

Nekat, Kai; Nippel, Peter

**Working Paper — Digitized Version**

## The impact of a firm's payout policy on stock prices and shareholders' wealth in an inefficient market

Manuskripte aus den Instituten für Betriebswirtschaftslehre der Universität Kiel, No. 619

**Provided in Cooperation with:**

Christian-Albrechts-University of Kiel, Institute of Business Administration

*Suggested Citation:* Nekat, Kai; Nippel, Peter (2007) : The impact of a firm's payout policy on stock prices and shareholders' wealth in an inefficient market, Manuskripte aus den Instituten für Betriebswirtschaftslehre der Universität Kiel, No. 619, Universität Kiel, Institut für Betriebswirtschaftslehre, Kiel

This Version is available at:

<https://hdl.handle.net/10419/147672>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# **The Impact of a Firm's Payout Policy on Stock Prices and Shareholders' Wealth in an Inefficient Market**

October 2006

Kai Nekat<sup>a\*</sup> and Peter Nippel<sup>a</sup>

619/2007

---

<sup>a</sup> University of Kiel, Department of Business, Chair of Finance, Olshausenstraße 40, D-24098 Kiel, Germany

\* Corresponding author. Tel.: +049 0431 880 1442, E-mail: [nekat@bwl.uni-kiel.de](mailto:nekat@bwl.uni-kiel.de)

# **The Impact of a Firm's Payout Policy on Stock Prices and Shareholders' Wealth in an Inefficient Market**

## **Abstract**

In inefficient stock markets payout policy may be directly relevant for stock prices, not only by way of announcement effects considered in signaling games. We show that paying out free cash flow, either as a dividend or via repurchasing shares, has in general a positive price impact and increases shareholders' wealth, if the existence of non-smart investors and limits of arbitrage leads to market inefficiency. Shareholders gain more from a share repurchases instead of paying a dividend as long as capital gains are not heavily discriminated by taxation in relation to dividends. The positive price effect of dividends can be enhanced if the firm implements a dividend reinvestment plan (DRIP).

*Keywords:* Payout policy, Dividends, Share Repurchases, Inefficient Market, Price Pressure, Dividend Reinvestment Plans (DRIPs).

*JEL classification:* G14, G35,

## 1 Introduction

Firms can either retain and reinvest free cash flow (FCF) or distribute it to its shareholders via dividends or share repurchases. The payout policy may have an effect on stock prices. A broad literature has already analyzed price effects within signaling models. Those models predict mainly announcement effects. However, price pressure effects of payouts in an inefficient stock market have been widely ignored. Moreover, price effects have mostly been studied separately for the various payout policies available to a firm. A profound comparison of price effects of various payout policies in inefficient markets is still lacking.

We show that paying out free cash flow to the firm's shareholders, either as dividend or via repurchasing shares, has in general a positive price impact and increases shareholders' wealth, if the market is inefficient due to the existence of so called non-smart investors and limited arbitrage. Therefore, our paper adds to the literature on the impact of payout policies in two important ways. Firstly, it predicts that, if stock markets are inefficient, positive price effects show up at the payment date. Secondly, payout policies differ with respect to the magnitude of the price effects they cause: Shareholders gain more from share repurchases instead of dividends as long as capital gains are not heavily discriminated by taxation compared to dividends.

Our theoretical approach strongly contrasts the signaling-type approaches of payout policies based on information asymmetries, which predict a price effect at the announcement date, while in our model abnormal returns are observable at the payment date. These signaling theories can be categorized in two broad groups. The first group analyzes only single payout policies. Well known are e.g. the papers of Bhattacharya (1979) and Miller and Rock (1985) considering dividends, while e.g. McNally (1999) and Oded (2005) consider open market share repurchases. The second group compares price effects of various payout policies. Ofer and Thakor (1987) show the announcement effect of a repurchase to be stronger, on average, than the announcement effect of a dividend. The model by Brennan and Thakor (1990) predicts dividends for small payouts, open market repurchases for intermediate and tender offers for large distributions. Under the

assumption of asymmetric information between shareholders and better informed management and adverse selection costs of share repurchases, the model by Lucas and McDonald (1998) predicts that small payouts are made through dividends and large payouts through dividends with a repurchase component.

Also in contrast to our model is the work of DeAngelo and DeAngelo (2006), who expand the well known work of Miller and Modigliani (1961). DeAngelo and DeAngelo (2006) argue in the setting of frictionless markets that the irrelevance theorem of Miller and Modigliani (1961) is only a product of the implicit assumption ruling out the retention of free cash flow. If retention is allowed and the NPV of investment policy is fixed, a firm can reduce its value by paying out less than the full present value of free cash flow. Therefore payout policy matters and investment policy is not the sole determinant of the firms' value in frictionless markets. This reasoning presupposes that retained free cash flow may be invested in zero NPV projects, but not distributed in the future.

Closest to our theoretical approach is the work by Isagawa (2002). He shows that for open market repurchases not only informational effects in the announcement date may have an impact on the share price. Given that the market reaction on the announcement is incomplete the payout also has also an impact on the share price at the time of the actual repurchase.

Similar to Isagawa (2002) and in contrast to the previous mentioned asymmetric information theories, we build a model based on market inefficiency resulting from the existence of non-smart investors and (not explicitly modeled) limits of arbitrage. Limits of arbitrage may result from on the lack of perfect substitutes (see Wurgler and Zhuravskaya (2002)) or the risk aversion of potential arbitrageurs (see Shleifer and Vishny (1997) and De Long et al. (1990)). This results in a downward sloping demand for stock<sup>1</sup> and therefore share prices may deviate from their fundamental value.<sup>2</sup>

---

<sup>1</sup> Whether the demand for stock actually slopes downward, is a long-debated issue in Finance. Scholes (1972) identifies the price impact of large block trades and finds some evidence for the price pressure hypothesis which is strongly related to the downward sloping demand curve. Shleifer (1986) also finds broad evidence for a downward sloping demand.

<sup>2</sup> Market inefficiencies due to noise trading are also central in the work of De Long et al. (1990), De Long et al. (1991), Shleifer and Vishny (1990) and Shleifer and Vishny (1997).

In our model non-smart investors buy stock they consider attractive without fully rationally maximizing their wealth subject to the share price and expectations of future values. Due to the existence of non-smart investors and the resulting inefficiency, a share repurchase leads to a price increase<sup>3</sup> and an increase in shareholders' wealth. The same is true for distribution of free cash flow as a dividend. The price per share, adjusted for the dividend, increases and shareholders' wealth also increases, as long as the tax on dividends is not too high. The dividend payment results in a price pressure for the same reasons as the repurchase: the non-smart investment relative to the firm's fundamental value increases if the firm pays out cash. We furthermore show that the price pressure resulting from paying a dividend can be enhanced if the firm offers a dividend reinvestment plan (DRIP).<sup>4</sup>

The general predictions of our model are in line with already documented empirical evidence. Davidson et al. (1996) present evidence for price pressure by observing the price behavior along tender offers. McNally et al. (2006) document a positive price impact of open market repurchase trades. Ogden (1994) reports evidence of a price pressure impact of sole dividends. Blouin and Cloyd (2005) find evidence of price pressure when a DRIP is offered by closed end funds. Furthermore Ogden (1994) reports that the positive price impact of dividends is substantially higher when a DRIP is offered. An empirical study comparing the price pressure effects of alternative modes of distributing free cash flow on prices and shareholder value is – to our knowledge – not yet available.

The paper is organized as follows. Section 2.1 introduces a stock market model. In section 2.2 we use this model to determine the share price and shareholders' wealth when the firm retains free cash flow. In section 2.3 we examine the impact on share price and shareholders' wealth when the firm uses the free cash flow for repurchasing its own shares. Section 2.4 provides an analysis of share price and

---

<sup>3</sup> This has been already suggested by Shleifer (1986).

<sup>4</sup> DRIPs are widely available to shareholders in the US. About 29 of the 30 firms listed in the Dow Jones Industrial Average Index in 2006 offered DRIPs to their shareholders. In Europe, on the other hand, only 2 of the 50 firms listed in the EURO STOXX 50 index regularly offer DRIPs to their shareholders. Another 5 firms offer a DRIP only to investors holding American Depositary Receipts (ADRs). Overall, DRIPs are still quite rare for European firms.

shareholders' wealth when the firm pays a dividend. Section 2.5 expands the former analysis to include a dividend payment in combination with a DRIP. Section 3 summarizes and compares the results of the various payout policies. Section 4 offers some concluding remarks and empirical predictions.

## 2 The Firm and the Stock Market

### 2.1 General Assumptions

Assume a firm that has, at present, in  $t = 0$ , a free cash flow of  $FCF$ , net of corporate tax. This free cash flow can either be reinvested internally or distributed via share repurchase or dividend payment. Assume for simplicity that the return on reinvested free cash flow equals the riskless rate, which shall be normalized to zero. Therefore, reinvestment is a zero NPV-Project.

With reinvestment the total expected value of the firm's equity in the future, in  $t = 1$ , is  $E(V_1) + FCF$ , with  $E(V_1)$  as the expected value of the firm, net of reinvestment, and  $FCF$  as the gross return from reinvesting the free cash flow. If the free cash flow is paid out to the shareholders, only  $E(V_1)$  remains as the expected future value of equity.

Let there be two types of investors in the market. The first type we will call "smart" in the sense that these investors' demand for shares in  $t = 0$  (rationally) depends on the expected future value,  $E(V_1) + FCF$ , and the price  $P_0$ . Thus, the smart investors' reduced demand function in  $t = 0$  is

$$q_s = \frac{E(V_1) + FCF}{P_0}. \quad (1)$$

This is the demand immediately before distribution of the free cash flow, and if the firm retains the cash, since reinvestment is by assumption in zero NPV projects.

The second type of investor is called "non-smart". These investors want to buy shares of the firm because they simply believe in increasing prices. Therefore they

are ready to invest a given sum of money,  $A$ , for any reasonable current price. This leads to their reduced demand function

$$q_{ns} = \frac{A}{P_0}. \quad (2)$$

The main difference between the smart and non-smart investors is that the total investment  $A$  of the non-smart does not depend on fundamentals, at least not in a sophisticated way. Later on we will also assume that the non-smart investors do not change their demand after the firm distributes cash, i.e., they stay passive.

Let the investment  $A$  of the non-smart investors be “small” in the sense of

$$A \leq \frac{\alpha(E(V_1) + FCF)((1 - \alpha)E(V_1) - FCF)}{\alpha E(V_1) + FCF}. \quad (3)$$

The relevance of this assumption will become clear when we consider equilibrium prices. It guarantees reasonable prices.

We omit arbitrageurs as a third type of market participants. It is well known that without limits on arbitrage, share prices would never deviate from their “true value”<sup>5</sup> and hence no price pressure from repurchases or dividends would be observable. We therefore implicitly assume that there are either transaction costs hindering perfect arbitrage, or no close substitutes<sup>6</sup> of the firm’s stock exist. Furthermore, risk aversion of arbitrageurs hinders perfect arbitrage<sup>7</sup>, leading to market imperfections.

Let the number of outstanding shares be normalized to 1. The total mass of investors shall also be 1, of which the smart investors constitute a portion  $\alpha$  and the non-smart the remainder,  $1 - \alpha$ .

---

<sup>5</sup> See Shleifer (2000).

<sup>6</sup> Wurgler and Zhuravskaya (2002) show that the lack of close substitutes may result in a downward sloping demand curve.

<sup>7</sup> See De Long et al. (1990) and De Long et al. (1991).



## 2.2 Market Equilibrium if the Firm Retains the Free Cash Flow

The scenario where the firm retains and reinvests the free cash flow will be used as a reference throughout the analysis to determine the price and wealth effects that will obtain if the firm distributes the free cash flow to its shareholders.

Given the number of shares normalized to 1, the investors' demand from (1) and (2), and the relative importance of smart investors, measured by  $\alpha$ , market clearing requires

$$\begin{aligned} \alpha q_s + (1-\alpha)q_{ns} &= 1 \\ \Leftrightarrow \alpha \frac{E(V_1) + FCF}{P_0} + (1-\alpha) \frac{A}{P_0} &= 1, \end{aligned} \quad (4)$$

so that the market clearing price is

$$P_0 = \alpha [E(V_1) + FCF] + (1-\alpha)A. \quad (5)$$

This is the equilibrium price immediately before any distribution of free cash flow, and it is unchanged in case of retaining the  $FCF$ .

Note that the price in (5) equals the expected future value, including the free cash flow, if all investors are smart, i.e.  $\alpha = 1$ . For  $\alpha < 1$  the current share price is smaller than  $E(V_1) + FCF$ , given the assumption in (3):

$$\begin{aligned} P_0 < E(V_1) + FCF &\Leftrightarrow \alpha [E(V_1) + FCF] + (1-\alpha)A < E(V_1) + FCF \\ &\Leftrightarrow A < E(V_1) + FCF, \end{aligned} \quad (6)$$

since:

$$\begin{aligned} \frac{\alpha (E(V_1) + FCF) ((1-\alpha)E(V_1) - FCF)}{\alpha E(V_1) + FCF} &< E(V_1) + FCF \\ \Leftrightarrow -\alpha^2 E(V_1) - (1-\alpha)FCF &< 0. \end{aligned} \quad (7)$$

So, by assumption, for  $\alpha < 1$  the price is less than the expected value  $E(V_1) + FCF$ . Only if all investors were smart,  $\alpha = 1$ , the share price would equal the sum of expected value and free cash flow, which we may interpret as the firm's fundamental value. If not all investors are smart, i.e.  $\alpha < 1$ , the firm is undervalued, given assumption (3).

We introduced this assumption since, for a price exceeding expected value  $E(V_1) + FCF$ , the smart investors' expected return would be negative. That would make a positive demand from smart investors unreasonable. Therefore assumption (3) ensures that smart investors always remain in the market.<sup>8</sup>

The reason for the undervaluation in our model is that there are not enough smart investors to drive the price up to the fundamental value. In a more elaborate model this could be explained with the risk premium in share price demanded by smart investors, which depends on the degree of risk sharing and hence the number of (smart) investors.<sup>9</sup>

Given the price property in (6) we furthermore find that this price  $P_0$  from (5) is positively related to the parameter  $\alpha$ . We may therefore consider  $\alpha$  as a measure of undervaluation resulting from the existence of non-smart investors, or simply of market inefficiency.

As we will see in the next section the inefficiency and undervaluation of the firm's stock is affected when the free cash flow is distributed via a open market repurchase. Our reasoning is in line with the fact, that undervaluation seems to be the main motive for repurchasing share in the real world.<sup>10</sup>

## 2.3 Share Repurchases

### 2.3.1 Demand and Supply

We now consider the equilibrium share price and the firm's market value after distributing the free cash flow in  $t = 0$  via a repurchase of shares on the open market. To payout the free cash flow, the firm has to buy back shares in a quantity of

---

<sup>8</sup> A more general approach would be to assume smart investors with heterogeneous expectations so that, as they drop out of the market one by one, the price rises above the individual expectation of future value.

<sup>9</sup> See Wilson (1968).

<sup>10</sup> Empirical evidence for undervaluation as a motive for share repurchases is given in Baker et al. (1981); Baker et al. (2003) and Brav et al. (2005).

$$q_f^{exR} = \frac{FCF}{P_0^{exR}}, \quad (8)$$

with  $P_0^{exR}$  as the equilibrium price when the firm is in the market to repurchase own shares.

As a result of this repurchase the (smart and non-smart) investors face a reduced supply of shares, which is

$$(1 - q_f^{exR}) = 1 - \frac{FCF}{P_0^{exR}}. \quad (9)$$

The smart investors' demand no longer depends on the free cash flow. In result of the payout it is:

$$q_s^{exR} = \frac{E(V_1)}{P_0^{exR}}. \quad (10)$$

For the non-smart investors we assume that they stay passive if the firm pays out free cash flow. That is, they do not sell or buy shares, so that the number of shares held by non-smart investors after repurchase,  $q_{ns}^{exR}$ , is the same as before:

$$q_{ns} = q_{ns}^{exR}. \quad (11)$$

This assumed passivity may be seen as a further indication of non-smartness. But it may also be rational if the “non-smart” investors are very optimistic about future share price but have only a limited budget of  $A$  to invest.

### 2.3.2 Market Equilibrium with Repurchase

Given the shareholders' demand from (10) and (11) (with (2)), and the reduced supply of shares from (9), market clearing requires

$$\begin{aligned} \alpha q_s^{exR} + (1 - \alpha) q_{ns}^{exR} &= 1 - q_f^{exR} \\ \Leftrightarrow \alpha \frac{E(V_1)}{P_0^{exR}} + (1 - \alpha) \frac{A}{P_0} &= 1 - \frac{FCF}{P_0^{exR}} \\ \Leftrightarrow \alpha E(V_1) + FCF &= P_0^{exR} \left( 1 - \frac{(1 - \alpha)A}{P_0} \right), \end{aligned} \quad (12)$$

so that the market clearing price immediately after the repurchase is

$$P_0^{exR} = \alpha E(V_1) + FCF + (1-\alpha)A \frac{\alpha E(V_1) + FCF}{\alpha(E(V_1) + FCF)}. \quad (13)$$

Again, the assumption given in (3) implies that this price does not exceed the expected value  $E(V_1)$ :

$$P_0^{exR} < E(V_1) \Leftrightarrow A \leq \frac{\alpha(E(V_1) + FCF)((1-\alpha)E(V_1) - FCF)}{\alpha E(V_1) + FCF}. \quad (14)$$

The firm's stock is therefore still undervalued.

The firms' market value after the share repurchase,  $MV_0^{exR}$ , is the price  $P_0^{exR}$  times the reduced number of shares:

$$\begin{aligned} MV_0^{exR} &= P_0^{exR} \left( 1 - \frac{FCF}{P_0^{exR}} \right) = P_0^{exR} - FCF \\ &= \alpha E(V_1) + (1-\alpha)A \frac{\alpha E(V_1) + FCF}{\alpha(E(V_1) + FCF)}. \end{aligned} \quad (15)$$

Comparing our previous results, we observe that buying back shares at the open market would not alter the price of the remaining shares if the market were efficient (i.e.  $\alpha = 1$ ). But, for our inefficient market with non-smart investors the repurchase leads to a price pressure. The price per share after the repurchase,  $P_0^{exR}$  from (13), exceeds the price in case of retention of free cash flow,  $P_0$  from (5), if

$$\begin{aligned} P_0^{exR} > P_0 &\Leftrightarrow (1-\alpha) \left[ \alpha(E(V_1) + FCF) + (1-\alpha)A \right] > 0 \\ &\Leftrightarrow 1 > \alpha. \end{aligned} \quad (16)$$

This condition holds as long as some of the investors are non-smart.

In our model the positive price impact of repurchasing shares at market value does not result from signaling or any other factor based on informational asymmetries. It is the price pressure due to the fact that the investment of the non-smart,  $A$ , is increased, relative to the firm's fundamental value, by the distribution of the free

cash flow. Therefore, the effect of the share repurchase on the share price depends on the degree of market inefficiency  $(1-\alpha)$ .<sup>11</sup>

### 2.3.3 Shareholders' Wealth

#### 2.3.3.1 The Smart Investors' Wealth

Smart investors' wealth in  $t=0$  in case of retaining free cash flow can be calculated by multiplying the demanded quantity with the market price:

$$W_s = \alpha q_s P_0 = \alpha (E(V_1) + FCF). \quad (17)$$

Repurchasing shares to payout free cash flow leads to decreasing demand from smart investors: Referring to (1), (10), (5), and (13) we find

$$\begin{aligned} q_s > q_s^{exR} &\Leftrightarrow \frac{E(V_1) + FCF}{P_0} > \frac{E(V_1)}{P_0^{exR}} \\ &\Leftrightarrow P_0 > 0. \end{aligned} \quad (18)$$

$q_s > q_s^{exR}$  is of course obvious from the fact that non-smart investors, by assumption, do not change their holdings, and the number of outstanding shares decreases when the firm buys back, so that the equilibrium demand of the smart investors must fall.

But the price per share increases (see (16)) so that the smart investors realize a capital gain of  $(q_s - q_s^{exR})(P_0^{exR} - P_0)$  on the shares sold. We assume that this (additional) capital gain is taxed at a tax rate of  $\tau^{CG} \geq 0$ .

The smart investors' wealth in case of repurchase is therefore the sum of the

- value of shares held in stock subsequent to the repurchase, and
- revenues realized by selling shares, net of capital gains taxes.

Formally:

---

<sup>11</sup> This result is strongly supported by the empirical findings of Haggard and Pereira (2005), who report that the price pressure effect is negatively related to institutional ownership, which can be interpreted in our model as the market share of smart investors.

$$\begin{aligned}
W_s^{exR} &= \alpha \left[ q_s^{exR} P_0^{exR} + (q_s - q_s^{exR}) P_0^{exR} - \tau^{CG} (q_s - q_s^{exR}) (P_0^{exR} - P_0) \right] \\
&= \alpha \left[ q_s P_0^{exR} - \tau^{CG} (q_s - q_s^{exR}) (P_0^{exR} - P_0) \right] \\
&= \alpha E(V_1) + FCF - \tau^{CG} (1 - \alpha) \frac{FCF^2}{\alpha E(V_1) + FCF}.
\end{aligned} \tag{19}$$

The smart investors gain from the repurchase if their wealth, given in (19), exceeds the wealth in case of retention of free cash flow, i.e. the wealth in (17):

$$\begin{aligned}
W_s^{exR} > W_s &\Leftrightarrow (1 - \alpha) > \tau^{CG} (1 - \alpha) \frac{FCF}{\alpha E(V_1) + FCF} \\
&\Leftrightarrow \frac{(1 - \alpha) (\alpha E(V_1) + FCF)}{(1 - \alpha) FCF} > \tau^{CG}.
\end{aligned} \tag{20}$$

Condition (20) holds for all  $\tau^{CG} < 1$ , since for  $\alpha < 1$  the term on the left-hand side in the last line exceeds 1.

The reason for the increase in the smart investors' wealth is of course the increase in the share price (see (16)). This leads to a higher value of the retained shares and a gain from selling some shares, which is positive even after tax. Thus, the smart investors definitely gain from repurchasing shares even though the firm could invest in zero NPV projects.

### 2.3.3.2 The Non-Smart Investors' Wealth

The non-smart investors' wealth in case of retention of free cash flow is just the value of their stock

$$W_{ns} = (1 - \alpha) q_{ns} P_0 = (1 - \alpha) A. \tag{21}$$

Repurchasing shares to payout free cash flow does not – by assumption – change the non-smart investors' holdings. Since the repurchase leads to an increase in share price, the non-smart investors' wealth obviously increases, too. Their wealth after the repurchase is

$$\begin{aligned}
W_{ns}^{exR} &= (1 - \alpha)q_{ns}P_0^{exR} = (1 - \alpha)A \frac{P_0^{exR}}{P_0} \\
&= (1 - \alpha)A \frac{\alpha E(V_1) + FCF}{\alpha(E(V_1) + FCF)}.
\end{aligned} \tag{22}$$

From the first line in (22) it is easy to see that  $W_{ns}^{exR} > W_{ns}$  iff  $P_0^{exR} > P_0$ , which is guaranteed for  $\alpha < 1$ , see (16). Therefore, non-smart investors are better off if the firm repurchases shares instead of retaining free cash flow.

Summing up the results for the shareholders' wealth we see that both types of investors benefit from the repurchase. Even though, by assumption, the firm could reinvest its free cash flow in zero NPV projects, and we have no informational asymmetries etc., the payout policy is not irrelevant. The positive price impact of the repurchase, with its positive impact on shareholders' wealth, results from the variation in market inefficiency. If the firm is undervalued before the repurchase, buying back shares leads to a decrease in the undervaluation per share. This, in turn, is due to the relative increase in the non-smart investors' investment in the firm.<sup>12</sup>

## 2.4 Dividends

### 2.4.1 Demand and Supply

We have seen that repurchasing shares may result in an increase of the share price (price pressure), and thus benefits investors. Next, we consider whether dividends, as a more traditional mode of paying out cash flow, result in a similar advantage for shareholders. First, this will be done under the assumption that non-smart investors are passive in the same respect as in our analysis of repurchases: they simply do not readjust their holdings. In Section 2.5, we will consider the participation of non-smart investors in a DRIP.

---

<sup>12</sup> If the firm is overvalued before the repurchase (which makes a violation of the assumption in (3) necessary), repurchasing further increases the overvaluation per share. Again, the reason lies in the increasing investment of the non-smart investors relative to the firm's fundamental value.

If non-smart investors do not readjust their holdings of shares when a dividend is paid, their holding is given by the demand, which has already been determined in (2):

$$q_{ns}^{exD} = q_{ns} = \frac{A}{P_0}. \quad (23)$$

The smart investors' demand after paying out the free cash flow through a dividend instead depends on the expected future value and the price per share:

$$q_s^{exD} = \frac{E(V_1)}{P_0^{exD}} \quad (24)$$

with  $P_0^{exD}$  for the price per share ex dividend.

Since paying out dividends does not reduce the number of shares, the supply stays constant, i.e., it is 1 as in the case of retaining the free cash flow.

#### 2.4.2 Market Equilibrium with Dividend

Paying out a dividend does not alter the number of shares. Hence, the market clearing condition is

$$\alpha q_s^{exD} + (1 - \alpha) q_{ns} = 1 \Leftrightarrow \alpha \frac{E(V_1)}{P_0^{exD}} + (1 - \alpha) \frac{A}{P_0} = 1. \quad (25)$$

Solving for the share price  $P_0^{exD}$  gives:

$$\begin{aligned} P_0^{exD} &= \frac{\alpha E(V_1)}{\alpha(E(V_1) + FCF)} P_0 \\ &= \frac{\alpha E(V_1) [\alpha(E(V_1) + FCF) + (1 - \alpha)A]}{\alpha(E(V_1) + FCF)}. \end{aligned} \quad (26)$$

This price obviously falls short of the price cum dividend  $P_0$  (see (5)) for any  $FCF > 0$ . But the difference between the share prices is less than the amount of



free cash flow, i.e. the dividend discount is less than the dividend for all  $\alpha < 1$ :<sup>13</sup>

$$P_0^{exD} > P_0 - FCF \Leftrightarrow (1-\alpha)(E(V_1) + FCF) > (1-\alpha)A. \quad (27)$$

From (6) we have learned that condition (27) will hold as long as  $\alpha < 1$  is guaranteed. Therefore, given the existence of non-smart investors, the adjusted share price is increased by paying a dividend. The reason is the same as for the increase after repurchase: the non-smart investment increases relative to the firm's fundamental value after the dividend payment.

Comparing the adjusted price after paying a dividend,  $P_0^{exD} + FCF$ , with the price after repurchasing shares,  $P_0^{exR}$  from (13), shows that a repurchase results in a higher price pressure:

$$P_0^{exR} > P_0^{exD} + FCF \Leftrightarrow (1-\alpha)A \frac{FCF}{\alpha(E(V_1) + FCF)} > 0. \quad (28)$$

### 2.4.3 Shareholders' Wealth

#### 2.4.3.1 The Smart Investors' Wealth

In equilibrium the smart investors do not adjust their holdings after payment of the dividend. Their demand remains unchanged at the level of  $q_s^{exD} = q_s$ , since the non-smart investors by assumption do not change their holdings and the total number of outstanding shares is not affected by paying dividends. We can also prove this formally:

$$\begin{aligned} q_s = q_s^{exD} &\Leftrightarrow \frac{(E(V_1) + FCF)}{P_0} = \frac{E(V_1)}{P_0^{exD}} \\ &\Leftrightarrow \frac{\alpha E(V_1)}{(E(V_1) + FCF)} P_0 = P_0 \frac{\alpha E(V_1)}{(E(V_1) + FCF)}. \end{aligned} \quad (29)$$

---

<sup>13</sup> A discount less than the dividend per share could also result from a wealth transfer from debt holders to shareholders. See e.g. French et al. (2005) for a simple model of this "bondholder expropriation" (Vermaelen (1981)).

Since in equilibrium no investor sells shares (and the share price drops) no capital gains tax is due. Instead, shareholders have to pay tax on the dividend at a rate of  $\tau^{Div} \geq 0$ .

In the case that free cash flow is paid out as a dividend, the smart investors' wealth will thus be:

- the value of shares held in stock subsequent to the dividend payment, plus
- the after-tax dividend received.

Formally:

$$\begin{aligned} W_s^{exD} &= \alpha q_s [P_0^{exD} + (1 - \tau^{Div})FCF] \\ &= \alpha E(V_1) + \alpha q_s (1 - \tau^{Div})FCF. \end{aligned} \quad (30)$$

Comparing this with the wealth in the case of retention of free cash flow,  $W_s$  from (17), leads to

$$\begin{aligned} W_s^{exD} > W_s &\Leftrightarrow \alpha q_s [P_0^{exD} + (1 - \tau^{Div})FCF] > \alpha q_s P_0 \\ &\Leftrightarrow (1 - \alpha) \left( 1 - \frac{A}{E(V_1) + FCF} \right) > \tau^{Div}. \end{aligned} \quad (31)$$

Therefore, smart investors are not guaranteed a gain. Their wealth increases only if the tax rate on dividends is low. For an increase in wealth, the tax rate must fall short of the market inefficiency,  $(1 - \alpha)$ , times the "degree of undervaluation",

$$1 - \frac{A}{E(V_1) + FCF} > 0, \text{ before the dividend payment.}$$

Compared to repurchasing shares, there may or may not be a loss for smart investors when the firm pays a dividend. The repurchase is preferred to the dividend if:

$$\begin{aligned} W_s^{exR} > W_s^{exD} &\Leftrightarrow \\ \tau^{Div} \frac{\alpha (E(V_1) + FCF)}{\alpha (E(V_1) + FCF) + (1 - \alpha)A} & \\ > \tau^{CG} \frac{(1 - \alpha)FCF}{\alpha E(V_1) + FCF} - \frac{(1 - \alpha)A}{\alpha (E(V_1) + FCF) + (1 - \alpha)A}. \end{aligned} \quad (32)$$

Not surprisingly, this condition holds if the tax rate on capital gains is low compared to the tax rate on dividends. Then repurchasing shares benefits smart

investors more than paying dividends. Particularly, if  $\tau^{Div} \geq \tau^{CG} = 0$ , i.e. the tax on capital gains is zero, condition (32) holds.

But even if the tax rate on capital gains is at least as high as the tax rate on dividends,  $\tau^{CG} \geq \tau^{Div}$ , condition (32) may hold. Therefore, repurchasing shares may be preferable to paying a dividend even if there is a tax advantage for dividends.<sup>14</sup>

#### 2.4.3.2 The Non-Smart Investors' Wealth

By assumption, the non-smart investors do not adjust their holdings of shares, so that their wealth after a dividend payment will be

$$\begin{aligned} W_{ns}^{exD} &= (1-\alpha)q_{ns} \left[ P_0^{exD} + (1-\tau^{Div})FCF \right] \\ &= (1-\alpha)A \left( \frac{\alpha E(V_1)}{\alpha(E(V_1) + FCF)} + \frac{(1-\tau^{Div})FCF}{\alpha(E(V_1) + FCF) + (1-\alpha)A} \right). \end{aligned} \quad (33)$$

We therefore find that non-smart investors may or may not gain from the paying out of a dividend relative to retention of free cash flow:

$$\begin{aligned} W_{ns}^{exD} > W_{ns} &\Leftrightarrow (1-\alpha)q_{ns} \left[ P_0^{exD} + (1-\tau^{Div})FCF \right] > (1-\alpha)q_{ns}P_0 \\ &\Leftrightarrow (1-\alpha) \left( 1 - \frac{A}{E(V_1) + FCF} \right) > \tau^{Div}. \end{aligned} \quad (34)$$

Therefore non-smart investor's wealth increases only if the tax on dividends is sufficiently low. The condition (34), which implies a preference for a dividend payment instead of retaining free cash flow, is the same as for smart investors (see (31)).

Comparing dividends with the repurchase of shares yields clear-cut results. The repurchase always leads to increased wealth for the non-smart investors:

---

<sup>14</sup> For an imputation tax system there might be a preference for dividends, as identified for the United Kingdom by Rau and Vermaelen (2002). Specifically, they report: "Unlike in the United States, pension funds have had a clear tax preference for dividend payments, at least until the U.K. government abolished the imputation system in July 1997."

$$\begin{aligned}
W_{ns}^{exR} > W_{ns}^{exD} &\Leftrightarrow (1-\alpha)q_{ns}P_0^{exR} > (1-\alpha)q_{ns}\left[P_0^{exD} + (1-\tau^{Div})FCF\right] \\
&\Leftrightarrow \tau^{Div} > -\frac{(1-\alpha)A}{\alpha(E(V_1) + FCF)}.
\end{aligned} \tag{35}$$

Since the right-hand side in the last line of (35) is negative, this condition holds for all  $\tau^{Div} \geq 0$ . One reason for this result is that non-smart investors do not pay taxes in the case of a share repurchase. The other reason is that repurchases result in a higher price pressure (see (28)).

## 2.5 Dividend with Dividend Reinvestment Plan (DRIP)

### 2.5.1 Integrating a Dividend Reinvestment Plan (DRIP) into the Model

We have seen that distributing free cash flow as a dividend results in an increase of the adjusted share price and may also result in an increase of shareholders' wealth relative to the retention of free cash flow. But the increase in wealth obtains only if the tax rate on dividends is "low".

Our comparison of the payment of dividends with the repurchase of shares has shown that the latter is definitely preferable for non-smart investors and probably also for smart investors. Nevertheless, a firm may want to pay dividends for reasons outside the scope of our model.<sup>15</sup> We will therefore consider how the already identified price pressure of dividend payments can be boosted to the benefit of the firm's shareholders. We will show that this can be achieved with a dividend reinvestment plan (DRIP).

A dividend reinvestment plan offers shareholders the opportunity to reinvest net dividends in additional shares of the firm. These shares can be bought on the open market, or they can be newly issued by the firm. We will examine the former case; the latter alternative has been already analyzed for example by Bernheim (1991), Bierman (1997) or Peterson et al. (1987).

---

<sup>15</sup> Indeed, the interview study of Brav et al. (2005) and the empirical findings of Grullon and Michaely (2002) indicate that share repurchases are growing in importance, but also show that dividend payments continue to be important.

The demand of the smart investors after the paying out of dividends does not depend on the existence of a DRIP. The functional form of their share demand is structurally the same as in (24):

$$q_s^{exDRIP} = \frac{E(V_1)}{P_0^{exDRIP}}. \quad (36)$$

For the non-smart investors we assume instead that they will participate in the DRIP and reinvest their net dividend. They extend their primary holding of  $q_{ns}$  by the number of shares to be bought with their net dividend. In sum, the demand of the non-smart investors will therefore be

$$q_{ns}^{exDRIP} = q_{ns} \left( 1 + \frac{(1 - \tau^{Div}) FCF}{P_0^{exDRIP}} \right). \quad (37)$$

This increase in the non-smart investors' demand implies that they do not explicitly optimize over their investments, but simply reinvest their net dividend, perhaps out of convenience. Or they actually anticipate a substantially higher future share price and are budget constrained, so that the dividend augments their total investment budget to be invested rationally in the firm. This liquidity effect of distributed dividends has already been considered by Ogden (1990), who identifies price pressure caused by dividend reinvestment as one explanation for excess returns in the course of so-called calendar or monthly effects on stock prices.

The assumption that all non-smart investors participate in the DRIP and use all their net dividend to buy additional shares is admittedly extreme. We use this assumption to solve for the upper bound of the price pressure and wealth effects of dividends. The lower bound is what we analyzed in section 2.4 with regard to a dividend payment without DRIP.

### 2.5.2 Market Equilibrium with DRIP

Since we are considering a DRIP with shares to be bought on the open market, the total number of outstanding shares is not affected. Hence, the market clearing condition is

$$\begin{aligned} \alpha q_s^{exDRIP} + (1-\alpha)q_{ns}^{exDRIP} &= 1 \\ \Leftrightarrow \alpha \frac{E(V_1)}{P_0^{exDRIP}} + (1-\alpha) \frac{A}{P_0} \left( 1 + \frac{(1-\tau^{Div})FCF}{P_0^{exDRIP}} \right) &= 1. \end{aligned} \quad (38)$$

Solving for the market clearing price gives

$$\Leftrightarrow P_0^{exDRIP} = \alpha E(V_1) + (1-\alpha)A \frac{\alpha E(V_1) + (1-\tau^{Div})FCF}{\alpha(E(V_1) + FCF)}. \quad (39)$$

This price exceeds the ex dividend price from (26), where we considered the case without a DRIP:

$$\begin{aligned} P_0^{exDRIP} &> P_0^{exD} \\ \Leftrightarrow \alpha E(V_1) + (1-\alpha)A \frac{\alpha E(V_1) + (1-\tau^{Div})FCF}{\alpha(E(V_1) + FCF)} & > \frac{\alpha E(V_1) [\alpha(E(V_1) + FCF) + (1-\alpha)A]}{\alpha(E(V_1) + FCF)} \\ \Leftrightarrow (1-\alpha)A(1-\tau^{Div})FCF &> 0. \end{aligned} \quad (40)$$

Condition (40) holds for all  $\alpha < 1$  and  $\tau^{Div} < 1$ . The price pressure is thus higher if a DRIP is used,<sup>16</sup> because it results in a higher demand (both relatively and absolutely) from the non-smart investors. Therefore, the undervaluation per share is further diminished.

However, comparing the price from (39) with the share price after a repurchase (see (13)) shows that even the DRIP does not result in a higher share price than the repurchase:

$$P_0^{exDRIP} < P_0^{exR} \Leftrightarrow -\tau^{Div}(1-\alpha)A < \alpha(E(V_1) + FCF). \quad (41)$$

The left-hand side in (41) is never positive, so that this condition holds for all  $\alpha > 0$ .

---

<sup>16</sup> Blouin and Cloyd (2005) document such a price pressure from dividend reinvestment activity for closed-end funds.

## 2.5.3 Shareholders' Wealth

### 2.5.3.1 The Smart Investors' Wealth

The smart investors' wealth immediately after dividend and implementation of the DRIP is the sum of their shares in the firm's market value plus net dividend plus the proceeds from selling  $q_s - q_s^{exDRIP}$  shares:

$$\begin{aligned}
 W_s^{exDRIP} &= \alpha \left[ q_s^{exDRIP} P_0^{exDRIP} + (q_s - q_s^{exDRIP}) P_0^{exDRIP} + q_s (1 - \tau^{Div}) FCF \right] \\
 &= \alpha q_s \left[ P_0^{exDRIP} + (1 - \tau^{Div}) FCF \right] \\
 &= \alpha (E(V_1) + FCF) \frac{P_0^{exDRIP}}{P_0} + \alpha (E(V_1) + FCF) \frac{(1 - \tau^{Div}) FCF}{P_0} \\
 &= \alpha E(V_1) + (1 - \tau^{Div}) FCF.
 \end{aligned} \tag{42}$$

This wealth exceeds the smart investors' wealth in the case of retention of free cash flow (see (17)) if

$$\begin{aligned}
 W_s^{exDRIP} > W_s &\Leftrightarrow \alpha q_s \left[ P_0^{exDRIP} + (1 - \tau^{Div}) FCF \right] > \alpha q_s P_0 \\
 &\Leftrightarrow (1 - \alpha) > \tau^{Div}.
 \end{aligned} \tag{43}$$

This means that the smart investors gain in relation to the scenario where the firm retains the free cash flow, if the tax on dividends is low. Only if all investors were smart, i.e.  $\alpha = 1$ , is paying a dividend definitely less advantageous than retaining free cash flow for all positive tax rates, since in that case paying a dividend results in no price pressure at all.

Condition (43) is less restrictive than (31) for the wealth increase of smart investors in the case of dividend payment without DRIP. The reason is that with DRIP the price pressure is more intense than without.<sup>17</sup> Therefore the smart investors' wealth is greater if a DRIP is used than in the case of dividend only:

$$\begin{aligned}
 W_s^{exDRIP} > W_s^{exD} &\Leftrightarrow \alpha q_s \left[ P_0^{exDRIP} + (1 - \tau^{Div}) FCF \right] > \alpha q_s \left[ P_0^{exD} + (1 - \tau^{Div}) FCF \right] \\
 &\Leftrightarrow P_0^{exDRIP} > P_0^{exD}.
 \end{aligned} \tag{44}$$

---

<sup>17</sup> This prediction of our model is supported by the empirical findings of Ogden (1994), who discovers a positive relation between dividend payments and excess returns and moreover a substantially greater excess return for firms that use DRIPs.

The proof of  $P_0^{exDRIP} > P_0^{exD}$  is already given in (40).

A comparison of the smart investors' wealth after the dividend payment with DRIP versus the wealth after repurchase (see (19)) yields no unambiguous result. Smart investors prefer the repurchase if the tax on capital gains is small compared to the tax on dividends:

$$W_s^{exDRIP} < W_s^{exR} \Leftrightarrow \tau^{CG} \frac{(1-\alpha)FCF}{\alpha E(V_1) + FCF} < \tau^{Div}. \quad (45)$$

Since  $\frac{(1-\alpha)FCF}{\alpha E(V_1) + FCF} < 1$ , smart investors definitely prefer the repurchase if the

tax on capital gains does not exceed the tax on dividends,  $\tau^{CG} \leq \tau^{Div}$ . Furthermore, they prefer the repurchase if the capital gains tax exceeds the tax on dividends but is sufficiently small so that (45) remains valid. If both tax rates were zero, repurchasing shares and the DRIP would lead to the same wealth for smart investors.

### 2.5.3.2 The Non-Smart Investors' Wealth

Non-smart investors' wealth in the case of paying dividends and reinvesting the net proceeds via DRIP is

$$\begin{aligned} W_{ns}^{exDRIP} &= (1-\alpha)q_{ns} \left( 1 + \frac{(1-\tau^{Div})FCF}{P_0^{exDRIP}} \right) P_0^{exDRIP} \\ &= (1-\alpha)A \left( \frac{\alpha E(V_1) + (1-\tau)FCF}{\alpha (E(V_1) + FCF)} \right). \end{aligned} \quad (46)$$

This wealth exceeds their wealth in the case of retention of free cash flow under exactly the same condition as for the smart investors (see (43)):

$$\begin{aligned} W_{ns}^{exDRIP} > W_{ns} &\Leftrightarrow (1-\alpha)A \left( \frac{\alpha E(V_1) + (1-\tau^{Div})FCF}{\alpha (E(V_1) + FCF)} \right) > (1-\alpha)A \\ &\Leftrightarrow (1-\alpha) > \tau^{Div}. \end{aligned} \quad (47)$$



Therefore, given a relatively low tax rate on dividends, both types of investors gain. Unanimity with respect to dividends versus retention of free cash flow was already found in the case without DRIP (see (31) and (34)).

The same holds when comparing wealth for dividends with and without DRIP. Non-smart investors gain from implementing a DRIP since

$$\begin{aligned}
W_{ns}^{exDRIP} &> W_{ns}^{exD} \\
\Leftrightarrow (1-\alpha)q_{ns} \left[ P_0^{exDRIP} + (1-\tau^{Div})FCF \right] &> (1-\alpha)q_{ns} \left[ P_0^{exD} + (1-\tau^{Div})FCF \right] \quad (48) \\
\Leftrightarrow P_0^{exDRIP} &> P_0^{exD}
\end{aligned}$$

which is the same condition as for smart investors (see (44)).

But, although non-smart investors profit from the implementation of a DRIP, their wealth will always be higher if the firm repurchases shares, as long as the tax on dividends is positive:

$$\begin{aligned}
W_{ns}^{exDRIP} &< W_{ns}^{exR} \\
\Leftrightarrow (1-\alpha)A \left( \frac{\alpha E(V_1) + (1-\tau^{Div})FCF}{\alpha(E(V_1) + FCF)} \right) &< (1-\alpha)A \frac{\alpha E(V_1) + FCF}{\alpha(E(V_1) + FCF)} \quad (49) \\
\Leftrightarrow 0 &< \tau^{Div}.
\end{aligned}$$

### 3 Summary of Results

#### 3.1 Stock Prices

Given the inefficient valuation of a firm's stock caused by the existence of non-smart investors, paying out free cash flow leads to price pressure and results in an increase of shareholders' wealth. We found that the price per share after a repurchase exceeds the price when free cash flow is retained:

$$P_0^{exR} > P_0. \quad (\text{see (16)})$$

Paying out the free cash flow as a dividend results in a dividend discount, i.e.  $P_0^{exD} < P_0$ , but this discount is less than the dividend per share. Hence the price adjusted for dividend payment also exceeds the price in the case of retention of free cash flow:

$$P_0^{exD} + FCF > P_0. \quad (\text{see (27)})$$

If non-smart investors reinvest their dividends (via DRIP) the price pressure is even higher, leading to:

$$P_0^{exDRIP} > P_0^{exD}. \quad (\text{see (40)})$$

But even this price never exceeds the price after repurchase:

$$P_0^{exR} > P_0^{exDRIP}. \quad (\text{see (41)})$$

Summing up, we find

$$P_0^{exR} > P_0^{exDRIP} > P_0^{exD}. \quad (50)$$

Hence, if the firm wants to maximize its share price, it should use its free cash flow to repurchase shares.

Comparing the dividend-adjusted prices shows the same ranking:

$$P_0^{exR} > P_0^{exDRIP} + FCF > P_0^{exD} + FCF \quad (51)$$

since

$$\begin{aligned} P_0^{exR} &> P_0^{exDRIP} + FCF \\ \Leftrightarrow \alpha E(V_1) + FCF + (1-\alpha)A \frac{\alpha E(V_1) + FCF}{\alpha(E(V_1) + FCF)} \\ &> \alpha E(V_1) + (1-\alpha)A \frac{\alpha E(V_1) + (1-\tau^{Div})FCF}{\alpha(E(V_1) + FCF)} + FCF \\ \Leftrightarrow 0 &< \tau^{Div} \end{aligned} \quad (52)$$

and

$$P_0^{exDRIP} + FCF > P_0^{exD} + FCF,$$

which is obvious from  $P_0^{exR} > P_0^{exDRIP}$  (see (41)). Hence, considering the mere price effect the firm should start a repurchase program.

### 3.2 Shareholders' Wealth

The wealth effect of paying out free cash flow via repurchase is positive for smart investors

$$W_s^{exR} > W_s \quad (\text{see (20)})$$

and also non-smart investors

$$W_{ns}^{exR} > W_{ns} \quad (\text{see (22)})$$

In the case of dividend payment, smart investors are not guaranteed a gain. Only if the tax on dividends is sufficiently small does their resulting wealth exceed the wealth in the case of retention of free cash flow (see (31)). The same is true for non-smart investors (see (34)). Shareholders' wealth does not necessarily increase with DRIP either (see (43) and (47)).

Comparing dividend payment with and without DRIP, we find that a DRIP further increases the wealth of smart and non-smart investors:

$$W_s^{exDRIP} > W_s^{exD} \quad , \quad (\text{see (44)})$$

$$W_{ns}^{exDRIP} > W_{ns}^{exD} \quad . \quad (\text{see (48)})$$

And, at least for  $\tau^{CG} \leq \tau^{Div}$ , the maximum wealth for both investor clienteles is achieved if the firm uses share repurchases to payout free cash flow:

$$W_s^{exR} > W_s^{exDRIP} \quad (\text{see (45)})$$

and

$$W_{ns}^{exR} > W_{ns}^{exDRIP} \quad (\text{see (49)})$$

Therefore, considering the price pressure effect from the existence of non-smart investors who are “passive” and do not explicitly optimize their holdings, the firm should use its free cash flow to buy back its own shares instead of paying dividends. If a dividend is to be paid for reasons outside the scope of our model, shareholders should be offered a DRIP to their own benefit.

## **4 Concluding Remarks and Empirical Predictions**

Traditionally, financial theory attributes the impact of a firm's payout policy on prices and shareholder wealth to informational effects. Repurchase and dividend announcements may convey managements' private information that will be instantaneously incorporated into share prices and influence shareholders' wealth. Given that information is disseminated by announcement, the effective open market share repurchase or dividend payment is of no further impact on share prices (adjusted for dividend) and shareholders' wealth. This is a theoretical view which implicitly assumes efficient markets. But, since there seems to be considerable empirical evidence of market inefficiencies, we believe that informational asymmetries are not the only factor of relevance for a firm's payout policy.

In our model we use a downward sloping demand function and the existence of non-smart investors to generate market inefficiency that leads to an under-valuation of a firm's shares. The results show that in general, payout policy may reduce market inefficiency. This is because share repurchases and dividend payments has a positive impact on share prices and shareholders' wealth, even if dividends and capital gains are taxed. In particular, repurchasing shares will always increase smart and non-smart shareholders' wealth, taxation of capital gains notwithstanding. Dividend payments also positively affect the wealth of both shareholder clienteles when dividend taxation is not excessive. In comparison, our model predicts that all shareholders will prefer share repurchases to dividend payments unless there is a heavy tax disadvantage of share repurchases compared to dividend taxation. These implications are in line with the observable trend in payout policy that shows a growing importance of share repurchases compared to dividends (see for example Grullon and Michaely (2002)).

Furthermore, we integrate a dividend reinvestment plan (DRIP) into the analysis of price pressure from dividend payment. The model predicts that offering a DRIP enhances the positive price and wealth effects for all shareholders compared to dividend payment alone. This finding with regard to share price is consistent with the empirical findings of Ogden (1994) and may be one explanation for the

popularity of DRIPs among firms that are listed in the US capital market. In the US, we can observe a great importance of DRIPs, whereas in the European capital market DRIPs are not very popular yet (see footnote 4).

The main empirical predictions of our model can be summarized as follows:

- If a firm pays out free cash flow by repurchasing shares on the open market or via dividends the share price (adjusted for the dividend) rises and shareholders gain.
- As long as capital gains taxation is not too high relatively to dividend taxation shareholders gain more from a share repurchase instead of a dividend.
- In case of paying a dividend the increase in adjusted share price and shareholder wealth will be enhanced when the firm offers a DRIP.

The finding of a benefit from offering a DRIP when paying a dividend may be seen as the most practical implication of our theoretical model. Firms not yet offering a DRIP should consider the implementation of this instrument to enhance shareholders' wealth.

## References

- Baker, H.K., P.L. Gallagher and K.E. Morgan (1981), 'Managements view of stock repurchase programs', *Journal of Financial Research*, Vol. 4, pp. 233-247.
- Baker, H.K., G.E. Powell and E.T. Veit (2003), 'Why companies use open-market repurchases: A managerial perspective', *The Quarterly Review of Economics and Finance*, Vol. 43, pp. 483-504.
- Bernheim, B.D. (1991), 'Tax policy and the dividend puzzle', *Rand Journal of Economics*, Vol. 22, pp. 455-476.
- Bhattacharya, S. (1979), 'Imperfect Information, Dividend Policy and the 'Bird in the Hand' Fallacy', *Bell Journal of Economics and Management Science*, Vol. 10, pp. 259-270.
- Bierman, H.J. (1997), 'The dividend reinvestment plan puzzle', *Applied Financial Economics*, Vol. 7, pp. 267-271.
- Blouin, J. and C.B. Cloyd (2005), 'Price Pressure from Dividend Reinvestment Activity: Evidence from Closed-End Funds', Working Paper.
- Brav, A., J.R. Graham and C.R. Harvey (2005), 'Payout policy in the 21st century', *Journal of Financial Economics*, Vol. 77, pp. 483-527.
- Brennan, M., J. and A.V. Thakor (1990), 'Shareholder Preferences and Dividend Policy', *Journal of Finance*, Vol. 45, pp. 993-1018.
- Davidson, W.N., I. Chhachhi and J.L. Glascock (1996), 'A Test for Price Pressure Effects in Tender Offer Stock Repurchases', *The Financial Review*, Vol. 31, pp. 25-49.
- De Long, J.B., A. Shleifer, L.H. Summers and R.J. Waldmann (1990), 'Noise Trader Risk in Financial Markets', *Journal of Political Economy*, Vol. 98, pp. 703-738.
- De Long, J.B., A. Shleifer, L.H. Summers and R.J. Waldmann (1991), 'The Survival of Noise Traders in Financial Markets', *Journal of Business*, Vol. 64, pp. 1-19.

- DeAngelo, H. and L. DeAngelo (2006), 'The irrelevance of the MM dividend irrelevance theorem', *Journal of Financial Economics*, Vol. 79, pp. 293-315.
- French, D.W., P.L. Varson and K.P. Moon (2005), 'Capital Structure and the Ex-Dividend Day Return', *The Financial Review*, Vol. 40, pp. 361-379.
- Grullon, G. and R. Michaely (2002), 'Dividends, Share Repurchases, and the Substitution Hypothesis', *Journal of Finance*, Vol. 57, pp. 1649-1684.
- Haggard, K.S. and R. Pereira (2005), 'Price Pressure and the Response to Share Repurchase Announcements', Working Paper.
- Isagawa, N. (2002), 'Open-Market Repurchase Announcements and Stock Price Behavior in Inefficient Markets', *Financial Management*, Vol. 31, pp. 5-20.
- Lucas, D.J. and R.L. McDonald (1998), 'Shareholder Heterogeneity, Adverse Selection, and Payout Policy', *Journal of Financial and Quantitative Analysis*, Vol. 33, pp. 233-253.
- McNally, W.J. (1999), 'Open Market Stock Repurchase Signaling', *Financial Management*, Vol. 28, pp. 55-67.
- McNally, W.J., B.F. Smith and T. Barnes (2006), 'The Price Impacts of Open Market Repurchase Trades', *Journal of Business Finance & Accounting*, Vol. 33, pp. 735-752.
- Miller, M.H. and F. Modigliani (1961), 'Dividend Policy, Growth, and the Valuation of Shares', *Journal of Business*, Vol. 34, pp. 411-433.
- Miller, M.H. and K. Rock (1985), 'Dividend Policy under Asymmetric Information', *Journal of Finance*, Vol. 40, pp. 1031-1051.
- Oded, J. (2005), 'Why Do Firms Announce Open-Market Repurchase Programs?' *Review of Financial Studies*, Vol. 18, pp. 271-300.
- Ofer, A.R. and A.V. Thakor (1987), 'A Theory of Stock Price Responses to Alternative Corporate Cash Disbursement Methods: Stock Repurchases and Dividends', *Journal of Finance*, Vol. 42, pp. 365-394.

- Ogden, J.P. (1990), 'Turn-of-Month Evaluations of Liquid Profits and Stock Returns: A Common Explanation for the Monthly and January Effects', *Journal of Finance*, Vol. 45, pp. 1259-1272.
- Ogden, J.P. (1994), 'A Dividend Payment Effect in Stock Returns', *The Financial Review*, Vol. 29, pp. 345-369.
- Peterson, P.P., D.R. Peterson and N.H. Moore (1987), 'The Adoption of New-Issue Dividend Reinvestment Plans and Shareholder Wealth', *The Financial Review*, Vol. 22, pp. 221-232.
- Rau, P.R. and T. Vermaelen (2002), 'Regulation, Taxes, and Share Repurchases in the United Kingdom', *Journal of Business*, Vol. 75, pp. 245-282.
- Scholes, M.S. (1972), 'The Market for Securities: Substitution Versus Price Pressure and the Effects of Information on Share Prices', *Journal of Business*, Vol. 45, pp. 179-211.
- Shleifer, A. (1986), 'Do Demand Curves for Stocks Slope Down?' *Journal of Finance*, Vol. 41, pp. 579-590.
- Shleifer, A. (2000), 'Inefficient Markets: An Introduction to Behavioral Finance', Oxford University Press.
- Shleifer, A. and R.W. Vishny (1990), 'Equilibrium Short Horizons of Investors and Firms', *American Economic Review Papers and Proceedings*, Vol. 80, pp. 148-153.
- Shleifer, A. and R.W. Vishny (1997), 'The Limits of Arbitrage', *Journal of Finance*, Vol. 52, pp. 35-55.
- Vermaelen, T. (1981), 'Common Stock Repurchases and Market Signaling: An Empirical Study', *Journal of Financial Economics*, Vol. 9, pp. 139-183.
- Wilson, R. (1968), 'The Theory of Syndicates', *Econometrica*, Vol. 36, pp. 119-132.
- Wurgler, J. and E. Zhuravskaya (2002), 'Does Arbitrage Flatten Demand Curves for Stocks?' *Journal of Business*, Vol. 74, pp. 583-608.