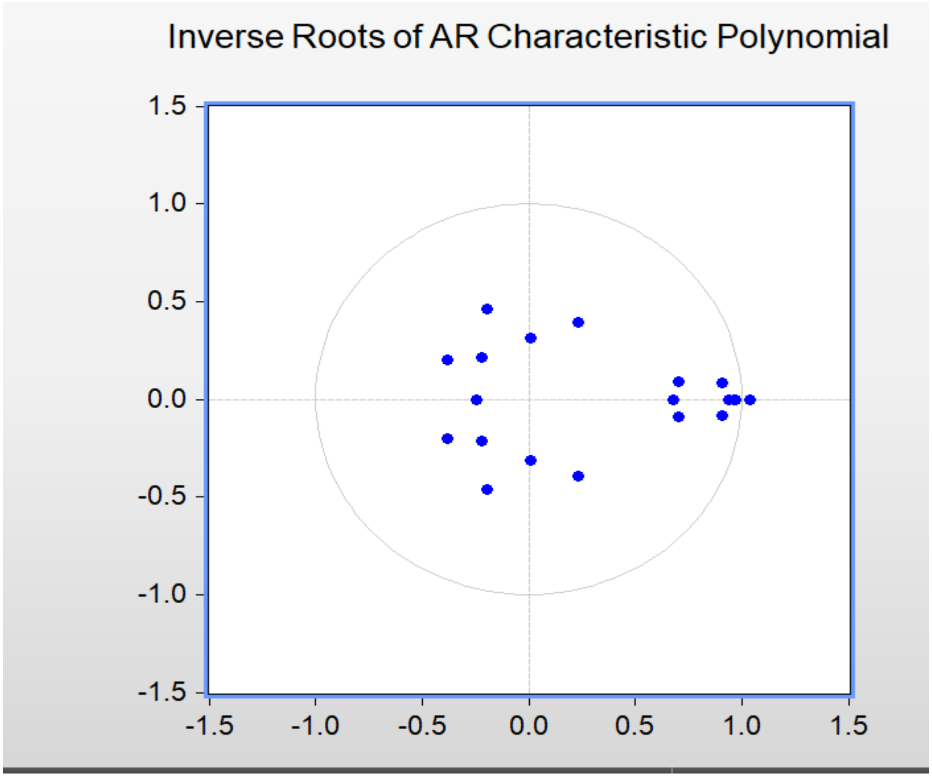


Figure 3: ADF Inverse roots - Explanatory Variables



4.3 Regressions

Analysis of the results obtained from the first and second stage regressions begins with a summary of the five-factor regression. The IVs results are analysed, by first presenting the five-factor model results followed by the validity of the constructed IVs. These are used in the main model which tests the peer effects on firm payout decisions. The results of the main variable are divided into four sub-model depending in the variable in question.

4.3.1 Five-factor Model

The five-factor model is analysed and the validity of the model in parsing out the common factor returns is investigated. The idiosyncratic monthly returns are extracted and applied in the first and second stage regressions. Specifically, the fitted value (Instrumented Peer Variable) obtained from the five-factor model predict the firm's specific payout decision in the second stage regressions of the main model.

Table 8: Mean, median and standard deviation of Factor Regression Results

	Mean	**Median**	**S.D**
α_{ijt}	-0.0057	-0.0059	0.0152
$\beta^{M}{}_{ijt}$	-0.0060	-0.0050	-0.0060
$\beta^{SMB}{}_{ijt}$	-0.0040	0.0095	-0.0040
$\beta_{ijt}{}^{HML}$	0.0520	0.0515	0.0520
$\beta_{ijt}{}^{MOM}$	0.0160	0.0200	0.0160
$\beta_{ijt}{}^{IND}$	0.0021	0.0018	0.0021
Obs Per Regression	52	60	08
R-squared	0.1337	0.0890	0.1084
Adj.R-squared	0.1153	0.070	0.1107
Monthly Return	0.0092	0.0072	0.0015
Expected Monthly return	0.007826	0.0071	0.0200
Idiosyncratic Monthly returns	0.0014	0.0011	0.0102

Source: Iress2019 and Author's own estimates

Table 8 presents summary statistics for the estimated factor regressions. The table depicts the coefficients of the explanatory variables of the IVs factor regressions. The majority of the regressions have a full five-year (60 month) window, with an average number of months per rolling regression over the year of 52(60). The Adjusted R-squared shows that the factor returns explain 11.53% of the total variation in share returns over the sample. The R-squared of 13.37%

shows that returns on the JSE are explained by other factors such as macroeconomic factors besides these factors. Since this model's purpose is not to fully exhaust all the factors that affect share prices, one can argue that these stylised factors do significantly contribute to the variations in share prices at 1% level. In the same vein, Auret and Page (2019) argue that the factor regressions load positively on value, industry and momentum factors and negatively on market and size factors, significant at 1% level. The coefficient of the factor regressions depicts that a unit positive change in the size will result in a negative monthly average return of -0.4%. This implies that as firms mature, their risk premium decreases, hence the reduction in average monthly returns. The results show that the size effect persist, small firms have higher returns due to their higher level of risk. The value coefficient shows that a unit positive change in the book-to-market ratio will result in a positive holding period monthly average return of 1.2%, thus the value effect persist

The economic size of the momentum is greater than the value and size. The momentum coefficient displays that for every one-unit increase in momentum there will be an additional 1.6% in average excess return per month. The positive coefficient shows that past winners keep on winning and the momentum effect is confirmed. As expected, industry beta has the smallest load in absolute terms, depicting that the four factors successfully removed most of the systematic variation in the stock returns. Moreover, the five-factor model results validate the IVs used, as these factors do indeed affect firm returns. The purpose of the IVs is to identify factors that can be used in place of serially correlated factors. Thus the model used is good in extracting the IVs. These result corroborate other results on the JSE in size, momentum and value effect. See for instance (Rensburg & Robertson, 2003; Basiewicz & Auret, 2009; Auret & Page, 2019) papers. Similar to the results of Adhikari and Agrawal (2018), the average idiosyncratic return is roughly 10 basis points.

4.3.1 Validity of the Instrumental variables

The validity of the peer effects on firm payout decisions will largely depend on the validity and quality of the Peer Idiosyncratic return and Peer Idiosyncratic risk (the Instrumental Variables). If the Instrumental Variables (IVs) are valid and of good quality, they are expected to meet the relevance and exclusion criterion conditions. For the relevance condition, the Peer Idiosyncratic return and Peer Idiosyncratic risk must be strongly correlated with the endogenous regressor (peers' dividends and repurchase policy). While under the exclusion restriction criterion, the Peer Idiosyncratic return and Peer Idiosyncratic risk must not have a direct effect on the dependent variable (firm-specific dividend and repurchase decisions).

The two IVs (Peer Id.EquityShock and Peer Id.EquityRisk) are expected to predict peers' dividend decisions significantly as they contain information on peers' future profitability and cash flow volatility, relevant for cash dividends (Adhikari & Agrawal, 2018). To illustrate how the IVs are related to the important determinants of dividends, peers' average future profitability and cash-flow volatility are regressed on the IVs.

Table 9:Relevance of the IVs for dividends

	Model 1	**Model 2**	**Model 3**	**Model 4**
Variables	**Peer**	**Peer**	**Peer Profitability**	**Peer Cash Flow**
Peer Id.EquityShock	**0.0449*** **	**0.0609*** **	**0.0314*** **	**-0.0056*** **
	(3.6487)	(3.2015)	(2.9676)	(-3.4488)
Peer Id.EquityRisk	**-0.5591*** **	**-0.01365*** **	**-0.0105*** **	**0.00855*** **
	(-3.7596)	(3.1522)	(-2.8882)	(2.8964)
Peer Profitability	**0.4248*** **	**0.4407** **	**0.3731** **	**0.08715** **
	(2.8171)	(2.3024)	(2.3451)	(4.3547)
Peer Sales Growth	**0.259550*** **	**0.5077*** **	**0.2270**	**0.2026**
	(5.0835)	(8.1524)	(1.5440)	(4.2826)
Peer MTB	**-0.0030*** **	**-0.0015**	**-0.0034**	**0.0007**
	(-2.1608)	(-0.5125)	(-1.4699)	(1.0123)
Peer Log(firm Age)	**0.1966* **	**0.085114*** **	**0.0479**	**-0.0037**
	(1.8177)	(2.7692)	(0.5348)	(-0.1369)
Peer Size (JSE %ile)	**0.036643*** **	**0.07518*** **	**0.0055* **	**-0.0049**
	(2.6230)	(3.0582)	(1.7811)	(-0.2612)
Peer RE/BE	**-0.0872**	**-0.0893**	**-0.272812*** **	**-0.0191**
	(-1.0987)	(-0.9699)	(-3.6226)	(-0.7125)
Peer Cash Flow Risk	**-0.02089*** **	**-0.0084**	**-0.0689*** **	**-0.034413*** **
	(-4.0972)	(-3.0334)	(-2.7568)	(3.5353)
Peer R& D/Assets	**-2.753505*** **	**-0.3157**	**-0.0054**	**0.339509*** **
	(-2.6275)	(-0.2589)	(-0.0054)	(1.1133)
Constant	**-0.104724*** **	**0.120928*** **	**0.115373** **	**0.044465*** **
	(-3.2450)	(7.2635)	(6.8522)	(9.9055)
N	241	241	241	241
Adj-R-squared	0.0914	0.0529	0.0070	0.0201

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively*

t statistics are reported in brackets

4.3.1.a. Relevance Criteria

Table 9 presents the results of peers' average future profitability and cash flow volatility regressed on peers' average idiosyncratic equity shock (Peer Id.EquityShock) and equity risk (Peer Id.EquityRisk). The study departs from using fixed effects in Adhikari and Agrawal (2018) and adopts Robust least Squares to eradicate potential bias from outliers in the panel data (Bramati & Croux, 2007). In line with Adhikari and Agrawal (2018), Model 1 shows that the IVs, peers' equity shock (risk) positively (negatively) predict the future profitability significantly at 1% level, for years $_{t+1}$ to $_{t+3,}$ even after controlling for other variables related to profitability, including current profitability. The findings are in line with finance literature. The IVs strongly predict peers' dividend decisions and these variables encompass information about market's expectations of peers' future profitability (DeAngelo, 1996; Denis & Osobov, 2008). The results show that the IVs are more economically significant in explaining peer influence on the JSE compared to the findings of Adhikari and Agrawal (2018). This was expected as the JSE is associated with high levels of asymmetric information compared to a more developed and transparent NASDAQ market in Adhikari and Agrawal (2018) , hence higher idiosyncratic risks.

Model 2 and 3 show that though the IVs are significant in model 1, the further we focus into the future the less effective they become in predicting the market's expectations about peers' future profitability and cash flow risk. Miller (1987) posítulated that most of the signalling empirical models produced weak future earnings because dividends are better described as lagging than leading earnings. Model 4 shows that the IVs, Id.Equity.shock (risk) negatively (positively) predicts future average cashflow risk (Peer Cash flow risk($_{t+1,\ t+5}$), significantly at 1% level. In a nutshell, the results indicate that the IVs contain information about market's expectation about peers' profitability and cash flow risk, and the relevant criterion is met. The impact on cashflow risk is higher for the JSE compared to those of Adhikari and Agrawal (2018), and, this can be attributed to the fact that NASDAQ firms are well established and bigger in size to be faced with low cashflow risk.

In line with Adhikari and Agrawal (2018), the IVs are less significant in predicting peers' repurchase policies. Repurchases are regarded as residuals and are not sticky as dividends, hence they are weakly dependent on the level of future profitability, where as share repurchases are mainly influenced by undervaluation. Peer Idios. Shock negatively predict repurchases and peer idios.risk negatively predict repurchases as repurchases depend on large sums of free cash flow and firms with high cashflow risks are unlikely to buy back their shares. This is in line with Dittmar and Field (2015) who posited that share repurchases are expected to be strongly dependent on market timing not future profitability, as they are a temporary commitment by a firm that does not need to be sustainable overtime.

The other variables are included for robust tests and the size, firm age, MTB and research and development variables (which are control variables) are all significant for predicting future and cashflow risk summarise the findings or results on other vital variables which are control variables.

4.3.1.b Exclusion Criteria

The exclusion restriction stipulates that the IVs should only affect firm-specific dividend decisions through their effect on peers' dividend decisions. The five-factor model adopted from Adhikari and Agrawal (2018) ensures that the idiosyncratic stock returns and risks are obtained as the residuals from a Fama-French and Carhart model, with the models being augmented further by the industry factor as well. Thus the residuals obtained in the study are purely firm-specific. These models are well recognised in asset-pricing literature for decomposing stock returns into common and firm-specific shocks. The shocks are serially uncorrelated and cross-uncorrelated; thus firms' shocks do not forecast future shocks for themselves or for their peers.

4.3.2 Payout Decision models/ Sub- Empirical models

4.3.2.1 Model 1 – Peer effect on a firm's decision to pay dividends or to repurchase

Table 10 presents results on a firm's propensity to pay dividends or to repurchase shares. In this probit Instrumental Variable Probit model, Y_{ijt} is the dependent variable denoting a dummy which signify a binary instrumental, showing how peer firms affect a firm's decision to pay dividends (repurchases). The dependent variable for Column 1 is a dummy variable indicating peer dividend payer. The dependent variable for Column 2 is a dummy variable indicating whether or not a firm pays cash dividend in a fiscal year (Dividend Payer). Peer Repurchaser is the dependent dummy for Column 3 and Repurchaser is a dummy dependent variable for Column 4 indicating whether a firm repurchased its stock.

Table 10:Propensity to pay dividends or repurchases Panel A

Panel A	Column 1	Column 2	Column 3	Column 4			Column 1	Column 2	Column 3	Column 4
Variables	**Peer Div**	**Dividend**	**Peer Rep**	**Repurchase**		**Variables**	**Peer Div**	**Dividend**	**Peer Rep**	**Repurchaser**
	(IV	**(IV-Probit:**	**(IV Probit:**	**(IV-Probit:**			**(IV Probit:**	**(IV-**	**(IV Probit:**	**(IV-Probit:**
Peer Firm Averages						Peer Cash flow risk	**-4.0958*****	**-**	**-16.0047****	**-22.8681*****
Inst. Peer Div Payers		**2.7428****					(-2.9932)	(-3.1205)	(-2.7284)	(-3.2064)
Inst.Peer		-2.4219		**0.5025*****		Peer R&D/Assets	**-82.2954**	**-83.7666**	**127.6935**	**-86.213**
				-3.3309			(-0.6245)	(-0.4362)	-1.1634	(-0.4927)
Peer Sales Growth	**-3.3141***	**-3.3630****	**-0.8294****	**-1.2352**		Peer Leverage	**-3.7806**	**-1.0642**	**-46.7788****	**-76.2050***
	(-1.8953)	(-2.0515)	(-2.3025)	(-2.4747)			(-0.9429)	(-0.6958)	(-2.1688)	(-1.8646)
Peer MTB	**0.4576****	**0.4266***	**-0.1997*****	**0.1942**		Peer Liquidity	**1.1834****	**0.3433***	**5.1507****	**8.1849***
	-1.9185	-1.9185	(-3.7822)	-0.4052			-2.4373	-2.5003	-2.4245	-1.8629
Peer Log(Firm Age	**2.8895****	**2.8895*****	**0.5022**	**-5.0199**		Peer Inside	**-7.5175**	**-1.4699***	**7.0018**	**-5.0025**
	-2.7621	-2.7621	-0.0969	(-3.3608)			(-0.5804)	(-2.1235)	-0.3193	(-0.1277)
Peer Size (JSE %ile)	**0.1056****	**-3.1684****	**4.7598****	**-14.688***		Peer Inst.Ownership	**7.5045****	**5.74290***	**1.0625**	**-4.513**
	-2.9383	(-2.2294)	-2.5375	(-2.2783)			(2.55350	-1.7562	-0.2671	-0.6817
Peer RE/BE	**-9.0386****	**6.6380***	**-10.1390****	**-20.1317**		Peer Tangible Assets			**-22.7686**	**-94.6533**
	(-2.2595)	-1.7713	(-2.0412)	(-1.6232)					(-1.0651)	(-1.5895)
Peer Profitability	**1.3481****	**-1.1987*****	**5.2254*****	**7.9282**		Peer EPS			**23.1038***	**-0.0346****
	-3.2433	(-2.3106)	-3.6125	-0.5547					-1.8232	(-2.9797)

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively)*

t statistics are reported in brackets

Panel B- Propensity to pay dividends or repurchases Panel

Panel B	Column 1	Column 2	Column 3	Column 4			Column 1	Column 2	Column 3	Column 4
Variables	**Peer Div Payers**	**Dividend Payer**	**Peer Repurchase**	**Repurchaser**		**Variables**	**Peer Div Payers**	**Dividend Payer**	**Peer Repurchase**	**Repurchase**
	(IV Probit:1st	**(IV- Probit:**	**(IV Probit: 1st Stage)**	**(IV-Probit: 2nd Stage)**			**(IV Probit:1st**	**(IV- Probit:**	**(IV Probit: 1st Stage)**	**(IV-Probit: 2nd Stage)**
Firm Specific						**Firm Specific**				
Sales Growth	**-3.8734****	**-4.8144****	**-21.1151***	**-39.3430***		**Liquidity**	**4.0624****	**3.5294****	**28.6947*****	**21.0004*****
	(-2.2082)	(-2.2685)	(-1.9033)	(-1.8387)			-2.4158	-2.0888	-3.6643	-3.0576
MTB	**-0.061**	**-0.112**	**-0.4793****	**-2.0097***		**Inside Ownership**	**-1.9055**	**-2.4379***	**3.7216**	**9.7073**
	-0.3242	(-0.6135)	(-2.2698)	(-1.7556)			(-1.2738)	(-1.7272)	-1.1548	-1.4847
Log(Firm Age	**2.2412****	**1.3408***	**0.7353**	**2.631**		**Inst Ownership**	**0.0472****	**0.0339***	**-0.0233**	**-0.0594**
	-2.5781	-2.2924	-0.4444	-0.798			-2.3084	-1.7624	(-0.4899)	(-0.8835)
Size (JSE	**4.5148*****	**4.0463*****	**4.0398****	**8.5285***		**EPS**			**0.0195****	**-43.2784***
	-4.0961	-3.9391	-2.2898	-1.711					-2.6085	(-1.8216)
RE/BE	**-0.0353***	**1.5592**	**-10.1390****	**1.3670***		**Idios.Equity Shock**	**1.7311****	**0.1450*****	**-24.8386*****	**-27.1223***
	(-1.9194)	-0.7681	(-2.0412)	-1.927			-2.4037	-3.3146	(-3.2955)	(-1.9174)
Profitability	**0.5589***	**3.1391*****	**24.1208*****	**49.4962****		**Idios.Equity Risk**	**-7.8911*****	**-18.4359****	**10.5559****	**5.4437*****
	-1.8516	-3.6411	-3.8076	-2.861			(-2.7889)	(-2.6024)	-2.6016	-3.1827
Cash flow risk	**-14.9257***	**-10.4091****	**-12.3872****	**-48.6746****		**Instrumental**				
	(-1.8517)	(-2.2686)	(-2.7379)	(-2.8567)		**Lag1(Peer**	**4.5422*****		**-2.5422****	
R&D/Assets	**-3015.959****	**-2279.762***	**2854.692****	**-4781.025****			-2.6987		(-2.6987)	
	(-2.0172)	(-1.6899)	-2.4975	(-2.1271)		**Lag1(Peer**	**-19.1290*****		**-16.1290*****	
Leverage	**-3.467**	**-4.028**	**-128.1**	**-65.2998****			(-3.2218)		(-3.2218)	
	(-0.7573)	(-0.8607)	(-1.1037)	(-2.2168)		**R-Squared**	**0.6418**	**0.6515**	**0.6930**	**0.7729**
Observations	91	91	81	81		**Observations**	91	91	81	81

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively)* *t statistics are reported in brackets*

The results are displayed in two separate tables according to the explanatory variables. Panel A shows the results for peer variables where the main explanatory variable is the fraction of peer firms who are dividend payers (*Peer Div. Payers*).The instrumental variable probit (IVP) model are lagged *peers' idiosyncratic return shocks* and lagged *peers' idiosyncratic risk* and control variables. The study simulates the methodology of Adhikari and Agrawal (2018).

Panel B displays firm-specific and instrumental variables. The control variable includes a number of firm characteristics payout determinants that have been outstanding in literature, as discussed in the literature review section. In contrast with Adhikari and Agrawal (2018), the study adds five more control variables which significantly determine JSE firms' payout in literature (inside ownership, institutional ownership, leverage, liquidity and tangible assets). Additionally, Panel B shows the instrumented variable probit (IV-Probit), which is estimated as the binary dependent variable derived from the fitted value of the first stage regression

For Column 1 and Column 2, the main explanatory variable is the fraction of peer firms who are peer dividend payers (IV). As expected, in Column 1, the instruments variables (lag1(Peer. Id.EquityShock) and lagged peer's idiosyncratic risk (Lag1(Peer Id.EquityRisk)) predicts peers' dividends significantly positively (negatively), even after the control variables.

Column 2 portrays the second stage of the IV-Probit model, in which the fitted value of Peer. Div.Payers from the first stage (Instrumented Peer Div. Payers) predicts firm-specific dividend decision. As expected, the instrumented Peer Div. Payers strongly explain a firm's payout decisions , with a positive coefficient for idiosyncratic shocks and a negative impact for idiosyncratic risk, statistically significant at 1%. The estimated marginal effect of Peer Div. Payers on the probability of a firm paying dividends, when other variables are kept at their means, is 41.75%. These results indicate that a firm is more likely to pay dividends if other firms in the same industry are paying dividends. With an almost 42% probability that they will also follow the peer firms in the same indusrty. These results are significant at the 1% level of significance. Both instruments are individually and jointly significant at 1% levels, thus one can conclude that the IVs are relevant and peer's payout decisions about whether to pay dividends influence a firm's payment decision. Moreover, the effect is 16% more than the 26% obtained on the Nasdaq market, indicating that peer effects are more pronounced on the JSE.

This may be due to higher levels of asymmetry and less development of the JSE financial market compared to developed and more transparent financial markets like Nasdaq.

The results support the finding of Milliken (1987) who documented that, the imitation process by managers is most stimulated in ambiguous environments, where managers might lack some relevant information on causality effects to assign probabilities and predict possible outcomes and end up imitating their informed peers. Thus, on the potential causes of peer influence, the information-based theory and the learning model seem to hold in this study.

The main explanatory variable for Column 3 and Column 4 is the fraction of peer repurchasers (IV). Different variations of the Instrumental Variable Probit (IVP) regressions are used to estimate a potential causal peer effect on the dividend payment decision. Column 3 displays the results of the first stage regression, in which the dependent variable is the fraction of firms which repurchase shares each year (Peer Repurchases). Both the instruments variables peer's idiosyncratic shock (lag1(Peer. Id.EquityShock)) and lagged peer's idiosyncratic risk (Lag1(Peer Id.EquityRisk)) predict peers' repurchases negatively (positively), even after the control variables, thus, one can conclude that the IVs are relevant and peer's payout decisions influence a firm's repurchase decision.

Column 4 portrays the second stage of the IV-Probit model, in which the fitted value of *Peer. Repurchaser* from the first stage (Instrumented Peer. Repurchaser) predicts firm-specific dividend decision. The estimated marginal effect of Peer Repurchasers on the probability of a firm buying back shares, when other variables are kept at their means, is 14.81. The results indicate that a firm is more likely to repurchase shares if other firms in the same industry are repurchasing. With an almost 14.81% probability that they will also follow the peer firms in the same indusrty. These results are significant at the 1% level of significance; thus, one can conclude that the IVs are relevant and peer's payout decisions influence a firm's repurchase decision. The effect is less pronounced than the 16% of Adhhikari and Agrawal's (2018) study. This is mainly because on average, few firms buy back their shares on the JSE compared to the NASDAQ market.

The control variables results supports the theories explained earlier. The results support the agency theory and the life cycle theory as the significant positive coefficient on profitability, size, firm age and negative coefficient on cashflow risk show that dividends payments are concentrated amongst mature profitable firms with few growth opportunities. Mature profitable firms with lower sales growth and cashflow risk, high liquidity and lower leverage levels issued more dividends (Jensen &Meckling, 1976; DeAngelo et al., 2006). The results show that undervaluation, EPS Dilution motivates share repurchases as indicated by significant negative coefficients of the MTB and EPS variables (Harford & Zhang 2015; Louis & White, 2007). Moreover the significant positive coefficients on Inside ownership and Liquidity show that firms are motivated to repurchase in order to reduce the EPS and improve the liquidity of their shares. The five additional control variables seems to have significant effect on payout decisions. Specifically, the results show that liquidity plays a significant role in payout decisions of South African firms.

4.3.2.2 Model 2 – Peer effect on a firm's Amount of Payout

Table 11 presents results on the impact of peer firms on the amount of payout decision or repurchase amount. Y_{ijt} denotes a dummy variable of a binary instrumental variable tobit (IV-Tobit) model (Dividend/Repurchase level) decision in a fiscal year. The main dividend payout variable is obtained by scaling annual cash dividends and total assets (Div/Assets or Repurchases/Assets). The number of dividends is normalised by book assets instead of market capitalisation or earnings to avoid bias from stock price variations and negative earnings (Allen and Michaely, 2003; Li and Zhao, 2008). Tobit regression is applied as it jointly models the propensity of paying dividends or repurchases.

Finally, peer influence on total payout is analysed, calculated as the sum of dividends and repurchases scaled by total assets (Total Payout); the Instrumented Peer Total Payout ratio is expected to positively predict the firm's specific Total Payout ratio in a highly significant manner. The results are displayed in two separate tables. Panel A shows the results for peer variables and panel B shows firm-specific variables.

Table 11:The amount of Payment Panel A

Panel A	Column 1	Column 2	Column 3	Column 4			Column 1	Column 2	Column 3	Column 4
Variables	**Peer**	**Dividend/Assets**	**Repur/Assets**	**Total**		**Variables**	**Peer**	**Dividend/Assets**	**Repur/Assets**	**Total Payout**
	(IV	**(IV-Probit:**	**(IV-Probit:**	**(IV-**			**(IV Probit:**	**(IV-Probit:**	**(IV-Probit:**	**(IV-Probit:**
	1st Stage)	**2nd stage**	**2nd Stage)**	**2nd**			**1st Stage)**	**2nd stage**	**2nd Stage)**	**2nd Stage)**
Peer Firm Averages						**Peer Firm Ave.**				
Instr. Peer Div/Assets		**2.6864*****				Peer Cash flow risk	**-13.035*****	**-0.8380*****	**-3.6452**	**-5.2774*****
		(3.0576)					(-3.9916)	(-3.1064)	(-0.308)	(-2.6304)
Instr.Peer Repur/Assets			**0.4559****			Peer R&D/Assets	**-97.0082**	**-24.4099**	**-32.0731**	**-48.9310****
			1.9998				(-1.3733)	(-0.6624)	(-0.5659)	(-1.8276)
Instr.Peer Total Payout				**2.9580*****		Peer Leverage	**-23.7652****	**-2.7711**	**-32.1601*****	**-13.3906****
				(3.7832)			(-2.4758)	(-0.6528)	(-3.3498)	(-2.0826)
Peer Sales Growth	**-5.347*****	**2.1955***	**1.2925**	**3.4611*****		Peer Liquidity	**2.7267****	**1.3617*****	**3.4345*****	**2.1783*****
	(-2.6692)	(1.8788)	(0.7796)	(2.6777)			(2.3227)	(3.3767)	(3.5842)	(2.3434)
Peer MTB	**0.2129***	**0.2640****	**-0.0354*****	**-0.0167***		Peer Ins.Ownership	**7.7658**	**3.1547**	**2.8546**	**1.776**
	(1.7501)	(2.3478)	(-3.2373)	(-1.7651)			(0.6719)	(0.9623)	(0.2956)	90.2083)
Peer Log(Firm Age	**1.6806***	**2.7027****	**-3.9081***	**6.9408***		Peer Inst Ownership	**-4.3153**	**0.3864**	**-1.4201**	**1.292**
	(1.4219)	(2.9164)	(-1.8896)	(1.9258)			(-1.4057)	(0.4733)	(-0.5022)	(0.5676)
Peer Size (JSE %ile)	**5.4747***	**-1.3561***	**3.1588**	**2.1703**		Peer Tangib. Assets	**33.0755***	**23.6562****	**-0.3895**	48.0132***
	(1.8996)	(-1.9524)	(1.2425)	(1.8161)			(1.8499)	(2.0167)	(-0.0303)	(3.0116)
Peer RE/BE	**-0.3846**	**3.7095***	**-5.6932**	**2.7004****		Peer EPS			**-0.0060****	
	(-0.1146)	(2.2856)	(-1.3266)	(1.9968)					(-2.595)	
Peer Profitability	**3.6242*****	**2.9452*****	**2.0432***	**5.4476*****						
	(3.4987)	(3.6048)	(1.9824)	(2.8212)						

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively)*

t statistics are reported in brackets

The amount of Payment- Panel B

Panel B	**Column 1**	**Column 2**	**Column 3**	**Column 4**			**Column 1**	**Column 2**	**Column 3**	**Column 4**
Variables	**Peer**	**Dividend/Assets**	**Repur/Assets**	**Total**		**Variables**	**Peer**	**Dividend/Assets**	**Repur/Assets**	**Total**
	(IV Probit:	**(IV-Probit:**	**(IV-Probit:**	**(IV-**			**(IV Probit:**	**(IV-Probit:**	**(IV-Probit:**	**(IV-Probit:**
	1st Stage)	**2nd stage**	**2nd Stage)**	**2nd Stage)**			**1st Stage)**	**2nd stage**	**2nd Stage)**	**2nd Stage)**
Firm Specific Factors						**Firm Specific Factors**				
						Liquidity	**-1.7884***	**-1.8059***	**4.1463****	1.5566
Sales Growth	**-12.3110****	**-5.3483****	**-11.5510*****	**-9.0999*****			(-1.8959)	(-1.8796)	(2.2082)	1.3265
	(-1.7725)	(-2.4199)	-3.7109	-2.6588		Inside Ownership	**2.1622***	**3.4628****	**0.9426**	**-3.6759***
MTB	**0.6389***	**0.0514***	**0.7742*****	**0.35149***			(1.7365)	(2.5107)	(0.4326)	-1.7651
	(1.6758)	(1.7377)	2.5973	1.8386		Inst Ownership	**-0.0002**	**-0.0202**	**0.0242**	**3.9803*****
Log(Firm Age	**0.9147***	**2.2657****	**0.4055**	**0.7462***			(-0.0113)	(-0.8981)	0.5363	3.0745
	(1.9259)	(2.2523)	0.316	1.6021		Tangible Assets	**-8.6351**	**1.4487**	**2.8201**	**-0.0377**
Size (JSE %ile)	**-1.2954***	**0.3389***	**0.2523***	**0.4073*****			(-1.2909)	(0.2714)	1.8626	-1.3881
	(-1.9221)	(1.8637)	1.8754	3.942		EPS			1.9263*	**-2.1638**
RE/BE	**-7.7659****	**3.9976**	**36.0628***	**-8.9904****						-0.4591
	(-0.7557)	(1.2826)	1.7537	-2.1508		Id.Equity.Shock	**10.7331*****	**0.1526*****	**-12.86032*****	
Profitability	**22.9471****	**11.1268****	**7.9714****	**21.8820*****			(2.6593)	(3.5527)	(-3.2839)	
	(2.0344)	(2.6938)	2.1676	2.6688		Id.Equity.Risk	**-0.2638*****	**-0.8659*****	**-4.3355*****	**0.7151****
Cash flow risk	**-1.8482****	**-13.6516***	**-30.2389***	**-29.4787****			(-3.0296)	(-3.1239)	(-3.2839)	2.1365
	(-2.2196)	(-1.7312)	-1.9275	-2.3589		**Instrumental variables**				**-2.6414****
R&D/Assets	**-**	**-1064.162*****	**-1238.703****	**-**		La1(Peer.Id.Eq.Shock)	**39.0487*****			-2.3643
	(-1.9887)	(-3.1352)	-2.1656	-3.1656			(2.9791)			
Leverage	**11.1887**	**5.0232**	**-29.6808**	**7.647**		La1(Peer Id.Eq.Risk)	**-3.4389*****			
	(1.6066)	(1.0767)	-0.4064				(-3.4391)			
R-Squared	**0.6674**	**0.5345**	**0.5565**	**0.5571**		**R-Squared**	**0.6674**	**0.5345**	**0.5565**	**0.5571**
Observations	**96**	**91**	**81**	**91**		**Observations**	**96**	**91**	**81**	**91**

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively)*

t statistics are reported in brackets

The previous regressions displayed a strong causal effect of peers on a firm's decision on whether to pay dividends and to repurchase shares. This section will analyse if peers can also influence the amount of dividends and repurchase. The estimation model is similar to the one discussed earlier, except that the dependent variable is now Div/Assets or Repurchases/Assets.

Column 1 from Table 11 shows the estimates from the first stage regression of an instrumental variable Tobit (IV-Tobit) model for dividend payouts. As expected, the IV (Peer.Idios.Shock and Peer.Idios.Risk) positively (negatively) predict Peer Div/Assets highly significantly at 1% level. The instrumented Peer Div/Assets in Column 2 obtains a positive and significant coefficient of 0.51 in explaining a firm's dividend payout decision. These results show that peer firms' payout ratios have a positive causal effect on firm-specific dividend payout ratios. Overally, an increase in Peer Div/Assets ratio by 10% causes a firm to increase its own Div/Assets ratio by approximately 5.1%. This is statistically and economically significant. The effect on the JSE is comparable to the 5.8% of Adhikari and Agrawal (2018), although smaller. JSE firms are smaller in size compared to the majority of firms in Adhikari and Agrawal's (2018) study, hence the dividend amount level and the peer effect thereof, is bound to be smaller in magnitude.

The second stage regression of repurchases in Column 3 obtains a positive and statistically significant coefficient of 0.135 on instrumented Peer Repurchase/Assets ratio in predicting a firm's own repurchase ratio. Specifically, the coefficient estimate suggests that an increase in Peer Repur/Assets ratio by a unit leads a firm to increase its own Div/Assets ratio by about 13.58%. Similar to earlier results, the effect on JSE is smaller than that of NASDAQ due to few stock buy backs and smaller firm size on the JSE.

Column 4 shows peers' influence on total payout. The second stage of total payout is consistent with the separate analysis of each payout variable. The instrumented Peer Total Payout ratio positively predicts the firm-specific and a unit change in peers total payout amount leads to a 51.64% change in a firm's payout amount level.

4.3.2.3 Model 3 – Peer effect on a firm's target payout ratio adjustments

In this model, Y_{ijt} is the target payout ratio for firm i, in industry *j*, in time t (change in t is semi-annually) and the parameter δ is the speed of adjustment. The model follows that of Grennan (2019) where peer influence is quantified by constructing a time series of firm-specific peer dividend decisions. Dividend yield is used as a proxy for payout ratios. The model is similar to the main model and the IVs are used to estimate the coefficient of peer influence on payout ratios adjustments. This result in a speed of adjustment model below:

$$Y_{ijt} = \delta\beta\bar{y}_{\_ijt}' + \delta\gamma' \ddot{X}_{\_ijt} + \delta\acute{\lambda}X_{ijt} + \acute{\omega}vt + \delta t + \mathcal{E}_{jit} \qquad (7)$$

Table 12: Speed of adjustment

Variable	Coefficient
Peer Idios. Shock	1.17***
Peer Idios. Risk	-0.969***
Peer-payout ratio change (δ)	0.119
Adjusted R-Squared	18.13%
N	92

*(***,**,* indicates significance at the 1,5,10% level of significance, respectively)*

Table 12 displays the results of firm *k* payout ratio adjustment in response to peer influence. A change in peer payout ratios influence a firm to adjust its dividend payments 0.119 times faster than it would have if peer influence were low. These results are statistically significant at 1% level. Thus, a standard deviation increase in peer influence leads to a partial adjustment of the payout ratio (dividend level). The results support the existence of peer effects on dividend levels, although the influence is lower than the 16% of the influence obtained by Grennan (2019). This may be due to a smaller sample and limited time frame used in this study. The results support Brav et al.,'s (2005) rule of not deviating from rivals. One can conclude that, firms benchmark their payout ratio targets to those of their peers, which they closely monitor and adjust if there is a change in peers' ratios, to close the gap and ensure that their target remain close to those of their peers.

<u>4.3.2.3.1 Model 3.1 - Robustness check</u>

Vector auto-regression analysis

Vector auto regression (VAR) is used to analyse the dynamic impact of random disturbances of a change in peer firm payout ratio (shock) on a firm payout adjustment level. In accordance with Fry and Pagan (2007), the VAR model is adopted to check how a peer effect shock is propagated through the firm's payout decision or repurchase decision. The ADF inverse roots are inside the circle and less than one, indicating that the model is stationary.

The estimation equation for the VAR can be represented by:

$$Y_t = A_0 + ApY_{t--q} + e_t \qquad (8)$$

Where Y_t represents a kx1 vector of the firm i's payout decision and the peer effects. A represents a k x k matrix of coefficients on the lagged endogenous excess returns and peer effects. e_t *is* a k x 1 vector of error terms that are uncorrelated and orthogonal and are expected to have economic meaning. The lag length criteria test will be employed to determine the optimal lag length.

i. Impulse Response Functions.

The impulse response function is expected to trace the marginal effect of the peer payout decision shock by setting a counterfactual experiment that sets the error term of the impulse variable to one while setting the other variable to zero. The impact of such an impulse on firm payout decision (Yt) will be evaluated overtime. The Impulse response functions are applied to analyse interactions between variables in a VAR model through the reactions of the payout decisions to peer shocks hitting the system. In this section the direct marginal effect of a peer shock to payout decision is evaluated by tracing the effect of a one standard deviation shock to current and future payout decisions (Lu & Xin, 2010). Dividend yield is used as a proxy for Payout ratio changes.

Figure 4: Impulse Response

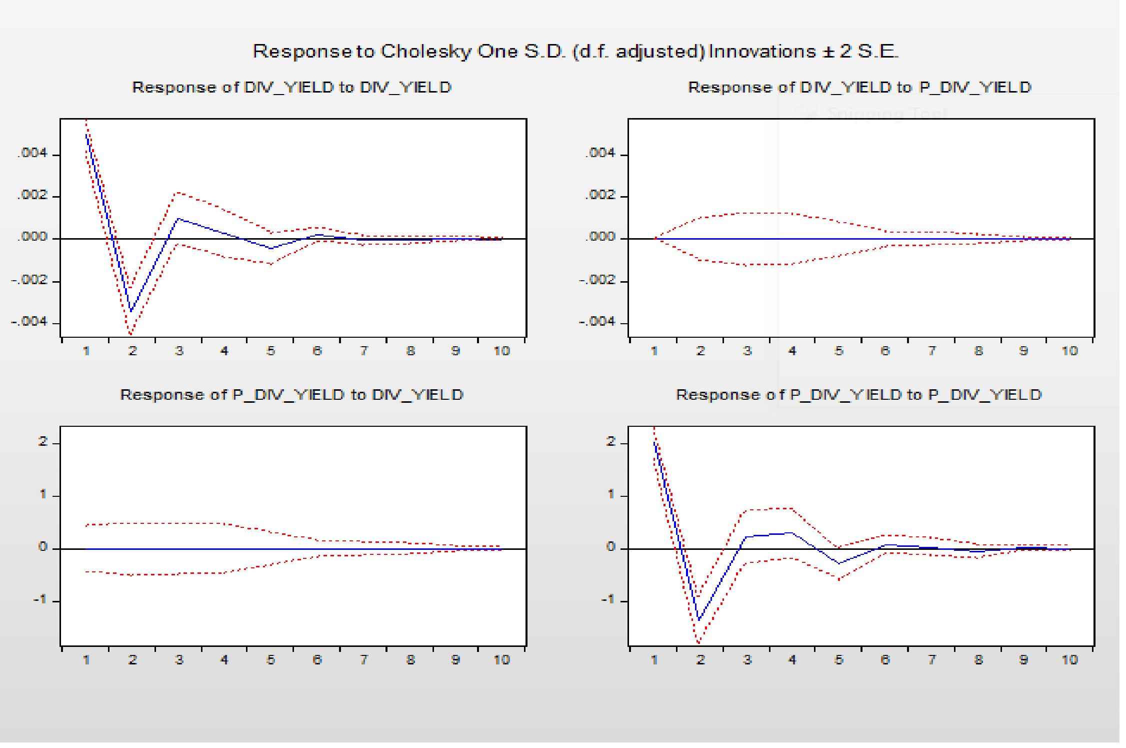


Figure 5: Accumulated Impulse Response

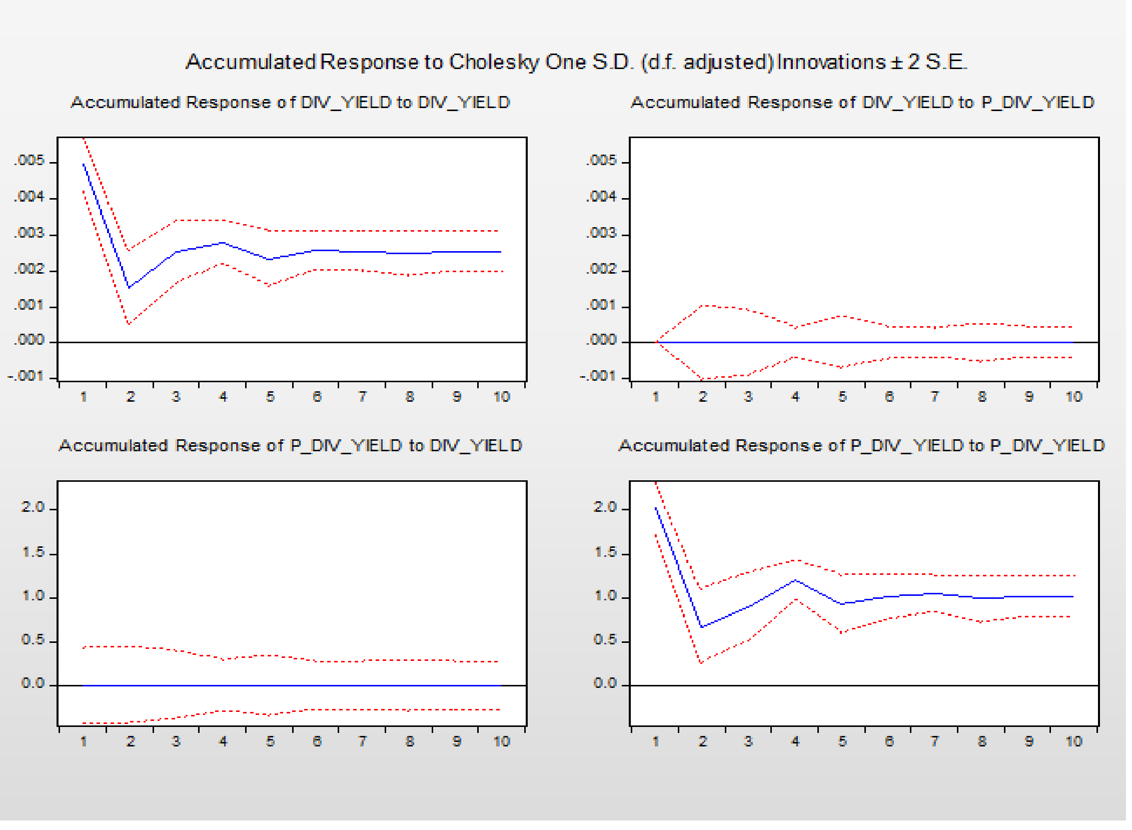


Figure 4 above shows the impact of a peer effect shock on a firm's payout decision. Thus, a shock peers payout decision impacts a firm's payout ratio positively, with the impulse response dissipating close to zero after that. Figure 4 shows that the effect asymptote to zero overtime and this shows that firms do not take much time to incorporate peer firm changes in payout decisions into their dividend or repurchase decisions. These results validate the earlier results on speed of adjustment which state that firms adjust their payout ratio in response to peers' payout changes, more than they would otherwise have, in order to close the gap as Brav et al., (2005) posit that the rule of the game is does not favour deviations from their competitors.

ii. *Variance Decomposition*

According to Stock and Watson (2001), the forecast error decomposition shows the percentage of the variance of the error made in forecasting a variable due to a specific shock in another variable at a given future horizon. This will provide information further regarding the relative importance of a random innovation in the peer effects and its effect on a firm's payout decision. The payout ratio is explained as a linear combination of its own current innovations and lagged innovations of peer payout variable.

Figure 6: Variance Decomposition

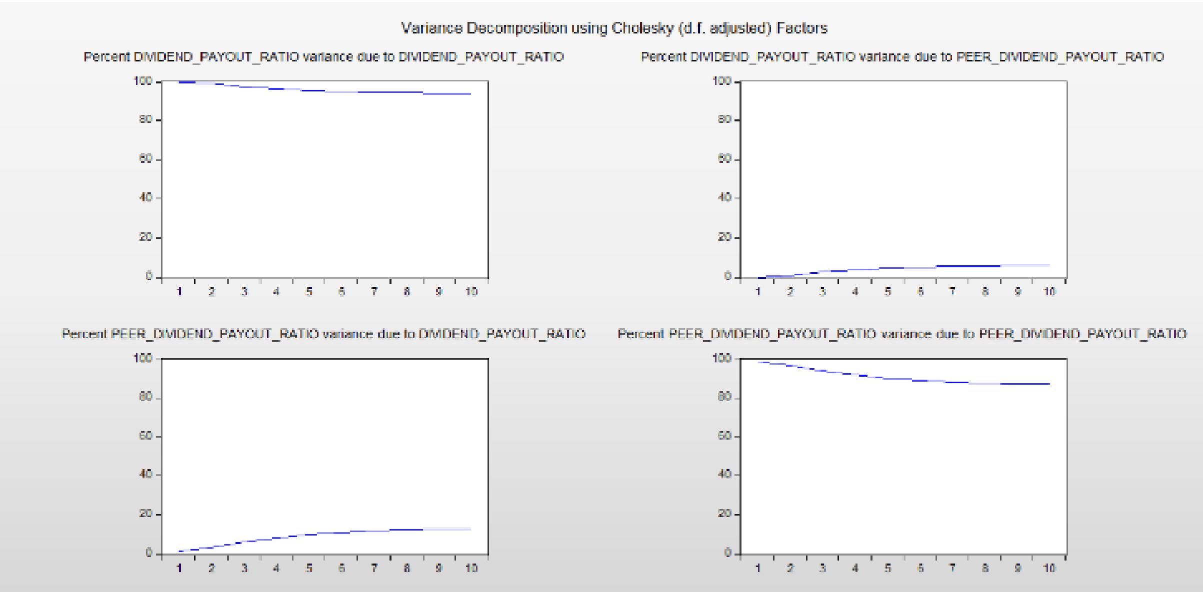


Figure 5 above shows the variance decomposition between peer payout ratios and a firm payout ratio. The results show that the contribution of a shock to firm payout ratio is significant and persistent over time. The results are similar to the impulse response function

iii. Cointegration

The Johansen's cointegrating VAR (CVAR) approach is applied to clarify the long run relationship between integrated variables (Johansen & Juselius, 1992). The test will confirm whether the variables are cointegrated and if they are, a restricted VAR model in the form of a Vector Error Correction Model can be developed. If the variables are cointegrated, this will imply convergence in the payout policy which will explain why firms in the same industry seem to have similar payout ratios or policies.

Johansen's cointegrating VAR (CVAR)

The long-run equilibrium relationship between firm and payout decisions in South Africa is analysed using the Johansen's cointegrating VAR (CVAR) model. Cointegration is applied to integrated variables, therefore, Johansen procedure will be used to test if the variables in the study are cointegrated. If the variables are found to be cointegrated, a restricted VAR model in the form of a Vector Error Correction model can be developed. Cointegration will be tested using the Johansen (1991, 1995) VAR-based methodology. Following Sayed (2016), a VAR of order p model below is adopted:

$$Y_t = A1y_{t-1} + \ldots\ldots\ldots Apy_{t-p} + B_{xt} + \varepsilon_t \qquad (9)$$

Where Y_t is a k-vector of nonstationary I(1) variables, xt is a b-vector of deterministic variables, and Ɛt is a vector of innovations.

The Johansen test procedure is used to define two statistics; namely the trace statistic and the maximum eigenvalue statistic. The trace statistic tests the null hypothesis that the number of independent cointegrating vectors is < r against the alternative that it is > (r+1). The test is used iteratively, starting with a null of r = 0 and then repeated for r=1, r-2, until one fails to reject. The maximum eigenvalue statistic tests the null hypothesis that the number of cointegrating vectors is r against the alternative that it is (r+1) and is also used iteratively. Regarding the trend underlying the data, a third case is chosen where the level data have linear trends but the cointegrating equations have only intercepts. Lag intervals 1 2 is chosen.

To determine the number of cointegrating relations, r, subject to the assumptions made about the trend in the series, one can proceed sequentially from r = 0 to r=k-1 until we fail to reject. The first row in the upper table of the EViews output tests the hypothesis of no cointegration, the second row tests the hypothesis of one cointegrating relationship, the third row tests the hypothesis of two cointegrating relations and so on, all against the alternative hypothesis of full rank, that is, all series in the VAR are stationary:

Table 13: Cointergration Test

Table Y Johansen Cointegration Test – Dividend Yield and Peer Dividend Yield				
Trace Test				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.282110	31.61203	15.49471	0.0001
At most 1 *	0.023473	2.113981	3.841466	0.1460
Maximum Eigen Values				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.282110	29.49805	14.26460	0.0001
At most 1 *	0.023473	2.113981	3.841466	0.1460
Normalized Cointegrating coefficients				
Firm Dividend Payout ratio 1.000000		Peer Dividend Payout ratio 0.598075		
*Denotes rejection of the hypothesis at the 0.05 level ** MacKinnon-Haug Michelis (1999) p-values				

Trace and Max-eigenvalue test indicate 1 cointegrating eqn(s) at the 0.05 level

From the maximal eigenvalue (0.282) with a p-value of 0.0001 which is less than 5% in Table 13, one rejects the null hypothesis of no cointegration. Moreover, the trace statistics is 31.612 and the critical value is 15.495, one therefore rejects the null of no cointegration in favour of at least one cointegrating relationship, since the trace statistic is greater than the critical value. This shows convergence in the payout policy and explain why firms in the same industry seem to have similar payout ratios or policies. Little evidence exists for more than one cointegration relationship. The findings support the findings earlier on, that a significant long-run relationship exists between firm payout ratio and peer firm payout ratios adjustment on the JSE.

Next is the second null hypothesis of “At most 1” (r=1), so the null hypothesis is that there is at least 1 cointegrating equation. Here the p-value is 14.60% and as it is greater than 5% the null hypothesis cannot be rejected. In addition, the trace statistic is 2.113981 and is, therefore, smaller than the critical value (3.841466) so we fail to reject the null hypothesis.

The maximum eigenvalue is also examined. Here the p-value for the null hypothesis of none (r=0) is 0.0000 and we can reject the null hypothesis as it is less than 5%. Furthermore, the max-eigen statistic is greater than the critical value (29.50> 14.26), confirming that we can reject the null. For the null hypothesis of “At most 1” where there is at least one cointegrated equation, the p-value is greater than 5% and the max-eigen statistic is smaller than the critical value therefore we fail to reject the null hypothesis.

From the maximal eigenvalue and trace eigenvalue statistics, one can strongly reject the null of no cointegration in favour of at least one cointegrating relationship. Little evidence exists for more than one cointegration relationship. The findings strengthen the findings earlier on, that a significant long-run relationship exists between firm payout ratio and peer firm payout ratios adjustment on the JSE.

iv. VECM

The cointegration test established that the variables are cointegrated and now a restricted VAR model in the form of VECM can be found. A VEC model has cointegration restrictions built in the specification, that allows integrated nonstationary series. The impact of peer effects in predicting payout decision both in the short run and long run is analysed. Engle and Granger (1987) posit that important information is lost when differencing time series data. If the variables are I(1), then Johansen cointegration technique Vector Error Correction Model (VECM), will be used to model the long-run relationship between peer firms payout decision and a firm payout decision (Johansen, 1988.

The results in (appendix) show the number of cointegrating ranks chosen for the variables. The equation in the long run is given by:

Firm payout target ratio = 1.457Peer Firm Payout.

The coefficient is close to unity, thus one fail to reject the restriction of long-run homogeneity. This shows that there is consistence of the long run relationship between peer firms' and a firm's payout decision and the speed of adjustment is weakly exogenous. The speed of adjustment coefficient of the VECM to the disequilibrium caused by peer effect is support earlier results on speed of adjustment.

4.3.2.4 Model 4- How the market react to changes in dividends conditioned on proximity to peers.

Following Adhikari and Agrawal (2018), the market reaction to a dividend change is examined conditional on where the level of its resulting dividend mounds up, relative to its industry peers. In the analysis, the marginal effect of the change in the dividend to assets ratio is expected to be larger when the resulting dividend is closer to peers' averages than when it is further away from them.

The study adopts the event study methodology of Brown and Warner (1985) to observe excess returns around the announcement day. An estimation period from day -5 to day +5 is used to calculate the parameters, A and B of the market model below:

$$Rt = Ai + BiRmt + Eit \qquad (7)$$

Where Rt is the rate of return of the share of firm *k* on day t. Rmt is the value-weighted market rate of return on day t and Bi is the estimated market risk of share i. Ai is the estimated intercept. Eit is the error term on day t; E(Eit) = 0. The estimated parameters, Bi and Ai are used to calculate the excess returns, Eit from day -5 to day +5 for each share, as reflected below:

$$Eit = Rit - Ai - BiRmt. \qquad (8)$$

The absolute difference between a firm's dividend payout ratios and its peer's payout ratio is calculated first, then based on the median of such absolute differences; the sample is partitioned according to how a firm's payout ratio is close or far from its peers. A regression of the eleven-day cumulative returns (-5,+5) around semi-annually dividend announcements as a function of changes in firm-level dividends payouts (Div/Assets) and whether the payout ratios are close to or far for industry peers is performed. The eleven-day period is adopted in contrast with the 3-day in Adhikari and Agrawal (2018), to cater for less market development and lower liquidity levels on the JSE compared to the NASDAQ.

$$ARt = 1/N \sum_{i=1}^{N} Eit \qquad (10)$$

$$CAR = \sum_{t=-D}^{D} ARt \qquad (11)$$

Where ARt is the average of excess returns of firms announcing dividends on a given day t; CAR is the cumulative average of excess returns from day -D to day D, and N is the number of companies in a category.

Table 14:Announcement effect of annually dividend changes and proximity to peer averages

	Close to Peers **CAR (-5, +5)**	**Far from Peers** **CAR (-5, +5)**
Intercept	0.0509***	0.0160
Δ Div/Assets	**1.3952*** **	**0.5455***
Div/Assets	3.7566***	0.1530
Peer Div/Assets	-1.2755***	-0.9114***
Adjusted R-squared	26.95%	4.43%
N	22	44

(,**,*** indicates 10%,5% and 1% significance)*

Table 14 presents the regressions of eleven-day cumulative abnormal returns CAR (-5,+5) around annually dividend announcements as a function of changes in firm-level dividend payouts (Div/Assets) and whether the payout ratios are close to peers or far from industry peers. The marginal effect of the market reaction to the change is more pronounced and significant for firms which are close to their peers than firms which are far from their peers.

Overall, the results shows that there is a positive market reaction to payout announcements for both categories (firms close to peers and firms far from peers). This is in line with Bhana

(1997, 2007) who found significant abnormal returns around dividend announcement and share repurchase announcements. Consequently, the findings in this study show that, though there are positive market reactions to payout announcement, the effect is more pronounced in firms that are close to their peers, as they try not to deviate from their peers' payout decisions.

Moreover, in unreported results, share repurchases which are more dependent on market timing rather than profitability were analysed. Significant returns were observed for share repurchases, and the positive temporary reaction was more pronounced for share repurchases which dependent on market timing, than dividends which mainly depend on profitability. Share repurchases are a temporary commitment by firms and do not need to be sustainable overtime, thus managers do not hesitate to repurchase if there is a window of opportunity.

5. SUMMARY AND CONCLUSION

Black (1976) posits that "the harder we look at the dividend picture, the more it seems like a puzzle with pieces that just do not fit together". This study demonstrated that peer influence is a significant piece that can be added to the dividend puzzle. The evidence from the study supports the notion that firms strive to come up with a best-in-classy payout policy and in this process, peer influence plays an integral role as firms benchmark their decision to peers.

The study challenges the hypothesis that peers' payout policies have no effect on a firm's decision on dividend payment or repurchasing shares. It is evident that peers' payout policies affect a firm's decision on dividend payment or repurchasing shares. Moreover, the study rejected the hypothesis that industry peers' payout policies have no effect on the amount of dividend (repurchase) decision. It is evident that a firm's decision on the amount of dividends or repurchases is influenced by its peers. Majority of the firms are influenced by their peers to adjust their payout ratios sooner than they would otherwise have. The study, therefore, explained the episode of firms changing their dividends at the similar times, thus elaborating on the findings of De Angelo (2006) of disappearing and appearing dividends. The study showed that peer effects are more pronounced on JSE firms compared to Nasdaq firms, due to different levels of transparency and informational asymmetry, which is one of the channels that fuel peer influence.

The study rejects the hypothesis that firms are not inspired by their peers' decisions to adjust their target payout ratio than they would otherwise. It is evident that firms are inspired by their peers' decisions to adjust their target payout ratio than they would otherwise as they avoid deviating from their peers. The announcement returns in the study shows that the market anticipates the consequences of peer influence and the abnormal returns around announcement days are more pronounced for firms that have payout ratios targets closer to peers. This indicates that sometimes managers do not have a lot of discretion in payout decisions and their hands will be tied as they try to catch up with their peers to meet the market expectations.

Various avenues for research can be explored from the study. Empirically, one can extend this study to investigate economic channels through which peer influence impacts payout decisions. Although significant peer effects have been documented in this study, it is empirical to investigate whether peer induced payout decisions are optimal for firm value (Grennan, 2019).Considering the significance of peer effects on payout decisions, one can revisit the validity of dividend discount models and studies on managerial behaviour, which suggests that managers have ample discretion on payout decisions.

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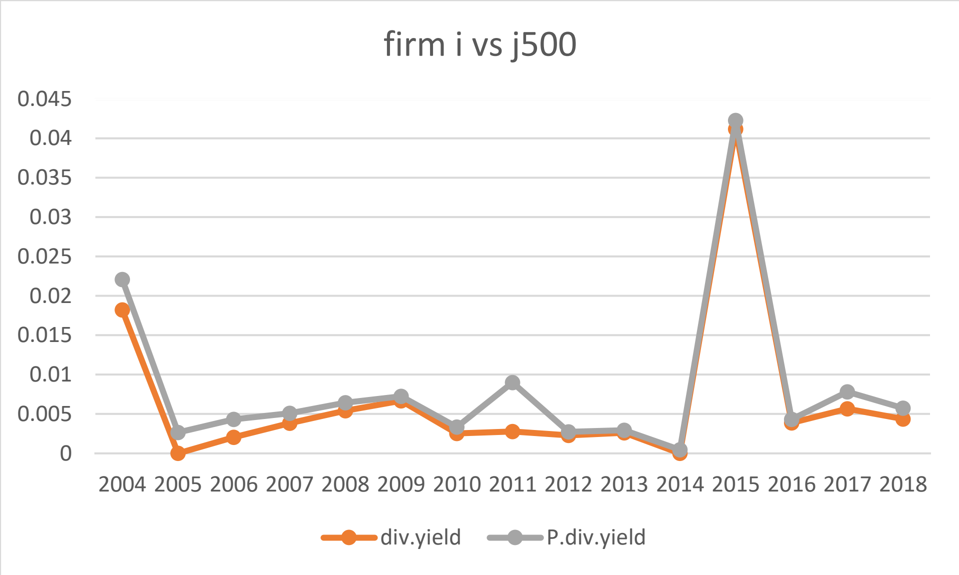
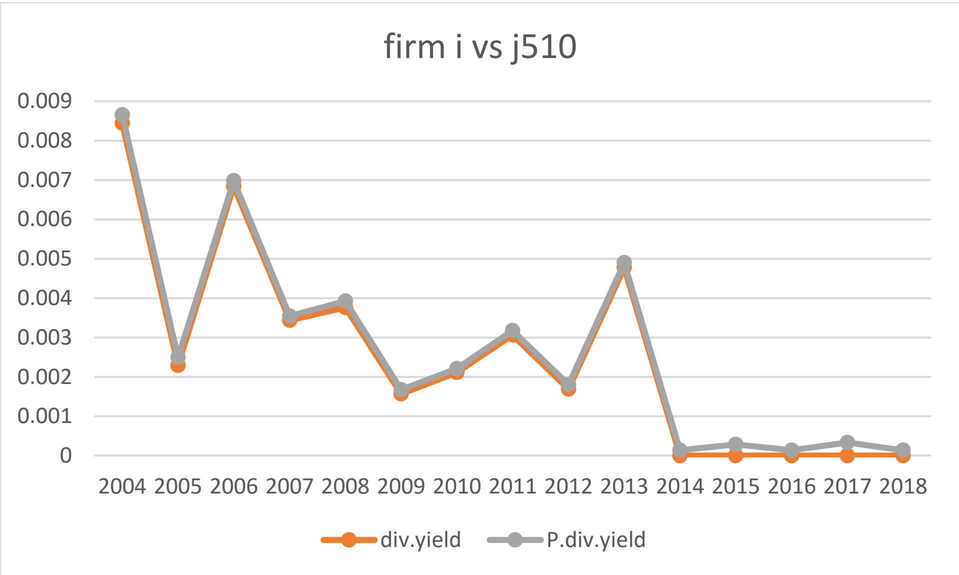
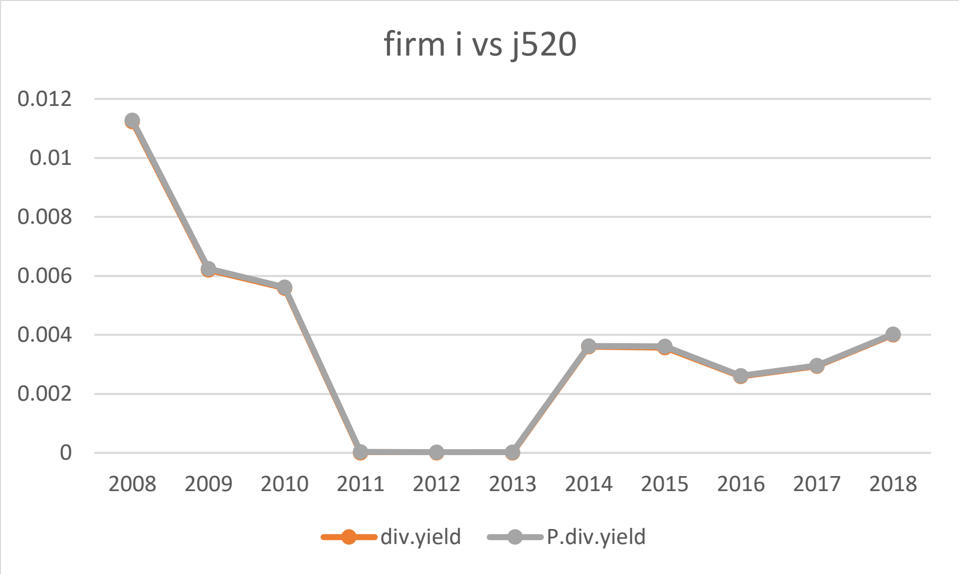
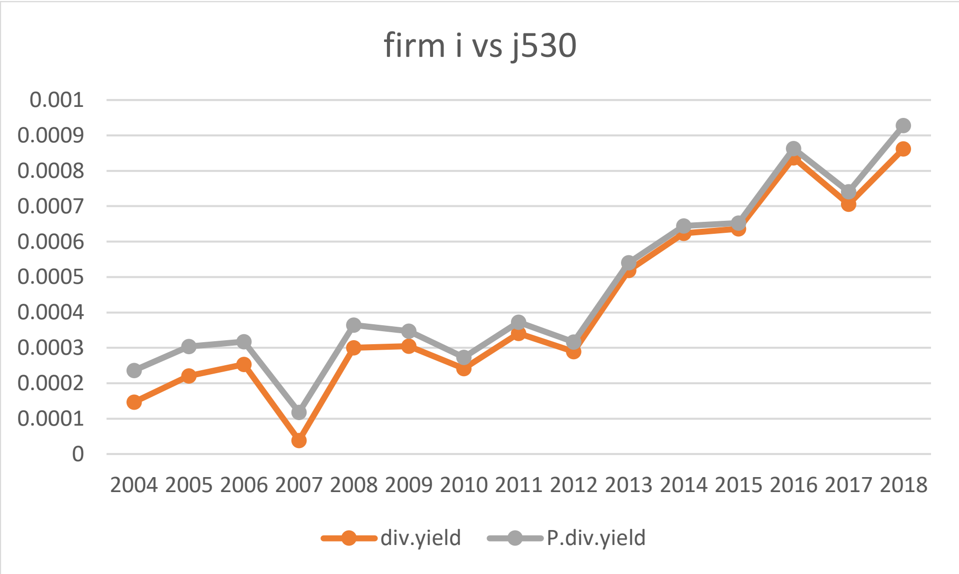
7. APPENDICES

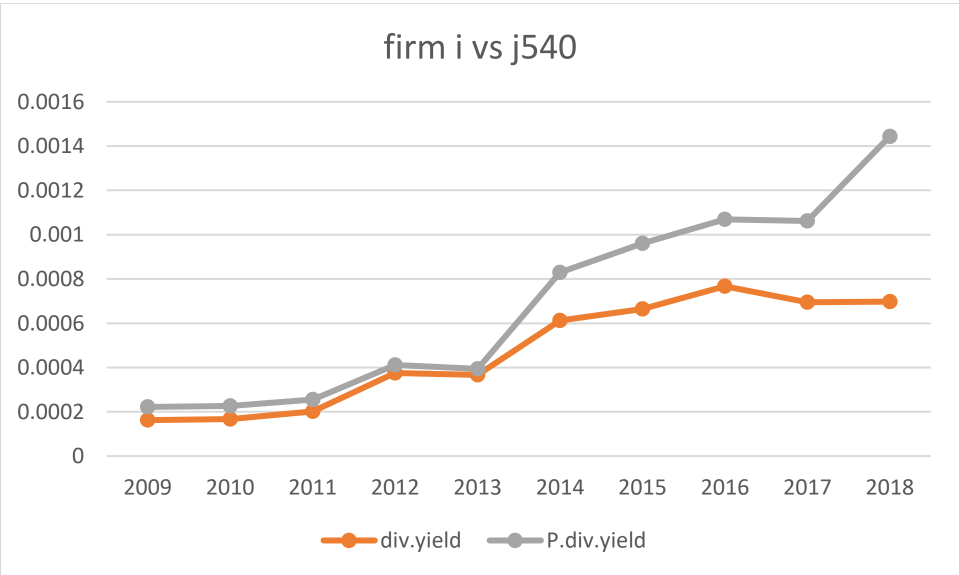
Appendix 1 – firm and peer dividend correlation for the 8 different sectors

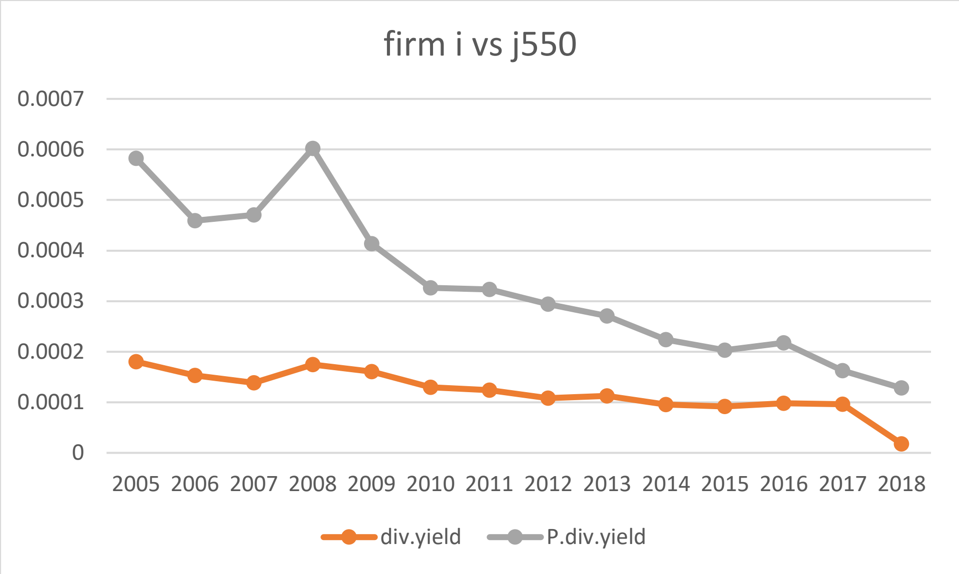


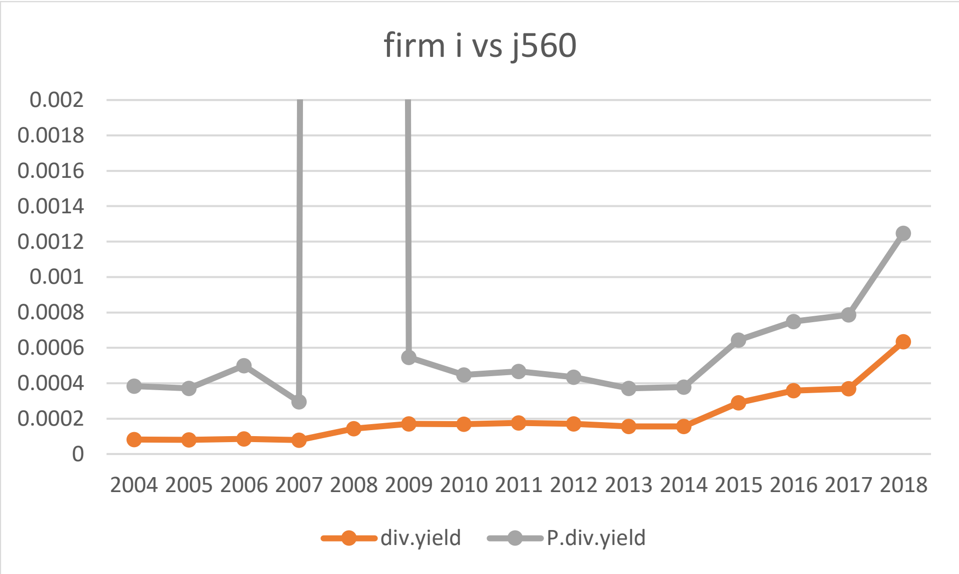


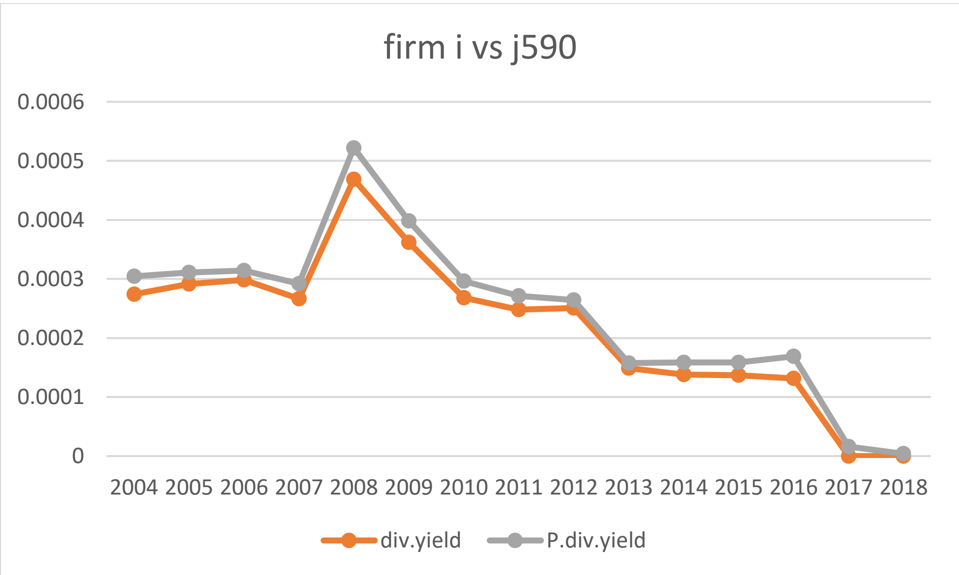

firm i vs j520
0.012
0.01
0.008
0.006
0.004
0.002
0
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield


firm i vs j530
0.001
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield


firm i vs j540
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield


firm i vs j550
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield


firm i vs j560
0.002
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield


firm i vs j590
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
div.yield
P.div.yield

Appendix 2 – descriptive statistics

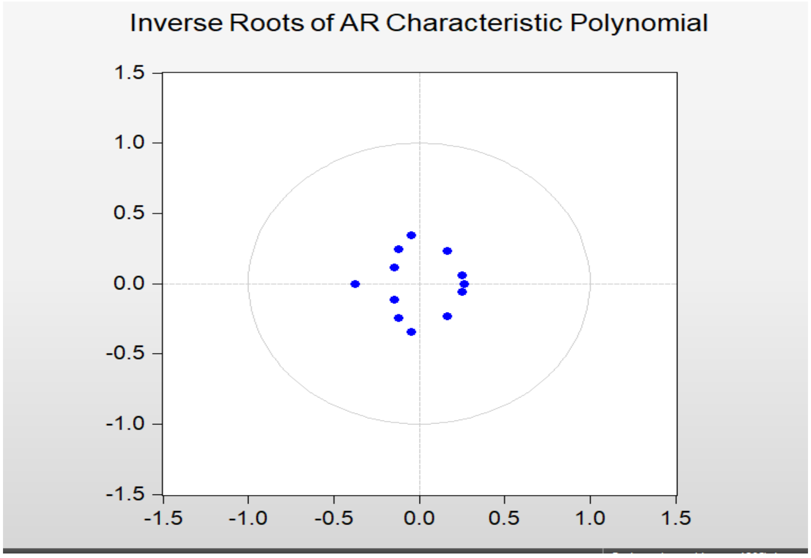
Summary of instrumental factors

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
MKT	241	-0.006	0.011	-0.041	-0.011	0.001	0.033
SMB	241	-0.004	0.009	-0.026	-0.011	0.003	0.020
HML	241	0.052	0.050	-0.044	0.019	0.084	0.198
MOM	241	0.016	0.056	-0.205	-0.010	0.050	0.210
IND	241	0.002	0.008	-0.018	-0.003	0.006	0.027

Summary Stastics of main explanatory variables

	Peer_Cashflow _risk	Peer_firm age	Peer_firm_ size	Peer_idios shock	Peer_idos_risk	Peer_mtb	Peer_ profitability	Peer_re_be	Peer_sales_ growth
Mean	0.065478	1.355230	3.397231	0.097435	0.022332	2.328330	0.124501	0.125757	0.017480
Median	0.048771	1.390306	3.419087	0.001266	0.011273	2.309418	0.151105	0.157301	0.015133
Maximum	1.012124	1.639356	4.355951	1.078039	0.168258	6.271456	0.268544	0.344039	0.587962
Minimum	0.007385	0.852509	2.191872	-0.216733	0.000000	-15.04707	-0.447934	-0.515303	-1.111870
Std. Dev.	0.096031	0.176109	0.451453	0.262503	0.031973	2.093614	0.100662	0.156709	0.128914
Skewness	8.678334	-0.487812	-0.468273	2.457189	2.556330	-4.864557	-2.359368	-1.483494	-5.099855
Kurtosis	85.24136	2.662924	3.388621	7.812072	9.432287	43.28040	11.99075	5.728581	56.80167
Jarque-Bera	33263.88	5.016555	4.840846	222.7378	317.8766	8084.991	485.4290	76.50183	14118.66
Probability	0.000000	0.081408	0.088884	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	7.399018	153.1410	383.8871	11.01018	2.523491	263.1013	14.06858	14.21050	1.975293
Sum Sq. Dev.	1.032866	3.473612	22.82666	7.717683	0.114492	490.9205	1.134878	2.750462	1.861295
Observations	113	113	113	113	113	113	113	113	113

Appendix 3 – Unit root test



UNIT ROOT TEST RESULTS TABLE (ADF)
Null Hypothesis: the variable has a unit root

		J500	HML	IND2	MKT	MOM	SMB
At Level							
With Constant	t-Statistic	-44.1715	-12.9650	-26.6384	-23.1416	-31.2589	-6.9874
	Prob.	*0.0001*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***
With Constant & Trend	t-Statistic	-44.2199	-12.9767	-26.6836	-23.1423	-31.2487	-6.9828
	Prob.	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***
Without Constant & Trend	t-Statistic	-44.1529	-12.1632	-25.6127	-21.1646	-9.8821	-5.6338
	Prob.	*0.0001*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***
At First Difference							
		d(J500)	d(HML)	d(IND2)	d(MKT)	d(MOM)	d(SMB)
With Constant	t-Statistic	-20.1541	-17.4987	-23.0037	-15.9116	-16.3825	-14.6008
	Prob.	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***
With Constant & Trend	t-Statistic	-20.1488	-17.4943	-22.9980	-15.9073	-16.3742	-14.6070
	Prob.	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***
Without Constant & Trend	t-Statistic	-20.1594	-17.5036	-23.0092	-15.9155	-16.3875	-14.6033
	Prob.	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
		***	***	***	***	***	***

Notes:
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant
b: Lag Length based on SIC
c: Probability based on MacKinnon (1996) one-sided p-values.

This Result is The Out-Put of Program Has Developed By:
Dr. Imadeddin AlMosabbeh
College of Business and Economics
Qassim University-KSA

Appendix 4 – Instrumental Validity test

Dependent Variable: PEER_PROFITABILITY(1)
Method: Robust Least Squares
Date: 04/12/20 Time: 02:22
Sample (adjusted): 2005 2017
Included observations: 97 after adjustments

Method: M-estimation

M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)

Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	0.259550	0.051057	5.083516	0.0000
D(PEER_MTB)	-0.003015	0.002598	-2.160760	0.0457
D(PEER_FIRM_AGE)	0.196620	0.108171	1.817682	0.0691
D(PEER_FIRM_SIZE)	0.036643	0.058812	2.623044	0.0333
D(PEER_RE_BE)	-0.087176	0.079344	-1.098707	0.2719
D(PEER_PROFITABILITY)	0.424844	0.150810	2.817074	0.0048
PEER_CASHFLOW_RISK	-0.020896	0.214879	-4.097247	0.0000
PEER_R_D_TA	-2.753505	1.047969	-2.627467	0.0086
D(PEER__INSIDER_OWNERSHIP)	0.137909	0.296324	0.465399	0.6416
D(PEER_INSTIT_OWNERSHIP)	0.051589	0.071591	0.720609	0.4711
PEER_LEVERAGE	-0.188639	0.087286	-2.161162	0.0307
PEER_LIQUIDITY	0.007751	0.009791	0.791731	0.4285
D(PEER_TANGIBLE_ASSETS)	0.243126	0.249771	0.973395	0.3304
PEER_EPS	0.000147	7.80E-05	1.879511	0.0602
PEER_IDIOS_SHOCK	0.044943	0.027260	3.648712	0.0092
D(PEER_IDOS_RISK)	-0.559131	0.317753	-2.759642	0.0085
C	-0.104724	0.084114	-3.245014	0.0031

Robust Statistics

R-squared	0.242867	Adjusted R-squared	0.091441
Rw-squared	0.505690	Adjust Rw-squared	0.505690
Akaike info criterion	12.43281	Schwarz criterion	181.1988
Deviance	0.344676	Scale	0.057728
Rn-squared statistic	61.23452	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	0.118436	S.D. dependent var	0.104727
S.E. of regression	0.108145	Sum squared resid	0.935623

Dependent Variable: PEER_PROFITABILITY(2)

Method: Robust Least Squares

Date: 04/12/20 Time: 02:28

Sample (adjusted): 2005 2016

Included observations: 89 after adjustments

Method: MM-estimation

S settings: tuning=1.547645, breakdown=0.5, trials=200, subsmpl=11,
refine=2, compare=5

M settings: weight=Bisquare, tuning=4.684

Random number generator: rng=kn, seed=1098525380

Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	0.507679	0.062274	8.152360	0.0000
D(PEER_MTB)	-0.001485	0.002898	-0.512488	0.6083
D(PEER_FIRM_AGE)	0.085114	0.110660	2.769155	0.0418
D(PEER_FIRM_SIZE)	0.075183	0.071046	3.058221	0.0029
D(PEER_RE_BE)	-0.089321	0.092092	-0.969914	0.3321
D(PEER_PROFITABILITY)	0.440687	0.191403	2.302400	0.0213
PEER_CASHFLOW_RISK	-0.084640	0.253273	-3.033404	0.0034
PEER_R_D_TA	-0.315736	1.219393	-0.258929	0.7957
PEER_IDIOS_SHOCK	0.060983	0.032071	3.201537	0.0072
D(PEER_IDOS_RISK)	-0.030312	0.362957	4.852201	0.0041
C	0.120928	0.016649	7.263489	0.0000

Robust Statistics

R-squared	0.208946	Adjusted R-squared	0.052972
Rw-squared	0.565528	Adjust Rw-squared	0.565528
Akaike info criterion	111.0855	Schwarz criterion	143.2526
Deviance	0.400879	Scale	0.065347
Rn-squared statistic	76.29769	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	0.116376	S.D. dependent var	0.104518
S.E. of regression	0.092885	Sum squared resid	0.672954

Dependent Variable: PEER_PROFITABILITY(3)

Method: Robust Least Squares

Date: 04/12/20 Time: 02:30

Sample (adjusted): 2005 2015

Included observations: 81 after adjustments

Method: M-estimation

M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)

Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	0.227032	0.147041	1.544005	0.1226

D(PEER_MTB)	-0.003431	0.002334	-1.469894	0.1416
D(PEER_FIRM_AGE)	0.047962	0.089684	0.534782	0.5928
D(PEER_FIRM_SIZE)	0.005429	0.060487	1.781077	0.0749
D(PEER_RE_BE)	-0.272812	0.075309	-3.622576	0.0003
D(PEER_PROFITABILITY)	0.373096	0.159093	2.345140	0.0190
PEER_CASHFLOW_RISK	-0.068926	0.206176	-2.756759	0.4492
PEER_R_D_TA	-0.005371	0.998279	-0.005380	0.9957
PEER_IDIOS_SHOCK	0.031363	0.028596	2.967620	0.0027
D(PEER_IDOS_RISK)	-0.010515	0.317835	-2.888191	0.0056
C	0.115373	0.014163	6.852185	0.0000

Robust Statistics

R-squared	0.131098	Adjusted R-squared	0.006970
Rw-squared	0.362636	Adjust Rw-squared	0.362636
Akaike info criterion	128.7983	Schwarz criterion	159.2041
Deviance	0.264630	Scale	0.048856
Rn-squared statistic	27.16992	Prob(Rn-squared stat.)	0.002448

Non-robust Statistics

Mean dependent var	0.113098	S.D. dependent var	0.105661
S.E. of regression	0.114241	Sum squared resid	0.913571

Dependent Variable: PEER_CASHFLOW_RISK(5)
Method: Robust Least Squares
Date: 04/12/20 Time: 02:37
Sample (adjusted): 2005 2013
Included observations: 65 after adjustments
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	0.202597	0.047307	4.282598	0.0000
D(PEER_MTB)	0.000733	0.000724	1.012295	0.3114
D(PEER_FIRM_AGE)	-0.003739	0.027313	-0.136888	0.8911
D(PEER_FIRM_SIZE)	-0.004922	0.018845	-0.261212	0.7939
D(PEER_RE_BE)	-0.019062	0.026755	-0.712470	0.4762
D(PEER_PROFITABILITY)	0.018714	0.052764	4.354676	0.0008
PEER_CASHFLOW_RISK	-0.034413	0.064292	-3.535262	0.0000
PEER_R_D_TA	0.339509	0.304961	1.113287	0.2656
PEER_IDIOS_SHOCK	-0.005573	0.012417	-3.448800	0.0006
D(PEER_IDOS_RISK)	0.008559	0.098459	2.896448	0.0045

C	0.044465	0.004489	9.905519	0.0000

Robust Statistics

R-squared	0.173214	Adjusted R-squared	0.020105
Rw-squared	0.430915	Adjust Rw-squared	0.430915
Akaike info criterion	102.1789	Schwarz criterion	130.8623
Deviance	0.017088	Scale	0.014183
Rn-squared statistic	30.01887	Prob(Rn-squared stat.)	0.000851

Non-robust Statistics

Mean dependent var	0.066676	S.D. dependent var	0.121211
S.E. of regression	0.135888	Sum squared resid	0.997140

Dependent Variable: PEER_CASHFLOW_RISK(1)
Method: Robust Least Squares
Date: 04/12/20 Time: 02:36
Sample (adjusted): 2005 2017
Included observations: 97 after adjustments
Method: MM-estimation
S settings: tuning=1.547645, breakdown=0.5, trials=200, subsmpl=11,
refine=2, compare=5
M settings: weight=Bisquare, tuning=4.684
Random number generator: rng=kn, seed=1098525380
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	0.008266	0.013866	0.596110	0.5511
D(PEER_MTB)	0.000896	0.000692	1.293784	0.1957
D(PEER_FIRM_AGE)	0.003181	0.026542	0.119828	0.9046
D(PEER_FIRM_SIZE)	0.018379	0.016498	1.114015	0.2653
D(PEER_RE_BE)	0.036334	0.021789	1.667531	0.0954
D(PEER_PROFITABILITY)	-0.114307	0.043108	-2.651631	0.0080
PEER_CASHFLOW_RISK	0.213743	0.060234	3.548571	0.0004
PEER_R_D_TA	1.523601	0.289748	5.258369	0.0000
PEER_IDIOS_SHOCK	0.001002	0.007213	0.138970	0.8895
D(PEER_IDOS_RISK)	-0.001828	0.082770	-0.022090	0.9824
C	0.033064	0.003930	8.413015	0.0000

Robust Statistics

R-squared	0.175050	Adjusted R-squared	0.079126
Rw-squared	0.474434	Adjust Rw-squared	0.474434

Akaike info criterion	139.2720	Schwarz criterion	173.0018
Deviance	0.031370	Scale	0.015991
Rn-squared statistic	73.67937	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	0.065883	S.D. dependent var	0.103250
S.E. of regression	0.107168	Sum squared resid	0.987706

Appendix 5 – Cross sectional regressions.

Model 1- Column 1-divinded first stage

Dependent Variable: DUMMY1
Method: ML - Binary Probit (Quadratic hill climbing / EViews legacy)
Date: 04/12/20 Time: 07:53
Sample (adjusted): 2006 2018
Included observations: 91 after adjustments
Convergence achieved after 7 iterations
QML (Huber-White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	-3.314126	1.748627	-1.895273	0.0581
PEER_MTB	0.457625	0.214174	2.136696	0.0326
D(PEER_FIRM_AGE)	4.706506	3.676522	3.280152	0.0005
D(PEER_FIRM_SIZE)	0.105648	2.757075	2.938319	0.0094
D(PEER_RE_BE)	-9.038561	4.000176	-2.259541	0.0238
D(PEER_PROFITABILITY)	1.348071	5.541562	3.243266	0.0078
PEER_CASHFLOW_RISK	-4.095825	13.96905	-2.993207	0.0094
PEER_R_D_TA	-82.29537	131.7806	-0.624488	0.5323
D(PEER__INSIDER_OWNERSHIP)	-7.517489	12.95301	-0.580366	0.5617
D(PEER_INSTIT_OWNERSHIP)	-7.504497	2.938884	-2.553519	0.0107
PEER_LEVERAGE	-3.780627	4.009514	-0.942914	0.3457
PEER_LIQUIDITY	1.183362	0.485514	2.437340	0.0148
D(PEER_TANGIBLE_ASSETS)	-6.033974	14.84682	-0.406415	0.6844
D(SALES_GROWTH)	-3.873416	18.60652	-2.208175	0.0351
D(MTB)	0.060960	0.188017	0.324229	0.7458
D(R_D_TA)	-3015.959	1495.151	-2.017161	0.0437
FIRM_AGE	2.241226	1.420171	2.578138	0.0145
FIRM_SIZE	4.514801	1.102208	4.096141	0.0000
D(RE_BE)	-0.035258	1.820900	-1.919363	0.0846
D(PROFITABILITY)	0.558959	5.007658	1.881621	0.0911

D(TANGIBLE_ASSETS)	1.723298	5.325391	0.323600	0.7462
CASHFLOW_RISK	-14.92574	8.060480	-1.851718	0.0641
FIRM_IDIOS_RISK	-7.891145	10.00253	-2.788915	0.0002
FIRM_IDIOS_SHOCK	1.731138	0.720205	2.403674	0.0162
PEER_IDIOS_SHOCK(-1)	4.542208	1.683122	2.698680	0.0070
D(PEER_IDOS_RISK(-1))	-19.12895	15.65613	-3.221819	0.0018
D(INSIDER_OWNERSHIP)	-1.905545	1.495944	-1.273808	0.2027
D(INSTIT_OWNERSHIP)	0.047162	0.020431	2.308428	0.0210
D(LEVERAGE)	-3.466524	4.577483	-0.757299	0.4489
D(LIQUIDITY)	4.062406	1.681624	2.415764	0.0157
C	-35.47499	9.185532	-3.862050	0.0001

McFadden R-squared	0.641823	Mean dependent var	0.417582
S.D. dependent var	0.495893	S.E. of regression	0.337338
Akaike info criterion	1.168081	Sum squared resid	6.827799
Schwarz criterion	2.023429	Log likelihood	-22.14768
Hannan-Quinn criter.	1.513160	Deviance	44.29535
Restr. deviance	123.6689	Restr. log likelihood	-61.83447
LR statistic	79.37359	Avg. log likelihood	-0.243381
Prob(LR statistic)	0.000002		

Obs with Dep=0	53	Total obs	91
Obs with Dep=1	38		

Model 1- Column 2-divinded Second stage

Dependent Variable: DUMMY1
Method: ML - Binary Probit (Quadratic hill climbing / EViews legacy)
Date: 04/12/20 Time: 08:17
Sample (adjusted): 2006 2018
Included observations: 91 after adjustments
Convergence achieved after 8 iterations
QML (Huber-White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	-3.362956	1.639235	-2.051540	0.0402
PEER_MTB	0.426631	0.222382	1.918457	0.0551
D(PEER_FIRM_AGE)	2.889479	3.791582	2.762077	0.0060
D(PEER_FIRM_SIZE)	-3.168380	2.577278	-2.229351	0.0289
D(PEER_RE_BE)	6.637992	3.747613	1.771258	0.0765
D(PEER_PROFITABILITY)	-1.620839	5.218008	-2.310624	0.0561
PEER_CASHFLOW_RISK	-1.198658	9.945320	-3.120525	0.0041

PEER_R_D_TA	-83.76661	192.0223	-0.436234	0.6627
D(PEER__INSIDER_OWNERSHIP)	-1.469994	11.90730	-2.123453	0.0917
D(PEER_INSTIT_OWNERSHIP)	-5.742905	3.270104	-1.756184	0.0791
PEER_LEVERAGE	-1.064186	1.529516	-0.695766	0.4866
PEER_LIQUIDITY	0.343331	0.686202	2.500335	0.0668
D(PEER_TANGIBLE_ASSETS)	-2.203154	14.09643	-0.156292	0.8758
D(SALES_GROWTH)	-4.814402	17.92983	-2.268513	0.0283
D(MTB)	-0.112286	0.183160	-0.613046	0.5398
D(R_D_TA)	2279.762	1349.056	1.689895	0.0910
FIRM_AGE	1.340771	1.037431	2.292395	0.0962
FIRM_SIZE	4.046343	1.027228	3.939088	0.0001
D(RE_BE)	1.559228	2.030025	0.768083	0.4424
D(PROFITABILITY)	3.139134	4.896531	3.641094	0.0015
D(TANGIBLE_ASSETS)	-3.767144	6.809983	-0.553180	0.5801
CASHFLOW_RISK	-10.40911	8.209020	-2.268009	0.0448
FIRM_IDIOS_RISK	-18.43590	11.50781	-2.602034	0.0291
FIRM_IDIOS_SHOCK	0.145028	0.460923	3.314647	0.0030
D(INSIDER_OWNERSHIP)	-2.437918	1.411517	-1.727161	0.0841
D(INSTIT_OWNERSHIP)	0.033923	0.019249	1.762360	0.0780
D(LEVERAGE)	-4.028321	4.680184	-0.860718	0.3894
D(LIQUIDITY)	3.529417	1.689686	2.088800	0.0367
DIVFITTED	2.742838	1.132516	2.421898	0.0154
C	-27.27546	8.627094	-3.161604	0.0016

McFadden R-squared	0.651533	Mean dependent var	0.417582
S.D. dependent var	0.495893	S.E. of regression	0.323425
Akaike info criterion	1.132907	Sum squared resid	6.380808
Schwarz criterion	1.960662	Log likelihood	-21.54725
Hannan-Quinn criter.	1.466855	Deviance	43.09450
Restr. deviance	123.6689	Restr. log likelihood	-61.83447
LR statistic	80.57444	Avg. log likelihood	-0.236783
Prob(LR statistic)	0.000001		

Obs with Dep=0	53	Total obs	91
Obs with Dep=1	38		

Model 1- Column 3 – repurchase first stage

Dependent Variable: DUMMY4

Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)

Date: 04/11/20 Time: 10:49

Sample (adjusted): 2007 2018

Included observations: 81 after adjustments
Convergence achieved after 38 iterations
Coefficient covariance computed using observed Hessian
WARNING: Complete separation detected at estimated parameters (results may not be valid)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	-0.829439	2.742258	-2.302466	0.0223
D(PEER_MTB)	-0.199737	0.255357	-3.782188	0.0041
D(PEER_FIRM_AGE)	0.502247	5.41266	0.096939	0.9228
D(PEER_FIRM_SIZE)	4.759764	4.587887	2.537463	0.0295
D(PEER_RE_BE)	-10.13904	4.967223	-2.041188	0.0412
D(PEER_PROFITABILITY)	5.225353	8.56619	3.609997	0.0019
PEER_CASHFLOW_RISK	-16.00468	21.97221	-2.728406	0.0464
PEER_R_D_TA	127.6935	109.7555	1.163436	0.2447
D(PEER__INSIDER_OWNERSHIP)	7.001759	21.93027	0.319274	0.7495
D(PEER_INSTIT_OWNERSHIP)	-1.062498	3.977444	-0.267131	0.7894
PEER_LEVERAGE	-46.7788	21.56895	-2.168803	0.0301
PEER_LIQUIDITY	5.150748	2.12449	2.424463	0.0153
D(PEER_TANGIBLE_ASSETS)	-22.76862	21.37721	-1.065089	0.2868
PEER_EPS	23.10381	11.53936	1.823182	0.0637
D(SALES_GROWTH)	-21.11507	20.44905	-1.903257	0.0618
D(MTB)	-0.479256	0.37744	-2.269754	0.0242
D(R_D_TA)	2854.692	1143.031	2.497476	0.0125
FIRM_AGE	0.735318	1.654684	0.444386	0.6568
FIRM_SIZE	4.039795	1.764239	2.289822	0.0252
D(RE_BE)	19.54285	7.028854	2.780375	0.0054
D(PROFITABILITY)	24.12075	13.34432	3.807567	0.0007
D(TANGIBLE_ASSETS)	-13.40503	10.76103	-1.245701	0.2129
CASHFLOW_RISK	-12.38715	16.78736	-2.737885	0.0406
FIRM_IDIOS_RISK	10.55587	17.14284	2.601576	0.0381
FIRM_IDIOS_SHOCK	-24.83863	19.18039	-3.295001	0.0053
D(INSIDER_OWNERSHIP)	3.721575	3.222718	1.154794	0.2482
D(INSTIT_OWNERSHIP)	-0.023281	0.004752	-0.489908	0.6242
D(LEVERAGE)	-128.0816	119.7365	-1.103657	0.7189
D(LIQUIDITY)	28.69469	20.97508	3.664308	0.0074
PEER_IDIOS_SHOCK(-1)	-2.542208	1.683122	-2.698680	0.0256
D(PEER_IDOS_RISK(-1))	16.12895	15.65613	3.221819	0.0018
EPS	0.019523	0.032082	2.608537	0.0428
C	-60.89556	22.54082	-2.701569	0.0069

McFadden R-squared	0.692979	Mean dependent var	0.412371
S.D. dependent var	0.494819	S.E. of regression	0.310994
Akaike info criterion	1.034698	Sum squared resid	6.48004

Schwarz criterion	1.831001	Log likelihood	-20.18288
Hannan-Quinn criter.	1.356684	Deviance	40.36575
Restr. deviance	131.4757	Restr. log likelihood	-65.73786
LR statistic	91.10998	Avg. log likelihood	-0.208071
Prob(LR statistic)	0.000000		
Obs with Dep=0	74	Total obs	81
Obs with Dep=1	7		

Model 1- Column 4 - repurchase second stage

Dependent Variable: DUMMY1
Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)
Date: 04/11/20 Time: 10:58
Sample (adjusted): 2007 2018
Included observations: 81 after adjustments
Convergence achieved after 38 iterations
Coefficient covariance computed using observed Hessian
WARNING: Complete separation detected at estimated parameters (results may not be valid)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	-1.235187	2.602009	-2.474705	0.0335
D(PEER_MTB)	0.194209	0.479473	0.405046	0.6854
D(PEER_FIRM_AGE)	-5.019944	13.9134	-3.360799	0.0082
D(PEER_FIRM_SIZE)	-14.68842	11.49313	-2.278018	0.0712
D(PEER_RE_BE)	-20.13168	12.40223	-1.623231	0.1045
D(PEER_PROFITABILITY)	7.928002	14.29316	0.554671	0.5791
PEER_CASHFLOW_RISK	-22.86814	35.52608	-3.206437	0.0098
PEER_R_D_TA	-86.21299	174.9889	-0.492677	0.6222
D(PEER__INSIDER_OWNERSHIP)	-5.002531	39.16325	-0.127735	0.8984
D(PEER_INSTIT_OWNERSHIP)	-4.513044	6.619872	-0.681742	0.4954
PEER_LEVERAGE	-76.20504	40.86834	-1.864647	0.0622
PEER_LIQUIDITY	8.184926	4.393603	1.862919	0.0625
D(PEER_TANGIBLE_ASSETS)	-94.65303	59.54786	-1.589533	0.1119
D(SALES_GROWTH)	-39.34296	34.5502	-1.838719	0.0548
D(MTB)	-2.009656	1.144743	-1.755553	0.0792
D(R_D_TA)	-4781.025	2247.681	-2.127103	0.0334
FIRM_AGE	2.631106	3.297164	0.797991	0.4249
FIRM_SIZE	8.528499	4.985135	1.710786	0.0871
D(RE_BE)	1.366959	3.545044	1.926917	0.0552
D(PROFITABILITY)	49.49619	26.59247	2.861286	0.0327

D(TANGIBLE_ASSETS)	-18.55807	18.05202	-1.028033	0.3039
CASHFLOW_RISK	-48.67458	56.81444	-2.856729	0.0016
FIRM_IDIOS_RISK	5.443794	29.79708	3.182696	0.0085
FIRM_IDIOS_SHOCK	-27.12238	26.65823	-1.917411	0.0609
D(INSIDER_OWNERSHIP)	9.707286	6.538352	1.484668	0.1376
D(INSTIT_OWNERSHIP)	-0.059363	0.067191	-0.883497	0.3757
D(LEVERAGE)	-65.29981	30.96908	-2.216807	0.0386
D(LIQUIDITY)	21.00035	15.01376	3.057569	0.0056
D(RP_FITTED)	0.502465	1.525121	3.330892	0.0074
PEER_EPS	-0.034612	0.03533	-2.979663	0.0273
EPS	-43.27838	23.75817	-1.821621	0.0685
C	-110.4089	59.56673	-1.853533	0.0638

McFadden R-squared	0.772916	Mean dependent var	0.148148
S.D. dependent var	0.495893	S.E. of regression	0.274927
Akaike info criterion	0.989926	Sum squared resid	4.535107
Schwarz criterion	1.845273	Log likelihood	-14.04161
Hannan-Quinn criter.	1.335005	Deviance	28.08323
Restr. deviance	123.6689	Restr. log likelihood	-61.83447
LR statistic	95.58571	Avg. log likelihood	-0.154303
Prob(LR statistic)	0.000000		

Obs with Dep=0	69	Total obs	81
Obs with Dep=1	12		

Model 2- Column 1-divinded first stage

Dependent Variable: DUMMY9

Method: ML - Binary Probit (Quadratic hill climbing / EViews legacy)

Date: 04/12/20 Time: 08:58

Sample (adjusted): 2005 2018

Included observations: 96 after adjustments

Convergence achieved after 9 iterations

QML (Huber-White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	-5.344673	2.002367	-2.669177	0.0076
D(PEER_MTB)	0.212911	0.283849	1.750086	0.0532
D(PEER_FIRM_AGE)	1.680600	3.983527	1.421888	0.0673
D(PEER_FIRM_SIZE)	5.474710	2.881985	1.899632	0.0575
D(PEER_RE_BE)	-0.384646	3.357652	-0.114558	0.9088
D(PEER_PROFITABILITY)	3.624195	7.266967	3.498722	0.0080
PEER_CASHFLOW_RISK	-13.03246	13.14325	-3.991571	0.0014

PEER_R_D_TA	-97.00817	70.63816	1.373311	0.1697
D(PEER__INSIDER_OWNERSHIP)	7.765763	11.55714	0.671945	0.5016
D(PEER_INSTIT_OWNERSHIP)	-4.315303	3.069802	-1.405727	0.1598
PEER_LEVERAGE	-23.76517	9.598983	-2.475801	0.0133
PEER_LIQUIDITY	2.726685	1.173923	2.322712	0.0202
D(PEER_TANGIBLE_ASSETS)	33.07555	17.87918	1.849948	0.0643
D(SALES_GROWTH)	-12.31096	15.98775	-1.770025	0.0413
D(MTB)	0.638880	0.381247	1.675763	0.0938
D(R_D_TA)	-1152.355	579.4440	-1.988725	0.0467
FIRM_AGE	0.914663	0.987830	1.925932	0.0545
FIRM_SIZE	-1.295360	0.673930	-1.922099	0.0546
D(RE_BE)	-7.765971	3.665896	-2.118438	0.0341
D(PROFITABILITY)	22.94709	11.27929	2.034445	0.0419
D(TANGIBLE_ASSETS)	-8.635132	6.689107	-1.290925	0.1967
CASHFLOW_RISK	-1.848222	8.417019	-2.219582	0.0262
FIRM_IDIOS_RISK	-0.263751	8.918351	-3.029574	0.0064
FIRM_IDIOS_SHOCK	10.73306	4.036053	2.659296	0.0078
D(INSIDER_OWNERSHIP)	2.162299	1.245553	1.736015	0.0826
D(INSTIT_OWNERSHIP)	-0.000208	0.018411	-0.011312	0.9910
D(LEVERAGE)	11.18870	6.964403	1.606556	0.1082
D(LIQUIDITY)	-1.788420	1.996265	-1.895883	0.0703
PEER_IDIOS_SHOCK(-1)	39.04874	15.75136	2.979070	0.0132
D(PEER_IDOS_RISK(-1))	-21.71151	15.08834	-3.438960	0.0002
C	-13.67903	8.673949	-1.577025	0.1148

McFadden R-squared	0.667445	Mean dependent var	0.510417
S.D. dependent var	0.502516	S.E. of regression	0.320633
Akaike info criterion	1.106708	Sum squared resid	6.682367
Schwarz criterion	1.934779	Log likelihood	-22.12198
Hannan-Quinn criter.	1.441428	Deviance	44.24396
Restr. deviance	133.0426	Restr. log likelihood	-66.52129
LR statistic	88.79863	Avg. log likelihood	-0.230437
Prob(LR statistic)	0.000000		

Obs with Dep=0	47	Total obs	96
Obs with Dep=1	49		

Model 2- Column 2- dividend second stage

Dependent Variable: DUMMY9
Method: ML - Binary Probit (Quadratic hill climbing / EViews legacy)
Date: 04/12/20 Time: 08:39
Sample (adjusted): 2006 2018
Included observations: 91 after adjustments
Convergence achieved after 8 iterations
QML (Huber-White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	2.195457	1.168559	1.878773	0.0603
PEER_MTB	0.264046	0.112466	2.347779	0.0189
D(PEER_FIRM_AGE)	2.702704	2.949359	2.916370	0.0495
D(PEER_FIRM_SIZE)	-1.356107	1.423937	-1.952364	0.0840
D(PEER_RE_BE)	3.709490	2.885487	2.285568	0.0986
D(PEER_PROFITABILITY)	2.945229	4.869390	3.604846	0.0053
PEER_CASHFLOW_RISK	-0.838007	7.878697	-3.106364	0.0091
PEER_R_D_TA	-24.40992	36.85220	-0.662373	0.5077
D(PEER__INSIDER_OWNERSHIP)	3.154678	8.164120	0.386408	0.6992
D(PEER_INSTIT_OWNERSHIP)	-0.101614	1.982598	-0.051253	0.9591
PEER_LEVERAGE	-2.771109	4.244836	-0.652819	0.5139
PEER_LIQUIDITY	1.361744	0.403276	3.376705	0.0007
D(PEER_TANGIBLE_ASSETS)	23.65618	11.73043	2.016651	0.0437
D(SALES_GROWTH)	-5.348272	12.73554	-2.419948	0.0465
D(MTB)	0.051396	0.216180	1.737746	0.0821
D(R_D_TA)	-1064.162	339.4267	-3.135174	0.0017
FIRM_AGE	2.265692	1.005948	2.252295	0.0243
FIRM_SIZE	0.338906	0.392396	1.863683	0.0878
D(RE_BE)	3.997582	3.116850	1.282571	0.1996
D(PROFITABILITY)	11.12678	5.875222	2.693848	0.0382
D(TANGIBLE_ASSETS)	1.448741	5.337487	0.271427	0.7861
CASHFLOW_RISK	-13.65165	7.886560	-1.731002	0.0835
FIRM_IDIOS_RISK	-0.865949	6.991113	-3.123864	0.0014
FIRM_IDIOS_SHOCK	0.152681	0.276246	3.552701	0.0005
D(INSIDER_OWNERSHIP)	3.462845	1.379260	2.510654	0.0121
D(INSTIT_OWNERSHIP)	-0.020208	0.022501	-0.898113	0.3691
D(LEVERAGE)	5.023159	4.665393	1.076685	0.2816
D(LIQUIDITY)	-1.805902	1.530991	-1.879564	0.0982
DT_FITTED	2.686406	0.878592	3.057627	0.0022
C	-17.25242	3.906037	-4.416860	0.0000

McFadden R-squared	0.534466	Mean dependent var	0.516484
S.D. dependent var	0.502497	S.E. of regression	0.386522
Akaike info criterion	1.304202	Sum squared resid	9.113346
Schwarz criterion	2.131958	Log likelihood	-29.34119

Hannan-Quinn criter.	1.638150	Deviance	58.68238
Restr. deviance	126.0539	Restr. log likelihood	-63.02693
LR statistic	67.37149	Avg. log likelihood	-0.322431
Prob(LR statistic)	0.000069		
Obs with Dep=0	44	Total obs	91
Obs with Dep=1	47		

Model 2- Column 3- repurchase second stage

Dependent Variable: DUMMY4
Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)
Date: 04/11/20 Time: 10:47
Sample (adjusted): 2007 2018
Included observations: 81 after adjustments
Convergence achieved after 38 iterations
Coefficient covariance computed using observed Hessian
WARNING: Complete separation detected at estimated parameters (results may not be valid)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
PEER_SALES_GROWTH	1.292542	1.659248	0.778993	0.4326
D(PEER_MTB)	-0.035439	0.143906	-3.237275	0.0021
D(PEER_FIRM_AGE)	-3.908099	4.394325	-1.889554	0.0737
D(PEER_FIRM_SIZE)	3.158845	2.538082	1.242458	0.2133
D(PEER_RE_BE)	5.693175	4.291708	1.326552	0.1847
D(PEER_PROFITABILITY)	2.043196	7.234392	1.982428	0.0776
PEER_CASHFLOW_RISK	-3.645189	11.83333	-0.308044	0.7258
PEER_R_D_TA	-32.07314	56.67066	-0.565897	0.5715
D(PEER__INSIDER_OWNERSHIP)	2.854551	9.658144	0.295559	0.7676
D(PEER_INSTIT_OWNERSHIP)	-1.420121	2.830088	-0.502179	0.6155
PEER_LEVERAGE	-32.16011	9.600779	-3.349843	0.0008
PEER_LIQUIDITY	3.434507	0.958263	3.584162	0.0003
D(PEER_TANGIBLE_ASSETS)	-0.389516	12.83506	-0.030348	0.9758
D(SALES_GROWTH)	-11.55101	16.24793	-3.710922	0.0071
D(MTB)	0.774244	0.298097	2.597288	0.0094
D(R_D_TA)	-1238.703	571.9964	-2.165579	0.0303

FIRM_AGE	0.405504	1.283204	0.316009	0.7452
FIRM_SIZE	0.252302	0.672083	1.875403	0.0874
D(RE_BE)	4.250054	2.603538	1.601109	0.1072
D(PROFITABILITY)	7.971364	6.827219	2.167586	0.0243
D(TANGIBLE_ASSETS)	2.820056	6.272715	0.449575	0.6053
CASHFLOW_RISK	-30.23893	15.68832	-1.927480	0.0539
FIRM_IDIOS_RISK(-1)	-4.335541	15.26931	-3.283938	0.0065
FIRM_IDIOS_SHOCK(-1)	12.86032	13.02533	3.987486	0.0034
D(INSIDER_OWNERSHIP)	0.942574	2.179068	0.432558	0.6653
D(INSTIT_OWNERSHIP)	0.024249	0.045215	0.536314	0.5917
D(LEVERAGE)	-29.68076	18.60652	-0.406415	0.6844
D(LIQUIDITY)	4.146327	5.007658	2.208175	0.0351
D(RT_FITTED)	0.455946	0.912226	1.999817	0.0472
PEER_EPS	-0.006001	0.030781	-2.594974	0.0454
EPS	4.362617	4.250884	1.926285	0.0948
C	-26.79201	8.215674	-3.261085	0.0011

McFadden R-squared	0.556515	Mean dependent var	0.135802
S.D. dependent var	0.495893	S.E. of regression	0.370975
Akaike info criterion	1.262036	Sum squared resid	8.394978
Schwarz criterion	2.089792	Log likelihood	-27.42263
Hannan-Quinn criter.	1.595984	Deviance	54.84526
Restr. deviance	123.6689	Restr. log likelihood	-61.83447
LR statistic	68.82368	Avg. log likelihood	-0.301348
Prob(LR statistic)	0.000044		

Obs with Dep=0	70	Total obs	81
Obs with Dep=1	11		

Model 2- Column 4 – total payout second stage

Dependent Variable: DUMMY9

Method: ML - Binary Probit (Quadratic hill climbing / EViews legacy)

Date: 04/12/20 Time: 08:51

Sample (adjusted): 2006 2018

Included observations: 91 after adjustments

Convergence achieved after 8 iterations

QML (Huber-White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.

PEER_SALES_GROWTH	-3.461123	1.292589	-2.677668	0.0074
D(PEER_MTB)	-0.016744	0.132953	-1.765060	0.0899
D(PEER_FIRM_AGE)	6.940844	3.604156	1.925789	0.0541
D(PEER_FIRM_SIZE)	2.170297	1.784650	1.816091	0.0924
D(PEER_RE_BE)	2.700367	3.389077	1.996786	0.0425
D(PEER_PROFITABILITY)	5.447625	6.633840	2.821187	0.0015
PEER_CASHFLOW_RISK	-5.277433	8.372209	-2.630351	0.0085
PEER_R_D_TA	-48.93102	39.48200	-1.827592	0.0532
D(PEER__INSIDER_OWNERSHIP)	1.775956	8.525769	0.208305	0.8350
D(PEER_INSTIT_OWNERSHIP)	1.291975	2.276335	0.567568	0.5703
PEER_LEVERAGE	-13.39061	6.429604	-2.082649	0.0373
PEER_LIQUIDITY	1.483293	0.670893	2.210923	0.0270
D(PEER_TANGIBLE_ASSETS)	48.01322	15.94290	3.011573	0.0026
D(SALES_GROWTH)	-9.099969	13.81194	-2.658848	0.0075
D(MTB)	0.351491	0.191175	1.838578	0.0660
D(R_D_TA)	-1531.733	483.8671	-3.165607	0.0015
FIRM_AGE	0.746233	1.239411	1.602087	0.0574
FIRM_SIZE	0.407316	0.432380	3.942033	0.0032
D(RE_BE)	8.990421	4.179962	2.150838	0.0315
D(PROFITABILITY)	21.88202	8.199245	2.668785	0.0076
D(TANGIBLE_ASSETS)	-2.163765	4.713251	-0.459081	0.6462
CASHFLOW_RISK	-29.47873	12.49676	-2.358909	0.0183
FIRM_IDIOS_RISK	-2.641375	7.250992	-2.364278	0.0457
FIRM_IDIOS_SHOCK	0.715091	0.334701	2.136508	0.0326
D(INSIDER_OWNERSHIP)	3.980338	1.294609	3.074548	0.0021
D(INSTIT_OWNERSHIP)	-0.037728	0.027180	-1.388070	0.1651
D(LEVERAGE)	7.646953	4.912758	1.556550	0.1196
D(LIQUIDITY)	-3.675927	2.082608	-1.765060	0.0776
TT_FITTED	2.957965	0.781873	3.783177	0.0002
C	-9.452761	5.092957	-1.856046	0.0634

McFadden R-squared	0.557115	Mean dependent var	0.516484
S.D. dependent var	0.502497	S.E. of regression	0.374899
Akaike info criterion	1.272828	Sum squared resid	8.573490
Schwarz criterion	2.100584	Log likelihood	-27.91366
Hannan-Quinn criter.	1.606776	Deviance	55.82733
Restr. deviance	126.0539	Restr. log likelihood	-63.02693
LR statistic	70.22654	Avg. log likelihood	-0.306744
Prob(LR statistic)	0.000028		

Obs with Dep=0	44	Total obs	91
Obs with Dep=1	47		

Model 3- Speed of Adjustment

Dependent Variable: DP__INC_DCR
Method: Robust Least Squares
Date: 03/30/20 Time: 07:32
Sample (adjusted): 2005 2018
Included observations: 105 after adjustments
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
D(PEER_IDOS_RISK)	-0.969018	0.219423	-4.417352	0.0000
PEER_IDIOS_SHOCK	1.171023	0.156384	7.466507	0.0000
PEER_CASHFLOW_RISK	-0.189956	0.100732	-1.885626	0.0593
PEER_PR__INC_DCR	0.111946	0.926579	3.962362	0.0041
PEER_MTB	-0.010878	0.001805	-6.027340	0.0000
PEER_LIQUIDITY	0.032084	0.008681	3.696034	0.0002
PEER_LEVERAGE	-0.023997	0.015741	-1.524488	0.1274
PEER_FIRM_SIZE	0.039688	0.016621	2.387768	0.0170
PEER_FIRM_AGE	0.013465	0.019926	0.675759	0.4992
PEER_SALES_GROWTH	0.008108	0.024341	0.333107	0.7391
D(PEER_RE_BE)	-0.060699	0.036459	-1.664837	0.0959
PEER_R_D_TA	0.066703	0.516598	0.129119	0.8973
D(PEER_PROFITABILITY)	0.017092	0.064113	0.266597	0.7898
C	-0.107031	0.042125	-2.540798	0.0111

Robust Statistics

R-squared	0.254639	Adjusted R-squared	0.181253
Rw-squared	0.835415	Adjust Rw-squared	0.835415
Akaike info criterion	256.5590	Schwarz criterion	305.3512
Deviance	15747342	Scale	256.0478
Rn-squared statistic	243.4989	Prob(Rn-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	-0.284429	S.D. dependent var	0.178397
S.E. of regression	0.189644	Sum squared resid	3.272308

Model 3- Speed of Adjustment - Robustness check

Cointegration Test

Date: 03/31/20 Time: 16:17
Sample (adjusted): 2007 2018
Included observations: 89 after adjustments
Trend assumption: Linear deterministic trend
Series: DIVIDEND_PAYOUT_RATIO PEER_DIVIDEND_PAYOUT_RATIO
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.282110	31.61203	15.49471	0.0001
At most 1	0.023473	2.113981	3.841466	0.1460

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.282110	29.49805	14.26460	0.0001
At most 1	0.023473	2.113981	3.841466	0.1460

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

DIVIDEND_PAYOUT_RATIO	PEER_DIVIDEND_PAYOUT_RATIO
0.012156	0.007270
0.043533	-0.001372

Unrestricted Adjustment Coefficients (alpha):

D(DIVIDEND_PAYOUT_RATIO)	-2.223627	-5.259379

D(PEER_DIVIDEND_PAYOUT_RATIO)	-145.0612	3.558863

1 Cointegrating Equation(s):	Log likelihood	-1052.722

Normalized cointegrating coefficients (standard error in parentheses)

DIVIDEND_PAYOUT_RATIO	PEER_DIVIDEND_PAYOUT_RATIO
1.000000	0.598075
	(0.10618)

Adjustment coefficients (standard error in parentheses)

D(DIVIDEND_PAYOUT_RATIO)	-0.027031
	(0.04605)
D(PEER_DIVIDEND_PAYOUT_RATIO)	-1.763394
	(0.31032)

VECM Test

Vector Error Correction Estimates
Date: 04/06/20 Time: 03:42
Sample (adjusted): 2007 2018
Included observations: 89 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
DIVIDEND_PAYOUT_RATIO(-1)	1.000000

PEER_DIVIDEND_PAYOUT_RATIO(-1)	-1.457105	
	(0.29606)	
	[-4.92173]	
C	-1.669757	

Error Correction:	D(DIVIDEND_PAYOUT_RATIO)	D(PEER_DIVIDEND_PAYOUT_RATIO)
CointEq1	-0.233191	0.353420
	(0.09266)	(0.10023)
	[-2.51652]	[3.52598]
D(DIVIDEND_PAYOUT_RATIO(-1))	-0.498429	-0.245214
	(0.11572)	(0.12518)
	[-4.30707]	[-1.95895]
D(DIVIDEND_PAYOUT_RATIO(-2))	-0.080892	-0.112846
	(0.09731)	(0.10526)
	[-0.83130]	[-1.07211]
D(PEER_DIVIDEND_PAYOUT_RATIO(-1))	-0.283672	-0.248201
	(0.12770)	(0.13813)
	[-2.22141]	[-1.79686]
D(PEER_DIVIDEND_PAYOUT_RATIO(-2))	-0.181912	-0.103440
	(0.10245)	(0.11081)
	[-1.77569]	[-0.93345]
C	0.895461	0.875732
	(2.85049)	(3.08333)
	[0.31414]	[0.28402]
R-squared	0.428129	0.371692
Adj. R-squared	0.393679	0.333842
Sum sq. resids	59309.61	69394.64
S.E. equation	26.73151	28.91505
F-statistic	12.42752	9.820171
Log likelihood	-415.6196	-422.6078

Akaike AIC	9.474599	9.631637
Schwarz SC	9.642372	9.799410
Mean dependent	-0.399718	0.250387
S.D. dependent	34.32987	35.42708

Determinant resid covariance (dof adj.)	590172.8
Determinant resid covariance	513281.2
Log likelihood	-837.6828
Akaike information criterion	19.13894
Schwarz criterion	19.53041
Number of coefficients	14

Model 4 - Market Reaction - Far from Peers

Dependent Variable: CAR
Method: Robust Least Squares
Date: 04/15/20 Time: 09:25
Sample: 3/01/2018 11/21/2018
Included observations: 44
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
DIV_ASS	0.152998	0.202818	0.754360	0.4506
P_DIV_ASS	-0.911431	0.331591	-2.748662	0.0060
CHANGE_DIV_ASS	0.545513	0.286771	1.902262	0.0571
C	0.015935	0.011450	0.493798	0.6214

Robust Statistics

R-squared	0.066493	Adjusted R-squared	0.044267
Rw-squared	0.015233	Adjust Rw-squared	0.015233
Akaike info criterion	62.24590	Schwarz criterion	67.55274
Deviance	0.118338	Scale	0.044416
Rn-squared statistic	0.569060	Prob(Rn-squared stat.)	0.450633

Non-robust Statistics

Mean dependent var	-0.023530	S.D. dependent var	0.067420
S.E. of regression	0.073713	Sum squared resid	0.228212

Market Reaction – Close to Peers

Dependent Variable: CAR
Method: Robust Least Squares
Date: 04/15/20 Time: 09:25
Sample: 3/01/2018 11/21/2018
Included observations: 44
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
DIV_ASS	3.756622	1.110053	2.986354	0.0065
P_DIV_ASS	-1.275505	0.376902	-3.684181	0.0025
CHANGE_DIV_ASS	1.395157	4.122650	3.384126	0.0007
C	0.050915	0.007496	-1.784388	0.0044

Robust Statistics

R-squared	0.304259	Adjusted R-squared	0.269472
Rw-squared	0.442352	Adjust Rw-squared	0.442352
Akaike info criterion	26.75829	Schwarz criterion	29.39101
Deviance	0.006796	Scale	0.017112
Rn-squared statistic	11.45268	Prob(Rn-squared stat.)	0.000714

Non-robust Statistics

Mean dependent var	0.005726	S.D. dependent var	0.025861
S.E. of regression	0.020352	Sum squared resid	0.008284