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On the Dynamic Interaction Between Dividend and Investment Decisions: Evidence from Tunisian Listed Firms

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ABSTRACT

The purpose of this paper is to analyze the interactions between investment and dividend decisions in the absence and in the presence of an asymmetric information constraint. According to financial theory, firms with limited resources are constrained by either choosing to distribute earnings to shareholders or to reinvest funds in more profitable projects. Conducting empirical tests on the Tunisian context, we found a non-symmetric interaction between these decisions, where dividend is influenced by investment, while the latter is independent of the first when deciding on the amount to be invested. This result is confirmed, by the agency conflicts hypothesis, which indicated that taking into account constraint of over-investment risk leads us to a one-sided dependency.

JEL Classifications: G30, G31, G32, G34, G35

Keywords: dividend; investment; interactions; information asymmetry; overinvestment

I. INTRODUCTION

For several years, financial economists have paid considerable attention to the relevance of financial decisions to maximizing shareholders wealth and firm value (Modigliani and Miller, 1958 and 1961). This resulted in a proliferation in theoretical proposals and their empirical validation (Myers, 1974; Black, 1976; Jensen, 2002). However, among this growing trend, relatively little research has focused on explaining the potential links between investment and dividend decisions. Financial theory in the tradition of Irving Fisher usually supposes possible investment opportunities program, as offered by the company to be known in advance. In terms of behavior, investment decision is considered as fundamental in the Investment- Dividend-Financing sequence. In this context, dividend decision is of secondary importance. Higgins (1972) obtains results on American companies, which support this view: dividends were a function of profit and investment, but investment did not depend on dividends. According to Lintner (1956, 1962, and 1964), decisions on dividends, investment and financing are determined mutually and are highly interdependent in the business. Walter (1956) considers dividend policy as a residual decision determined by investment opportunities. For Miller and Modigliani (1961), dividend policy does not matter and does not affect shareholder wealth. Thus, firm value only depends on the long-term real decision.

Several other studies focused on the relationship between investment and dividends without the perfect market hypothesis. The results are far from unanimous and are rather contradictory. Thus, the conclusions of some authors led to the absence of a relationship between these decisions (e.g., Fama, 1974; Higgins, 1972), while others pointed to a significant interaction between investment and dividends (e.g., Dhyrmes and Kurz, 1967). Under agency conflicts hypothesis, dividends may help reduce agency costs associated with the separation of ownership and control. Easterbrook (1984) argues that dividend payments force managers to raise funds in the financial markets more frequently than they would without paying dividends. On the other hand, and according to Jensen (1986), the existence of a discretionary fund (FCF) can be a source of conflicts of interest between shareholders and managers. Indeed the latter tend to increase the firm size by investing all free cash flow and accepting risky projects. In this context, dividend decision can be a way of reducing these discretionary funds, which are at the disposal of the manager, and subsequently mitigating over-investment risk.

Galai and Masulis (1976) introduce the hypothesis that dividends transfer wealth between bondholders and stockholders by reducing the value of debt holders claims. In equilibrium, debt holders optimally protect their interest by placing restrictive covenants on disposition of assets and dividend payments. Jensen et al. (1992) tested managerial financial decisions in a simultaneous system. They found that Leverage and dividends appear to be chosen simultaneously to decrease agency costs. However, they found no evidence that insider ownership is a substitute for Leverage and dividends in controlling agency costs. Born and Rimbey (1993) offered some empirical evidence inconsistent with the Easterbrook's (1984) hypothesis. DeFusco et al. (2014) examine the long-term dynamic relationships between investment, earnings and dividends for US firms observed over the period 1950-2006. Using impulse response functions and variance decomposition, they showed that investment and payout correlate in both the short and the long run via earnings. Hussain and Ahmed (2015) show investment and dividends

have bidirectional causality. Profits are more allocated towards paying dividends rather than making investment.

In this paper, we will analyze the nature of the interaction between investment and dividend decisions using simultaneous equations in the absence or in the presence of agency conflicts. In the empirical part, we will test interactions between these decisions in the Tunisian context using the double least squares (DLS) method. The rest of the paper is organized as follows: the second section presents the literature review. The econometric methodology and data are discussed is third section. The fourth section deals with the empirical results. Section V gives concluding remarks.

II. LITERATURE REVIEW

Two fundamental theories are presented in the literature analyzing the interaction between investment and dividend decisions: (i) the first uses the perfect market hypothesis and proposes that these two corporate decisions are separated since firm's investment policy is independent of how such a decision is financed. (ii) The second refers to the market imperfections hypothesis and suggests that investment and dividend decisions of firms are negatively associated since these decisions compete to use limited internal funds. Unlike Miller and Modigliani (1958 and 1961), who suppose neutrality of financial decisions, and subsequently the absence of any possibility of interactions of these decisions with the investment, other researchers have pointed to a significant relationship when abandoning the perfect capital market hypothesis. Therefore, a company that faces an information asymmetry to finance its investment opportunities will tentatively focus on a maximum use of its internal funding opportunities in order to avoid external financing costs. Accordingly, dividend decision then becomes a residual policy. However, a profitable firm with easy access to the financial market and other external funding sources will prefer to keep a stable dividend level regardless of investment financing constraints. This section then reviews the main approaches describing dividend and investment relationships. In many cases, the classical approach of investment-dividend interaction supposes perfect market conditions in terms of the simplicity of rational investor's decision behavior and full information.

A. The Residual Approach of Financial Decisions

The dividend decision is a residual corporate decision**:** The residual theory as proposed by Walter (1956) suggests that the company cares first about financing its investment opportunity, and if it still funds, it distributes the rest to its shareholders. According to the theory, only two levels of distribution are possible to ensure maximum value for the company: If there are many profitable opportunities, the percentage of dividend paid will fall to zero. However, if the company is unable to generate opportunities to invest, the dividend rate will be 100%. Kuh (1963) tests the hypothesis of a consistent relationship between investment and dividend. The empirical tests showed that the adjustment speed of the Lintner model is faster than the stock of capital adjustment. These results reject the existence of a significant causality. Higgins (1972) shows that investment is a priority for using internal funds. The distribution of earnings to shareholders is determined as a

residual. The amount of distributed dividend is a function of two exogenous variables: profit and net investment. It would be positively related to the first variable and negatively to the second variable. Higgins points out two important consequences: (a) the firm avoids to modify its capital. Indeed any increase intensifies the dilution of ownership structure and therefore reduces the current and future dividends per share. (b) Even if investment is a priority to dividends, nothing forces the firm to pay residual funds as dividends.

Investment is a residual variable of dividends**:** When we explain investment by residual funds, we suppose the priority of dividend policy in using funds. First, we distribute dividends to shareholders and subsequently the remaining sums will be allocated to financing the firm's growth activities. This can be achieved only if the following conditions are met: (i) the dividend decision is rigid: this condition is much more verified when the firm has an ideal distribution rate in the long term, ownership structure is dispersed and the financial market penalizes any decrease in the payout ratio. (ii) Firms have a strong preference to internal financing. In this case, cash flow is the only source available to finance investments than the external financing cost (iii) the company is in a stage of maturity where investment opportunities are less profitable in the presence of a saturated market. According to Meyer and Glauber (1964), investment is considered as residual when the company's conjectural fluctuation, i.e. production is at full capacity, and investment should not exceed the use of residual internal funds.

B. The Interaction Approach with Limited Funds

The empirical research presents mixed results on the nature of the interaction between investment and dividend. In line with the approaches presented by Darling (1957) and Brittain (1965), Turnovsky (1967) discusses how cash flow is divided between dividend and reserves. Empirical tests show that investment and retention appear as large independents. Dhrymes and Kurz (1964) have empirically tested the behavior of dividend on a sample of 261 electricity distribution companies in the United States. Tests show that firms with the highest investment rates tend to have the lowest dividend rate. The results also show that big firms with high debt level distribute fewer dividends. In 1967, these authors studied the interdependence of financial decisions under limited available funds. In particular, the model addresses the problem of causal relations between investment, dividend, and financing. The empirical validation allowed the authors to assert that the variable long-term debt is affected significantly by investment while this latter is insensitive to dividend distribution. On the other hand, it seems that investment and dividend variables are not influenced by changes in debt.

Fama (1974) examines the relationship between investment and dividend on a sample of 298 US firms over the 1946-1968 period. The author's aim is to evaluate the predictive power of the explanatory models of dividends and investment. In other words, these two variables are better predicted by models that consider them separately in accordance with the work of Lintner and Chenery, or simultaneously. To resolve this problem, Fama (1974) conducts tests in two stages: the first is to estimate the performance of the investment and dividend models separately, while the second method assesses the performance of investment and dividend forecast models in a simultaneous way. The results show that the simultaneous estimation of the variables of dividends and investment did not improve the predictive power of these variables when used

separately. In addition, the author does not find the same evidence like that obtained by Dhrymes and Kurz (1967).

McDonald et al. (1974) analyze the relationship between investment, dividend and financing decisions on a cross-section of French firms. Consistent with Fama (1974), the authors deduce that these three financial decisions are independent. Smirlock and Marshall (1983), empirically examine the principle of separation, which argues that investment decisions are not influenced by dividend decisions. These authors use causality tests to examine whether investment decisions are in fact statistically exogenous to dividend decisions. Using both global firms and specific data, the results indicate that there are no causal relationships between dividend and investment, which confirms the principle of separation as an empirical proposition. The relationship between dividend and investment decisions according to this principle can be described as follows: the amount allocated to investment expenditures can be considered when determining common dividends, while the reverse is not true.

C. The Interaction Model under Agency Costs Hypothesis

According to Jensen and Meckling (1976), and Myers (1977), there are certain types of actions that shareholders may take to expropriate wealth at the expense of creditors. This transfer of wealth may result from excessive dividend payments. In this case, shareholders increase the level of dividend, either by reducing the investment budget or by more debt. From this perspective, Allen and Michealy (2001) argue that these activities, unanticipated by the creditors, may simultaneously cause a decline in the market value of bonds in favor of an increase in shares price. Jensen and Smith (1985), distinguished several origins of conflicts, which led to a transfer of wealth from creditors to shareholders.

As proposed by Merton (1973), Black and Scholes (1973), and Galai and Masulis (1976), the theory of options considers equity as an option on the firm's assets. Considering equity as a residual claim on the firm's cash flows, shareholders might be receiving payment after other financial claim-holders have been satisfied. In this case, shareholders have a European call option on the firm's assets at a spot price corresponding to the value of debt maturity. The main results of this approach are the following: (i) any investment that increases the variability of the rate of return on assets of a firm increases the value of the shares in favor of creditors' claims. (ii) Unanticipated acquisitions financed by cash can be considered as the exchange of risk-free assets against risky assets. This will increase equity value and reduce debt. Accordingly, issuing a bond in a way not anticipated by creditors, and using the proceeds to make dividend distribution, may damage creditors by increases in their risk position. If the compensation of the latter is fixed, taking into account a risk level lower than that, they actually support decreases in bonds value resulting in a transfer of wealth from bondholders to shareholders.

According to Jensen and Long (1972), and Myers (1977), underinvestment appears when a firm rejects positive NPV projects while it has sufficient financial resources. In this context, we observe a wealth transfer from creditors to shareholders when the firm either, uses funds to pay dividends and rejects positive VAN projects, or

by selling existing assets. These activities reduce firm value since there is a decrease in the assets that bondholders may claim in an event of liquidation. If bondholders do not anticipate such dividends payment, their wealth would be transferred to shareholders. This will take place when bondholders anticipate underinvestment behavior and take into account the fixing of their required return at the expense of shareholders' wealth.

The resolution of these conflicts requires the limitation of the payout ratio. This choice can be achieved by different means: (i) On the one hand, the law can defend bondholders' interests by imposing reserve requirements on corporations. These reserves increase the pledge of the creditors allowing firms in an event of a decrease in their activities to draw funds from this reserve to repay debt. (ii) Bondholders can explicitly embed protective covenants in their lending agreements to limit excessive dividend payments. In this context, Kalay (1982) examines a sample of 135 U.S. companies, and finds that in 94% of cases, protective covenants are there to limit dividend payments with borrowed funds or from the disposal of long-term assets.

As explained by Adedeji (1998), the nature of the relationship between dividend and investment decisions depends on the way the firm faces lack of benefit in financing firm activity. In this regard, the author distinguishes two types of behavior: (a) If firms fills the inadequacy of the benefit by borrowing in order to pay dividends and finance growth opportunities, the result of such a decision is that dividend ratio and investment should have a positive effect on financial leverage. (b) Conversely, if firms respond to an inadequacy of benefits by reducing or delaying investment, and distribute dividends by using short-term debt, leverage will positively correlate in this case with dividend ratio and negatively with investment. Adedeji (1998) tests the interaction between investment, financing and dividend policy on a sample of 224 British firms over the period 1993-1996.The results point to a negative relationship between dividend ratio and investment and a positive relationship between dividend and leverage.

III. DATA AND METHODOLOGY

In this section, we empirically examine the dynamic relationship between investment and dividend decisions on a sample of Tunisian firms. First, we describe the data and methodology. Then we test our main predictions. Finally, we discuss alternative explanations of our empirical findings and run additional robustness checks.

A. The Data

The sample consists of companies listed on the Tunisian Stock Exchange from 2005 to 2014. Companies' annual reports were the main source used to obtain the financial information required by our tests. We use the WorldScope Database to collect the panel data on financial statements of Tunisian listed firms. From the web page of each company, we also obtained complementary information in particular that on corporate governance practice. Our sample is divided into two categories: industrial firms (68%) and banks (32%). The data covers the period 2005-2014 during which both the financial crisis and the Arab spring of the Tunisian revolution took place. Our sample was chosen from all listed firms in the Tunisian stock exchange during the period 2005-2014. The selection process is based on three criteria:

(i) Representativeness: Compared to the total number of companies listed during the period from 2005 (45 listed companies) to 2014 (77 listed companies), our sample size 31 represents respectively a percentage that varies between 69% and 40%.

(ii) Dynamic transactions: since the stock exchange index (TUNINDEX) consists of the most firms (varies between 39 firms and 74 firms) with a high transaction volume, our sample has a percentage that varies respectively between 74% and 55%.

(iii) "The Bird in the hand argument": since in the Tunisian context dividends are treated at a preferential tax rate than ordinary income and according to the bird hand argument, all firms of our sample distribute regular dividends and have the highest historical dividend payout.

In order to analyze the dynamic interaction between investment and dividend for Tunisian listed firms during ten years, which requires longitudinal data, we limited our study to 31 firms, which have permanent time series data over the period 2005 to 2014. In total, we built a balanced panel of data with 310 firm-year observations, which we believe are sufficient to run relevant econometric tests on the Tunisian stock exchange. The sample in this study considers all dividend-paying firms that (i) distribute an ordinary annual cash dividend, (ii) do not pay any other form of dividend in the current year, and (iii) have financial data on the fiscal year closure.

For size, we use average total assets as the level to distinguish between large and small firms. We found that 23% of the sample as large firms and 77% of the sample as small and medium size firms. For capital dispersion, we consider a capital concentration when more than five shareholders hold a percentage greater than 50% of capital. We found that 73% of observations are concentrated firms, while 27% of observations as firms with dispersed ownership.

B. Variables Measurement and Hypotheses

1. Dependent Variables

Investment ratio (I) : According to Fama (1974), we use the expenditures of property, plant, and equipment (PPE) as a measure of the stock of capital (K) and investment is calculated by a change in capital stock $I_t = K_t - K_{t-1}$. Investment ratio is obtained by Investment to total equity(S) and long-term debt (LTD).

Dividend per Share (D): the second dependent variable is the firm's dividend behavior measured by dividend per share and defined as the total dividend to the number of outstanding equity. Dividend per Share is also considered as the amount of declared dividend distributed by a firm for every ordinary share outstanding. This simplest form of corporate distribution is important because (i) it is used as a return value to its shareholders when compared to stock price; (ii) increasing dividend is a way for a company to signal its market performance to its shareholders; and (iii) it is used by investors, who are interested in various companies paying cash dividends. However, this measure is not preferred by growth investors, who are more concerned about backing funds into earnings retention.

2. Independent Variables

We use two types of variables (Table 1): (i) variables related to standard determinants of investment and dividend decisions (ii) variables related to agency conflicts.

Growth opportunities (Q) is defined as the ratio of market value of a firm's assets divided by the replacement cost of those assets[1]. Economics and financial theory of investment suppose Q ratio as a measure of growth opportunities (Tobin 1969). It predicted that if Q is greater than one, more profits are generated which would give additional investment in the firm as its stock price increases. Future growth opportunities, Q, is measured as the ratio of market to book value of equity in accordance with Lang and Litzinberger (1989), Gadhoum (2000), and Farinha (2002). Our model predicts a negative relationship between anticipated growth and dividend payout ratio, since firms prefer to avoid transaction costs due to external financing and retain a greater proportion of cash if they have growth opportunities. Recent studies, like that of Rozeff, found that dividend policy is negatively influenced by the potential growth of the firm. A negative relationship between growth and dividend ratio is intuitively plausible and consistent with agency costs' account of dividends. The justification for the growth variable is based on the fact that firms, regularly seeking the financial market to raise capital, expose themselves to discipline and control exercised by the market. More costs associated with a capital increase require firms optimally choosing a low dividend ratio.

Hypothesis 1: we assume that Tobin's Q positively influences investment

The firm size (SIZE): is measured by total assets (or Log (TA)). This variable allows for distinguishing between large and small companies. For the first, investment has an irreversible character, so for the second it is flexible. The theoretical framework on information asymmetry, transaction costs and Agency costs suggests that large firms have easy access to new sources of capital and to foreign markets than small businesses. Thus, investment for the latter would depend more on the available internal funds.

Hypothesis 2: we suppose that size positively influences investment and dividend.

Cash flow (CF): The profitability of an investment is evaluated based, on the cash flows generated by the project and not on its accounting profits. In this regard, cash flows differ from net profits after depreciation being taken into account. Net income is obtained after deducing amortization expense, which is not the case for cash flow calculation that will take into account the result of depreciating tax savings. Cash flow is used as an internal source of capital, which comes from retained profits, and tax advantage of depreciation. Using internal funding may allow a firm to have to pay less interest and give less of the company and the firm will be better and more attractive to potential investors.

Hypothesis 3: we assume that cash flow positively influences investment

The Retention ratio (RPS): we use the amount of retention to determine the degree of financing hierarchy which supposes that firms have a priority of seeking financing resources. The pecking order theory (Donaldson 1961, Myers 1974, and Myers and Majluf 1984) argues that adverse selection, asymmetric information, and other

factors imply that internal financing is better than external financing and firms prefer debt to equity if external financing is used.

Hypothesis 4: We assume retentions are positively correlated with investment decision

3. Agency Conflicts Variables

Agency cost of debt argues that debt financing affects shareholders' investment decisions in two opposite ways: (i) according to Jensen and Meckling (1976), the asset substitution problem arises when shareholders do not bear the full cost of low return, and have incentives to take riskier investments at the expense of the debtholders. (ii) According to the underinvestment problem (Myers, 1977), shareholders of a levered firm will refuse projects with positive net present value because a fraction of the return of their projects will benefit debtholders. We use risk of overinvestment as proxy of agency cost of equity and ownership structure measures as proxies of agency cost of debt.

Free Cash Flow (FCF): Jensen's free cash flow hypothesis was supported by Rozeff (1982), Jensen et al. (1992) and Smith and Watts (1992). The free cash flow hypothesis is an ad hoc combination of signalling and agency costs paradigms. According to this hypothesis, which refers to cash flows in excess of positive Net present Value (NPV) investment opportunities, it is better for managers to return the excess cash to shareholders as dividends in order to maximize shareholders wealth. Otherwise, the hypothesis argues that the existence of free cash flow may lead management to undertake suboptimal investment projects. Many authors found support of this hypothesis, thus we predict a positive relationship between free cash-flow and investment. FCF is defined as cash flow per unit of asset. Our measure of free cash flow is developed from Crutchley's (1989) study of dividend policy as part of managerial decision-making. The author defines FCF as the funds available to managers before discretionary capital investment decisions. This includes net income, depreciation, and the interest expense of the firm. The needed capital expenditure is subtracted from these cash flows to account for investment in positive NPV projects.

Hypothesis 5: we expect that FCF positively affects dividend and investment decisions.

Capital concentration (MAJ) is a dummy variable that takes 1 if ownership is concentrated in the hands of five shareholders and 0 if ownership is dispersed. The dominant shareholder can form a coalition with other shareholders to obtain control and then expropriate minority investors. In fact, most controlling shareholders prefer other forms of distribution in order to avoid transaction costs and taxation affecting their own wealth. In this case, we expect a negative effect of the presence of multiple shareholders on dividend policy. By contrast, large shareholders can play a monitoring role and thus reduce the private benefits of control. In this case, a positive relationship will be established between multiple shareholders and dividend payout.

Hypothesis 6: we assume that concentration affects negatively dividend and positively investment.

Institutional investors (INST) is the percentage of equity owned by institutional investors. Institutional block holders may act as a monitoring (banks, insurance, pension funds. Etc.) device of the firm's managers. Shleifer and Vishny (1986), and Allen and Michaely (2001) argue that large institutional investors are more willing and able to monitor corporate management than are small institutional investors and diffuse owners. Short et al. (2002) examine three alternative dividend models and find a positive relationship between dividend payout and institutional ownership in a sample of UK firms. This type of investors decreases agency costs and increases the need for a regular dividend payment. Therefore, for institutionally controlled firms, we expect a high dividend payout.

Hypothesis 7: we assume that Institutional ownership affects positively dividend and investment decisions.

4. The Overinvestment Hypothesis

According to Galai and Masulis (1976), Jensen and Meckling (1976), Jensen (1986), and Stulz (1990), the overinvestment problem arises when managers, considering firms as a means to increase their own capital, abuse their decision-making power by choosing projects with negative present value that could increase their own private profit and at the same time decrease and harm shareholders and debtholders wealth. We use two measures of over-investment risk:

(i) The Jensen's (1986) method (RSJ) considers that overinvestment occurs when the company has positive Free Cash Flow (FCF > 0) associated with poor future growth opportunities (Q <1). In this case, we use a dummy RSJ variable that takes one when the over-investment risk is high and zero when this risk is low. Most studies assume a positive relationship between dividend and free cash flow of the firm. In the presence of free cash flow, Jensen (1986) proposes that shareholders prefer the distribution of dividend immediately to limit the discretionary funds at the disposal of the manager. Financial theory recognizes also the role of dividends in reducing conflicts of interest between shareholders and executives. The company's commitment to distribute more dividend increases its need to the financial market to meet financial slackening, and subsequently requires managers to invest optimally and to decrease their private consumption.

$$\mathrm{RSJ} = \begin{cases} 1 \text{ if } \mathrm{FCF} \succ 0 \text{ and } \mathrm{Q^{Tobin}} < 1 \\ 0 \qquad\qquad\qquad \text{otherwise} \end{cases} \tag{1}$$

(ii) The method of Lang and Litzenberger (1989) (RSLL) which States that overinvestment risk is important when the corrected Q is less than one. The formula we use is as follows:

$$\mathrm{Q^{LL}} = \frac{\mathrm{X+I(ROA-WACC)T}}{\mathrm{K \cdot WACC}} \tag{2}$$

where X is operating profit, K is capital measured by permanent capital, WACC is the weighted average cost of capital, I is the amount of future investment, ROA is economic profitability, and T is the horizon of planning for the future growth of the company. Lang

and Litzenberger (1989) suppose an average value of Q^{LL} less than unity to have a firm facing overinvestment. According to this hypothesis, we define the risk of Overinvestment as a dummy variable as follows:

$$RSLL = \begin{cases} 1 & \text{if } Q^{LL} < 1 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

Hypothesis 8: in the presence of shareholders majority, we assume that over-investment risk (measured by RSJ or RSLL) negatively influences investment and positively dividend distribution.

Table 1
Definitions and measures of variables

Variable	Measurement of variable	Hypothesis to be tested
Investment ratio: I	I = Inv/K	Investment influences negatively dividend
Dividend per share: D	D = total dividends/number of shares	Dividend negatively influences investment
Earnings[2] per share E	E = profits/number of shares	Positively influences dividend
Retentions per share RPS	RPS = retentions/number of shares	Positively influences investment
Cash flow per share CFPS	CFPS = cash flow/number of shares	Positively influences investment and dividend
Firm Size	Size= Log(total assets)	Size influences positively dividend and investment
Free cash flow	FCF= Net income+ depreciation+ int expense -capital exp	FCF influences positively dividend and investment.
Capital concentration	MAJ = 1 if capital is concentrated and = 0 if not	Capital concentration influences negatively dividend and positively investment
Institutional investors	INST = ownership of institutional investors	Institutional ownership negatively influences investment and positively dividend
Future growth Opportunities	Q^{tobin} = VM/VC, VM is firm's market value and VC is firm's book value.	Positively influences investment and negatively dividend
Over-investment risk	Jensen's Method1 : RSJ = 1 if Q^{tobin}<1 and FCF is positive, = 0 otherwise Long and Lizenberger's Method 2 : RSLL = 1 if Q^{LL} <1 , and =0 otherwise	Negatively influences investment and positively dividend.

C. The Model

Our aim here is to present the model to be tested. To establish a fundamental approach that explains the causal relationship between dividends and investment, three models have often been used: (i) the partial Adjustment model of dividend as suggested by

Lintner (1956); (ii) the flexible accelerator model of investment as presented by Chenery (1952) and Koyck (1954); and (iii) funds flow identity as proposed by Modigliani and Miller (1961).The Lintner specification proposes the target adjustment formula in two equations:

$$\begin{Bmatrix} \Delta D_{it} = \lambda\,(D_{it}^{*} - D_{it-1}) + \varepsilon_{it} \\ D_{it}^{*} = rE_{it} \end{Bmatrix} \tag{4}$$

Where ΔD_{it} is dividend change between D_{it} and D_{it-1}. D_{it}^{*} is the target dividend that is assumed to be proportional to earnings E_{it}, λ is adjustment speed coefficient. In this model, Lintner (1956) suggests that change in dividend is a function of a firm's target dividend and its past dividends.

The investment model is chosen in line with the dividend model's equation where change in capital stock ΔK_{it} is proportional to the adjustment speed between target capital stock K_{it}^{*} and K_{it-1} its past value.

$$\begin{Bmatrix} \Delta K_{it} = \delta\,(K_{it}^{*} - K_{it-1}) + \eta_{it} \\ K_{it}^{*} = \rho O_{it} \end{Bmatrix} \tag{5}$$

Fama (1974) considers the flexible accelerator of Chenery (1952) and Koyck (1954) where the target capital stock K_{it}^{*} is proportional to output O_{it}. In this study, we favor the Tobin's Q theory as presented by Hennessy et al. (2007) as the model of the target investment ratio:

$$\begin{Bmatrix} \Delta I_{it} = \delta\,(I_{it}^{*} - I_{it-1}) + \eta_{it} \\ I_{it}^{*} = \nu Q_{it} \end{Bmatrix} \tag{6}$$

To examine the possible influence of investment on dividend, changes in capital stock, which include new investment $\Delta K_{it} = I_{it}$ can be added to equation (Fama, 1974).

$$\Delta D_{it} = \lambda\,(D_{it}^{*} - D_{it-1}) + \alpha_3 I_{it} + \varepsilon_{it} \tag{7}$$

For the investment model, the possible effect of dividend policy on change in capital stock is presented as:

$$\Delta I_{it} = \delta\,(I_{it}^{*} - I_{it-1}) + \beta_3 D_{it} + \eta_{it} \tag{8}$$

The structural equations of dividend and investment interaction are given by

$$\begin{Bmatrix} \Delta D_{it} = \lambda\,(D_{it}^{*} - D_{it-1}) + \alpha_3 I_{it} + \varepsilon_{it} \\ \Delta I_{it} = \delta\,(I_{it}^{*} - I_{it-1}) + \beta_3 D_{it} + \eta_{it} \end{Bmatrix} \tag{9}$$

Combining these equations and the target dividend and investment equations yields:

$$\begin{Bmatrix} D_{it} = \alpha_1 D_{it-1} + \alpha_2 E_{it} + \alpha_3 I_{it} + \varepsilon_{it} \\ I_{it} = \beta_1 I_{it-1} + \beta_2 Q_{it} + \beta_3 D_{it} + \eta_{it} \end{Bmatrix} \quad (10)$$

The funds flow identity, as proposed by Modigliani and Miller (1958) where sources of funds must equal uses of funds is used to predict the relationship between investment I_t and dividend decisions D_t may be expressed as:

$$I_t + D_t = E_t + \Delta B_t + \Delta S_t \quad (11)$$

where E_t is earnings in period t, ΔB_t and $\Delta S_t$are respectively debt and external equity financing in period t. Since investment and dividend are considered as competing uses of funds, we consider a negative relationship between these decisions as we hypothesized. In this context, Partington (1985) proposes three possible major scenarios of the causal relationship between investment and dividend: (i) a residual dividend Policy where its level depends on investment and financing decisions; (ii) an independent dividend policy where its level is determined by exogenous factors other than investment and financing constraints; and (iii) a simultaneous dividend policy where its level is neither residual nor totally independent.

IV. THE EMPIRICAL RESULTS

A. Descriptive Statistics

Table 2a indicates that more than 50% of earnings per share EPS (with a mean of 1.482) is paid out as dividend per share DPS (with a Mean of 0.854). It is found also that EPS is more volatile (with a Standard Deviation STD of 8.317) than Dividend and Investment with STD of 1.512 and 0.449 respectively indicating that corporate financial decisions are more stable than the firm's current activity indicator.

Table 2a
Descriptives statistics

	N	Mean	Std. Dev.	Min	Max
I	310	-0.032	0.449	-5.739	1.451
D	310	0.854	1.512	0	9.692
E	310	1.482	8.317	-117.625	30.753
Q^{tobin}	310	1.360	1.703	0.001	17.181
MAJ	310	0.606	0.159	0.29	0.908
INST	310	0.351	0.255	0	0.938
Q^{LL}	310	16.097	83.569	-16.436	773.270
CFPS	310	0.104	0.158	-1.078	0.986
RPS	310	0.628	8.042	-118.025	30.322
Size	310	8.330	0.969	6.069	9.977
FCF	310	1.77 e+07	3.95 e+07	-2.02 e+08	2.13 e+08

Notes: this table reports summary statistics on firm characteristics; all data are from WORLDSCOPE DATABASE. I: Investment ratio, D: dividend per share, E: is earnings per share, Q^{Tobin} is Tobin's Q, MAJ is the Capital concentration, INST is ownership of institutional investors; Q^{LL} is the corrected Q as proposed by Lang and Litzenberger (1989), CFPS is cash flow per share, RPS is retentions per share, Size is the firm size, FCF is free cash flow as measured by Jensen (1986). N is firm-year observations.

The Table 2a shows that the firm's ownership structure is more concentrated with a mean of 60% and a minimum of 29% and a maximum of 90%. This table, shows also that ownership structure is affected by institutional investors, about 35% of voting rights is owned by institutional investors.

B. Stationarity and Unit-Root Test

To test the unit root of the dependent variables, we consider a number of stationarity tests in panel datasets. Both Levin-Lin-Chu (2002) (LLC) and Harris-Tzavalis (1999) tests have as null hypothesis that all panels contain unit roots while Hadri (2000) assumes H0 that all panels are stationary. We have a balanced panel dataset on investment and dividend for 31 Tunisian firms over 10 years. According to our unit root tests for series in level and trend as shown in Table 2b, both LLC and Harris-Tzavalis tests strongly reject the null hypothesis that contain unit roots in favor of the alternative that panels are stationary while the Hadri LM test shows the opposite result and reject the null hypothesis that all panel series are stationary and indicate that at least one of them contains a unit root.

Table 2b
Panel unit root tests results in level for the dependent variables

	Investment(I)		Dividend(D)	
	Intercept	Trend	Intercept	Trend
Levin-Lin-Chu	173.35	132.38	-23.56	-29.36
test(LLC)	(1.00)	(1.00)	(0.00)	(0.00)
Harris-Tzavalis	-0.02	-0.04	0.57	0.42
test(HZ)	(0.00)	(0.00)	(0.00)	(0.75)
Hadri-LM	4.43	4.21	7.31	9.35
stationarity	(0.00)	(0.00)	(0.00)	(0.00)

The values in brackets are the corresponding p values

C. The Empirical Tests of the Dividend-Investment Relationships

The system of simultaneous equations is estimated using pooled cross-sectional time series data from each of the 31 firms over the period 2005-2014 and applying the two-stage least squares techniques (TSLS). The TSLS is a generalized least squares procedure to estimate simultaneous equations when each model of the structural model contains endogenous variables as well as predetermined variables on the right-hand side. The two-stage-least-squares estimation uses the information available from the specification of an equation system to obtain a unique estimate for each structural parameter. Intuitively, the first stage of TSLS finds the portions of the endogenous and exogenous variables that can be attributed to the instruments. This stage involves estimating an OLS regression of each variable in the model on the set of instruments. The second stage is a regression of the original equation, with all of the variables replaced by the fitted values from the first regression. The coefficients of this regression are the TSLS. The estimated dividend and investment regressions take the general form:

$$\begin{cases} D_{it} = \alpha_0 + \alpha_1 D_{it-1} + \alpha_2 E_{it} + \alpha_3 I_{it} + \alpha_4 X_{it} + \varepsilon_{it} \\ I_{it} = \beta_0 + \beta_1 I_{it-1} + \beta_2 Q_{it} + \beta_3 D_{it} + \beta_4 X_{it} + \eta_{it} \end{cases} \quad (12)$$

where the subscript refer to firm i and year t, and the variables are measured as D is dividend per share, E is earning per share, I is investment ratio (changes in fixed assets, plant and equipment / total assets). Below, we present the TSLS estimates obtained from regressing Dividend on a constant and investment, with the instrument list as a constant, earnings E, D(-1); Investment on a constant and Dividend, with the instruments list as a constant, Q, I(-1). The results of the tests are summarized in Table 3.

Our tests are conducted in five regressions, which are regrouped in two steps. The first group of regressions examines the interaction between investment and dividend without taking into account the variables related to asymmetric information and agency conflicts (Regression1 and Regression 2). In a second step, we introduce variables related to agency costs such as Ownership structure, free cash flow and over-investment risk. The results are summarized in Table 3 (Regressions, 3, 4, 5).

In the first regression (Regression1, Table 3), the structural equations are estimated without considering the lagged variable of each dependent decision. The test shows the absence of interaction between investment and dividend since the coefficients α_3 and β_3 and measuring respectively sensitivity of dividend and investment to each other are not significant. This result is consistent with those of Modigliani and Miller (1958) and Fama (1974) that sustain the separability principle between these two decisions. Nevertheless, we notice that the negative relationship between investment and dividend is verified without significant coefficients. This finding supports the absence of possible interaction when firms do not adjust their financial decision to the target ratio.

Table 3
Results of investment-dividend interaction

	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
	INV	DIV	INV	DIV	INV	DIV	INV	DIV	INV	DIV
Intercept	-0.030	0.776[a]	-0.038		-0.44[c]	-0.070	-0.87[a]		-1.21[a]	-0.86[c]
I		-0.159		-0.17[c]		-0.16[c]		-0.21[b]		-0.189[b]
D	-0.192		-0.017		-0.014		-0.009		-0.004	
I(-1)			-0.029		-0.049		-0.037		-0.046	
D(-1)				0.850[a]		0.819[a]		0.796[a]		0.796[a]
EPS		0.048[a]		0.012[b]		0.012[b]		0.016[a]		0.015[a]
Q^{tobin}	0.011		0.013		0.034[b]		0.028		0.026[c]	
SIZE					0.048[c]	0.021	0.106[a]	0.072	0.144[a]	0.078
CFPS					-0.006		0.067		0.047	
MAJ								0.496[c]		0.504[c]
INST								0.169		0.223
RSJ							0.037	0.043		
RSLL									0.001[b]	-0.000
DUAL							-0.028			
FCF							-0.00[a]	-0.00[c]	-0.00[a]	-0.00
ADR^2	0.001	0.07	0.002	0.794	0.024	0.73	0.117	0.74	0.132	0.739
F Test	0.75	12.51[a]	0.56	394.4[a]	8.82	850.8[a]	41.7[a]	877.6[a]	47.37[a]	877.08[a]

a, b and c indicate significance at the 1%, 5%, and 10% levels respectively

In the second regression (Regression 2, Table 3), the structural equation of investment and dividend is estimated while considering the partial adjustment process of each decision. For the investment equation, the results are not satisfactory. All coefficients are insignificant (the t statistic of the corresponding coefficients is below the critical value). The coefficients of determination are very low. These results suggest that the model was seriously misspecified. When dividend per share DPS was added as an independent variable in the modified Fama model, its coefficient was insignificant and failed to yield the relationship, as described by the equation. Unlike the investment model, the dividend model shows more consistency. The adjusted R^2 is 79.4 %. All the coefficients of the independent variables (the model estimated without a constant) are significantly different from zero (the t statistic is over the critical value). With the inclusion of investment ratio as an independent variable in the Dividend model, its coefficient was significant at the 10 % level. Investment decision has a negative impact on dividend decision but the opposite effect for dividend on investment is not verified. This result partially confirms the causal relationship between these decisions where the interaction is non-symmetric from one side. In this case, dividend is presented as dependent of investment decision, confirming the residual hypothesis assuming that payout ratio level depends on the selected value of the investment variable.

In Regression 3, we have considered an advanced investment and dividend interaction that takes into account the firm's financial constraints such as size, return on assets and cash flow. Overall, the explanatory power of the regression has well improved compared to the equations of simple partial adjustments. All of the introduced variables are not significant except the variable size in both investment and dividend equations. For the interaction between dividend and investment, there is also a non-symmetrical relationship between these two decisions. Dividend has no impact on investment while the latter explains negatively and significantly (threshold 1%) the first decision. In this framework, the partial adjustment models in the presence of constraints of cash flow and size on investment support the possibility of a negative relationship between investment and dividend decisions.

In Regression 4: adding variables related to agency conflicts has improved the explanatory power of dividend and investment models (adjusted R^2 is respectively 74% and 11.7%). Unlike the variable participation of institutional investors, the concentration of capital variable is significant and influences positively firms' dividend behavior. This result is consistent with the view that assumes the presence of blockholders is beneficial for firms and constitutes a control device used to monitor managers and encourage them to distribute more dividends to shareholders.

The Variable measuring Free Cash Flow (FCF) has a negative effect on both dividend and investment decisions. For the dividend structural equation, the negative effect of FCF does not support Jensen's hypotheses (Jensen 1986) that firms with higher levels of free cash flow will have higher agency costs and need higher dividend per share to reduce those agency costs. According to Jensen (1986), for a firm that has excess cash enough to finance real activity, it is better for managers to distribute this money as dividends. Otherwise, Jensen (1986) assumes that the existence of FCF may lead management to undertake suboptimal projects that destroy shareholders wealth. Furthermore, the negative coefficient of FCF in the Investment structural equation does not support the Investment efficiency hypothesis (Jensen, 1986; Stulz, 1990; Shleifer and Vishny, 1997). For the interaction between investment and dividend decisions, taking

into account variables of agency conflicts has improved the coefficient measuring causality between these decisions when compared to the performance observed in Regression 3. However, the overinvestment risk in accordance with Jensen's (1986) proposal is found to be insignificant since the RSJ variable is not significant in the investment and dividend equations, while the explanatory power of the equation system 4 has improved compared to equation system 3.

In Regression 5, we have measured management overinvestment activity like Lang and Litzenberger (1989) who define overinvestment risk as the modified Tobin's Q that takes into account capital cost, return on assets and the planning horizon for the future growth of the company. The empirical test shows the significance of this variable in explaining investment and dividend causality. Indeed the dividend equation, even though it has slightly decreased its explanatory power, remains strongly explained by lagged dividend, profit and investment variables. Most of the independent variables of the investment equation are significant. Unlike the results of Regression 4, Regression 5 confirms the existence of a positive relationship between investment and overinvestment risk.

Besides the importance of agency conflicts proxies as measured by FCF and MAJ in explaining the non-symmetric interaction between investment and dividend, it is interesting to consider that these variables play a significant role in determining the decreased agency control mechanism of dividends (Fama and French, 2001). Indeed, a high level of FCF intensifies agency conflicts between managers and shareholders, which reduces growth opportunities or dividends distribution. On the other hand, a high level of ownership concentration (MAJ) reduces agency conflicts between managers and shareholders by favoring more earnings distribution and substituting the disciplinary role of dividends.

D. Sensitivity Tests

As a second step in our estimations, we conducted an empirical analysis of the interaction between investment and dividends by sector of activity (see Table 4). The results obtained are different across the two tested sectors. For the industrial sector, the hypothesis of a negative interaction between investment and dividends seems to be verified by our data. Causality is observed from one side where investment causes dividend while the opposite is not verified. The variable over-investment risk RSLL as measured according to Lang and Litzenberger (1989) is significant and influences positively investment decisions. This result is more relevant for a large-sized company keeping a low free cash flow level.

For the financial sector, the results (Table 4) yield a coefficient different from that obtained for the industrial sector. The interaction between investment and dividend decisions seems also to be verified in one direction but with a positive effect. Investment causes positively dividend decision while the latter does not influence the former. Overinvestment risk explains negatively investment decision. In this case, banks are less affected by equity agency cost where management entrenchment is of little relevance in more controlled companies.

Table 4
Results of investment-dividend interaction by sector

	Industrial sector(N=209)		Financial sector (N=100)	
	Investment	Dividend	Investment	Dividend
Intercept	-4.007[a]	-2.72[c]	-0.002	1.702
I		-0.229[c]		11.575[b]
D	0.004		-0.00004	
I(-1)	-0.076[c]		-0.0048	
D(-1)		0.640[a]		0.771[a]
EPS		0.142[a]		-0.0009
Q^{tobin}	0.035[a]		0.111[a]	
SIZE	0.521[a]	0.326[c]	0.0002	-0.161
MAJ		0.345		0.3078
INST		0.356		-0.615[b]
RSLL	0.0016[a]	0.0002	-0.104[a]	-0.2862
FCF	-2E-08[a]	-6E-09	-4E-12	1.35E-09
R^2	0.6169	0.7875	0.987	0.69
F Test	336.9[a]	775.1[a]	6110[a]	224.5[a]

a, b and c indicate significance at the 1%, 5%, and 10% levels respectively.

As explained above, for the sample selection, industrial and financial sectors are the main sectors that are listed on the Tunisian stock exchange. Unlike the industrial sector, the positive interaction between investment and dividend obtained in the financial sector is explained by absence of conflicts about financial resources between these two opposite financial decisions and financial institutions and less constrained in explaining the investment-cash flows sensitivity (Fazzari, Hubbard and Peterson 1988).

V. CONCLUSION

In theory, when financial markets are frictionless, Modigliani and Miller (1958, 1961) have shown that the firm's financial decisions are independent from its real decisions. Fama and Miller (1972) term this finding the separation principle. Although, capital markets are not perfect, the validity of the separation principle as an empirical behavior is not confirmed. The earlier empirical tests on the issue show mixed findings. Dhyremes and Kurz (1967), and Partington (1985) report results not consistent with this view. Fama (1974), Smirlock and Marshall (1983), and Pruit and Gitman (1991) conclude to a no relationship between investment and dividend decisions.

In this paper, we examined the dynamic interaction between investment and dividend decisions with a particular focus on how agency conflicts explain these relationships. We conducted a study using panel data on Tunisian firms over the period 2005 to 2014. Our empirical estimation is based on the two-stage least squares (2SLS) and the three-stage least squares (3SLS) tests consistent with Chang et al (1985). In contrast to Fama (1974), we found support for the hypothesis that investment and dividend correlate negatively. However, this is a one-sided causality where investment causes dividend while the latter does not cause the former. In addition, the results indicated that overinvestment risk is an important factor that influences the negative relationship between these decisions in the Tunisian context. Our result indicates also that for the subsample, a negative causality between investment and dividends is confirmed in the industrial sector, while the financial sector shows the opposite causality direction.

ENDNOTES

1. For further discussion of Tobin's Q, see Lindeberg and Ross (1981), Hayashi (1982), and Lang and Litzenberger (1989).
2. As Noted by Lintner (1956), Fama and French (2001), the magnitude of net earnings is always considered as a primary determinant of corporate dividend decision.

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