The interrelationship between capital structure and distribution policies of companies listed on the Johannesburg Stock Exchange

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ABSTRACT

The study used a sample of 68 companies listed on the Johannesburg Stock Exchange over the periods 1990 to 2017 and 1999 to 2017 to investigate the interrelationship between capital structure and distribution policies. First, using an individual equation approach (fixed effects, random effects, and the generalised method of moments), the results suggested that financing decisions and pay-out decisions were likely to be determined directly and through joint determinants. However, the findings of the individual equation approach were mixed, warranting the use of a more robust approach. The simultaneous decision-making approach (a three-stage least squares approach) showed that the dividend paid correlated significantly negatively with two alternative measures of the capital structure (the debt-to-equity ratio and the debt-to-asset ratio), and correlated significantly positively with the leverage factor; and the three alternative measures of the capital structure correlated significantly negatively with the dividend. This finding suggested that the South African companies in the sample were more likely to be financially constrained. The simultaneity through joint determinants revealed that the two policies were indirectly interrelated through profitability, cash flow, liquidity, market volatility, non-debt tax shield and the degree of operating leverage. Furthermore, investigating whether the 2008 financial crisis had an impact on the interdependence between the capital structure and the dividend paid, the findings of the research revealed that there was no interplay between the capital structure and the dividend during the financial crisis. However, before and after the financial crisis, the two policies were related.

INTRODUCTION

Although much effort has been put into investigating the behaviour of companies, capital structure decisions and distribution policy decisions have been examined individually and frequently in isolation rather than together (Jensen, Solberg and Zorn, 1992). Indeed, the seminal works by Modigliani and Miller (1958) and Miller and Modigliani (1961) posit the capital structure irrelevance theorem and the distribution policy irrelevance theorem separately. The Modigliani-Miller theorems demonstrate that internal and external funds for a company are substitutes in a perfect market environment. Thus, capital structure and dividend pay-out choices should have no impact on the company's value and should be irrelevant to shareholders' wealth. These theorems suggest that there is no statistical relationship between the set of company decisions in a perfect market environment where there is no friction. As a result, each of the two policies has been widely and intensively investigated in the literature on finance, but little is known about any interdependence there may be between them (Al-Najjar, 2011). When market imperfections – such as the insufficient availability of internal funds, and limited access to new external funds (for example, when a company reaches its debt capacity) – are introduced, these may hamper the company's ability to return cash to shareholders. Therefore, when a company adjusts its capital structure, its distribution policies may also be affected. Jensen *et al.* (1992) argue that careful analysis is required to distinguish any direct effects from indirect effects resulting from a company's operating choices. Consequently, a strategic simultaneous decision-making approach was warranted to identify the effects of interrelated decisions.

Whereas the majority of prior studies have examined either capital structure or dividend payments in isolation, in this study we argue that dividend decisions and capital structure decisions are both directly and indirectly interrelated through some joint determinants. Thus, this study empirically investigated the interdependence between the alternative measures of capital structure (debt-to-equity ratio, debt-to-asset ratio and leverage factor) and of distribution policies (dividend payments and share repurchase) by South African managers, with reference to JSE-listed companies. To interrelate the financing decision to distribution policies through joint determinants, as suggested by Crutchley and Hansen (1989) and Al-Najjar (2011), the study used the following determinants: company size, profitability, non-debt tax shield, market volatility, asset tangibility, and liquidity. The study was limited to the basic materials, industrial, consumer goods, and consumer services sectors. The study also used static models (fixed and random effects techniques), a dynamic model (the generalised method of moments), and a simultaneous equation system (three-stage least squares) to test the relationship between pay-out and financing decisions. The main contributions of the study to the existing knowledge on decision-making by a board of directors are fourfold. First, using agency cost models developed in prior research (Ding and Murinde, 2010; Noronha, Shome and Morgan, 1996), the study examines the inter-relationship between the capital structure (the debt-to-equity ratio, the debt-to-asset ratio, and the leverage factor) and the distribution strategies (dividend paid, share repurchases, and total pay-out) directly and indirectly through some joint determinants. (Although dividends are used throughout the document, the dividends used in the analyses are actually scaled by total assets.) Second, the research tests for the trade-off and the pecking order theories using an individual and simultaneous equation approach. Third, the study investigates the effects of the 2008 financial crisis on the interdependence between capital structure and pay-out decisions. Fourth, from the practitioners' (shareholders and the board of directors) point of view, the study contributes to better knowledge of how the two policies are interrelated in the South African context, which can provide information on how they should reduce agency costs.

The remainder of the study is structured as follows: the next section discusses the literature related to financing and pay-out decisions, and the simultaneity between them. Then the study presents the data sources and the research methodology. A further section offers the results and interpretation, with implications for managers and conclusion drawn in the final section.

LITERATURE REVIEW

Capital structure and distribution strategies

The term 'distribution policy' refers to the distribution of a portion of the profit or free cash flow to shareholders as a form of reward for fulfilling the wealth maximisation objective of the shareholders, while 'financing policy' refers to the raising of capital involving the identification of various sources of financing and the quantum of finance to be raised from long-term and short-term sources to maximise the value of the company.

Since Modigliani and Miller's (1958) debt irrelevance proposition and Miller and Modigliani's (1961) dividend irrelevance proposition, financial economists have advanced a number of capital structure and distribution policy relevance theories. It is important to acknowledge that financing decisions and distribution strategies are interrelated through the accounting identity approach, the institutional approach, the information approach, the agency cost theory, the pecking-order theory, and the trade-off theory. Dhrymes and Kurz (1967) argue that the relationship between the investment, dividend, and external finance behaviour of companies is often alluded to but rarely studied systematically. Given the institutional milieu of the modern corporation, there is at least a presumption that the capital structure and the distribution strategies of a company's decision-making process exhibit some interaction. However, the view in the literature is that these corporate decisions are independent and should each be studied individually using an individual equation analysis. Jensen *et al.* (1992) acknowledge that not only do companies differ with respect to factors such as company size, growth and profitability, but these companies' attributes have also been related empirically to their capital structure and distribution policy. Ultimately, in resolving the identified issues, understanding the interdependence between distribution strategy and capital structure directly and through joint determinants is essential, and has warranted investigation.

Financing decisions, pay-out decisions, agency cost theory, and simultaneous decision-making

Many empirical studies have investigated whether the choice of financial decisions, such as dividends and the capital structure, derives from the agency problem (Ding and Murinde, 2010). Initially, the capital structure and the distribution policy were assumed to be exogenous company-specific attributes hypothesised to affect each other separately. For example, some authors used the distribution policy as a determinant of the capital structure (Frank and Goyal, 2009), while others viewed the capital structure as a determinant of the distribution policy using an individual equation analysis (Baker, Dewasiri, Yatiwelle Koralalage and Azeez, 2019; Ben Amar, Ben Salah, and Jarboui, 2018; Benavides, Berggrun and Perafan, 2016; Yusof and Ismail, 2016; Banerjee and De, 2015; Kaźmierska-Jóźwiak, 2015; Moon, Lee and Dattilo, 2015; Arko, Abor, Adjasi and Amidu, 2014; Nizar Al-Malkawi, 2007). Despite this common belief, there are strong reasons for the two policies to be interrelated (Baker and Weigand, 2015).

Easterbrook (1984) argues that paying dividends induces the issuing of new securities, resulting in capital market monitoring and a consequent reduction in agency costs. Such an agency rational clearly links the company's dividend and financing decisions. For instance, based on the agency cost theory, some scholars (Kim, Rhim and Friesner, 2007; Crutchley, Jensen, Jahera and Raymond, 1999; Jensen *et al.,* 1992) tested three managerial financial decisions – leverage, dividend, and insider ownership in a simultaneous framework. The empirical results of Crutchley *et al.* (1999) and Jensen *et al.* (1992) indicated that the dividend payments negatively correlated with the debt ratio and that the debt ratio negatively correlated with the dividend payments. These findings suggest that the capital structure and the dividend payments appear to be chosen simultaneously to decrease agency costs. This finding is validated by some authors who only focus on the interplay between the dividend payments and the equity ratio (Ding and Murinde, 2010; Noronha *et al*., 1996). Furthermore, while the results of Crutchley *et al.* (1999) also indicate that the level of debt and the dividends negatively affect the choice of insider ownership, but that insider ownership does not affect the choice of debt and dividends, the empirical findings by Jensen *et al.* (1992) found no evidence that insider ownership was a substitute for capital structure and dividend payments in controlling agency costs. In contrast, Kim *et al.* (2007) found that debt policy and ownership structure had a significantly positive impact on dividend policy. Furthermore, debt and dividend policy were significantly and positively related to ownership structure. These findings support both the theory of convergence of interest between management and ownership and the entrenchment theory. Al-Najjar (2011) found an insignificant negative relationship between dividend payments and capital structure, and an insignificant negative relationship between capital structure and dividend payments.

Chen and Steiner (1999) established that capital structure, managerial ownership, dividend payments, and risk were simultaneously determined, and that there were substitution effects between the three financial variables as well as between institutional ownership and managerial ownership. The empirical findings showed that leverage positively correlated with dividend payments, while dividend payments negatively correlated with leverage.

Company-specific characteristics

Based on the agency theory narrative, some authors (Al-Najjar, 2011; Crutchley and Hansen, 1989) argue that financing and payout decisions are determined by the impact of company-specific characteristics. An examination of the signs and significance of the coefficient of the joint determinants allowed inferences about the nature of simultaneity for each of the two policies. For example, if profitability were found to be statistically significant in the policies, this would indicate that profitability exhibits a two-way (simultaneous) causality. On the other hand, if profitability were not statistically significant, then the two-way causality would not exist (Al-Najjar, 2011; Noronha *et al*., 1996; Crutchley and Hansen, 1989). Furthermore, the joint determinants are chosen to reflect the costs and benefits of the three decisions. They are mainly chosen based on the signalling, agency cost, trade-off, and pecking-order theory frameworks following prior research (Yusof and Ismail, 2016; Al-Najjar, 2011; Ding and Murinde, 2010; Crutchley *et al.,* 1999; Noronha *et al.,* 1996; Easterbrook, 1984). Below follows a brief discussion of the suggested joint determinants according to the abovementioned theories:

Profitability: because dividends are usually distributed from annual profits, profitable companies tend to pay higher dividends (Al-Najjar, 2009). Therefore, a positive relationship is anticipated between the company's profitability and its dividend payments. Furthermore, profitability is negatively associated with debt ratio because profitable companies are supposed to have more available internal capital, based on the pecking-order theory (Al-Najjar, 2011).

Company size: because larger companies impose greater liquidity-based diversification costs on managers, the size of the company is expected to have a positive effect on both leverage and dividend payments (Crutchley and Hansen, 1989). As a result, to control equity agency costs, managers of large companies should pay more dividends (owing to reduced flotation costs) and should use more leverage.

Market volatility: increased market volatility raises expected bankruptcy costs (hence debt agency costs), so that less debt is used to control equity agency costs. Furthermore, if managers choose to attain the best trade-off of benefits and costs as market volatility increases, managers should not only reduce leverage, but they should also reduce dividends. Thus, market volatility should have a negative effect on leverage and on dividend payments.

Asset tangibility**:** according to the agency theory, the shareholders of a leveraged company are willing to invest sub-optimally to expropriate wealth from bondholders. However, the more tangible the company's assets are, the more these assets can be used as collateral. According to Al-Najjar (2011), collateralised assets can restrict such opportunistic behaviour. Thus, a positive relationship is expected between tangible assets and the leverage ratio. In addition, Al-Najjar (2009) argues that the more collateralised the assets in the company, the less the chance that the short-term assets will be used as collateral for short-term loans. Consequently, companies will rely on their retained earnings, which will reduce the chance to pay dividends, suggesting a negative relationship between asset tangibility and dividend payments.

Growth opportunities: agency problems are more severe for growing companies because they are more flexible in their selection of future investments (Al-Najjar, 2011).

As a result, the expected growth rate should be negatively correlated with leverage. In addition, the bigger the growth opportunities, the more the need for funds to finance expansion and the more likely the company is to retain earnings rather than to pay them as dividends (Al-Najjar, 2011; Ding and Murinde, 2010), and consequently minimise the agency conflicts.

Non-debt tax shield: companies with high non-debt tax shields, such as accelerated depreciation and investment tax credits relative to their expected cash flows, should use less debt. This leads to the prediction of a negative correlation between non-debt tax shields and debt. In addition, Chang and Rhee (1990) stated that the greater the non-debt tax shields, the higher the dividend payments. This argument is supported by the narrative that the depreciation cost is a non-cash expense.

Liquidity: companies with high liquid assets can use such assets to finance their investments. Consequently, a company's liquidity position should have a negative effect on its leverage ratio. Furthermore, according to Manos (2003), liquidity is an inverse proxy for transaction costs, and so has a positive impact on the dividend payments.

Based on the theoretical framework of the agency cost theory, the pecking-order theory, the trade-off theory, the signalling theory, and the evidence of prior studies, the following hypotheses were developed to determine the interdependence between capital structure and distribution strategies for South African companies listed on the JSE:

H1: In a simultaneous decision-making framework, the capital structure is negatively correlated with the distribution policy, while the distribution policy is negatively correlated with the capital structure

H2: The capital structure and the distribution policy are interrelated indirectly through some joint determinants

DATA AND RESEARCH METHODOLOGY

All the data used in this study were sourced from the IRESS database. The sample consisted of 23 companies in the basic materials sector, 21 companies in the industrial sector, 16 companies in the consumer services sector, and nine companies in the consumer goods sector for the periods 1990 to 2017 and 1999 to 2017. For the period 1990 to 2017, the relations between different measures of capital structure and dividends paid were investigated. For the period 1999 to 2017, share repurchases, dividends paid, and the sum of share repurchases and dividends paid were related to different alternative measures of capital structure. To minimise the problem of outliers in both cross-sectional and panel regression, the data were winsorised at the fifth and 95th percentiles.

The study used an individual equation approach (fixed effects, random effects, and generalised method of moments) following Al-Najjar (2011) and Crutchley and Hansen (1989), as well as a simultaneous decision-making approach (a three-stage least squares estimation) following Jensen *et al.* (1992), Kim *et al.* (2007) and Ding and Murinde (2010). For the fixed effects and random effects model, the study used the following specifications:

Model 1

$$CD_{i,t} = \beta_0 + \beta_1 GW_{i,t} + \beta_2 RA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TAN_{i,t} + \beta_5 CF_{i,t} + \beta_6 VO_{i,t} + \beta_7 DOL_{i,t} + \beta_8 LIQ_{i,t} + \beta_9 NDT_{i,t} + \beta_{10} CS_{i,t} + u_{i,t} \quad (1)$$

Model 2

$$CS_{i,t} = \beta_0 + \beta_1 GW_{i,t} + \beta_2 RA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TAN_{i,t} + \beta_5 CF_{i,t} + \beta_6 VO_{i,t} + \beta_7 DOL_{i,t} + \beta_8 LIQ_{i,t} + \beta_9 NDT_{i,t} + \beta_{10} CD_{i,t} + u_{i,t} \quad (2)$$

where

$CS_{i,t}$ represents the three alternative measures of the capital structure, namely the debt-to-equity ratio ([total long-term loan capital + total current liabilities]/total owners' interest), the debt-to-asset ratio ([total long-term loan capital + total current liabilities]/total assets) and the leverage factor ([profit after taxation/total owners interest]/([profit before interest and tax (EBT) - total profits extraordinary nature-taxation]/total assets);

$CD_{i,t}$ is the reported dividend paid by Company i in period t scaled by total assets;

$RA_{i,t}$ is the return on asset of company i in period t ([profit before interest and tax (EBIT) - profit of extraordinary nature]/total assets)*100);

$NDT_{i,t}$ is the non-debt tax shield of Company i in period t (depreciation over total assets);

$SIZE_{i,t}$ is the size of Company i in period t (the logarithm of sales and total assets);

$TAN_{i,t}$ is the asset tangibility of Company i in period t (net fixed assets over total assets);

$CF_{i,t}$ is the cash flow of Company i in period t (sum of net income plus depreciation expenses/total assets or cash flow from operating activities/total assets);

$VO_{i,t}$ is the market volatility of Company i in period t (The product of the daily standard deviation of the stock price by the square root of the number of trading days during the historical year for which the volatility measure is quantified (expressed as percentage));

$DOL_{i,t}$ is the degree of operating leverage of Company i in period t (the average growth in EBIT over the average growth in sales);

$LIQ_{i,t}$ is the liquidity of Company i in period t (total current assets over total current liabilities);

$GW_{i,t}$ is the growth of Company i in period t (the growth in sales or the growth in total assets); and

$u_{i,t} = \mu+v_{i,t}$ is the error term, which is the sum of an (unobservable) individual specific effect (time invariant) and well-behaved (remainder) disturbance.

In addition, owing to the dynamic nature of financing decisions and distribution strategies, the study used the generalised method of moments specifications, where past realisations of the capital structure and the dividend paid were included in Models 1 and 2 respectively.

For the simultaneous decision-making approach, the study used the following specifications:

System equation 1

$$CD=f(C(1)+C(2)*CS+C(3)*RA+C(4)*GW+C(5)*TAN)$$
$$CS=f(C(6)+C(7)*CD+C(8)*RA+C(9)*GW+C(10)*TAN+C(11)*CR) \quad (3)$$

System equation 2

$$DP=f(C(1)+C(2)*INVEST+C(3)*CF+C(4)*LIQ+C(5)*VO+C(6)*CS)$$
$$CS=f(C(7)+C(8)*DP+C(9)*INVEST+C(10)*CF+C(11)*TAN+C(12)*NDT) \quad (4)$$

where

DP represents two alternative endogenous distribution policies: share repurchases and total payouts (sum of share repurchases and dividend paid scaled by total assets);

INVEST is the fixed asset acquired over total assets; and CS is the endogenous capital structure representing the three alternative measures of capital structure: the debt-to-equity ratio, the debt-to-asset ratio, and the leverage factor. The other variables are defined as before.

To test for the pecking-order theory the study used the following simultaneous equations:

System equation 3

$$\Delta DE=f(C(1)+C(2)*CD+C(3)*CE+C(4)*\Delta WC+C(5)*CF)$$
$$DP=f(C(6)+C(7)*\Delta DE+C(8)*CE+C(9)*RA+C(10)*VO) \quad (5)$$

where

ΔDE is the endogenous change in the debt-to-equity ratio;

CE is the capital expenditure ([change in fixed asset plus depreciation]/total assets);

ΔWC is the net change in working capital ([current assets minus current liabilities]/total assets).

DP represents the endogenous dividend paid (CD), share repurchases (SRP) and the sum of the dividend paid and share repurchases (DS). The other variables are the same as for System equation 1.

RESEARCH FINDINGS AND INTERPRETATION

Summary statistics

Table 1 shows the mean values of and the standard deviations for each variable used in the present study after winsorisation over the period 1990–2017.

Table 1 also indicates that the average dividend paid and the average debt-to-equity ratios were 0.029 and 1.21, respectively.

TABLE 1
DESCRIPTIVE STATISTICS AFTER WINSORISATION: 1990–2017

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Observations
CD	0.029058	0.022293	0.099557	0.000000	0.027785	1.104088	3.458043	1 865
DE	1.213532	0.875500	3.841140	0.143840	1.019568	1.174971	3.514926	1 865
DA	0.447343	0.445300	0.790220	0.118240	0.203930	0.024083	1.852078	1 865
GW	12.71651	10.70120	60.00968	-20.54368	18.98995	0.665533	3.491246	1 865
RA	11.40951	10.89860	28.39192	-4.755420	8.312312	0.137184	2.674948	1 865
SIZE	6.721178	6.820109	8.043106	4.991276	0.823536	-0.360917	2.332330	1 865
TAN	0.287588	0.259099	0.746282	0.001882	0.211097	0.580138	2.487249	1 865
CF	0.102424	0.100515	0.257482	-0.040684	0.078086	0.132778	2.406150	1 865
VO	38.33953	34.41540	85.43271	0.000000	19.98760	0.581170	3.268607	1 865
DOL	1.149140	0.987431	25.44688	-24.11664	9.835510	-0.049537	5.099880	1 865
LIQ	2.361560	1.926449	5.731675	1.191178	1.222257	1.496965	4.419960	1 865
NDT	0.032717	0.032358	0.067367	0.000697	0.018379	0.084198	2.252096	1 865
LF	1.507106	1.215600	4.481730	-0.176950	1.036906	1.309024	4.758124	1 865
CR	1.746804	1.477000	4.116010	0.763300	0.871941	1.378025	4.181950	1 865
WK	0.174437	0.149970	0.555069	-0.097079	0.170189	0.559223	2.722714	1 865
INVEST	0.070512	0.063365	0.185263	0.000561	0.049423	0.695040	2.830782	1 865

Notes: CD = Dividend paid; DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; LF = Leverage factor; INVEST = Investment in assets; RA = Return on assets used as a proxy for profitability; NDT = Non-debt tax shield; SIZE = Company size; TAN = Asset tangibility; CF = Cash flow; VO = Market volatility; DOL = Degree of operating leverage used as proxy for the business risk; LIQ = Liquidity position of the company; GW = Growth in sales used as proxy for growth opportunities; WK = Net working capital

TABLE 2
ESTIMATION RESULT FOR DIVIDEND PAID WITH THE DIFFERENT MEASURES OF CAPITAL STRUCTURE (FIXED AND RANDOM EFFECTS MODEL): 1990–2017

Dependent variable: Cash dividend paid (CD)						
	Fixed effects model			Random effects model		
	DE	DA	LF	DE	DA	LF
	Coefficient t-statistic					
Constant	-0.020087* -2.490786	-0.014798 -1.853205	-0.027826*** -3.501102	-0.017411** -2.683070	-0.018784* -2.444216	-0.024451*** -3.941128
RA	0.000888*** 10.94782	0.000897*** 11.30413	0.000946*** 11.38522	0.001078*** 14.71347	0.001088*** 14.77651	0.001128*** 15.37790
NDT	0.026852 0.611009	0.015397 0.348057	0.028735 0.638930	-0.014664 -0.418914	-0.016380 -0.464285	-0.013246 -0.378933
SIZE	0.005402*** 5.837767	0.005313*** 5.851882	0.005336*** 5.677863	0.004479*** 5.527448	0.004499*** 5.532651	0.004492*** 5.556903
TAN	0.003693 0.802467	0.003983 0.869500	0.002620 0.562208	-0.001531 -0.440745	-0.001674 -0.481938	-0.001452 -0.418748
CF	0.046458*** 7.279067	0.046707*** 7.384017	0.048505*** 7.557458	0.089296*** 11.74477	0.089895*** 11.82491	0.089556*** 11.80441
VO	-7.50E-05*** -5.074471	-7.37E-05*** -5.174730	-6.97E-05*** -4.350309	-6.96E-05** -2.706628	-6.90E-05** -2.683962	-6.69E-05** -2.608700
DOL	-9.14E-05* -2.102631	-9.51E-05* -2.149421	-9.79E-05* -2.135701	-5.43E-05 -1.176672	-5.73E-05 -1.241146	-5.71E-05 -1.241290
LIQ	0.001253* 2.424030	0.000701 1.237943	0.002570*** 5.425688	0.000854 1.336290	0.001156 1.389387	0.001757** 3.233734
GW	-8.93E-05*** -4.474981	-8.90E-05*** -4.399272	-0.000100*** -5.180336	-0.000142*** -5.680792	-0.000143*** -5.712655	-0.000146*** -5.850995
DE	-0.002340*** -5.372423			-0.001336 -1.841254		
DA		-0.013672*** -4.177629			-0.002646 -0.521784	
LF			0.001034** 3.139636			0.001648*** 3.338415
Number of observations	1 865	1 865	1 865	1 865	1 865	1 865
Adjusted R^2	0.583897	0.585060	0.574734	0.288567	0.288024	0.291344
F-statistic test	14.839067***	14.020915***	13.801756***			
Hausman test				59.545983***	62.354302***	57.725691***

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

The null of no individual effects is rejected because the F-statistic is higher than the critical value at the 5% significance level. Therefore, there are differences in the cross-sections, and the companies in the sample are heterogeneous

RA = Return on asset used as proxy for profitability; NDT = Non-debt tax shield; SIZE = Company size; TAN = Asset tangibility; CF = Cash flow; VO = Market volatility; DOL = Degree of operating leverage used as a proxy for business risk; LIQ = Company liquidity; GW = Growth in sales used as a proxy for growth opportunities, DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; LF = Leverage factor

The mean value for company size was 6.72 as a natural logarithm of total assets. The average growth level of the companies, which was measured based on the increase in sales, was 12.72 per cent.

Individual equation approach: 1990–2017

Dividend payment correlation results of the fixed effects (FE), the random effects (RE), and the generalised method of moments (GMM) models

The results of the regression analysis of dividend payments to different measures of capital structure are given in Tables 2 and 3, both for the period 1990 to 2017.

Table 2 gives results using the fixed effects and random effects whereas Table 3 uses the GMM model.

In Table 2 the fixed effects model acknowledges cross-section heterogeneity and assumes a different intercept for each company included in the sample. It achieved this by including a matrix of dummies in the estimation in the case of the LSDV estimator. In the case of the within estimator, cross-section effects were wiped out, essentially estimating the same coefficients but running the regression through the origin. The presence of these effects was apparent because the F-test for the fixed effects clearly rejected the null hypothesis of homogeneous cross-sections (Baltagi, 2013).

The fixed effects might represent differences in financing decisions or distribution strategy decisions that were not explicitly included in the specification, but which were accounted for when estimation was done, ultimately leading to more representative estimates. This was evident from the fact that the model had the highest adjusted R^2-value in model variants 1, 2 and 3 (0.590606, 0.591432 and 0.581180 respectively). The random effects model also acknowledged the cross-section heterogeneity, but differed from the fixed effects models in that it assumed that these were generated by a specific distribution. Therefore, this model assumed cross-section differences, but did not explicitly model each effect. The loss in degrees of freedom, as was the case in the fixed effects models, was subsequently avoided. However, the Hausman test confirms the validity of specific fixed effects rather than random effects because the null hypothesis (the individual specific effects were random) was rejected, making the estimates of the fixed effects model consistent. Consequently, the interpretation of the results of the dividend equation as explained by the three alternative measures of the capital structure was based on the fixed effects model. The results indicated that the debt-to-equity ratio and the debt-to-asset ratio correlated significantly negatively with dividend paid. This finding validates the argument that, when companies engage in debt financing, they commit themselves to the payment of fixed interest charges, while a failure to meet these obligations may result in the companies facing the risk of bankruptcy.

TABLE 3
SYSTEM GENERALISED METHOD OF MOMENTS MODEL FOR DIVIDEND PAYMENTS AND THE DIFFERENT MEASURES OF CAPITAL STRUCTURE FOR THE FULL SAMPLE: 1990–2017

Dependent variable: Cash dividend paid (CD)			
	Model variant (1)	**Model variant (2)**	**Model variant (3)**
	Cash dividend	**Cash dividend**	**Cash dividend**
Independent variables	**Coefficient t-statistic**		
Lagged cash dividend (CD(-1))	0.161152* 1.914464	0.162645* 1.932323	0.171450* 1.902841
Growth opportunities (GW)	-0.000160** -2.685906	-0.000175** -2.963923	-0.000176** -2.763100
Profitability (RA)	-0.000591* -2.063457	-0.000615* -2.108143	-0.000696* -2.014466
Non-debt tax shield (NDT)	0.966638* 2.574132	0.914175* 2.490008	0.762594* 2.033300
Company size (SIZE)	0.014081* 2.209379	0.013672* 2.160398	0.007112 1.077677
Cash flow (CF)	0.096598* 2.522075	0.082747* 2.223054	0.169726** 2.729390
Market volatility (VO)	-0.000667 -1.635025	-0.000731 -1.751235	-0.000725 -1.544042
Debt-to-equity ratio (DE)	-0.009023* -2.314363		
Debt-to-asset ratio (DA)		-0.035877* -2.303538	
Leverage factor (LF)			0.000649 0.539547
Number of observations	1 451	1 451	1 451
Number of groups	68	68	68
Year dummies	Included	Included	Included
Industry dummies	Not included	Not included	Not included
AB-AR (1) p-value	-6.409223*** 0.0000	-6.400259*** 0.0000	-6.199430*** 0.0000
AB-AR (2) p-value	-0.955856 0.3391	-0.774754 0.4385	0.093988 0.9251
Hansen test (J-statistic) p-value	17.23636 0.140920	17.24973 0.140442	13.87866 0.308524

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

Arellano-Bond test for 1st serial correlation: Reject null of no first-order serial correlation. AB test for second-order serial correlation: Fail to reject the null of second-order serial correlation (at the 5% level of significance). Hansen J-test for over-identifying restrictions (test is robust to heteroscedasticity and autocorrelation): Fail to reject the null that over-identifying restrictions are valid. The results were computed using EViews 11

This finding was validated in the generalised method of moments. Profitability correlated significantly positively with the dividends paid. This positive relationship confirms the rationale of the signalling hypothesis, suggesting that signals with cash-based variables cannot be replicated by unprofitable companies because such companies do not have the ability to generate future cash and maintain increased dividends over time. Furthermore, profitable companies tend to increase dividends rather than to increase retained earnings in order to avoid a free cash flow problem, as asserted by Jensen (1986). However, in the generalised method of moments, the coefficient of profitability, surprisingly, was significantly negative. The coefficient of company size was significantly positive. This positive relationship indicates that large companies tend to be more diversified than smaller companies, and so less prone to the risk of bankruptcy (Rajan and Zingales, 1995). Liquidity correlated significantly positively with dividends paid. The positive sign is supported by the narrative that companies with high cash balances are more likely to pay dividends than companies with low levels of cash. The coefficient of market volatility was significantly negative. This indicates that, during a period of high uncertainty, increased risk, and thus high volatility, companies typically decrease the size of the dividend. The coefficient of the degree of operating leverage was significantly negative. This finding validates the narrative that companies with high business risk are more likely to experience financial stress and so pay low dividends (Al-Najjar, 2011). Growth opportunities correlated significantly negatively with dividends paid. This shows that growing companies tend rather to use funds to finance further growth opportunities than to pay out higher dividends. Cash flow correlated significantly positively with dividends paid. This indicates that companies with more cash are more likely to pay higher dividends than companies with low cash reserves. The significance of the cash flow also supports the free cash flow hypothesis (Jensen, 1986). The coefficient of asset tangibility and non-debt tax shield was positive but statistically insignificant in the FE model. In the generalised method of moments, the non-debt tax shield correlated significantly positively with the dividend paid in all specifications. The coefficient of the lagged dividend paid was significantly positive. This suggests that the payment of dividends was dynamic in nature, but still related to its past levels at the 10 per cent significance level in the short run, *ceteris paribus*. This supports the results of Baker *et al*. (2019).

Capital structure correlation results of the fixed effects model, the random effects model, and the generalised method of moments model

The results of the regression analysis of the capital structure using the fixed effects and random effects models are presented in Table 4, and the results of the GMM model are presented in Table 5.

The Hausman test in Table 4 indicates that the null hypothesis in the random effects model of the debt-to-equity ratio and the debt-to-asset ratio could be rejected. As a result, the coefficients in the fixed effects models of the financing equation (DE and DA) are consistent excluding the leverage factor equation, where the null hypothesis of specific individual random effects is not rejected, making the coefficient in the model efficient. The coefficient of the cash dividend paid is significantly negative in the debt-to-equity ratio equation and significantly positive in the leverage factor equation. This negative relationship is consistent with the trade-off theory and the pecking-order theory. According to the trade-off theory, companies will only increase dividends if they want to replace internal equity with debt to increase the company's interest debt shield, which directly adds to the company's overall value (Barclay, Smith, Clifford and Morellec, 2006). The pecking-order theory argues that an increase in dividend increases the company's internal funds deficit (Shyam-Sunder and Myers, 1999). This deficit can only be financed in terms of the pecking-order theory as the first choice, and hence an increase in dividends is directly proportional to an increase in debt-to-equity ratio.

In Table 5 the dividend coefficient was insignificant in the GMM model. Profitability was inversely and significantly related to the three alternative measures of capital structure in the fixed effects and to two measures of the capital structure in the GMM model. The finding that companies with greater profitability tend to have lower debt levels is consistent with the prediction of the pecking-order theory that companies prefer to use internal capital rather than external capital. It also indicates that external capital is costly and that companies will make corporate financing decisions after considering cost and risk.

The results of this study indicate that liquidity was significantly negatively related to all three measures of the capital structure (debt-to-equity, debt-to-assets, and the leverage factor) in the fixed effects model. Following this, liquidity was also significantly negatively related to two measures of the capital structure (debt-to-equity and debt-to-asset ratio) in the GMM model. This finding is consistent with the prediction of the pecking-order theory. Companies with more liquid assets need less external capital, and thus prefer to use internally generated funds for future investments. Asset tangibility was significantly positively related to the debt-to-equity ratio and the debt-to-asset ratio in the static models, and significantly positively related to the debt-to-asset ratio in the GMM model.

Company size was significantly negatively related to the debt-to-equity ratio and the debt-to-asset ratio for the fixed effects model. The negative sign suggested that large companies were more likely to be susceptible to financial distress. Cash flow was significantly negatively related to the debt-to-equity ratio and the debt-to-asset ratio.

TABLE 4
ESTIMATION OF FINANCING EQUATIONS WITH DIVIDEND PAYMENTS (FIXED EFFECTS AND RANDOM EFFECTS MODELS): 1990–2017

Dependent variable: Alternative measures of the capital structure						
	Fixed effects model			Random effects model		
	DE	DA	LF	DE	DA	LF
	Coefficient t-statistic					
Constant	2.657748*** 15.46855	0.861813*** 37.08504	1.663343*** 6.974903	2.621513*** 12.59493	0.862653*** 29.78930	2.006375*** 6.771832
CD	-0.682193* -2.267719	-0.069235 -0.939197	2.417394** 3.236667	-1.480655* -2.097689	-0.117234 -1.190000	3.544303** 3.303372
RA	-0.003467* -2.295070	-0.001353*** -5.427017	-0.013053*** -3.818735	-0.007288** -3.076396	-0.001708*** -5.164989	-0.024209*** -6.719151
NDT	-1.779334* -2.545963	-0.945544*** -5.679410	-1.096301 -1.125555	-0.779125 -0.696016	-1.004158*** -6.433025	-0.636928 -0.383586
SIZE	-0.084371*** -3.538292	-0.015529*** -4.572531	0.044496 1.328693	-0.035565 -1.308719	-0.014048*** -3.710990	0.023130 0.589858
TAN	0.223722*** 4.158118	0.060720*** 4.764510	-0.263070* -2.232359	0.339814** 2.873849	0.084860*** 5.155381	-0.187454 -1.115998
CF	-0.387843** -3.193954	-0.052908* -2.013667	-0.011386 -0.044933	-0.444055 -1.846836	-0.061402 -1.829318	-0.211791 -0.575999
VO	0.000389 0.878477	0.000112 1.052644	1.20E-05 0.013263	-0.000859 -1.081598	-0.000131 -1.177190	-0.000523 -0.433389
DOL	0.000684 1.111603	8.14E-05 0.504341	-0.000828 -0.486142	0.002464 1.765835	0.000240 1.230621	-0.000459 -0.214054
LIQ	-0.346378*** -31.09162	-0.119127*** -50.31979	-0.121669*** -6.782639	-0.444078*** -24.97103	-0.119229*** -48.11695	-0.166653*** -6.449997
GW	0.001426** 3.023145	0.000250*** 3.413848	0.001879** 2.632876	0.000932 1.214521	0.000250* 2.338221	0.002067 1.756677
Number of observations	1 865	1 865	1 865	1 865	1 865	1 865
Adjusted R^2	0.755170	0.904923	0.328708	0.281009	0.567061	0.047252
F-statistic test	31.966459***	40.296296***	9.730364***			
Hausman test				41.879597***	85.718347***	12.749191

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

The null of no individual effects is rejected since the F-statistic is higher than the critical value at the 5% significance level. Therefore, there are differences in the cross-sections, and the companies in the sample are heterogeneous

RA = Return on asset used as proxy for profitability; NDT = Non-debt tax shield; SIZE = Company size; TAN = Asset tangibility; CF = Cash flow; VO = Market volatility; DOL = Degree of operating leverage used as a proxy for business risk; LIQ = Company liquidity; GW = Growth in sales used as a proxy for growth opportunities; DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; LF = Leverage factor

This suggests that companies with more debt have less cash flow. Growth opportunities were significantly positively correlated with all three alternative measures of the capital structure in the fixed and random effects models and also in the GMM model. Based on the pecking-order theory, these findings support the narrative that, if internal capital is not enough to fund future opportunities, external finance is required. In addition, companies with greater potential for growth may find it easier to obtain external funding. Non-debt tax shields were significantly negatively related to the debt-to-equity ratio and the debt-to-asset ratio in the static model, and significantly negatively related to the debt-to-asset ratio in the GMM model. The negative sign indicates that companies' non-debt tax shields decrease with an increase in the debt-to-equity ratio and debt-to-asset ratio.

These results confirm the trade-off theory and suggest that companies' higher non-debt tax shields will have less of an appetite for debt, because the benefit of debt finance will already be captured by the non-debt tax shields.

The results of this study indicate a significantly positive correlation between lagged debt ratios and capital structure for two debt ratios (the debt-equity ratio and the debt-to-asset ratio) in the GMM model for the full sample. All coefficients were between 0 and 1 across the two debt ratios (debt-to-equity ratio and debt-to-asset ratio), which indicated that there was a dynamic capital structure for these companies and that they adjusted their capital structure to the desired level over time. In the estimation of the debt-to-equity ratio, as the regression result revealed, the coefficient was greater than zero (0.411599).

TABLE 5
SYSTEM GENERALISED METHOD OF MOMENTS MODEL FOR FINANCING EQUATION AND DIVIDEND PAYMENTS: 1990–2017

Dependent variable: Alternative measures of the capital structure			
Debt ratios	**Debt-to-equity ratios**	**Debt-to-asset ratios**	**Leverage factor**
Independent variables	**Coefficient t-statistic**		
Lagged debt ratios	0.411599*** 3.609812	0.420794*** 5.952956	-0.231403 -1.284887
Cash dividend (CD)	0.170633 0.153948	0.261476 1.487108	-0.773067 -0.145242
Profitability (RA)	-0.013833*** -3.644607	-0.002471*** -4.404503	-0.013448 -0.515257
Non-debt tax shield (NDT)	-6.832106 -1.149045	-3.338726*** -3.486954	-37.10701 -1.661715
Company size (SIZE)	0.057768 0.328042	-0.033086 -1.185793	-1.654952 -1.135374
Asset tangibility (TAN)	0.339954 1.047930	0.122508* 2.364936	6.130841 1.454274
Cash flow (CF)	0.105653 0.436322	0.045955 1.181310	-2.235530 -1.549890
Market volatility (VO)	-0.006138* -2.303123	-0.000360 -0.861133	-0.009896 -0.411999
Degree of operating leverage (DOL)	0.013732* 1.889547	0.001665 1.495866	0.024492 1.260695
Liquidity (LIQ)	-0.561248*** -7.429942	-0.164880*** -13.11014	0.118054 0.236725
Growth opportunities (GW)	0.001956* 2.219200	0.000290* 2.147190	0.020227* 2.204182
Year dummy	Included	Included	Included
Industry dummies	Not included	Not included	Not included
AB-AR1 p-value	-3.915402*** 0.0001	-5.474041*** 0.0000	-2.091773* 0.0365
AB-AR2 p-value	-0.322080 0.7474	-1.377620 0.1683	-0.846312 0.3974
Hansen test p-value	15.44312 0.800079	34.35917 0.033156	20.19558 0.445757
Number of observations	1 086	1 086	1 086
Number of cross-sections	68	68	68

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

Arellano-Bond test for first serial correlation: Reject null of no first-order serial correlation. AB test for second-order serial correlation: Fail to reject the null of second-order serial correlation (at 5% level significance). Hensen J-test for over-identifying restrictions (test is robust to heteroscedasticity and autocorrelation): Fail to reject the null that over-identifying restrictions are valid

Therefore, the adjustment of capital structure decision from year t-1 to year t fell short of attaining the target capital structure. Furthermore, the speed of adjustment was defined as one minus the value of the estimated coefficient of the lagged debt variable in the dynamic capital structure model.

Table 5 also indicates that the coefficient of the lagged debt-to-equity ratio was small (1-0.411599 = 0.588401). This provided evidence that the speed of adjustment on the overall debt-to-equity ratio was higher for these companies in the sample. In terms of the debt-to-asset ratio, Table 5 indicates that the coefficient was still greater than zero (0.420794), implying that there was optimal capital structure in the debt-to-asset ratio financing pattern. However, comparing this with the debt-to-equity ratio, the magnitude of its adjustment was more-or-less the same, which was only 0.579206 (= 1-0.420794).

The coefficient of market volatility was significantly negative in the debt-to-equity ratio equation in the GMM model and was insignificant in the static models. The finding of the GMM suggests that, during a period of high market volatility, companies in the sample decreased the amount of debt issued. The coefficient of the degree of operating leverage was significantly positive in the GMM model and insignificant in the static models. These findings of the GMM model suggest that a company's risk increased with an increase in the debt-to-equity ratio.

Simultaneous decision-making: 1990–2017 and 1999–2017

Simultaneous decision-making on dividend payments and capital structure: 1990–2017

The fixed effects and the system GMM analysis reported earlier indicate that the different measures of the capital structure and the dividend payments were likely to be endogenous. All the coefficients of the right-hand side endogenous variable had the expected signs.

To provide further evidence and more insight into the joint determination of dividend payments and capital structure, the researchers carried out a simultaneous decision-making equation system using the three-stage least squares (3SLS) full information method, which explicitly allows for the interdependence of the set of corporate decisions. The structure of the two corporate behaviours suggested that the necessary condition (the order condition) for identification was satisfied, and thus the system could be identified.

To apply the 2SLS to the system of structural equations first, the reduced form equations were estimated by the ordinary least squares method to obtain the fitted values for the endogenous variables in the first stage. The structural equations, in which the fitted values were used in place of the right-hand side endogenous variable, were then estimated for the second stage. In addition, the 3SLS method provided a third step in the estimation process that allowed for non-zero covariances between the error terms across equations.

For the dividend payment specifications for System equation 1 (Variants 1, 2 and 3), the findings in Table 6 suggest that the coefficients of the debt-to-equity ratio (DE), the debt-to-asset ratio (DA) and the leverage factor (LF) were significantly negative at the one per cent level. The findings indicate the importance of the capital structure choices in the dividend payment decision-making process. For the different alternative measures of the capital structure equation (Variants 1, 2 and 3), dividends were significantly negatively correlated with the debt-to-equity ratio and the debt-to-asset ratio. However, dividends were also significantly positively correlated with the leverage factor at the five per cent level. These findings suggest simultaneous decision-making on the capital structure and the dividend payments. The results indicate that the payment of dividends was likely to be

TABLE 6
SIMULTANEOUS DECISION-MAKING ON DIVIDEND PAYMENTS AND CAPITAL STRUCTURE: 1990–2017

	System CD and DE (Variant 1 of System equation 1)		System CD and DA (Variant 2 of System equation 1)		System CD and LF (Variant 3 of System equation 1)	
	CD equation	DE equation	CD equation	DA equation	CD equation	LF equation
	Coefficient t-statistic					
Constant	0.022660*** 14.00186	2.851956*** 39.67015	0.033115*** 17.40381	0.816140*** 58.46332	0.028343*** 6.487863	2.465323*** 31.35134
CD		-12.05600*** -5.448885		-2.678167*** -6.003613		6.167215* 2.538122
RA	0.001630*** 23.03333	0.006948 1.467808	0.001665*** 23.49332	0.003363 3.584361	0.001592*** 17.62123	-0.030773*** -5.922688
GW	-0.000140*** -4.624105	-0.000958 -0.808796	-0.000118*** -3.809982	-4.74E-05 -0.209406	-0.000148*** -4.488201	0.002771* 2.133069
TAN	-0.001095 -0.408648	-0.452491*** -4.477432	-0.001363 -0.498359	-0.123622*** -6.434717	-0.005032 -1.727241	-0.569632*** -5.141175
CR		-0.700444*** -26.49841		-0.168071*** -32.29163		-0.372980*** -12.91346
DE	-0.008443*** -10.77456					
DA			-0.047683*** -15.24371			
LF					-0.009457*** -4.100118	
Regression statistics						
Balanced observations	3 774		3 774		3 774	
Adjusted R^2	0.219940	0.225957	0.185812	0.297806	0.119685	0.107196

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

CD = Dividend paid; GW = Company growth opportunities; RA = Return on assets used as a proxy for profitability; TAN = Asset tangibility; CR = Current ratio; DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; LF = Leverage factor

constrained by the availability of internal funds and by access to external financing. With regard to simultaneous decision-making on capital structure and dividend payments, the study's findings validate the results of previous research (Aggarwal and Kyaw, 2010; Ding and Murinde, 2010; Chen and Steiner, 1999; Crutchley *et al.,* 1999; Noronha *et al*., 1996; Jensen *et al*., 1992). However, in terms of the direction of the statistical relationship, the study's findings are in line with research by Noronha *et al*. (1996), Ding and Murinde (2010), Aggarwal and Kyaw (2010) and Jensen *et al*. (1992). These researchers found a significantly negative correlation between capital structure and dividend payments.

More importantly, the significant negative relationships between the three measures of capital structure and dividends detected in the fixed effects, the random effects, and the GMM single-equation approach were validated. Profitability correlated significantly positively with dividends and correlated significantly negatively with the leverage factor. These findings validate the findings by Jensen *et al*. (1992) and Aggarwal and Kyaw (2010), but contradict the findings by Crutchley *et al*. (1999). The negative relationship between growth opportunities and dividends suggests that, in a simultaneous decision-making framework, managers of companies in the sample had to trade-off between investment outlays and dividend payments in order to allocate scarce funds rationally. This finding is consistent with those of Ding and Murinde (2010) and Jensen *et al.* (1992).

Another interesting result is the significantly negative effect of asset tangibility on the three measures of the capital structure. This finding is in line with the agency theory argument suggested by Titman and Wessels (1988), and contradicts the trade-off theory. The current ratio correlated significantly negatively with all three measures of the capital structure.

TABLE 7
THREE-STAGE LEAST SQUARES ESTIMATION RESULTS OF THE SHARE REPURCHASES, DISTRIBUTION STRATEGIES AND THE DIFFERENT MEASURES OF CAPITAL STRUCTURE: 1999–2017

	System equation 2							
	Variant 1 of System equation 2		**Variant 2 of System equation 2**		**Variant 3 of System equation 2**		**Variant 4 of System equation 2**	
	SRP equation	**DE equation**	**SRP equation**	**DA equation**	**DS equation**	**DE equation**	**DS equation**	**DA equation**
	Coefficient t-statistic							
Constant	-1.219857*** -4.190469	1.248605*** 10.42220	-0.507542*** -4.811616	0.486552*** 20.51166	-1.246942*** -6.870085	1.248336*** 10.21364	-0.483714*** -16.42982	0.483615*** 19.86240
SRP		-0.973192 -0.052736		4.802149 0.503023				
INVEST	-8.816365*** -3.940318	8.786148*** 3.916762	-1.037575* -2.532826	1.090191* 2.570558	-9.081230*** -3.877447	9.079572*** 3.801439	-1.310587** -2.929613	1.310671** 2.926746
CF	5.927251*** 5.955963	-5.874685*** -4.473324	1.101139*** 5.126749	-1.243943* -2.394598	6.431120*** 6.660069	-6.456853* -2.545562	1.511067*** 8.261031	-1.511466*** -7.227751
LIQ	-0.000255 -0.006841		-0.001008 -0.061484		0.001445 0.028336		8.38E-06 0.003395	
VO	-0.000644 -0.120112		0.000807 0.427416		-0.000146 -0.050919		1.11E-06 0.007812	
TAN		-0.005930 -0.121987		0.005715 0.314486		-0.003809 -0.088642		-3.50E-05 -0.019006
NDT		0.055428 0.114577		-0.058096 -0.295614		0.039827 0.038849		0.000495 0.011225
DE	1.003274*** 18.54842				1.002268*** 12.90611			
DA			0.965476*** 6.891898				1.000049*** 65.43059	
DS						1.037565 0.215599		1.001110*** 4.578700
Number of observations	2 582	2 582	2 582	2 582	2 582	2 582	2 582	2 582
Industry dummies	Not included							
Year dummies	Not included							

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

SRP = Share repurchases; INVEST = Actual investment in asset; CF = Cash flow; LIQ = Company liquidity position; VO = Market volatility; TAN = Asset tangibility; NDT = Non-debt tax shield; DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; DS = Sum of the dividend payment share repurchases

Simultaneous decision-making on share repurchases, total pay-out, and capital structure: 1999–2017

The results of simultaneous decision-making on share repurchases and debt-to-equity ratio (Variant 1 of System equation 2), share repurchases and debt-to-asset ratio (Variant 2 of System equation 2), distribution strategies (share repurchases and dividend payments) and debt-to-equity ratio (Variant 3 of System equation 2), and distribution strategies and debt-to-asset ratio (Variant 4 of System equation 2) are presented in Table 7.

For the share repurchases specification in Variants 1 and 2 of System equation 2, the endogenous variables (debt-to-equity ratio and debt-to-asset ratio) were significantly positive. The results suggest that an increase in debt led to an increase in share repurchases for companies in the sample. However, share repurchases was not significantly related to the debt-to-equity ratio and the debt-to-asset ratio specifications in Variants 1 and 2 of System equation 2. This finding suggests that there was no simultaneous decision-making on the capital structure and share repurchases. The coefficient of investment was significantly negative at the one per cent level. These results indicate that an increase in investment opportunities led to a decrease in share repurchases. These results also validate the notion that companies with more investment opportunities will be less inclined to repurchase shares. The coefficients of liquidity and market volatility were negative but insignificant. For the financing equation, investment correlated significantly positively with the debt-to-equity ratio and the debt-to-asset ratio.

Cash flow correlated significantly negatively with the debt-to-equity ratio and the debt-to-asset ratio (Variants 1, 2, 3 and 4 of System equation 2). This finding supports the results of Kim *et al.* (2007). Focusing on the distribution strategies (sum of the cash dividend and share repurchases) specification in Variants 3 and 4 of System equation 2, the results indicate that the debt-to-equity ratio and debt-to-asset ratio were both significantly positively correlated, while the sum of dividend payments and share repurchases was significantly positively correlated with the debt-to-asset ratio but insignificantly correlated with the debt-to-equity ratio. These findings suggest that there was simultaneous decision-making on the capital structure and the sum of the dividend payments and share repurchases. Investment correlated significantly negatively with the distribution strategies in Variants 3 and 4 (System equation 2), respectively. Cash flow was significantly positively correlated with distribution strategy in both Variants 3 and 4. For the financing equation in Variants 3 and 4, the coefficient of investment positively and significantly correlated with the debt-to-equity ratio and the debt-to-asset ratio in Variants 3 and 4. The coefficient of cash flow was significantly negative in Variants 3 and 4 of System equation 2.

Simultaneous-decision making for ΔDE, CD, SRP and DS: A test of the pecking-order theory

Table 8 presents the results of tests for the relationship between the change in debt-to-equity ratio (ΔDE) and the three measures of distribution strategy (dividend payments, share repurchases, and the sum of share repurchases and dividend payments) within a strategic simultaneous decision-making framework using a 3SLS full information approach for the period 1999 to 2017.

In the spirit of the literature on the financing hierarchy with asymmetric information, we specified the financing equation based on the pecking-order theory within a simultaneous equation framework. The pecking-order theory implies that there is no target or optimal leverage ratio, and that asymmetric information is the main determinant of companies' leverage ratios. The company will use internal sources of funds, followed by debt and equity financing respectively. Shyam-Sunder and Myers (1999) developed a model in which the company's debt level correlates with internal financial deficit. They argued that, if internal funds were not sufficient, and the pecking-order theory held, the company's debt level would respond to fluctuations in the financial deficit that the company faced. Following Frank and Goyal (2009), the present study disaggregated the financial deficit term within the simultaneous equation systems.

It is worth pointing out that, among other variables, the change in leverage was a function of cash dividend, share repurchases, and the sum of dividend payments and share repurchases as pay-out policies. For the change in the financing equation specification (the debt-to-equity ratio of System equation 3 Variant 1), the coefficient of the endogenous variable (dividend paid) was significantly positive at the five per cent level, while the coefficient of change in the debt-to-equity ratio in the dividend specification was significantly positive. These findings suggested that there was simultaneous decision-making on the change in debt-to-equity ratio (ΔDE) and dividends. Capital expenditure correlated significantly positively with the change in the debt-to-equity ratio, and the change in working capital and cash flow correlated significantly negatively with the debt-to-equity ratio. These results are in line with the pecking-order theory.

Capital expenditure and market volatility were significantly negatively correlated with cash dividends. Profitability correlated significantly positively with dividends over the period 1999 to 2017. These findings are consistent with those of Aggarwal and Kyaw (2010) and Jensen *et al.* (1992). For the change in financing equation (Variant 2 of System equation 3), share repurchases were significantly positively correlated, while the change in the debt-to-equity ratio (ΔDE) was also significantly positively correlated. These findings suggest that simultaneous

TABLE 8
THREE-STAGE LEAST SQUARES ESTIMATION FOR DISTRIBUTION STRATEGIES AND CHANGE IN DEBT-TO-EQUITY RATIO (PECKING-ORDER THEORY): 1999–2017

	System equation 3					
	ΔDE and CD Variant 1 of System equation 3		ΔDE and SR Variant 2 of System equation 3		ΔDE and DS Variant 3 of System equation 3	
	Financing ΔDE	Distribution CD	Financing ΔDE	Distribution SRP	Financing ΔDE	Distribution CD
	Coefficient t-statistic					
Constant	0.018401 0.491159	0.043074*** 6.795781	-0.029277 -0.482692	0.005281*** 4.136035	0.018482 0.492703	0.049854*** 7.340865
ΔDE		0.024085*** 5.805773		0.010408*** 16.37140		0.038566*** 8.565343
CD	3.445884* 2.031087					
SR			81.74736*** 6.960690			
DS					4.112007** 2.607596	
CE	0.769285** 2.824468	-0.035385* -2.417131	1.360056* 2.245571	-0.015373* -2.249398	0.856161** 3.118525	-0.052616** -3.100413
ΔWC	-2.156747*** -7.388164		-1.101603* -2.197975		-1.931961*** -6.678388	
CF	-1.562760* - 2.172907		-3.244780*** -4.257944		-1.947866** -2.634538	
RA		0.001085*** 5.876178		0.000197*** 5.888470		0.001349*** 6.602216
VO		-0.000511*** -4.015212		-6.88E-05** -2.609763		-0.000631*** -4.647254
Adjusted R^2	0.044551	0.134537	-	-	0.029239	-

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

ΔDE = Change in the debt-to-equity ratio; CD = Dividend paid; SR = Share repurchases; DS = Sum of the dividend payments and share repurchases; CE = Capital expenditure; ΔWC = Net change in working capital; RA = Return on asset used as a proxy for profitability; CF = Cash flow; VO = Market volatility

decision-making take place on share repurchases and changes in the capital structure. Capital expenditure was significantly positively correlated, while the change in working capital and cash flow was significantly negatively correlated. These results are in line with the pecking-order theory. Capital expenditure and share repurchases were significantly negatively correlated. Profitability was significantly positively correlated, while market volatility was significantly negatively correlated.

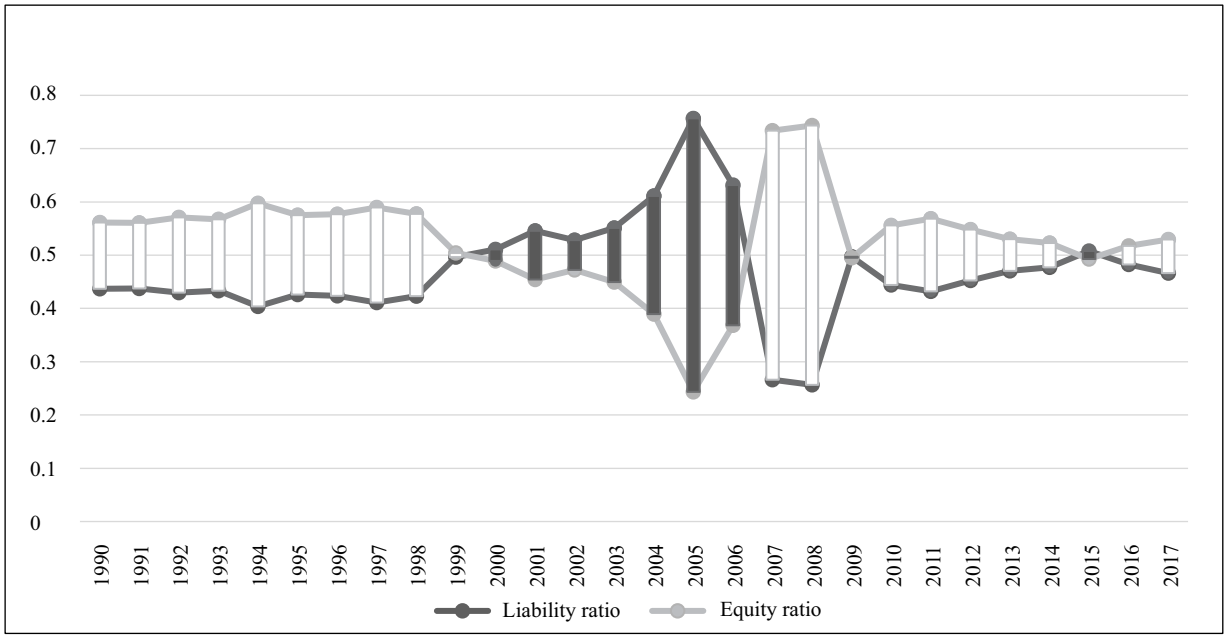
For the change in the debt-to-equity ratio (ΔDE) equation (Variant 3 of System equation 3), the endogenous variable distribution strategies (the sum of cash dividend and share repurchases) were significantly positive. Similarly, the debt-to-equity ratio was positively correlated with distribution strategy. This finding suggests simultaneous decision-making on the change in capital structure and the sum of the dividend payments and share repurchases. Capital expenditure was significantly positively correlated. The change in both working capital and cash flow was significantly negatively correlated. With respect to distribution strategy, profitability correlated significantly positively, while market volatility and capital expenditure correlated significantly negatively.

Simultaneous decision-making before, during, and after the financial crisis

Lim (2016) argues that, during a period of financial recession, the real rate of the return, inflation and risk premium will be low, whereas the liquidity and maturity risk premium will be higher (for example, during the 2008 financial crisis the stock market experienced a 77 per cent decline in market value, the housing market went into a prolonged slump, the US unemployment rate increased to 12 per cent, and the US and worldwide economic outputs declined by 25 per cent). The unprecedented economic crisis caused by subprime mortgages forcefully changed the distribution policies and capital structure of most companies; thus, it could have further changed the interplay between financing decisions and pay-out decisions. As a result, it is interesting to examine whether the interrelationship between the capital structure and the dividend payments would change if there were increased overall risk in crisis periods.

Interestingly, in terms of the interplay, it is noticeable that companies in the sample increased the level of debt over the period 1995 to 2005, followed by a decline in

FIGURE 1
VARIATIONS IN LIABILITY AND EQUITY RATIOS: 1990–2017



leverage in the period 2005 and 2007 (the period before the financial crisis, when most companies decreased their exposure to debt). Over the period 2008 to 2010 (when companies reduced debt and increased equity during the financial crisis), companies in the sample appeared to be more equity-financed than debt-financed. Figure 1 shows that this trend continued over the period 2011 to 2015 (after the financial crisis).

This trend is validated by the findings of Lim (2016), who found that most companies deleveraged and reduced the amount of the dividends paid to survive in response to the worldwide economic downturn. In addition, Dang, Kim and Shin (2014) assert that, during a decline in collateral values in a weak state of the economy, debt capacity will decline, and so a financially constrained company will find it difficult to take up further debt financing.

This influences the capital structure proportions when refinancing is needed to accommodate the economic crunch. This narrative is validated by the study's findings. The 2008 crisis provided an excellent window through which to investigate how an economic shock affected the relationship between distribution policies and the capital structure in a simultaneous decision-making framework. It is worth pointing out that Lim (2016) used an individual equation approach. He added that, owing to the known endogeneity between dividend payments and leverages, the interpretation of the statistical relationship between the two policies should be carefully reviewed. The present study overcame this problem by determining the statistical relationship using a strategic simultaneous decision-making framework.

Before the financial crisis (2005–2007): Table 9 presents the interdependence between dividend payments and capital structure before the financial crisis (2005–2007), during the financial crisis (2008–2010), and after the financial crisis (2011–2015). The results showed that, before the financial crisis, the dividends correlated negatively with capital structure (debt-to-equity ratio) at the one per cent significance level, while the debt-to-equity ratio was also negatively correlated with dividends. This finding suggests that, in the period before the financial crisis, there was simultaneous decision-making on capital structure and the dividend payments.

The researchers argue that the presence of simultaneous decision-making over this period could have been caused by the decrease in the amount of debt by South African companies in the sample, which had an impact on the magnitude of the dividend paid (see Figure 1). In addition, the most significant company-specific variables were profitability in the dividend equation and current ratio in the capital structure equation. These findings support the argument that, in the period before a recession, companies with higher liquidity and higher profitability will continue to pay dividends and decrease the amount of debt.

TABLE 9
SIMULTANEOUS EQUATION BETWEEN DIVIDEND PAID AND DEBT-TO-EQUITY RATIO BEFORE, DURING, AND AFTER THE FINANCIAL CRISIS

	CD and DE before financial crisis (2005–2007)		CD and DE during financial crisis (2008–2010)		CD and DE after financial crisis (2011–2015)	
	CD equation	**DE equation**	**CD equation**	**DE equation**	**CD equation**	**DE equation**
Coefficient t-statistic						
Constant	0.029077*** 5.261515	2.815154*** 12.61920	0.017308** 2.923204	3.076910*** 14.89180	0.013642*** 4.671855	2.576274*** 13.83033
CD		-28.52352*** -4.372573		-4.542801 -0.764091		-19.00100** -2.772443
RA	0.001899*** 8.177260	0.032463 1.821588	0.001752*** -0.978074	-0.002593 -0.191057	0.002158*** 13.03675	0.035797* 2.117178
GW	-1.17E-05 -0.122757	0.004248 1.086764	-0.004554 -0.978074	-0.000407 -0.121741	-0.000127 -1.452164	0.000837 0.219012
TAN	5.76E-05 0.006793	-0.148715 -0.422130	0.004988 0.494680	-0.365267 -1.104117	0.004743 0.729483	0.566059* 2.133695
CR		-0.513999*** -5.794746		-0.785684*** -10.62737		-0.688367*** -11.41554
DE	-0.012079*** -5.104440		-0.004554 -1.637630		-0.003763* -2.119798	
Regression statistics						
Balanced observations	398		406		340	
Adjusted R^2	0.384084	0.127178	0.216677	0.338925	0.345951	0.208102

Notes: *Significant at 10% level; **Significant at 5% level; ***Significant at 1% level

CD = Dividend paid; GW = Company growth opportunities; RA = Return on assets used as a proxy for profitability; TAN = Asset tangibility; CR = Current ratio; DE = Debt-to-equity ratio; DA = Debt-to-asset ratio; LF = Leverage factor

During the financial crisis (2008–2010): Table 9 indicates that, during the financial crisis, dividends were insignificantly correlated with capital structure (the debt-to-equity ratio), while the debt-to-equity ratio was insignificantly correlated with dividends. This finding suggests that, during the financial crisis, there was no correlation between capital structure and dividend payments, and South African companies issued more equity than debt. This finding is consistent with that of Lim (2016), that over this period companies deleveraged and decreased the amount paid in dividends. The most significant company-specific variables in the simultaneous decision-making framework in this period are profitability (in the dividend equation) and the current ratio (in the capital structure equation).

After the financial crisis (2011–2015): Table 9 shows that, after the financial crisis, dividends paid correlated negatively with the capital structure (the debt-to-equity ratio) at the five per cent significance level, while the debt-to-equity ratio correlated negatively with dividends. This finding suggests that, for the period after the financial crisis, the interdependence between capital structure and dividend payments became strong. In addition, the most significant company-specific variables in the SMS were profitability (in the dividend equation) and profitability, asset tangibility and the current ratio (in the capital structure equation). The existence of the inter-relationship between the two policies suggests an improvement in economic activities over this period.

Taken together, the findings suggest that, in a strategic simultaneous decision-making framework, the marginal effect of the dividends on shareholders' wealth decreases with an increase in debt and increases with a decrease in debt. This is true for companies listed on the JSE before the financial crisis and after the financial crisis (because the coefficient of the dividend increased over the three periods from -28.52352 to -19.00100). Furthermore, the stability in the credit crunch after the financial crisis improved the determination of the strategic simultaneous decision-making framework between the capital structure and the distribution policy.

CONCLUSION

This study investigated the interrelationship between the capital structure and the distribution strategies among companies listed on the JSE. The empirical results obtained using an individual equation and simultaneous equation approach validate the existence of simultaneity between financing and pay-out decisions in the target companies. The findings also reveal that the two policies are related indirectly through some joint determinants (profitability,

company size, cash flow, liquidity, market volatility, non-debt tax shield, and degree of operating leverage). The findings also indicate that the economic shock caused by the 2008 financial crisis changed the strategic simultaneous decision-making on capital structure and distribution policies. The findings of this study suggest that the target companies adjusted their financing decisions and distribution policies in response to the extreme credit crunch caused by the financial crisis. Consequently, the empirical evidence of this study suggests the existence of simultaneous decision-making on the capital structure and the distribution policies only over the periods before and after the financial crisis.

The study offers useful information to boards of directors for formulating and revising financing decisions and distribution decisions by taking into consideration the interdependence that may exist among these decisions to prevent possible undesirable side effects. In particular, if boards of directors consider increasing the dividend or resorting to external sources of finance to increase their company's value, the two policies must be reviewed in tandem rather than in isolation. In addition, although a high dividend payment attracts investors, it should be kept in mind that its marginal effects on shareholders' wealth creation decrease with an increase in debt.

LIMITATIONS AND FUTURE RESEARCH

This study was not without its limitations. First, it focused on only 68 JSE-listed companies with data over the periods 1990 to 2017 and 1999 to 2017. For greater generalisability of the findings, and to reflect better the interplay of companies in South Africa, future research could change the time frame to accommodate other listed companies. Second, the present study was based on secondary data. The use of questionnaires or qualitative studies such as interviews might provide future researchers with the opportunity to uncover other factors that affect the interdependence between capital structure and distribution policy. Third, the study did not find strong evidence of an interrelationship between the different measures of capital structure and share repurchases because the South African financial data source used for this study (IRESS) did not consistently record comprehensive share repurchase data for the period 1999 to 2017 (the second period covered in this study). The information was only available for certain periods. Future research could increase the magnitude of share repurchases. Despite its limitations, this study contributes to the existing literature on the important issues of the simultaneity of decision-making on financing and distribution strategies.

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