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DIVIDEND POLICY MODELS

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This paper surveys dividend policy principles based mostly on irrelevance, tax clientele effects, asymmetric information and agency costs. For each type of model, a brief overview of the papers surveyed and their relation to each other is provided. The most important ones are described in some detail, and their results are summarized and followed by an extended discussion. The goal in this survey is to synthesize the recent literature, summarize its results and relate them to presented empirical evidence. First, we focus on the theory of dividend policy and then discuss the empirical literature as it relates to the theoretical predictions.

DIVIDEND POLICY MODELS

1. Models based on the Irrelevance Theory

1.1. Overview of the theory

Bird in hand principle. Traditionally, it was argued that a firm can influence the price of its shares by changing its dividend policy. The share price could rise as a result of an increase in the firm's payout ratio. Distant dividend payments and capital gains were viewed as riskier than a current dividend increase on the principle that «a bird in the hand is worth two in the bush». Graham and Dodd (1951) have argued that investors bid up the price of common stock with a high dividend payout ratio as compared to other stocks with a lower payout ratio.

Miller and Modigliani principle. The modern theory of dividend policy started with Miller and Modigliani's *Dividend policy, growth, and the valuation of shares*, published in 1961. In this paper they laid the foundations, showing under what conditions dividend policy is irrelevant.

Their basic assumptions are related to market imperfections: transaction costs, irrational behavior and lack of perfect certainty. The derivation of a valuation formula was their first starting point. The valuation of shares is governed by a fundamental principle: the market-required rate of return for firms in the same risk class must be the same, otherwise there would be a risk-free arbitrage opportunity. Therefore, the rate of return is independent of the firm and can be described as:

$$(1.1) \quad \rho_{(t)} = \frac{d_j(t) + p_j(t+1) - p_j(t)}{p_j(t)}$$

where:

$\rho(t)$ – the market-required rate of return during the time period t ;

$d_j(t)$ – dividend per share paid by firm j during period t ;

$p_j(t)$ – the price (ex any dividend in $t-1$) of a share in firm j at the start of period t ;

Rearranging (1.1) leads to:

$$(1.2) \quad p_j(t) = \frac{1}{1 + \rho(t)} [d_j(t) + p_j(t+1)]$$

If the numerator and denominator of (1.2) are multiplied by the current number of shares outstanding, then the problem is restated in terms of the firm as a whole. After dropping the subscript j we obtain:

$$(1.3) \quad V(t) = \frac{1}{1 + \rho(t)} [D(t) + n(t)p(t+1)]$$

where:

$n(t)$ – the number of shares of record at the start of t ;

$V(t)$ – the total value of the enterprise equal to $n(t)p(t)$;

$D(t)$ – the total dividends paid during t to holders of record at the start of t equal to $n(t)d(t)$.

Allowing for the issue of new capital by the firm leads to:

$$(1.4) \quad V(t) = \frac{1}{1 + \rho(t)} [D(t) + V(t+1) - m(t+1)p(t+1)]$$

where:

$m(t+1)$ – the number of new shares sold during t at the ex dividend closing price $p(t+1)$.

The total number of new shares at the end of the period is equal to the sum of old and new ones:

$$(1.5) \quad n(t+1) = n(t) + m(t+1)$$

Because it is assumed that dividend decisions do not affect investment decisions, all positive NPV projects are taken, and thus sources and uses of funds must be equal. Therefore, the amount of outside capital required will be:

$$(1.6) \quad m(t+1)p(t+1) = I(t) - [X(t) - D(t)]$$

where:

- $I(t)$ – the given level of the firm’s investment or increase in its holding of physical assets in time t ;
- $X(t)$ – the firm’s total net profit for the period t .

When the expression (1.6) is substituted into (1.4) then

$$(1.7) \quad V(t) = \frac{1}{1 + \rho(t)} [X(t) - I(t) + V(t+1)]$$

the $D(t)$ cancels out.

Since dividends do not appear in the valuation equation and since $X(t)$, $I(t)$, $V(t+1)$ and $\rho(t)$ are independent of $D(t)$, it follows that the current value of the firm must be independent of the current dividend decision. Given that there are no taxes, transaction costs, or asymmetric information, the firm could choose any dividend policy it likes without affecting the return to shareholders. It could dispose of all cash from operations in the form of dividends and still undertake all planned investment by issuing new equity. Alternatively, it could decide not to pay dividends and to use the excess cash to repurchase shares, without affecting the value of the firm through any dividend policy course of action.

What Miller and Modigliani (1961) achieved was to separate dividend decisions from other financial decisions and then to prove that dividend policy is a trade-off between dividend payments and equity issue.

Personal tax avoidance. It could be argued that although dividends are more heavily taxed, this does not mean that they are undesired. The fact that there are many ways of avoiding personal tax payment makes the level of dividend payment irrelevant from the point of view of personal taxes.

Miller and Scholes (1978) extended Miller and Modigliani’s results by using a dividend laundering argument. They argued that dividend receipts can become tax-exempt by being laundered through a tax-equivalent investment vehicle, and that sufficient conditions are present for taxable investors to be indifferent to dividends despite tax differentials in favor of capital gains. The most obvious technique presented is the ability of individuals to construct homemade leverage by themselves in order to transform dividends into capital gains. The authors present an example where an investor initially owning net worth \$25,000 at first invested in 2,500 shares at \$10 each, expecting them to yield \$0.40 per share in dividends and \$0.60 in price appreciation. This investor, in order to offset dividend payments by interest expense, could borrow \$50,000 at the 6% market interest rate and invest the proceeds in an additional 5,000 shares of the same stock. The investor’s opening and closing balance sheets are presented in Table 1.1.

Table 1.1. An hypothetical investor's balance sheet

<i>Opening Balance Sheet</i>			
Assets		Liabilities	
7,500 shares @ \$10	\$75,000	\$50,000	Loan
		\$25,000	Net worth
Total	\$75,000	\$75,000	

<i>Pro Forma Closing Balance Sheet</i>			
Assets		Liabilities	
7,500 shares @ \$10.60	\$79,500	\$50,000	Loan
Accrued dividends @ \$0.40 per share	\$ 3,000	\$ 3,000	Accrued interest
		\$29,500	Net worth
Total	\$82,500	\$82,500	

Source: Miller and Scholes (1978, p.339-340).

At the end of the year the investor will receive \$3,000 in the form of dividends completely offset by interest payment –the entire dividend amount has been transferred to capital gains.

The technique presented above has limited usefulness in offsetting the entire dividend amount without at the same time raising the level of personal leverage. One way to avoid tax payment and at the same time offset leverage would be to invest in an insurance or a pension fund, which would allow tax-free and risk-free accumulation. Compared with homemade leverage, an investment in insurance neutralizes any added risk related to an unwanted rise in leverage. In this case, it would be possible to eliminate taxable dividends altogether and still bear no more risk than in the original unleveraged portfolio. Using the previous example, one could achieve this goal by borrowing \$16,667 and then immediately investing in riskless insurance at the riskless rate of interest. The opening and closing accounts on the balance sheet are presented in Tables 1.2 and 1.3.

Table 1.2. Insurance investment - opening account

Assets		Liabilities	
5,500 shares @ \$10	\$25,000	\$16,667	Loan
Insurance	\$16,667	\$29,500	Net worth
Total	\$82,500	\$82,500	

Source: Miller and Scholes (1978, p.343).

Table 1.3. Insurance investment - pro forma closing account

Assets		Liabilities	
2,500 shares @ \$10.60	\$26,500	\$16,667	Loan
Insurance	\$16,667		
Accrued interest on insurance	\$ 1,000		
Accrued dividends @ \$0.40 per share	\$ 1,000	\$ 1,000	Accrued interest
		\$27,500	Net worth
Total	\$45,167	\$45,167	

Here the investor has no net leverage and no net taxable income. The after-tax net income is equal to the sum of the shares and the \$1,000 of interest earned on the insurance investment, which is not subject to taxes. The one-thousand-dollar dividend is offset by the 6% interest payment.

The techniques presented by Miller and Scholes (1978) are only an example of what is possible. Allen (1989) presents an additional three. The first of them, income splitting, takes advantage of the fact that different family members may be in different income tax brackets. Hence, by spreading the income through the different brackets, taxes can be reduced. The second method uses tax shelters in real assets through the use of limited partnerships. These vehicles exploit the possibility of making deductions of tax depreciation provisions that were greater than real costs incurred, a fact which could lead to accounting losses that can be used to avoid taxes on income from other sources. The last method consists of some investment strategies in the security markets. Some of techniques presented have been ruled out by the 1986 Tax Reform Act, but others are still valid. A more complete description of some of the tax avoidance techniques is presented in J. E. Stiglitz's *Economics of the Public Sector* - second edition, chapter 24, «A Student's Guide to Tax Avoidance» (1).

The irrelevance theories of Miller and Modigliani and Miller and Scholes show that changing dividend policy has no impact on firm value or shareholder welfare. Now, some of the empirical evidence related to these theories will be presented.

1.2. Empirical evidence

«[I]t is not possible to demonstrate, using the best available empirical methods, that the expected returns on high yield common stocks differ from the expected returns on low yield common stocks either before or after taxes.»

Fisher Black and Myron Scholes (1974, p.1).

Traditionally, it has been found that companies that pay generous dividends are better priced than those that pay smaller dividends. These empirical findings are related to the testing method that was commonly used. Most studies related stock prices to current dividends and retained earnings, and reported that a higher dividend payout was associated with a higher price over earnings ratio (PER). The typical cross-sectional equation had the following form:

$$(1.8) \quad P_{it} = a + bD_{it} + cRE_{it} + \varepsilon_{it}$$

where:

- P_{it} – the price per share;
- D_{it} – the aggregate dividends paid out;
- RE_{it} – the aggregate retained earnings;
- ε_{it} – the error term.

The result of these studies was that the «dividend coefficient» was much larger than the «retained earnings coefficient».

Friend and Puckett (1964) were the first to criticize the above approach because it does not take into account either measurement error, which is much larger for retained earnings than for dividends, or the difference in the risk dimension of the firms. There is almost no measurement error in dividends, but there is considerable measurement error in retained earnings. This phenomenon is related to the fact that accounting measures of income reflect the real economic earnings of the firm only imprecisely, which in turn causes the retained earnings coefficient to be biased downwards. Secondly, riskier firms have both a lower dividend payout and a lower PER. Hence, the omission of the risk variable can cause an upward bias in the dividend coefficient.

The Black and Scholes (1974) study, the first major elaboration to use market data and the capital asset pricing model to control the risk factor, supported the dividend irrelevance theory. Their conclusions as presented in the headline were quite strong, and in fact most of the studies presented later try to challenge their statements.

Black and Scholes begin by emphasizing the ability of firms to adjust dividends to appeal to tax-induced investor clienteles. They argue that this «supply effect» effectively means that no corporation is able to affect its dividend policy, especially since there are different classes of investors that prefer different dividend yields. Additionally, there is a «diversification effect» that forces different classes of investors to hold portfolios with different dividend yields. It is not possible to compile portfolios of only high (low) yield stocks whose returns are perfectly correlated.

The diversification effect was later supported by the theoretical models of Long (1977) and Modigliani (1982), in which investors make their portfolio decisions in light of existing trade-offs along a tax and risk dimension. Modigliani found that, except at the margin, securities do not have perfect substitutes along the risk dimension. This fact causes the portfolio composition of investors with high marginal tax rates to differ only slightly from the configuration of that of low marginal tax rate investors. Similarly, Long deduces that the efficiency gain from switching to an after personal-tax efficient portfolio from a before-tax efficient portfolio is likely to be small for most investors.

In order to test the hypothesis that the before-tax returns on common stock are unrelated to corporate dividend policy, Black and Scholes add a dividend payout to the empirical version of CAPM. The tested equation is as follows:

$$(1.9) \quad \tilde{R}_i = \gamma_0 + [\tilde{R}_m - \gamma_0] \beta_i + \gamma_1 (\delta_i - \delta_m) / \delta_m + \varepsilon_i$$

where:

- \tilde{R}_i – the rate of return on the i th portfolio;
- γ_0 – the intercept term, which should be equal to the risk-free rate;
- \tilde{R}_m – the rate of return on the market portfolio;
- β_i – the systematic risk of the i th portfolio;
- γ_1 – the dividend related coefficient
- δ_i – the dividend yield on the i th portfolio (measured as the sum of dividend paid during the previous year divided by the end-of-year stock price);
- δ_m – the dividend yield on the market portfolio (measured over the prior 12 months);
- ε_i – the error term.

If the coefficient γ_1 of the dividend yield differs significantly from zero, then it is possible to interpret this result as evidence that dividend policy has an impact on the required rate of return for securities.

Using annual data and grouping the stock into 25 intermediate dividend yield portfolios, Black and Scholes tested the relationship between dividend yields and stock return in the time period of 1936-1966 and in its subperiods. The results are summarized in Table 1.4.

Table 1.4. The portfolio estimators for γ_1

Period	$\alpha_1 = \hat{\gamma}_1$	t_α	$\hat{\beta}_1$	δ_1	δ_m
1936-66	0.0009	0.94	-0.01	0.044	0.048
1947-66	0.0009	0.90	0.08	0.047	0.049
1936-46	0.0011	0.54	-0.01	0.036	0.046
1947-56	0.0002	0.19	0.11	0.054	0.060
1957-66	0.0016	0.99	-0.14	0.040	0.038
1940-45	0.0018	0.34	0.15	0.051	0.052

Source: Black and Scholes (1974, p.16).

The dividend coefficient $\hat{\gamma}_1$ is not significantly different from zero across the entire period and for every subperiod. This finding led the authors to claim that the expected returns on high yield securities are not significantly different from the expected returns on low yield securities.

Similar conclusions were reached by Gordon and Bradford (1980) and Hess (1982). The first two authors used a variant of the capital asset pricing model in order to measure the relative valuation of dividends and capital gains in the stock market. They found that dividends are not valued differently from capital gains. Hess, on the other hand, did not find empirical support for the dividend clientele effect and at the same time discovered that the information effect does not completely explain the dividend effect.

Black and Scholes' empirical findings have been criticized by Rosenberg and Marathe (1979, p. 212-214) and by others because the test they applied was not powerful enough. The loss of efficiency was related to the use of annual data and to grouping stocks into portfolios, when in fact the use of individual stock returns would have yielded much more accurate results. Consequently, the opposite hypothesis, namely that the dividend yield does matter, could not be rejected either.

The irrelevance theory has been questioned in many dimensions –in fact, the rest of this review consists of a description of them. But at this point it would be useful to present some studies related to the possibility of tax avoidance, which will not be presented later.

This tax avoidance theory was criticized by many authors. DeAngelo and Masulis (1980) contended that the borrow-to-buy insurance scheme is not sufficient to yield an equilibrium in which dividends are demanded and supplied. Feenberg (1981) suggested that the proposed method, although interesting, appears difficult to implement. The evidence indicates that investors have an upper limit on the amount of dividend income that they can shelter through Miller and Scholes' tax avoidance method. Feenberg found that the special circumstances under which this can occur are limited to two and half percent of recipients' dividend income. Hence, he concluded that a dominant role cannot be attributed to the Miller and Scholes hypothesis in the determination of corporate dividend policy. Finally, Poterba (1987) found that although these techniques are theoretically possible and can be used, they are not used as much as they should be, and that there are therefore many private investors who could gain significantly if they utilized them.

In summary, we can say that the Modigliani-Miller analysis has provided valuable insights towards understanding certain aspects of choices made by firms, but it has ignored others that have to do with the way in which firm value is maximized. In essence, this approach to dividend policy treats dividend policy as a residual effect of the firm's cash flow. The basic questions raised in the Allen paper (1989, p. 6) still need to be answered:

- 1) Why are large amounts of dividends paid to taxpaying shareholders?
- 2) Why are other methods of distributing cash, and in particular, share repurchases, used relatively infrequently despite the apparent tax advantages?
- 3) Why do dividends convey information?
- 4) Why is the stability of dividends important to firms?

To answer these questions, one must first relax the various Modigliani-Miller assumptions and then explore the data for evidence that dividend policy affects security prices and investor behavior.

2. Models based on Personal Tax

An introduction to taxes would perhaps be the best starting point for an investigation of the effect of relaxing the Modigliani-Miller assumptions.

In the US, dividend payments by a corporation do not affect its taxes. However, at least historically, dividends have been taxed at a higher rate than capital gains at the personal level. The 1986 tax code made the tax rate on capital gains equal to the ordinary income rate. However, the present value of capital gains taxes is lower than that of ordinary taxes because capital gains can be deferred indefinitely, unlike ordinary income taxes.

2.1. Overview of the theory

Modigliani and Miller dealt comprehensively with the effects of the corporate tax system on the valuation of companies. Other authors have dedicated their attention to the taxation of individuals.

Partial equilibrium analysis. An important step towards the recognition of the effects of personal tax on corporate financial policy was provided by Farrar and Selwyn (1967). They used partial equilibrium analysis and assumed that individuals seek to maximize their after-tax income. They considered three different sets of corporate and personal financial strategies and evaluated them in terms of the after-tax income received by the investor. Here, we shall present the first two strategies, describing the choice of the form of payment to be made by the firm. The third strategy, concentrating on the postponability of capital gains tax and on the whole analysis of capital structure policy as well as of the desired choice between personal versus corporate leverage, will not be presented here because it does not alter the conclusion about the influence of personal tax on a firm's dividend policy.

In the first strategy, all corporate earnings are to be paid out as dividends and are taxed at the personal tax rates. The investor receives the following net income per share:

$$(2.1) \quad \tilde{Y}_d = [(\tilde{X} - rD_c)(1 - T_c) - rD_p](1 - T_p)$$

where:

- \tilde{Y} – the random net income stream (including capital gains) available to an investor from holding one share of stock after all interest and taxes, personal and corporate, have been paid;
- \tilde{Y}_d – in the form of dividend,
- \tilde{Y}_g – in the form of capital gains;
- \tilde{x} – the random operating income per share of the company before interest and tax payments;
- r – the market rate of interest faced by personal and corporate borrowers and lenders;
- D_c – the amount of corporate debt outstanding per share of common stock;
- D_p – the amount of personal debt outstanding per share of common stock;
- T_c, T_p, T_g – the marginal corporate, personal, and capital gains tax rates.

The first term represents the after-corporate-tax cash flow of the company which is received by the individual. If we deduct from this the interest payment on personal debt used to buy the share and personal tax on this income, we are left with the net income of the investor.

Alternatively, the firm can decide not to pay dividends and to transfer all corporate earnings into capital gains, with all gains being immediately realized by investors and taxed at the capital gains rate. In this case, the after-tax net income available to the shareholder is:

$$(2.2) \quad \tilde{Y}_g = (\tilde{X} - rD_c)(1 - T_c)(1 - T_g) - rD_p(1 - T_p)$$

In this strategy, the investor, after paying the capital gains tax on the corporate earnings, deducts his after-personal-tax interest expense on personal debt. The strategy of transferring corporate earnings into capital gains is realized by repurchasing one's own shares.

The advantage to investors of receiving returns in the form of capital gains rather than dividends is easy to see if the last equation is rearranged as follows:

$$(2.3) \quad \tilde{Y}_g = (\tilde{X} - rD_c)(1 - T_c)(1 - T_g) - rD_p(1 - T_g) + rD_p(1 - T_g) - rD_p(1 - T_p)$$

$$(2.4) \quad \tilde{Y}_g = [(\tilde{X} - rD_c)(1 - T_c) - rD_p](1 - T_g) + rD_p(1 - T_g) - rD_p(1 - T_p)$$

$$(2.5) \quad \tilde{Y}_g = [(\tilde{X} - rD_c)(1 - T_c) - rD_p](1 - T_g) + rD_p(T_p - T_g)$$

From equations (2.1) and (2.5), the advantage to shareholders of receiving returns in the form of capital gains rather than dividends should be obvious if we decide to subtract these two equations. The difference of the two income streams:

$$(2.6) \quad \tilde{Y}_g - \tilde{Y}_p = [(\tilde{X} - rD_c)(1 - T_c) - rD_p](1 - T_g) + rD_p(T_p - T_g) + \\ - [(\tilde{X} - rD_c)(1 - T_c) - rD_p](1 - T_p)$$

$$(2.7) \quad \tilde{Y}_g - \tilde{Y}_p = [(\tilde{X} - rD_c)(1 - T_c) - rD_p](T_p - T_g) + rD_p(T_p - T_g)$$

is positive if $T_p > T_g$ for any positive operating cash flows, rate of interest, and level of debt. So long as this happens, individuals will prefer capital gains to dividends, a result which has implications for corporate policy. So long as the investor's marginal tax rate on dividends exceeds his marginal tax rate on capital gains, it is always optimal from the personal tax point of view for a company to use any residual earnings for share repurchases rather than for dividend payments. The straightforward implication of this finding is that corporations should never pay dividends, but that they should repurchase shares. This course of action would allow personal investors to avoid paying income taxes on dividends; instead, they would pay taxes at the lower rate. Even if the rate of capital gains is equal to the income on dividends, the capital gains taxes could be deferred to a later date; this possibility was considered by Farrar and Selwyn (1967). Thus, the effective tax rate on capital gains would be lower than on ordinary income; Miller (1977), for example, suggests that this rate is close to zero.

Market equilibrium framework. Brennan (1970) expanded the previously mentioned Farrar and Selwyn study into a general equilibrium model where investors are assumed to maximize their expected utility of wealth after personal taxes. He introduced personal income taxes into the capital asset pricing model.

Brennan assumed that capital gains are taxed at a lower rate than dividends, and that investors can borrow and lend at a risk-free rate of interest r , and furthermore that dividend amounts d_j are known at the beginning of the period. He found that:

$$(2.8) \quad \bar{R}_j - r = H \times COV(\tilde{R}_j, \tilde{R}_m) + T(\delta_j - r) \\ j = 1, \dots, n$$

where:

$$(2.9) \quad \tilde{R}_j = \frac{\tilde{\pi}_j + d_j - p_j}{p_j}$$

$$(2.10) \quad H = \bar{R}_m - r - T(\delta_m - r)$$

$$(2.2.11) \quad \delta_j = \frac{d_j}{p_j}$$

- p_j – the initial unit price of security j;
 $\tilde{\pi}_j$ – the uncertain terminal unit price of security j;
 r – the riskless rate of return;
 δ_j – the prospective dividend yield on security j;
 δ_m – the dividend yield on a value-weighted market portfolio;
 $\tilde{\pi}_j$ – the rate of return on security j;
 \bar{R}_m – the expected return on a value-weighted market portfolio;
 T_d – weighted averages of investors' marginal tax rates on dividends;
 T_g – weighted averages of investors' marginal tax rates on capital gains, where the weights depend upon the investors' marginal rates of substitution between expected return and variance of return.

In Brennan's after-tax version of the capital asset pricing model expected return is a function of the weighted average of investors' marginal tax rates on dividends and on capital gains.

$$(2.12) \quad T = \frac{T_d - T_g}{1 - T_g}$$

But in the derived equilibrium, T was reduced to the weighted average marginal tax rate on dividends when capital gains taxes do not exist.

Explaining equation (2.8), Brennan concludes that «the expected or required risk premium on security j ($j=1, \dots, n$), $(\bar{R}_j - r)$ is a function of that security's risk characteristics $COV(\tilde{R}_j, \tilde{R}_m)$ and of its expected dividend yield δ_j . The intuitive interpretation of this result is that for a given level of risk, investors require a higher total return on a security the higher its prospective dividend yield, because of the higher rate of tax levied on dividends than on capital gains» (2).

In the Brennan model, the expected rate of return of security j is equal to:

$$E(j) = \text{Risk-Free Rate} + \text{Risk Premium} + \text{Tax Exposure Premium}$$

A model based on taxes and investment opportunities. Masulis and Trueman (1986) presented a model where personal tax clienteles and IRS regulations force corporations to pay cash dividends.

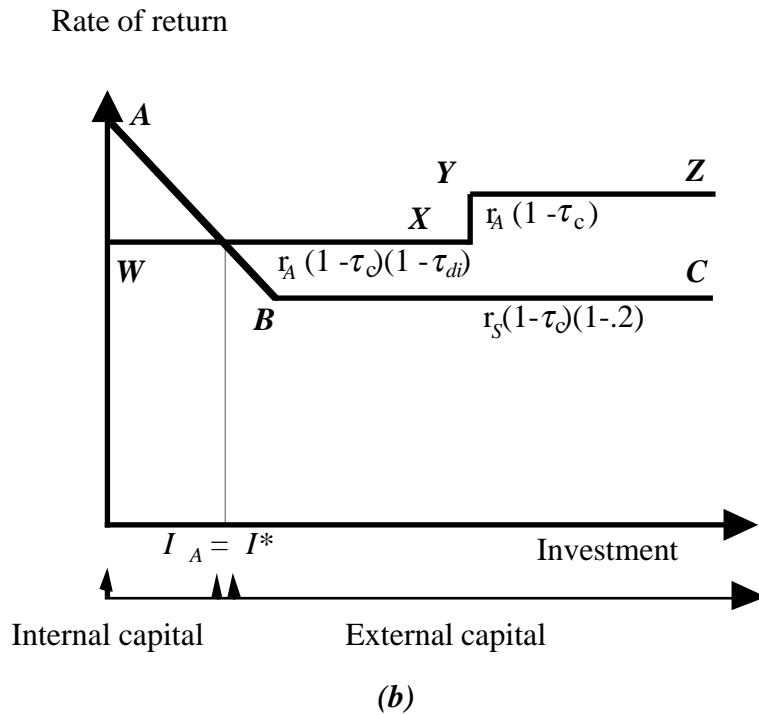
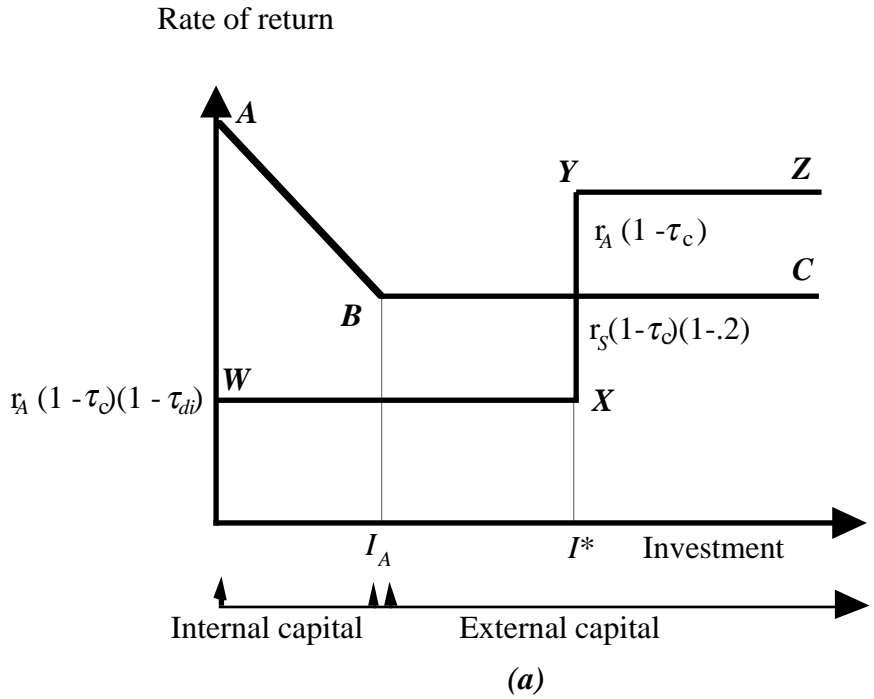
For simplicity, it is assumed that the company is 100% equity financed. The assumptions about taxes are as follows:

- all firms pay the same effective marginal corporate tax rate τ_c ;
- capital gains taxes are effectively zero $\tau_g = 0$;
- personal tax rates on dividend τ_{di} are different over investors;
- there is a tax exemption on dividends paid by one firm to another (before the 1986 tax code, 85%; now, 80%);
- the regular corporate repurchases of equity are treated in the same way as dividend payments.

Figure 1 presents the effect of taxes on the supply and demand for investment funds, where:

- r_A – the pretax return on investment in real assets;
- r_S – the pretax return on investment in securities of other firms.

Figure 1. Investment and dividend decisions with differing personal tax rates



Source: Copeland and Weston. (1992, p.562).

The investment in real assets represented by line segment AB has a diminished return to scale and marginally, at point B , is equal to the return on the investment in securities. There is an infinite amount of possible investments in securities which have constant returns to scale, illustrated by the line segment BC in Figure 1. The after-tax return on securities is equal to:

$$(2.14) \quad r_s(1-\tau_c)(1-0.2)$$

because firms that own securities have to pay corporate taxes on 20% of the dividends they receive from ownership of other firms.

In this model, internally generated capital has a different cost to the firm. The cost of internal capital (retained earnings) is equal to the required after-personal-tax return on an investment for the i th shareholder:

$$(2.15) \quad \text{Cost of internal funds} = r_A(1-\tau_c)(1-\tau_{di})$$

The cost of external capital is higher because it is equal to the required return for the marginal investors who are not paying any personal taxes at all (e.g., pension funds):

$$(2.16) \quad \text{Cost of external funds} = r_A(1-\tau_c)$$

The cost of capital for current shareholders is represented by the line segment WX in Figure 1. It depends on the tax bracket of the current shareholders; Figure 1a represents high tax-bracket shareholders, and Figure 1b low tax-bracket ones. The cost of external funds is illustrated by the line segment YZ in the figure.

From the figure we see that the higher a shareholder's tax bracket, the more likely it is that they would like the firm to invest earnings internally instead of paying taxed dividends. For the high tax-bracket investors represented in Figure 1a, a company needs to undertake all investment in real assets I_A and then to invest in other firms' securities up to amount I^* . At this point, all internally generated funds are finished and, because the after-tax return on investing in securities is lower than the return on external funds, the investment stops. Since all internal funds are used up, dividends are not paid out.

Dividends are paid in Figure 1b, where the low tax bracket induces the company to stop investment in real assets at $I_A=I^*$. At this point, not all internally generated cash flow is used for investment in real assets, since real assets require a higher rate of return. This fact signifies that dividends are paid out in the amount I^*X .

One of the implications of this model is that it is possible to explain the existence of dividend clientele investors. Different dividend preferences induce high tax-bracket individuals to purchase low (or zero) dividend-paying firms, and low tax-bracket investors to invest in shares with a high dividend payout.

In summary, we can say that Selwyn (1967) suggested that corporations should avoid paying dividends because dividends are valued less by personal investors than capital gains. Brennan (1970) showed that the empirical CAPM needs to include elements related to the dividend yield. Share value thus depends on the marginal level of personal tax and on the

dividend policy of the company. Finally, Masulis and Trueman (1986) tried to explain theoretically why dividends are paid out at all and to relate it to the existence of personal tax clienteles.

2.2. The dividend clientele effect - empirical evidence

«Each corporation would tend to attract to itself a “clientele” consisting of those preferring its particular payout ratio, but one clientele would be entirely as good as another in terms of the valuation it would imply for the firms.»

Merton Miller and Franco Modigliani (1961, p.431).

This sentence, suggesting the existence of the clientele effect, will serve as a guide in dealing with this part of the study. First, one must look at the possibility of the existence of the personal tax clientele effect. Are there people in high tax brackets who invest in low dividend companies in order to avoid paying income taxes on dividend income? This discussion continues our analysis in the previous chapter of the debate about the possibility of tax avoidance by individuals in high tax brackets. It will consist of three parts. It starts with a study related to the ex-dividend day effect, goes on to examine tests on portfolio positions, and concludes by analyzing evidence related to tax code changes in the US and in Canada.

After an examination of the clientele phenomenon, tests for the existence of the relationship between dividend yield and market value of equity will be presented.

2.2.1. The ex-dividend day study

A share purchased at the opening of trade on an ex-dividend day does not include a right to the previously announced dividend, whereas if it had been purchased on the previous day, it would. Therefore, the price of a security that goes ex-dividend is expected to drop. The ex-dividend day study offers a unique opportunity to compare capital gains –the level of a price drop to ordinary income– related to the level of dividend, free of potential informational effects as the dividend announcement date is at least two weeks before the ex-dividend day.

Precursors of the ex-dividend study were Campbell and Beranek (1955), who noted that the behavior of stock prices influences investors’ decisions. They noticed that if the price of shares fell by the full amount of paid dividends, investors who are subject to taxes, in order to avoid tax payments, would accelerate their shares before the ex-dividend day and delay their purchases until after the ex-dividend day. There is extensive evidence, found by these authors and in follow-up studies by Durand and May (1960), Elton and Gruber (1970), Green (1980), Auerbach (1981), Kalay (1982a), Eades, Hess and Kim (1984), that, on average, ex-dividend day stock prices fall by less than the full amount of the dividend.

Tax clientele hypothesis. As in the earlier studies, Elton and Gruber (1970) discovered, by observing NYSE dividend-paying stock over the period between April 1, 1966 and March 31, 1967, that the average price decline was lower than the dividend per share –77.7%. Additionally, in this paper they initiated the study of the relationship between ex-dividend day behavior and investors’ marginal tax rates. Elton and Gruber formulated the hypothesis that the ex-dividend day price change is influenced by the differential taxation of ordinary income and capital gains, and so it is possible to measure the clientele effect by

observing price decline when a stock goes ex-dividend. They presented two types of action, which, in order to prevent the possibility of arbitrage profits, have to be equivalent. The first scenario involves the current shareholder's selling his stock before it goes ex-dividend, and the second takes the same stock being sold after having gone ex-dividend. In this situation, the seller would be indifferent if:

$$(2.15) \quad P_B - t_c(P_B - P_C) = P_A - t_c(P_A - P_C) + D(1 - t_o)$$

Rearranging (2.15) with (2.16) and (2.17)

$$(2.16) \quad P_B - P_A - t_c(P_B - P_A) = D(1 - t_o)$$

$$(2.17) \quad (P_B - P_A)(1 - t_c) = D(1 - t_o)$$

leads to:

$$(2.18) \quad \frac{P_B - P_A}{D} = \frac{1 - t_o}{1 - t_c}$$

where:

P_B – price of the stock on the day before it goes ex-dividend;

P_A – price of the stock on the ex-dividend day;

P_C – price at which the stock was purchased;

t_o – the tax rate on ordinary income;

t_c – the capital gains tax rate;

D – the amount of the dividend.

Hence, from (2.18) they found that the ratio of decline in stock price to the dividend paid becomes a means of estimating the marginal personal tax rate of the average investor, knowing that the capital gains rate was half the ordinary tax rate during the study period.

Booth and Johnston (1984) extended the Elton-Gruber model to the unrealized capital gains tax version. They argued that if the investor's holding period is longer than the present value of capital gains, the tax liability is reduced. They found that in order to remain indifferent towards the timing of the decision to buy, equation (2.16) needs to be rearranged as follows:

$$(2.19) \quad P_B - P_A - \frac{t_c}{(1+k)^n} (P_B - P_A) = D(1-t_o)$$

which leads to:

$$(2.20) \quad \frac{P_B - P_A}{D} = \frac{1-t_o}{1-[t_c/(1+k)^n]}$$

where:

- n – the individual investor's expected holding period;
- k – the appropriate risk-adjusted discount rate.

If the investor's holding period is short, then equation (2.20) is equivalent to the Elton-Gruber model; however, if the individual chooses the time-selling decision with realized capital losses, then the effective capital gains tax rate will be zero and the ex-date price ratio will be equal to:

$$(2.21) \quad \frac{P_B - P_A}{D} = 1 - t_o$$

Bailey (1969) and Miller (1977) argued that the effective capital gains tax rate on shares is really almost zero. Protopapadakis (1983) made an estimation of the effective marginal tax rates on capital gains (excluding housing) in the United States between 1960 and 1978. He found that it fluctuated between 3.4% and 6.6% and that capital gains are held, on the average, between 24 and 31 years before being realized.

In order to test the existence of the tax clientele effect, Elton and Gruber ranked dividend yield from the lowest to the highest deciles, along with the average drop in price as a percentage of dividends and the implied tax bracket. They hypothesized that «[t]he lower a firm's dividend yield, the smaller the percentage of total return that a stockholder expects to receive in the form of dividends, and the larger the percentage he expects to receive in the form of capital gains. Therefore, investors who hold stocks which have high dividend yields should be in low tax brackets relative to stockholders who hold stocks with low dividend yields.»(3)

The results of their findings, presented in Table 2.1, were striking; they implied that tax brackets decrease as the dividend yield increases. The exception of the first decile is related to the high standard deviation of its mean of the ex-dividend statistic. The authors explain this high standard deviation by the presence of several low dividend stocks with quarterly dividends of just a few pennies, which experience ex-dividend price movements several times higher than the amount of dividends.

Table 2.1. Ex-dividend day drop ranked by dividend yield decline

Decile	D/P Mean	$(PB-PA)/D$ Mean	Probability true mean is one or more	Implied tax bracket %
1	0.0124	0.6690	0.341	49.74
2	0.0216	0.4873	0.007	61.45
3	0.0276	0.5447	0.002	59.15
4	0.0328	0.6246	0.001	53.15
5	0.0376	0.7953	0.027	33.98
6	0.0416	0.8679	0.031	23.34
7	0.0452	0.9209	0.113	14.65
8	0.0496	0.9054	0.085	17.47
9	0.0552	1.0123	0.591	*
10	0.0708	1.1755	0.999	*

*Indeterminate

Source: Elton and Gruber (1970, p.72).

The correlation between the dividend yield of a security and the proportionate size of its ex-dividend drop was positive and equaled 0.9152, a finding which is significant at the one per cent level. With the exemption of the first and seventh decile, the probability that the true mean price drops by the dividend amount rose continuously as the dividend yield increased.

Corporate trader hypothesis. One surprising result from the Elton and Gruber study is that price decreases for the last two highest yielding security deciles were significantly greater than the dividends. In both deciles the results show a market preference for dividends over capital gains. For the 10th decile, this was statistically significant at the 1 per cent level, and in the presented methodology it implied an investor clientele with negative tax rates. These results are consistent with tax-induced dividend clienteles if the marginal purchasers are corporations. Corporations were able to exclude 85% of any dividend from taxable income when capital gains were taxed at a rate of 25%. Thus, during the period covered by their study, a corporation would pay a tax on dividends equal to 7.8%, compared with a 25% rate on capital gains.

Similar results have been documented for high yielding common stocks by Kalay (1982a), Miller and Scholes (1982), Eades, Hess and Kim (1984). Kalay reported that on ex-days, high yielding common stock prices fall by an amount greater than the dividend. Miller and Scholes (1982) reported a negative dividend coefficient for the highest dividend yield group (this aspect will be discussed later). Eades, Hess and Kim (1984) examined the ex-dividend date return for a non-convertible preferred stock sample, characterized by a relatively large preferred dividend yield.

The methodology which they used for their study was different from that of Elton and Gruber. Instead of comparing the ex-dividend day drop with the amount of dividend, they reported their results in the form of excess rates of return. If on the ex-day the price of security i declines by an amount higher than the dividend, then the ex-day return, computed in equation (2.21), will be negative:

$$(2.21) \quad R_{i,t} = \frac{P_{i,t} - P_{i,t-1} + D_{i,t}}{P_{i,t-1}}$$

Their sample of 44 preferred stocks, consisting of heavily traded non-convertible preferred stocks, had a total of 708 ex-days, which occurred on 493 trading days during the period from January 1, 1974 to December 31, 1981. The ex-day returns of this preferred stock portfolio revealed significantly negative excess returns. The average percent excess return (-0.141) equalled the difference between the ex-dividend day portfolio return on day t and the mean portfolio return for day t , estimated during the 60-day period around the ex-day (30 days before and after). This finding implies that the stock price fell by more than the amount of the dividend, which is consistent with the existence of tax-induced clienteles.

Short-term trading hypothesis. Eades, Hess and Kim (1984) also examined ex-dividend day returns for two periods: before and after May 1, 1975. On that day, brokerage commissions were negotiated and presumably the market became more competitive, which implied lower transaction costs. For the time period of July 2, 1962 to April 30, 1975, the authors found the average excess return to be equal to 0.176% - with a high significance of $t=12.456$; for the interval of May 1, 1975 to December 31, 1980, the ex-day return was significantly lower - 0.064%. This finding suggests that lower transaction costs make arbitrage easier for short-term traders.

The existence of an arbitrage possibility on the ex-dividend day was first suggested by Kalay (1982a). The argument presented by Elton and Gruber (1970), and followed by the *tax clientele school*, is that, due to higher personal taxes on dividends than on capital gains, the equilibrium-determined stock price drop on the ex-date should be less than the dividend. The ordinary marginal income tax rate can be estimated by investigating the amount of the stock price drop. The first to challenge this traditional approach was Kalay (1982a). He presented an alternative explanation to the observed relationship between the dividend yield and relative price changes, called the *short-term trading hypothesis*, which states that the action of short-term traders rather than tax effects determines the size of the price decline. As a consequence, in the absence of transaction costs, a risk-neutral investor would eliminate any drop in price not equal to the amount of the dividend by buying and selling around the ex-dividend day.

Kalay relaxed some of the restrictive assumptions in the Elton and Gruber model and tried to show that the marginal tax rates cannot be inferred from the ex-date stock price behavior. He pointed out that in the US, short-term capital gains are taxed as ordinary income; hence, a large difference between the expected price drop and the amount of dividend paid would offer profit opportunities for arbitrageurs. Their arbitrage profit would be equal to:

$$(2.22) \quad (1 - \tau_0) \times \left| D - (P_B - \bar{P}_A) \right|$$

where:

- τ_o – the marginal tax rate on ordinary income that the arbitrageur is subject to;
 \bar{P}_A – the expected price on the ex-dividend day.

If transaction costs are included in the model, then they would gain when

$$(2.23) \quad (1 - \tau_o) \left[D - (P_B - \bar{P}_A) \right] - \alpha \bar{P} > 0$$

where:

$$(2.24) \quad \bar{P} = (P_B + \bar{P}_A) / 2$$

- $\alpha \bar{P}$ – the expected transaction costs of «a round trip».

Kalay found that transaction costs are much smaller for broker dealers (whether they be brokerage firms, partnerships, or individuals) and argued that they are potential short-term traders, especially since for them both dividends and capital gains are taxed as ordinary income. Hence, these dealers are the price setters because their transaction costs are the smallest, and the condition for no-profit opportunities is obtained by rearranging the previous equation (2.23):

$$(2.25) \quad \left| D - (P_B - \bar{P}_A) \right| \leq \alpha \bar{P}$$

Rearranging this again leads to:

$$(2.26) \quad 1 - \frac{\alpha \bar{P}}{D} \leq \frac{P_B - \bar{P}_A}{D} \leq 1 + \frac{\alpha \bar{P}}{D}$$

Thus, Kalay concluded that the allowable range of $(P_B - \bar{P}_A)/D$ consistent with the absence of profit opportunities is inversely proportional to the dividend yield, and marginal tax rates cannot be inferred from the Elton and Gruber model if it is outside the no-profit opportunity bounds. Moreover, the tax rates of the trading population cannot be inferred from it even if it is within the described boundaries because «[t]he estimate is likely to consist of a combination of relative price drops which are within the bounds with those which are outside the bounds. As such, it captures the effects of both the short-term profit elimination and the tax rates of the trading population.»(4)

The *short-term trading hypothesis* presented here implies that the ex-dividend day stock price drop should be equal to the dividend amount. If it were not, the short-term traders

could make arbitrage profit by trading away this difference. This argument, supported by the fact that arbitrageurs do not face different tax rates on dividends as opposed to capital gains, became dominant since the necessary condition for equilibrium is the absence of arbitrage profits.

However, since the transaction costs that arise from trading activity include the costs associated with the bid and ask spread, clearance and transfer taxes could inhibit the ability of short-term traders to generate arbitrage profits. Consequently, this short-term trading around the ex-dividend day is unprofitable and thus long-term tax rates determine the price at this time. This argument was initially highlighted by Elton, Gruber and Rentzler (1984), and was strongly supported by Heath and Jarrow (1988). Heath and Jarrow, relaxing the usual assumption of risk neutrality, demonstrated that the ex-dividend day price is not controlled by any specific group of traders. They found that even given continuous trading, a frictionless economy, and no transaction costs, it is still possible for the ex-date stock price drop to differ from the dividend and for short-term traders to still not be able to generate arbitrage profit. The reasoning supporting this is the fact that an arbitrage opportunity is a trading strategy that creates profits at no risk. In the case of a short-term trader, such a deal cannot be made. Although, in the opinion of Heath and Jarrow, the required size of the risk premium is small and awaits future empirical research, it is nevertheless positive, a fact that weakens the arguments that claim that it is impossible to estimate the marginal tax bracket based on the ex-dividend stock price drop.

Another possibility proposed by Elton, Gruber and Rentzler (1984) is that tax rates are important, but that short-term trading limits the amount of the fall in the price that would otherwise occur solely due to tax effects.

Trading volume study. The research related to finding evidence about the tax effect in ex-dividend study has focused mainly on examining the price behavior around the ex-days. Another method often used in studying finance is to observe the trading activity around the ex-dividend days.

Green (1980) and Kalay (1984) hypothesized in their study about volume patterns around the ex-days. Their extension of the Elton-Gruber analysis predicts that a positive abnormal volume should be observed on the ex-dividend day and on the day before, while a negative abnormal volume should be observed on other days. This pattern is related to the fact that investors who want to speed up their sale of a security will want to sell on the last day that the stock is trading cum-dividend; similarly, investors who want to delay their purchase will prefer to buy on the first day that the stock trades ex-dividend.

Lakonishok and Vermaelen (1986) studied the trading volume around the ex-date and tested the tax clientele and tax arbitrage hypotheses. The latter states that if there is a tax arbitrage, then the volume should be abnormally high around the ex-dates, and that it should be positively related to the dividend yield and negatively related to transaction costs. The data for their study included the daily trading volume of 2,300 NYSE and AMEX companies from 1970 until 1981.

The abnormal trading volume methodology will be used later in the empirical analysis of the information content of a dividend payment, so it is worthwhile to spend a bit more time describing the Lakonishok and Vermaelen approach.

To analyze trading activity, Lakonishok and Vermaelen used two methods. In the first, the *event time method*, for each ex-day event, the abnormal dollar trading volume was

computed for an eleven-day period beginning five days before the ex-date and ending five days after the ex-date. The normal dollar trading volume for each ex-date was estimated to be the average daily dollar trading volume applying a forty-day interval starting 64 days before the ex-date and ending 25 days before the ex-date. Then, the average abnormal dollar volume was computed on all ex-date results, starting from five days before the ex-date and ending five days after. In the *calendar time method*, on each calendar day, the average abnormal volume was computed over all stocks which went ex-dividend on that day. The normal volume for those stocks was estimated to be the average daily dollar trading volume for the same investigation period as in the *event-time method*. Finally, the «average» abnormal volume on the ex-date was estimated by taking the average of all the other averages. The procedure is then repeated successively for the five days before the ex-date and for the five days after.

The results of the Lakonishok and Vermaelen paper are consistent with the *short-term trading* hypothesis. Their results show that the trading volume does increase significantly around ex-dates and that the increase is more pronounced for high-yield, actively traded stocks, and during the period following the introduction of negotiated trading commissions. Moreover, the fact that most of the volume increase after the ex-dividend day does not show up on the ex-date itself, but a few days later, supports the *corporate trader hypothesis*, which holds that corporations subject to a sixteen-day holding rule are responsible in large part for the abnormal trading volumes.

Tax change event study. Examining the behavior of dividends and stock prices between different tax regimes offers a rare opportunity for assessing the effect of the personal tax rate on investors' valuation of dividends. The investigators presented below used the major changes in the tax policy of Canada and the United States to test the relevance of the personal tax rate in forming a clientele portfolio.

Lakonishok and Vermaelen (1983) and Booth and Johnston (1984) examined the ex-date stock behavior on the Toronto Stock Exchange when Canada first began taxing capital gains. Using the Elton-Gruber methodology, they examined the ex-dividend day returns of Canadian stock between 1971 and 1972. They found the ex-date price ratio to be less than one and the stock prices to fall by a smaller amount in Canada than in the US, a discovery which suggests a preference for capital gains; however, Lakonishok and Vermaelen attribute this fact to short-term trading by professionals and not to the tax clientele hypothesis. This interpretation was based on the change in the ex-date price ratio around the 1971-72 tax reform and not on the value itself. One would have expected the premium to be closer to the one after the tax reform, which increased the value of a dollar of taxable dividends relative to a dollar of capital gains for all investors subject to taxes. The empirical findings showed the opposite; namely, that the premium increased after the tax change. Moreover, they showed that a positive relation between dividend yield and relative price changes exists, but is less pronounced in Canada than in the US. All the presented results are inconsistent with the simple tax interpretation of ex-date stock behavior, although the question of why the drop is so small in Canada remains.

Booth and Johnston (1984) examined the price ratio during four distinct tax periods: 1979-71, 1972-76, 1977, and 1978-80, in order to determine whether the ex-date price ratio can be used to estimate marginal tax rates in Canada. They found that the ex-date price ratio is significantly different from the one which is consistent with a market preference for capital gains over ordinary income. Second, the response of the ex-date ratio to changes in the tax code is consistent with the stock holding of a marginal investor, who is an

individual with a very low effective tax rate on capital gains. Thirdly, the short-term trading hypothesis cannot explain the ex-dividend day behavior of the price ratio in the period of the major reforms of 1971-72 without additional assumptions. When Booth and Johnston calculated the abnormal trading volume on the ex-dates, they found that investors perceive the ex-dividend day as an important time in their trading strategies. However, they found a negative correlation between relative trading volume and dividend yield, with a significantly higher relative trading volume among the low-dividend yield stocks. The difficulty in finding stronger support for the tax clientele hypothesis led Booth and Johnston to try to present the hypothesis that a strong integration of the Canadian and American financial markets produces inconclusive results concerning empirical results based on the Canadian tax code changes. The fact that many US residents hold Canadian stocks could cause the stocks to reflect US and not Canadian personal tax rates.

There were two major changes in the dividend tax policy of the United States which offer an excellent opportunity for examination of ex-dividend day price behavior in different tax regimes. The first is related to the introduction of income tax in 1913, and the second is the 1986 Tax Reform Act, which eliminated the preferential tax treatment of long-term capital gains that had been adopted in 1921.

Barclay (1987) compared the ex-date price behavior of stocks for the periods from January 1, 1900 to December 31, 1906, and from December 12, 1909 to June 30, 1910, with their behavior in the years 1962-1985. He found that the average premium was not significantly different from the one before the enactment of the federal taxes, and significantly below the one in 1962-1985. These results support the hypothesis that investors in the pre-tax period viewed capital gains and dividends as perfect substitutes.

The opposite result was obtained by Michaely (1991) in his analysis of the behavior of stock prices around ex-date after the implementation of the 1986 Tax Reform Act. Michaely found that the reduction in differential taxes between dividend and capital gain income had no effect on ex-date stock behavior, a discovery which is not consistent with the expectation that long-term individual investors would have a significant effect on ex-date stock prices. It suggests that the activity of short-term traders and corporate traders dominates the price determination on the ex-dividend day.

The presented ex-dividend day studies strongly support the existence of personal tax clienteles. None of the described hypotheses cast doubt on their existence. But to be able to determine the existence of a relationship between dividend yield and the market value of equity, it is necessary to run additional tests.

2.2.2. Direct evidence of the clientele effect

There are some «real world» indications that tax clienteles do exist. One of them is government legislation that penalizes investors who make transactions around ex-dividend days primarily for tax reasons. Poterba and Summers (1984, p.1402) and Lakonishok and Vermaelen (1986, p.288) describe some other indications. Khoury and Smith (1977) examined the effect of changes in dividend policy after the imposition of capital gains tax in Canada in January 1972. They found evidence that Canadian boards of directors responded to the new capital gains tax by providing a benefit package more appealing to investors in view of the new tax law. The average percentage dividend change doubled from 5% per year before the tax law (1963-1971) to 10.1% in 1972-1973, after the law became effective –this result was found to be statistically significant. Additionally, Khoury and Smith estimated the

regression coefficients of the partial adjustment dividend model and found a significant decrease in the dependence of current dividend levels on last year's dividends.

Another indicator can be related to the stated policies of financial institutions. Lakonishok and Vermaelen (1986, p.288-289) quote in *Colonial Qualified Dividend Trust* one of the statements of their «Investment Objectives and Policies»: «The Trust tends to engage in a dividend rollover program. Under this program the trust will purchase dividend paying stocks to their ex-dividend dates and sell them on or after their ex-dividend dates.» The described actions suggest that tax-induced trading occurs.

In one of the classic cases, called *Gulf Oil Corporation-Takeover*, one of the proposed changes in financial policies was related to spinning off Gulf's oil and gas properties into a royalty trust. The advantage of this form of organization was «the elimination of a second layer of taxation on distributed earnings and the tax savings from the step-up in the basis of the properties.[...]The arrangement worked well if the corporation had a high dividend-payout ratio and stockholders had a high tax basis.»(5)

One of the most important results of the Lakonishok and Vermaelen (1986, p.288) study was the discovery that the competition among corporations for high dividends, because of significant tax benefits, makes stock prices increase abnormally by 1% in the three days before the ex-date. This finding adds to the evidence that the tax reason is important.

Investigations of investors' portfolios. Pettit (1977) tested the dividend clientele effect by direct investigation of individual investors' portfolio positions. These individual portfolio positions were taken from a large retail brokerage house over the seven-year period 1964-1970. The data that was finally compiled had a sample size of 914 positions, which, apart from portfolio information, included the results of a questionnaire determining the individuals' demographic characteristics, their methods of making investment decisions, and their expectations for returns from investments in securities and in mutual funds. From these responses variables were selected to represent the explanatory variables in the equation which estimates the dividend-paying characteristics of individual portfolios. Pettit found a tendency among investors to gravitate towards certain types of dividend-paying securities. In his opinion, stock which has a low dividend yield is preferred by investors with high income whose ordinary tax rates differ substantially from their capital gains tax rates; these are mostly younger investors and individuals holding portfolios with a high systematic risk. His regression model had the form:

$$(2.27) \quad DY_i = a_1 + a_2\beta_i + a_3AGE_i + a_4INC_i + a_5DTR_i + \varepsilon_i$$

where:

DY_i – dividend yield for the i th individual's portfolio in 1970;

β_i – the systematic risk of the i th individual's portfolio;

AGE_i – the age of the individual;

INC_i – the gross family income averaged over the last three years;

DTR_i – the difference between the income and capital gains tax rates for the i th individual;
 ε_i – a normally distributed random error term.

The regression results of the dividend yield equation for 1970 are (t -statistics are given in parentheses):

$$(2.28) \quad DY_i = 0,04222 - 0,02145\beta_i + 0,03131AGE_i - 0,3726INC_i + 0,0064DTR_i$$

(11.01) (-16.03) (6.15) (-2.25) (1.57)

Pettit's findings suggest the existence of a clientele effect, since he was able to explain a significant portion of the observed cross-sectional variation ($R^2=0.3$) in individual portfolio dividend yields. These results provide direct empirical evidence of the relative demand for dividend-paying securities induced by the individual investors' levels of income and by differences in the rates at which capital gains and dividends are taxed. However, the evidence suggests that although differential tax rates influence individual demand for securities, the magnitude of the effect on portfolio choice is only marginal.

Lewellen, Stanley, Lease and Schlarbaum (1978) studied direct evidence for the existence of dividend clientele. Although they used the same data base as Pettit, they reached a different conclusion. However, they supported Pettit's finding that, in the age dimension, they did not find evidence to support the presence of dividend-tax-clientele. Low yield securities were more frequently held by younger investors while high-dividend paying securities were more concentrated in the hands of older investors. In a multiple regression that was run to explain the dividend yields of investors' portfolios, the key factor was age, but the overall R^2 was just 1.5% in total. The tax rate variable was statistically significant and was negatively related to the dividend yield; however, its coefficient was so small that it implied that a 10 percentage point rise in an investor's marginal tax bracket, which is a sizeable increase, was associated with only a 0.1% decline in the yield of the securities held. This finding suggests that only a minimal clientele relationship exists.

In another study that directly examined stockholders' portfolios, Blume, Crockett and Friend (1974) found evidence of a moderately heavier tendency of low tax-bracket investors to hold high-yield securities.

2.3. The personal tax effect on company valuation

«[O]ne [dividend] clientele would be entirely as good as another in terms of the valuation it would imply for the firms.»

Merton Miller and Franco Modigliani (1961, p.431).

In a world without personal taxes, the Miller-Modigliani theory claims that dividend policy is irrelevant to the value of the firm. However, when personal taxes are introduced, with rates on capital gains lower than those on ordinary income, the situation changes –the companies do not pay dividends. Miller and Modigliani suggest another solution: that, since every company tends to attract the investors who prefer its particular payout ratio, choosing a

specific payout has no impact on the value of the firm. Otherwise, it would be possible to raise the value of the company by simply changing the firm's payout. Empirical findings presented in the previous subchapters support the existence of dividend clienteles, but they do not answer the question as to the relationship between dividend payout and the value of the company. One way to test this relationship is to test the relationship between dividend payout and security return.

The relationship between dividends and security return. This study is a natural continuation of those in the previous part that dealt with irrelevance. While Black and Scholes (1974) found the dividend effect to be insignificant, now we shall present a study that supports its significance. Litzenberger and Ramaswamy (1979) use the Brennan (1970) model to test the relationship between dividend yield and security returns. From the theory, the equilibrium specification they tested is:

$$(2.29) \quad E(\tilde{R}_i) - r_f = a + b\beta_i + c(d_i - r_f)$$

where:

$E(\tilde{R}_i)$ – the expected before-tax return on the i th security;

r_f – the before-tax return on the risk-free asset;

β_i – the systematic risk of the i th security;

a – the constant term;

b – the marginal effect of systematic risk;

c – the marginal effective tax difference between ordinary income and capital gains rates;

d_i – the dividend yield, i.e., dividend divided by price, for the i th security.

The tested hypotheses were that $a > 0$, $b > 0$, and, in the absence of the income-related constraint on borrowing, $c > 0$. In the tested regression, Litzenberger and Ramaswamy assume that expectations are rational and that the parameters a , b and c are constant over time, and they use the realized returns on the left side of equation:

$$(2.30) \quad \tilde{R}_i - r_{ft} = \gamma_0 + \gamma_1\beta_{it} + \gamma_2(d_{it} - r_{ft}) + \tilde{\epsilon}_{it}$$

where:

\tilde{R}_i – the return on security i in period t ;

r_{ft} – the before-tax return on the risk-free asset in period t ;

- β_{it} – the systematic risk of the i th security in period t ;
 d_{it} – the dividend yield for the i th security in period t ;
 $\tilde{\varepsilon}_{it}$ – the deviation of the realized return from its expected value;
 $\hat{\gamma}_0, \hat{\gamma}_1, \hat{\gamma}_2$ – the coefficients corresponding to a, b and c ;

Because the true population of β_i is unobservable, an estimate for past data was used. The estimate betas were obtained from a regression of the security return $\tilde{R}_{i\tau}$ on the return of the market portfolio $\tilde{R}_{m\tau}$ from data prior to period t ,

$$(2.31) \quad \tilde{R}_{i\tau} = \alpha_{it} + \beta_{it} \tilde{R}_{m\tau} + \tilde{\varepsilon}_{i\tau} \quad \text{where } \tau = t - 60, t - 59, \dots, t - 1.$$

Litzenberger and Ramaswamy computed a level-revised monthly dividend yield in the following way:

$$(2.32) \quad d_{it} = 0$$

if in month t , security i did not go ex-dividend;

- if it did and if the firm declared its dividend prior to month t and went ex-dividend in month t , then the dividend yield was equal to

$$(2.33) \quad d_{it} = \frac{D_{it}}{P_{it-1}}$$

the actual dividend divided by the share price at the end of previous month;

- if in month t security i was declared and went ex-dividend, then the yield was equal to:

$$(2.34) \quad d_{it} = \frac{\hat{D}_{it}}{P_{it-1}}$$

which is the previous regular dividend going back as far as one year.

Litzenberger and Ramaswamy estimate $\hat{\gamma}_0, \hat{\gamma}_1$ and $\hat{\gamma}_2$ using the Ordinary Least Squares (OLS), the Generalized Least Square (GLS) and the Maximum Likelihood Estimation (MLE) methods in the period 1936-1977. For a comparison, they used the before-tax version of the regression in the form:

$$(2.35) \quad R_{it} - r_{ft} = \gamma'_0 + \gamma'_1 \beta_{it} + \tilde{\mu}_{it}$$

The results are presented in Table 2.2.

Table 2.2. Estimates of the dividend yield effect for the period 1936-77

Procedure	After-tax model			Before-tax model	
	$\hat{\gamma}_0$	$\hat{\gamma}_1$	$\hat{\gamma}_2$	γ'_0	γ'_0
OLS	0.00616 (4.37)	0.00268 (1.51)	0.227 (6.33)	0.00681 (4.84)	0.00228 (1.26)
GLS	0.00446 (3.53)	0.00344 (1.87)	0.234 (8.24)	0.00516 (4.09)	0.00302 (1.63)
MLE	0.00363 (2.63)	0.00421 (1.86)	0.236 (8.62)	0.00443 (3.22)	0.00369 (1.62)

Notes: *t*-statistics are in parentheses under each coefficient;

Source: Litzenberger and Ramaswamy (1979, p.183).

Each regression was done over a spread of securities in a given month. These performances give the estimates $\{\hat{\gamma}_{0t}, \hat{\gamma}_{1t}, \hat{\gamma}_{2t}; t = 1, 2, \dots, T\}$ and $\{\hat{\gamma}'_{0t}, \hat{\gamma}'_{1t}; t = 1, 2, \dots, T\}$. The coefficients presented at the end are arithmetic averages of this time series, where $T=504$ and $j=1,2,3$

$$(2.36) \quad \hat{\gamma}_j = \sum_{t=1}^T \frac{\hat{\gamma}_{jt}}{T}$$

It was found that the dividend yield coefficient remained consistently positive and, with the exception of the period 1/1955 to 12/1961, significantly different from zero. The results indicate that risk-adjusted returns are higher for securities with higher dividend yields. The implication of this finding is that dividends are undesirable because higher returns are necessary to compensate investors in order to induce them to hold high dividend-yield stocks.

Elimination of the information effect. Miller and Scholes (1982) criticized Litzenberger and Ramaswamy for mixing the information effect and the tax effect together in computing the monthly return. They conducted a similar study, in which they tried to eliminate the information effect. In a regression similar to (2.30) the dividend coefficient was estimated by:

$$(2.37) \quad R_{it} - R_{ft} = a_1 + a_2 \hat{b}_{it} + a_3 (\hat{d}_{it} - R_{ft}) + \tilde{e}_{it}$$

where:

R_{it} – the rate of return on share i during period t ;

R_{ft} – the riskless rate of interest during period t ;

\hat{b}_{it} – the systematic risk coefficient for stock i in period t .

They estimated equation (2.37) using the Fama and McBeth (1973) approach and the Fama (1976) three-step, pooled cross-section and time-series approach utilizing individual company data. At the beginning they estimated \hat{b}_{it} – the systematic coefficient from the regression over the 60 months previous to the test month t

$$(2.38) \quad \tilde{R}_{it} - R_{ft} = a_{it} + b_{it} (\tilde{R}_{mt} - R_{ft}) + \tilde{e}_{it}$$

Later, the beta \hat{b}_{it} and \hat{d}_{it} , an estimate of the dividend yield, were treated as independent variables in the regression

$$(2.39) \quad \tilde{R}_{it} - R_{ft} = a_{1t} + a_{2t} \hat{b}_{it} + a_{3t} (\hat{d}_{it} - R_{ft}) + \tilde{e}_{it}$$

The dividend yield estimate was done in many different ways for comparison. The first way involved measuring the actual dividend yield; the second was the same as the Litzenberger and Ramaswamy level-revised method. The third utilized the dividend yield of 12 months ago, and the fourth contained the sample of dividends announced in advance.

Finally, the dividend coefficient a_3 was estimated as the sample mean, \bar{a}_3 , of the monthly cross-sectional regression coefficients \hat{a}_{3t} . The coefficients a_1 and a_2 were found in the same way.

Table 2.3. Different estimates of the dividend yield effect for the period 1940-78

Definition of expected dividend yield	\bar{a}_1	\bar{a}_2	\bar{a}_3
Actual dividend yield	0.0059 (4.5)	0.0024 (1.6)	0.3173 (10.2)
Level-revised (LR) monthly dividend yield	0.0065 (4.9)	0.0022 (1.4)	0.1794 (6.1)
Dividend yield of 12 months ago	0.0038 (2.9)	0.0019 (1.3)	0.0376 (1.3)
Dividends declared in advance	0.0043 (2.5)	0.0035 (2.2)	0.0135 (0.1)

Notes: t -statistics are in parentheses under each coefficient;

Source: Miller and Scholes (1982, p.1124,1129).

The results of the study presented in Table 2.3 show that the dividend variable has a highly significant positive coefficient in the first two methods of estimating the dividend yield. However, if the last two methods are used in order to eliminate the announcement effect, the results indicate a small, statistically insignificant relationship between yields and return.

In a new paper, Litzenberger and Ramaswamy (1982) responded to this criticism and ran their regression again. In order to avoid Miller and Scholes' criticism, they built models to predict the dividend level. As shown in Table 2.4, they were successful in achieving their goal; the results are statistically significant in the dividend-effect dimension.

Table 2.4. Different estimates of the dividend yield effect for the period 1940-80

Definition of expected dividend yield	$\hat{\gamma}_0$	$\hat{\gamma}_1$	$\hat{\gamma}_2$
LR monthly dividend yield	0.00313 (1.81)	0.00484 (2.15)	0.233 (8.79)
Predicted dividend yield	0.00337 (1.95)	0.00470 (2.08)	0.151 (5.39)
Subsample dividend yield	0.00097 (0.52)	0.00527 (2.33)	0.135 (4.38)

Notes: t-statistics are in parentheses under each coefficient;

Source: Litzenberger and Ramaswamy (1982, p.441).

The Litzenberger and Ramaswamy (1982) study indicates that there is a positive but non-linear association between common stock and dividend yield, and that these significant yield effects cannot be related to the information content of the announcement effect.

Table 2.5. Some tests on the effect of the yield on returns

Test	Test period & interval	Implied tax rate (%)	Standard error of tax rate
Brennan	1946-65, monthly	34	12
Black and Scholes (1974)	1936-66, monthly	22	24
Rosenberg and Marathe (1979)	1931-66, monthly	39.5	21
Stone and Bartter (1979)	1947-70, monthly	56	28
Litzenberger and Ramaswamy (1979)	1936-66, monthly	23.6	3
Blume (1980)	1936-76, quarterly	52	25
Gordon and Bradford (1980)	1926-78, monthly	17.62	2
Morgan (1982)	1947-77, monthly	20.9	2
Miller and Scholes (1982)	1940-78, monthly	4	3
Litzenberger and Ramaswamy (1982)	1940-80, monthly	14-23	2-3

Notes: a positive implied tax rate on dividends means that investors require a higher pre-tax return from stock with a higher dividend yield.

Source: Litzenberger and Ramaswamy (1982, p.433), Brealey and Myers (1991 p.387).

There were more tests done on the effect of the yield on returns, in which capital asset pricing models with different personal tax elements were developed and used. A summary of these findings is presented in Table 2.2.5. Although not all of them are significant, they do result in a positive implicit tax rate on dividends. This result suggests that investors require a higher pre-tax return from high dividend-paying stock. This conclusion was criticized by Hess (1981) (6). Although he had found that the before-tax expected returns are related to dividend yields, he argued that the nature of this relationship is not consistent with the tax-induced effects hypothesized by an after-tax capital asset pricing model.

Tax change study. Morgan (1980) looked at the Canadian market before and after tax changes and found evidence consistent with the existence of a tax effect. In Canada, at the beginning of 1972, a fiscal reform was introduced by imposing a capital gains tax and modifying dividend income, an action which on the average leads to a slightly lower tax rate on dividend income. Morgan used Canada to examine the before-tax and after-tax versions of the capital asset pricing model. The presented results suggest that the Canadian stock market behaved as though dividends and capital gains were imperfect substitutes in the period 1968-1971, and substitutes afterwards.

Poterba and Summers (1984) examined the effects of dividend taxes on investors' relative valuation of dividends and capital gains in Great Britain. They studied the relationship between dividend yields and stock market returns before and after changes in the British dividend tax policy during the period of 1955-1981. They obtained strong evidence that tax changes can affect security returns and they furthermore suggested that a weighted average of the investors' tax rates may provide an approximation of the tax preferences prevailing in the market. Using daily as well as monthly British data, they found that changes in dividend taxation have an effect on the level of premium which investors require to induce them to receive returns in the form of dividends.

Morgan (1980), as well Poterba and Summers (1984), both found that the valuation of dividends changes in different tax regimes, a result that is consistent with the Brennan theory that personal taxes account for part of the positive relationship between yields and stock market returns.

3. Models based on Asymmetric Information

«[I]n the real world a change in the dividend rate is often followed by a change in the market price (sometimes spectacularly so). Such a phenomenon [...] might be called the “informational content” of dividends...»

Merton Miller and Franco Modigliani (1961, p.431).

3.1. Overview of the theory

A significant proportion of recent research efforts has been devoted to models in which dividend payments are determined by information asymmetry.

The introduction to economics of explicit by modeling private information has allowed a number of new approaches in explaining dividend policy relevance. According to these

theories, firm managers or insiders are assumed to possess private information about the firm's future returns and investment opportunities, which investors do not have. Contrary to Miller and Modigliani's (1961, p.412) assumption that «[a]ll traders have equal and costless access to information about the ruling price and about all other relevant characteristics of shares», the information content of dividend hypotheses is based on the assumption that managers possess more information about the firm's prospects than individuals outside it.

The possibility that capital markets are not perfect encourages the theory that information has a social value. Hakansson, Kunkel and Ohlson (1982) were the first to extend, correct and unify earlier statements about the social value of public information, which were based mostly on Hirshleifer's (1971) conclusion that with pure exchanges, information does not have any social value. This statement was so categorical because he found that either no one is better off with information, or that if an individual does happen to gain an advantage, it can only be at someone else's expense. In a later paper, which extended the results of Hakansson, Kunkel and Ohlson (1982) by incorporating personal taxes, Hakansson (1982) stated that dividends are damaging to efficiency when investors are substantially homogeneous, have additive utility and markets are complete. On the other hand, dividends can improve efficiency, even in the presence of deadweight costs, if at least one of the following three conditions is met:

- 1) investors have heterogeneous beliefs –they have different probability assessments of dividend payouts;
- 2) their utility is non-time-additive –they have differing attitudes about how they wish to allocate consumption expenditures over time;
- 3) the financial market is incomplete.

In Hakansson's opinion, these three effects may operate in a complementary fashion, but the power of informative dividends to serve as a substitute for financial markets is particularly notable. «[D]ividend announcements may under certain circumstances bring an incomplete market to or even beyond the level of efficiency that would be attained if the market were complete» (7).

2.3.2. Theoretical models based on information signaling by dividends

This hypothesis asserts that dividend payouts convey managers' inside information to outsiders. This idea comes from Lintner's (1956) classic study and was mentioned by Miller and Modigliani and empirically supported by Fama and Blahnik (1968).

In their earlier paper Modigliani and Miller (1959) found that a company's value depended on its expected future earnings, not only on its current ones. Hence, if earnings depend on permanent and transitory components, and dividends depend only on the former, dividends could serve as a surrogate for expected future cash flows. Modigliani and Miller called this surrogate relationship «the information content of dividends» (8). This was the first recorded theoretical statement about the information hypothesis. Later, Miller and Modigliani (1961, p.430) adopted Lintner's (1956) smoothing evidence, which stated that «where a firm has adopted a policy of dividend stabilization with a long-established and generally appreciated "target payout ratio", investors are likely to (and have good reason to) interpret a change in the dividend rate as a change in the management's view of future profit prospects for the firm».

Since these two papers, the information hypothesis has been mentioned in both articles (9) and textbooks (10) on financial management as a possible explanation of the relationship between dividends and stock prices. More recently, formal models of dividends and information signaling have been developed.

This research trend began with Akerlof (1970), who showed that market failure caused by an adverse selection bias can result from asymmetric information. The failure could be lessened if the informed parties had a method for communicating their information. The use of financial decisions as vehicles for signaling company value was first proposed by Leland and Pyle (1977) and Ross (1977), who applied Spence's (1974) signaling model to financial market phenomena connected with:

- 1) incomplete diversification by entrepreneurs;
- 2) debt-equity choices by firms.

Ross (1977) found that the Miller-Modigliani theory on dividend irrelevancy (11) implicitly assumes that the market possesses complete information about firms' activities. However, in order to set the value of a firm, the market evaluates the firm's perceived future returns. Changes in the perception of these returns could alter the perceived value of the firm. Capital structure or dividend payouts may be used by insiders as a vehicle to send unambiguous signals to the marketplace. The motivation for this lies in Riley's (1979, p.331) argument that «[i]f buyers are less well informed about product quality than sellers, market prices will reflect average quality. Sellers of high quality products therefore have an incentive to engage in some distinguishing activity which operates as a signal to potential buyers». Ross (1977) suggests that insiders use changes in capital structure to show the market that the firm's prospects have improved. Managers have an incentive to send unambiguous signals, because the signaling cost is equal to the expected bankruptcy cost. At a certain level of leverage, it is higher for managers with less positive information.

Bhattacharya dividend-signaling model (12). Ross' (1977) incentive-signaling concept was later applied by Bhattacharya (1979, 1980), who developed a model that can be used to explain why firms may pay dividends despite the tax disadvantages of doing so. Bhattacharya (1979, p.269) points out that Ross' model may break down because of the shareholders' incentive to make side payments to induce false signaling by employing higher levels of debt. In his model he adopted dividends as a means of sending unambiguous signals of expected cash flow. The fundamental condition in all financial signaling models is the assumption that those who benefit from the signaling do not liquidate their asset position at the time the signal is emitted. «If unconstrained liquidation with no effect on value is posited, then current shareholders, and their agents, clearly have an incentive to signal falsely and sell out at an inconsistently high value. [...] It is also likely that observations of insider trading, conditional on their signaling decisions in the current shareholders' interest, or eliciting (conditional) insider bids in a *tatonnement* model, will play a significant role in convergence to the equilibrium valuation schedule as a function of the signal» (13).

The other basic assumptions of this model are:

- 1) there are three points in time: $t=0, 1, 2$;
- 2) the current generation of shareholders plan to sell out to the new generation at $t=1$;

- 3) a firm has two projects with different and independent payoffs $\{X_t\}$;
- 4) the insiders are the only people who know the cash flow distribution of their projects;
- 5) there is no agency cost between the management and shareholders at $t=0$;
- 6) cash flows at $t=1$ can be communicated without cost or moral hazard;
- 7) current and future investors are risk-neutral with one-period horizons;
- 8) for notional simplicity there is no discounting;
- 9) there are deadweight costs of financing if the firm has to borrow at $t=1$ in order to pay dividends;
- 10) there are no tax payments.

What is the sequence of events in this model? At $t=0$ managers choose the project and «commit» to a dividend policy. At $t=1$ the project's payoff is realized, dividends are paid and the firm is sold to the new generation of investors. At $t=2$ the project's payoff is realized and consumed by the new generation.

Consider a numerical example where the deadweight cost of financing is 0.2 for every 1 raised. The payoffs $\{X_t\}$ are presented in Table 3.1.

Table 3.1. The costs and payoffs of the projects

Project	Cost	Payoff per period	Probability	Total Expected Value at $t=0$
1	25	20	0.8	$-25+2(0.8 \times 20+0.2 \times 0)= 7$
		0	0.2	
2	10	20	0.1	$-10+2(0.1 \times 20+0.9 \times 0)= -6$
		0	0.9	

First, at the beginning, assume that outsiders believe that the project chosen by the present shareholders is the first one with positive value. Hence, because expected cash flow at $t=2$ is 16, the value of the firm is also $V=16$.

$$(3.1) \quad CF_2=(0.8 \times 20+0.2 \times 0)= 16$$

The expected return at time $t=0$ is 7 if management chooses the better project and 8 if they choose the worse one.

$$(3.2) \quad R_1=-25+(0.8 \times 20+0.2 \times 0)+16= 7$$

$$(3.3) \quad R_2=-10+(0.1 \times 20+0.9 \times 0)+16= 8$$

Hence, return on the second project is higher, so it is better for the current owners to choose the worse project. Since outsiders believed the firm would choose the first project, we are not in equilibrium.

Similarly, now suppose that outsiders believe that the management will choose the second project. How much are the outsiders prepared to pay as the firm's liquidation value at $t=1$? At that time, only the expected cash flow of 2 remains, so the firm's value is also $V=2$.

$$(3.4) \quad CF_2 = (0.1 \times 20 + 0.9 \times 0) = 2$$

Therefore, the expected return at time $t=0$ if managers choose the better project is -7 , and if they choose the second project -6 .

$$(3.5) \quad R_1 = -25 + (0.8 \times 20 + 0.2 \times 0) + 2 = -7$$

$$(3.6) \quad R_2 = -10 + (0.1 \times 20 + 0.9 \times 0) + 2 = -6$$

Since both projects have negative value, the belief that the firm will choose the second project also does not stand in equilibrium.

This projection shows that if the firm does not commit itself to paying dividends, then the only conclusion that can be reached in equilibrium is that no project will be undertaken and hence the firm's value is 0.

Now consider the situation when at $t=0$ the firm commits to pay dividends at $t=1$. If the commitment is that the dividend payment will be equal to 20, then the company will be able to meet this obligation only if the project is successful. If it is unsuccessful, the firm will have to borrow the money and carry the deadweight costs of borrowing.

Let's consider what happens when the firm commits to pay dividends of 20, and outsiders believe that the chosen project is the better one, irrespective of whether managers take project 1 or 2. At $t=0$ the expected values of choosing these projects are 6.2 and 4.4.

$$(3.7) \quad R_1 = -25 + (0.8 \times 20 + 0.2 \times 0) - (0.2 \times 0.2 \times 20) + 16 = 6.2$$

$$(3.8) \quad R_2 = -10 + (0.1 \times 20 + 0.9 \times 0) - (0.9 \times 0.2 \times 20) + 16 = 4.4$$

In this case, the insiders will choose the best project and the outsiders' beliefs are fulfilled. But now the firm is still not in equilibrium, because it did not choose the optimal dividend level. Bhattacharya's suggestion was that companies need to commit themselves to the level which diversifies projects best, but minimizes the payment of deadweight costs. This is the case when the dividend payment is such that the firm is indifferent as to which project to choose. Therefore, the optimal level of dividend (D) could be found as follows:

$$(3.9) \quad R_1 = R_2$$

$$(3.10) \quad -25 + 16 - (0.2 \times 0.2 \times D) + 16 = -10 + 2 - (0.9 \times 0.2 \times D) + 16$$

$$(3.11) \quad 7 - 0.04 \times D = 8 - 0.18 \times D$$

$$(3.12) \quad 0.14 \times D = 1$$

$$(3.13) \quad D = 7.14$$

This implies that the expected return of the projects is equal to 6.71.

$$(3.14) \quad R_1 = -25 + (0.8 \times 20 + 0.2 \times 0) - (0.2 \times 0.2 \times 7.14) + 16 = 6.71 = R_2$$

In this case, equilibrium exists: when the firm commits itself to the above dividends 7.14, because it is going to choose the best project, then investors' beliefs will be fulfilled. Since there are costs of paying dividends, the company will incur losses if it were to pay higher than optimal dividends, and at time $t=0$ their expected value would be lower.

Summarizing this part of the analysis, we found that, because of the cost of raising external funds for cash dividend payments, it is expensive for bad firms to mimic the signals of more successful ones. The fact that sending signals through dividends is expensive for less successful firms means that dividend payments give valuable information about the true value of a company, which cannot be fully communicated by other instruments, such as annual reports, earnings forecasts, or presentations before security analysts. If these conclusions are correct, then an unexpected dividend increase could be taken as a favorable signal about the increasing profitability of new projects.

Up to now our analysis has been based on assumption (10), that the firm is not paying taxes. How does this situation change if we include tax payments in our analysis? If we assume that only dividends paid at $t=1$ are subject to tax and that the tax rate is equal to t , then our optimum dividend payment looks like this:

$$(3.15) \quad -25 + 16 - (0.2 \times 0.2 \times D) - t \times D + 16 = -10 + 2 - (0.9 \times 0.2 \times D) - t \times D + 16$$

$$(3.16) \quad D = 7.14$$

Therefore, we find that tax has no effect on the optimal level of dividend payment. It only has an effect on the profitability of the project, which is equal to the expected return before tax minus tax payment.

$$(3.17) \quad R_1 = -25 + 16 - (0.2 \times 0.2 \times 7.14) + 16 - t \times 20 = 6.71 - t \times 20$$

Hence, for tax reasons dividend payments are a costly signal if they are taxed. However, this tax payment can be traded off against the dividend signaling value.

John and Williams (1985) signaling model. This is a formal model where taxes on dividends themselves are the dissipative costs. In contrast to signaling theories, where it was necessary in addition to explain why share repurchases could not achieve the same objective as dividends, but at a lower cost, this theory makes the dividend payment signal more valuable, because the tax cost makes dividends desirable. In the model, John and Williams make additional assumptions besides the classic one: that the firm's managers are the only ones who know the true value of the firm.

The additional assumptions are:

- 1) taxes are paid only on dividends;
- 2) no transaction costs are incurred when issuing, retiring, or trading shares;
- 3) all sources and uses of a firm's funds are fully observed by outsiders through cost-free public audits, but not its complete production technology.

This last piece of information could be convincingly sent to outsiders only through dividends and new issues of shares. Furthermore, the signaling equilibrium arises only if the demand for cash by the firm and its current stockholders exceeds the supply of internal funds. With symmetric information and taxes, outsiders would be able to make a correct assessment of the firm's value and the firm, therefore, would optimally pay no dividends. Whereas, with asymmetric information and no taxes, the optimal signaling function does not exist, and dividends convey no information. The liquidity needs arise when firms need to raise funds for investment or when current shareholders need to sell their shares. Reducing dilution on either a corporate or personal account is clearly more valuable to current stockholders when the price of their shares is more favorable. Otherwise, if the firm is undervalued at the time the firm or the shareholders must meet their liquidity needs, then they would be selling at a price below the true value.

All other things being equal, those firms with more favorable information pay larger dividends optimally and realize higher prices for their stock. In equilibrium, corporate insiders distribute dividends because outsiders find that the more valuable firms pay higher dividends. Insiders increase dividends until the marginal cost of additional dividends equals the net marginal benefit to current shareholders. Then the current shareholders capture all economic rents net of taxes on dividends. In this model, taxes are critical –without taxes or other costs of paying dividends, there is no signaling equilibrium because the poorer firms would be able to mimic the good ones.

Miller and Rock signaling model. This two-period model does not rely on the assumption about firms' «commitment» to the level of dividends but on the assumption that firms' earnings are correlated through time. Outsiders cannot observe either the profitability of a project, or the level of earnings, or the level of an investment. In this model, at $t=0$ managers choose a project which produces earnings at $t=1$ and spend it on new investments and dividend payments. Investment in new period $t=1$ produces earnings at $t=2$. At $t=1$ some shareholders could sell their rights in the firm, so the firm has an incentive to make them believe that at this time earnings are high, so the price of the shares is high too. What is the value of the equity (V) at time 1?

$$(3.18) \quad V_1 = \tilde{X}_1 - I_1 + \frac{1}{1+i} E(\tilde{X}_2)$$

Where X is the random earnings stream, I is firm investment and i is the appropriate risk-adjusted rate for the firm's expected earnings. As we can see, without any information asymmetry it is the original Miller-Modigliani proposition that dividends are irrelevant. If there is information asymmetry, this equation is described by taking into account the assumption about market expectation. The evaluation of the firm's random earnings stream X is a function of the amount of investment plus a random increment e with zero mean, i.e., $E(e)=0$.

$$(3.19) \quad \tilde{X}_1 = F(I_0) + \tilde{e}_1$$

$$(3.20) \quad \tilde{X}_2 = F(I_1) + \tilde{e}_2$$

Although the expectation of each random shock is zero, the conditional expectation of the second period random increment is not necessarily zero.

$$(3.21) \quad E_0(\tilde{e}_1) = E_0(\tilde{e}_2) = 0$$

$$(3.22) \quad E(\tilde{e}_2 | e_1) = ye_1$$

Where y is an assumed coefficient of persistence with $0 < y < 1$, so the market is assumed to adjust only partially to new information. If $y=1$, the first period shock is permanent, but if $y=0$ it is fully short-lived.

According to Miller-Rock, the announcement effect is necessarily to compare pre-announcement and post-announcement expectations about changes in shareholders' wealth. If we use the notation E_0 to serve as a reminder that expectations are formed before the announcements are made, the pre-announcement value of the firm can thus be expressed as:

$$(3.23) \quad E_0(V_1) = E_0(\tilde{X}_1) - E_0(I_1) + \frac{1}{1+i} [E_0(F(I_1))] \\ = F(I_0) - I_1 + \frac{1}{1+i} [F(I_1)]$$

The corresponding post-announcement value of shareholders' wealth is:

$$(3.24) \quad V_1 = X_1 - I_1 + \frac{1}{1+i} [E_1(X_2)] \\ = F(I_0) + e_1 - I_1 + \frac{1}{1+i} [F(I_1) + ye_1]$$

Subtracting (3.24) from (3.23) gives the announcement effect:

$$(3.25) \quad V_1 - E_0(V_1) = e_1 \left[1 + \frac{y}{1+i} \right] = (X_1 - E_0(X_1)) \left[1 + \frac{y}{1+i} \right]$$

Thus, we could expect share price changes at the announcement time to be proportional to the persistence factor and the «earnings surprise». The Miller-Rock theory shows that earnings, dividend payments and financing announcements are closely related. They used Miller and Modigliani (1961) constraints about sources and uses of funds in order to show that earnings and dividend surprises can convey the same information.

$$(3.26) \quad X_1 + m_1 P_1 + B_1 = I_1 + D_1$$

$$(3.27) \quad D_1 = X_1 + m_1 P_1 + B_{-1} - I_1$$

Where mP is the proceeds from an issue of external equity (m - the number of new shares, P - the price per share) and B_1 - the proceeds from new debt raised. Assuming that expected and actual investment are at an optimum level (and hence equal) and that there was no unexpected issue of new equity or debt, then the difference between the actual and the expected dividend is:

$$(3.28) \quad D_1 - E_0(D_1) = X_1 + m_1 P_1 + B_{-1} - I_1 - E_0(X_1 + m_1 P_1 + B_{-1} - I_1)$$

$$(3.29) \quad D_1 - E_0(D_1) = X_1 - E_0(X_1)$$

Thus, the earnings surprise and the net dividend surprise convey the same information: an unexpected increase in dividends will increase the value of the firm, and an unexpected decrease will be interpreted as bad news about the future prospects of the company.

Since outsiders are only able to observe dividend payments and issues of new debt and equity, and not earnings and investments, firms can pretend to have high earnings by cutting their investments and paying out high dividends instead. In this model, the dissipative cost which allowed signaling to occur is the distortion in the firm's profitable investment decisions, and the announcement effects emerge as implications of the basic valuation model.

In the aforementioned models dividend payments convey information about a firm's value. In each instance, it is costly for low-value firms to mimic the dividend payment of high-value firms. If investors cannot distinguish bad firms from good ones, Akerlof's (1970) lemons model shows that the average price response to financial signals (dividends, in this case), cannot therefore be positive. Hence, the credibility of this signal depends on whether false signaling is expensive to those who are signaling. In Bhattacharya (1979) the dissipative cost which allowed signaling to take place was the transaction costs arising from having to resort to outside financing. In Miller and Rock (1985), the dissipative costs arise from the distortion in the firm's investment decision. John and Williams (1985) show a theory where it is the taxes on dividends themselves that are the dissipative cost.

3.3. Models based on signaling by dividends and share repurchase

The previous models of dissipative signaling just through dividends provided only partial answers to the question of why firms should distribute dividends rather than repurchase shares. Other theoretical single-period models including signaling by using multiple corporate signals have been developed by Ambarish, John and Williams (1987), Williams (1988), and Ofer and Thakor (1987). Vermaelen's (1981) model signals only by share repurchase and Kumar (1988) informs about productivity levels.

Productivity signaling model. A model where dividends are used as «coarse» signals has been presented in Kumar's (1988) paper. In his model insiders have superior information about a firm's productivity compared with outsiders but limited investment capability. The firm's production function has a diminishing marginal product of capital. Additionally, managers are more risk-averse than investors. Investors are a diverse disparate group whose communication with insiders is through the level of dividend payments. If the marginal product of capital is large, managers are better off, as the amount of investment increases; however, because their resources are fixed, their share in the company during this

process decreases. This process gets to the point where the fall in the managers' share is offset by increasing output. Because the managers are more risk-averse than investors, this point has a lower level of productivity than the optimal one.

In Kumar's theory, the dividend level gives a signal to investors about how much they can invest. Insiders cannot deviate from this payment in order to give a false signal about their productivity level because in any case they would be worse off receiving shares in the company beyond their desired level.

Share repurchase signaling model. In his studies of corporate common stock repurchases, Vermaelen (1981) identified information signaling as the main motive for premium repurchase offers. His signaling model is similar to the one Ross (1977) developed, but in Vermaelen's model the penalties for managers are large compared to the side payments which could be received from shareholders. If managers do not possess inside information, the managers become more expropriated as the insider holdings, tender price, and proportion purchased become larger. When the proportion repurchased equals the amount of non-insider shareholders –which could be the extreme case– managers carry the total burden of the expropriation.

This model assumes that insiders have an incentive to increase the firm's stock price by announcing a stock repurchase in the form of a tender offer. It happens because they own stock options or receive side payments from tendering shareholders. There is a two-time-point model, $t=0, T$. The time of announcement $t=0$ and the time $t=T$, where the 'true' value of the shares becomes publicly available. If the managers have no positive information, but decide to repurchase shares above their «true» value, their decision will hurt the non-tendering shareholders at time $t=T$. To the extent of managers' holdings in the company at time $t=T$, they will carry the burden of the expropriation in proportion to the premium offered and the amount of shares repurchased F .

The amount of insiders' holdings at time $t=T$ is the most important factor in persuading outsiders to perceive the tender offer positively. For the purposes of signaling, it is very important that insiders commit themselves not to tender their shares and that this commitment is made known to the investors (14). After this, the fraction held by insiders will depend on the size of insiders' holdings at time $t=0$ and the fraction purchased F . The amount purchased F depends on the outcome of the offer and if the offer is oversubscribed, on the post-expiration purchase decision of the firm. Firms always commit themselves to repurchase all the shares tendered below the target fraction F^* , so the larger F^* is, the larger the expected repurchase fraction.

After this presentation, we have sufficient conditions –similar to Spence (1973)– for positive signals to be sent to the market. Vermaelen predicts that repurchase signals depend on the insiders' holdings in the company, the purchased target fraction F^* and the level of premium above the pre-announcement price. From the managers' point of view, the higher the value of the information they hold, «the lower the marginal cost to insiders of buying back larger fractions, offering a higher premium and holding more shares in the firm» (15).

Multiple signaling models. In the paper by Ambarish, John and Williams (1987), corporate insiders can convey information to outsiders through many combinations of dividends and announced investment, or through dividends and either sales or repurchases of stock. The efficient signaling equilibrium of dividends and investment

minimizes the dissipative cost of signaling. In this model, corporate insiders have superior information about a firm's future returns on either assets in place or investment opportunities. Because of this kind of asymmetric information, any announcement of new investments –or net increases in new stock– is positive only when there is no asymmetric information about assets in place. It is negative if outsiders know about the firm's investment opportunities.

Ambarish, John and Williams' (1987) model –as in Miller and Rock (1985)– assumes that the dissipative signaling costs come from distortions in the company's investment decisions. In the first case from accepting projects with negative net present value, in the second from rejection of positive NPV projects.

Williams (1988) extends a previous study of Ambarish, John and Williams (1987) by including the possibility of investment in financial assets in his model. In equilibrium, each firm invests to maximize the net present value of its risky real assets, sells stock in the capital market in order to finance the investment and distributes dividends which support the sale of stock. Better firms distribute dividends which support the sale of stock and distribute larger dividends that distinguish all firms in the efficient equilibrium. In the optimum case, companies do not retain financial securities and invest first from their internal sources, later going to the market and selling sufficient shares only to finance their optimal investment in real assets. One of the weaknesses of this model is that it does not explain why firms distribute dissipative dividends if the repurchase of stock and simultaneous sale of debt can give credible communication without dissipative costs.

Ofer and Thakor (1987) offer a model where managers can signal their firm's true value by using either a dividend or a stock repurchase or both. In this model the deadweight cost for the firm's manager who is sending signals is different for stock repurchase than for dividend payments. Dividends are costly because necessary external financing is more expensive than internal financing, especially because it has to be carried until the end of its planning horizon. In the repurchase case, although the rise of external financing has no continuous horizon, managers still have the additional cost of increasing undiversified holdings of their own firm's stock due to the repurchase. Ofer and Thakor (1987) conclude that because of this there are different signaling cost structures for the two cash-disbursement mechanisms. The managers' task is to minimize the deadweight cost for sending the signal about the «true» value of the firm. When the difference between the market and the «true» value is small, the firm needs to use dividends in order to send signals to investors, because the cost is low compared to a stock repurchase. However, when the disparity between the «true» intrinsic worth of an undervalued firm and its market price is high, a relatively large dividend is needed for informative consistent signaling. Then the managers find tender offer repurchases a less costly alternative.

Because of its treatment of vector-valued signaling, this model differs from others presented in a previous subchapter in which the firm makes signals using only dividends, and from Vermaelen's (1981) model, where it signals only through a stock repurchase. With respect to the utilization of multiple signals to reveal a single unknown attribute, Ofer and Thakor's analysis resembles those of Ambarish, John and Williams (1987) and Williams (1988). Their model does not assume a tax disadvantage for dividends. The signaling cost structure for repurchase differs from Vermaelen's model because the tender-offer price is exogenous: it can take any value as long as it exceeds the firm's true value, even though it is recognized that it potentially communicates valuable information. In this model, all variables carrying information, including the offer price, are endogenously and uniquely determined.

3.4. Information superiority of dividends against share repurchase

In order to answer why a particular form of payout is chosen, it is necessary to explore the possible explanations about the choice of the payout mechanism. Given the relative dominance of regular cash dividends compared to stock repurchases, the cost/benefit trade-off associated with these alternative payout methods must be differential. Because of the dividend tax disadvantage, it could be worth finding a credible explanation about the informative benefits of a cash dividend, or there is a cost of share repurchase which could be explained by asymmetric information models.

An important question which led to the concern about dividend payments in financial literature was the possibility of using share repurchases instead of paying more heavily taxed dividends. If share repurchases could be made on a regular basis, it would seem that the information could be sent to the market in such an advantageous way that the method would predominate. However, regular repurchases are likely to be taxed on the same basis as dividends, so the advantages of share repurchase could diminish (16).

The provisions of Section 302 of the Internal Revenue Code treat redemption of stock as a capital gain only if one of the following is applicable (17):

- 1) the redemption is «substantially disproportionate» to the extent that, after the repurchase, the percentage ownership of the shareholder must be less than 80% of the percentage ownership he had prior to the repurchase;
- 2) the stock is issued by railroad companies in certain reorganizations, defined by section 77(c) of the Bankruptcy Act;
- 3) the distribution is «essentially not equivalent» to paying a dividend.

There are some arguments that a combination of share repurchases and dividends might be feasible. But then when repurchases are organized in a random way it could be difficult to structure them and dividend payments in a way that observers would perceive as stable. Additionally, Lakonishok and Vermaelen (1990, p.456) argue that repurchase tender offers alone create substantial price uncertainty and therefore more opportunities for potential malpricing. This exposure increases because investors have to estimate more parameters to work out post-expiration prices:

- 1) the fraction of shares tendered;
- 2) subsequent repurchase decisions by the insiders.

In asymmetric information models the basic assumption is that insiders have information that is not available to outside stockholders. Barclay and Smith (1988) and Ofer and Thakor (1987) try to show that managers can use inside information to benefit themselves by means of share repurchases. However, because there are costs associated with this use of the information, managers are forced to use dividends to distribute cash instead of share repurchase.

Agency costs in open-market share repurchase. Barclay and Smith's (1988) study assumes that managers act in their own self-interest, so that if corporate policies give them an opportunity to benefit at shareholders' expense, they will take it. Jaffe (1974) and Seyhun

(1986) found strong evidence that managers have superior knowledge about the value of the companies run by them. If there were no adverse stockholders' reactions, they could benefit themselves by repurchasing shares when the shares are undervalued and selling them when they are overvalued. The danger of expropriation comes not only from the managers' flexibility in timing their purchase, but also from the possibility of manipulating the flow of information. They could advance the release of bad news before a repurchase and delay good news until the end of an open-market repurchase.

The agency cost associated with open-market repurchases (OMR) arises from increased trading activity by the better informed managers in the secondary market. Barclay and Smith's analysis implies that this trading increases the bid-ask spread, reduces the liquidity of the firm's shares and thereby increases the cost of the firm's capital and reduces its market value. They quote Treynor (1971), Glosten and Milgrom (1985), and Easley and O'Hara (1987) in finding that specialists in their role of market-makers who adjust the price to equate supply and demand expect to lose to informed traders. What they lose to informed traders, they need to recover from others through the spread between the price at which they buy and the price at which they sell. The spread in some way becomes a function of informed traders, and their rise makes the spread wider. Amihud and Mendelson (1986) developed and tested a model where the cost of capital was an increasing function of the bid-ask spread.

Contrary to OMR, payment of cash dividends does not affect the liquidity of the secondary market for the firm's shares. Although most of the cost of OMR could be reduced through the announcement of an inter-firm tender offer, it would not eliminate it completely. Tender offers still give managers the advantage of being able to choose the time of the offer and altering the flow of information. The cost of negotiated repurchases harms shareholders the most. This is mostly because this form of share repurchase allows managers to treat members of the same class of security holders in different ways.

Hence, we have Barclay and Smith's explanation about investors' cash dividends' preference being based on costs arising from the information disparity between managers and shareholders.

In addition to these costs, they find that transaction costs of cash dividends are comparatively small and largely fixed. «The mailing expenses should be small, since the incremental cost of including a dividend check with other financial statements sent to shareholders is virtually zero and is insensitive to the dollar value of the check» (18). OMR transaction costs are small, too, especially if they are spread over time, but in this case the agency costs are largest. The largest are transaction costs associated with tender offers, which are similar to the cost of raising new issues of equity, which Smith (1977) found to be 7-15% of the total proceeds of the issue up to \$10 million (19).

3.6. Empirical evidence

Survey of the methodology. An acceptable theory of signaling via dividends must be supported by empirical data. In particular, such a theory should provide empirically testable propositions that detail the effects of announced dividends on stock prices. If dividends do have information content, then in a semi-strong efficient capital market this will be reflected in stock price changes immediately after a public announcement. The changes will be a sign of managers' expectations about permanently higher or lower levels of cash flows from investment in the future. Unexpected rises/falls in dividend levels should therefore have a positive/negative effect on stock prices.

Before presenting the results of empirical studies it could be worthwhile analyzing the basis of methodological analysis of signaling hypotheses. If changes in dividends do carry information about the firm's prospects, then around the time when the market absorbs that information we should expect to observe a change in share prices in the form of abnormal returns. The models used to find expected return are:

1) market model

$$(3.30) \quad R_{jt} = a_j + b_j R_{mt} + \varepsilon_{jt}$$

2) Capital Asset Pricing Model (CAPM)

$$(3.31) \quad R_{jt} = R_{ft} + [R_{mt} - R_{ft}] \beta_j + \varepsilon_{jt}$$

3) empirical market line

$$(3.32) \quad R_{jt} = \hat{y}_{0t} + \hat{y}_{1t} \beta_j + \varepsilon_{jt}$$

where:

R_{jt} – return on security j for period t ;

R_{mt} – return on the market portfolio for period t ;

a_j – constant term for security j ;

b_j – the sensitivity of the return on security j to the market portfolio;

β_j – systematic risk of security j ;

\hat{y}_{0t} – the best estimator for intercept;

\hat{y}_{1t} – the best estimator for slope;

ε_{jt} – residual return for security j .

A residual return is the difference between the actual return and the return estimated by the model:

$$(3.33) \quad \varepsilon_{jt} = R_{jt} - E(R_{jt})$$

Expected value of ε_{jt} needs to be zero, but if there is information content then we can measure the value of the information by computing the abnormal performance index (API). API represents the value of investments in the portfolio before the information announcement and held for T periods of time. It is computed as follows:

$$(3.34) \quad \text{API} = \frac{1}{N} \sum_{j=1}^N \prod_{t=1}^T (1 + \varepsilon_{jt})$$

where:

N – the number of companies in a portfolio;

T – number of periods (days or months);

ε_{jt} – abnormal performance measured by deviations from the model.

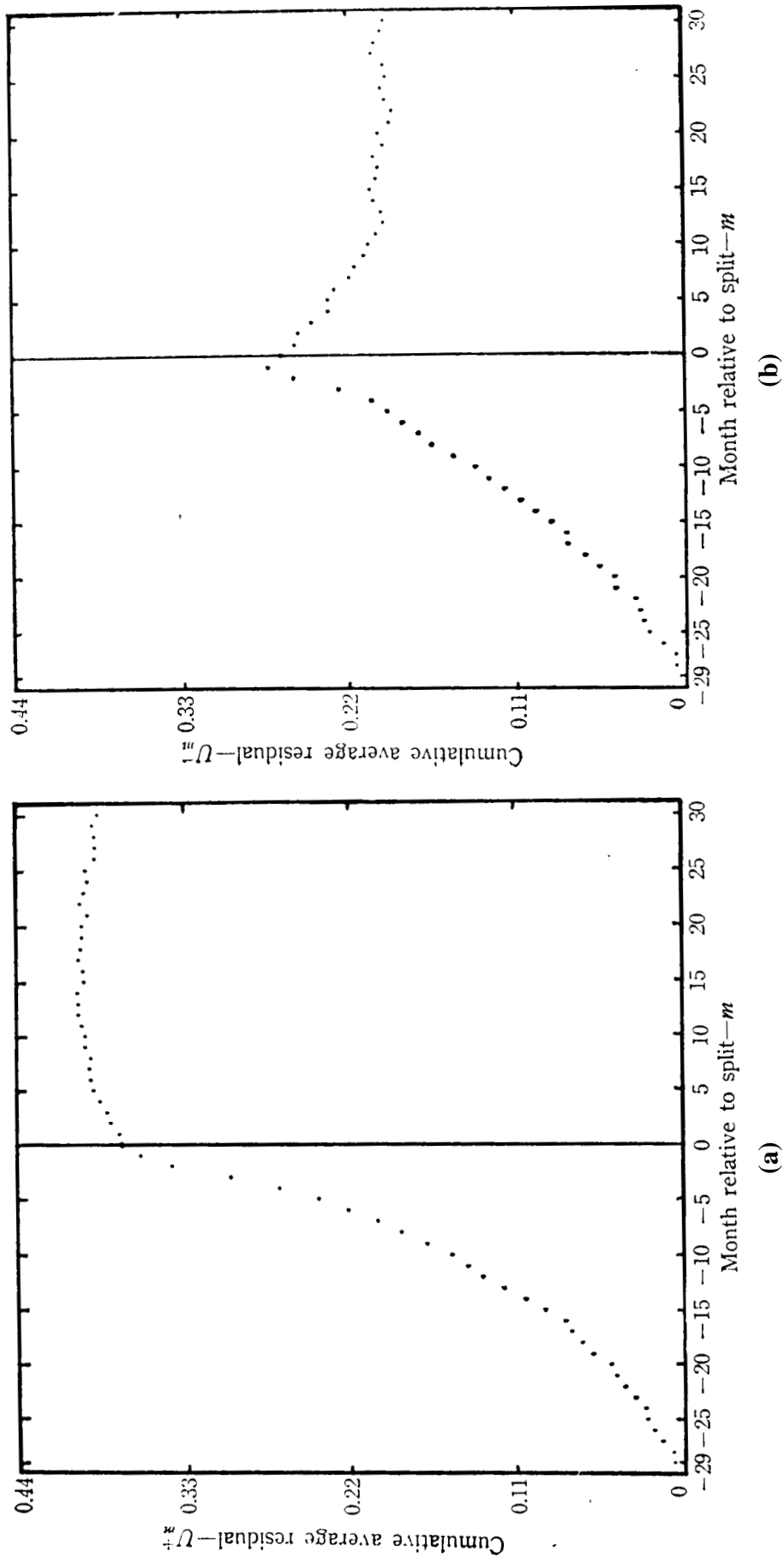
Observed dividend changes methodology. Fama, Fisher, Jensen and Roll (1969) were the first to test the announcement effect of dividend increases in their study of stock split. Cumulative average residuals were calculated for 940 splits done by US companies between January 1927 and December 1959 using a simple market model. The sample was divided into those firms that increased their dividends above the average for the market in the interval following the split and those that paid out lower dividends.

The results reveal that there was a statistically significant, positive mean, risk-adjusted stock return during the announcement months for the group that announced dividend increases. The firms that decreased dividends showed a significant decline in share price. The stock price performed poorly until about a year after the split, by which time it seems to be clear that the anticipated dividend increase would not be realized. Figure 2 shows the cumulative average residuals using monthly data for an interval of 60 months around the split ex date.

Pettit's (1972) investigation was another pioneering study which looked at this issue. The author used monthly and daily data, and a simple market model, in order to find the abnormal performance index calculated by compounding the periodic average unexpected return from a number of periods before and a number of periods after the announcement date.

Figure 2. Cumulative average residuals for split with (a) dividend increases and (b) decreases

ADJUSTMENT OF STOCK PRICES

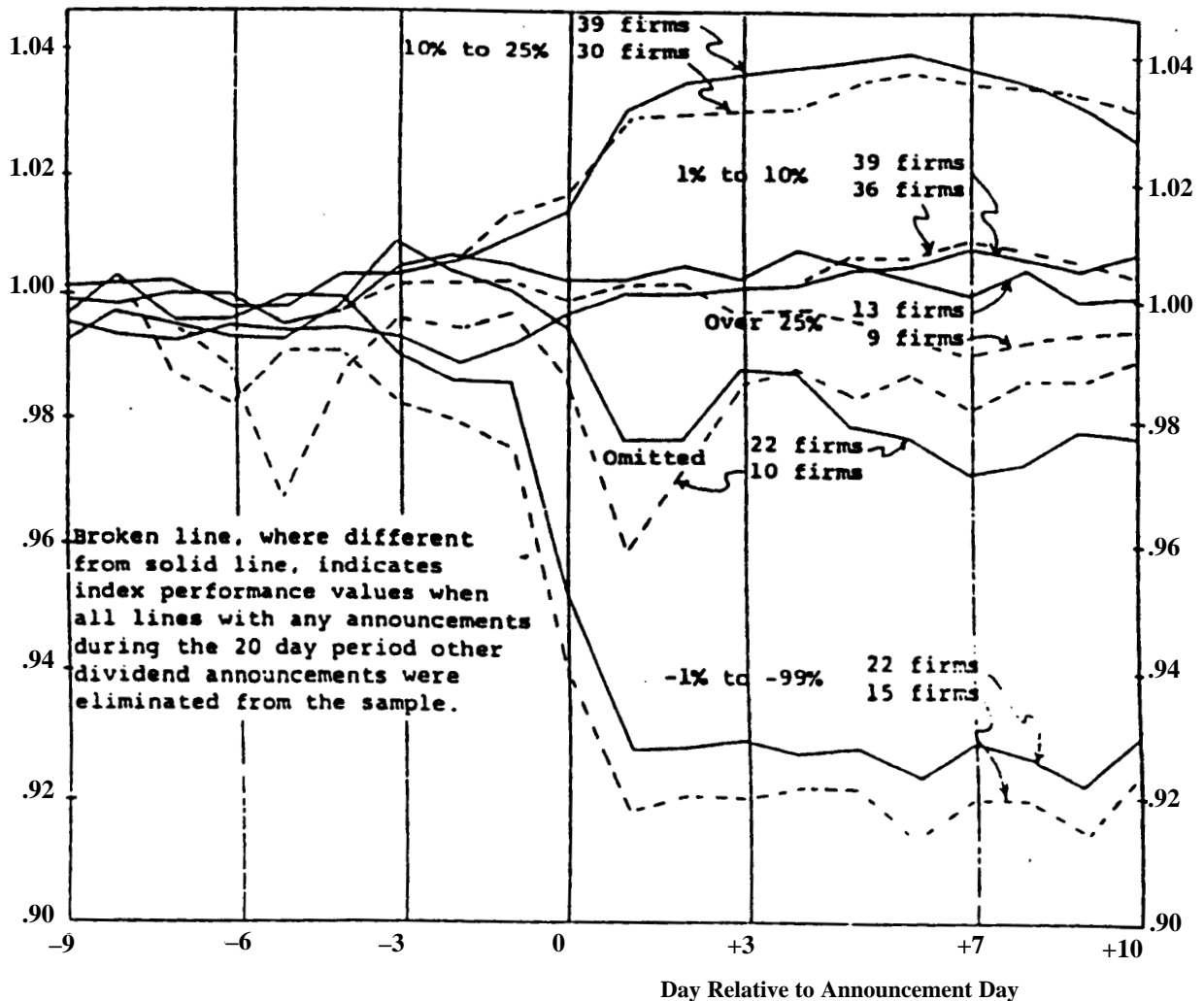


Source: Fama, Fisher, Jensen and Roll (1969, p. 15)

$$(3.35) \quad \text{API}_\tau = \prod_{t=1}^{\tau} \left(1 + \frac{1}{n} \sum_{i=1}^n \delta_{it} \right)$$

Approximately 1000 dividend changes, exclusive of extra or special dividends, announced by a set of 625 New York Stock Exchange firms for the period January 1964 through June 1968 were used to construct the API of companies that had dividends: omitted, initial, no changes and changes of -1% to -99%, 1% to 10%, 10% to 25%, and over 25%.

Figure 3. Abnormal performance index for dividend announcement effects, using daily data



Source: Pettit (1972, p.1004).

Cumulative APIs with daily data of 135 announcements made in the period 1967-1969 were found for firms that had dividends omitted and changed from -1% to -99%, 1% to 10%, 10% to 25%, and over 25%. Figure 3 demonstrates results for dividend announcements studied on a daily basis.

The results of both monthly and daily data were very similar. The most dramatic movements occur on day zero, or on the following day. The price changes appear to be significant. This leads Pettit to conclude that the market makes use of announcements of changes in dividend payments in assessing the value of a security, which is unequivocal proof that substantial information is conveyed by the announcement of dividend changes.

The unusual thing shown by Figure 3 is the relatively small effect on performance of the announcements of changes of over 25%, which is smaller than for changes of 1% to 10%, and the weaker reaction to announcements of dividend omission. This last finding seems to contradict DeAngelo and DeAngelo's (1990) study, which supported managers' reluctance to omit and not simply reduce dividends. In contrast, Pettit's study supports the policy of omitting dividends when there are financial troubles rather than cutting them, which in his study is more heavily penalized.

Pettit's results have been criticized because in his study he analyzed all dividend changes independently of market expectations about their level. Of course, if dividends do have information content we can find it only if we measure market reaction towards unexpected changes in dividends.

Naive expectation model. Aharony and Swary (1980) try to pass over this problem by assuming that market expectations about quarterly dividend payments are equal to the previous quarter's installment. In this «naive expectation model»

$$(3.36.) \quad \hat{D}_{j,q} = D_{j,q-1}$$

where:

$\hat{D}_{j,q}$ – expected dividend per share for the j -firm in the q -quarter;

$D_{j,q-1}$ – dividend per share paid in the previous quarter;

$D_{j,q}$ – actual dividend per share announced by the j -firm in the q -quarter.

Hence, a regular dividend announcement is considered favorable if $D_{j,q-1} > \hat{D}_{j,q}$, neutral if $D_{j,q-1} = \hat{D}_{j,q}$ and unfavorable if $D_{j,q-1} < \hat{D}_{j,q}$. The justification for their assumption lies in the finding that 87% of their sample cases fall into the category of no change in quarterly dividend payments. They were supported by Laub's (1972) study, which showed that the adjustment process of quarterly dividends is more likely to be discrete. Furthermore, in Handjinicolaou's (1982) study, stock price reactions to announcements of unexpectedly high/low dividends were examined where the classification of stocks was based on different prediction models. The results of the investigations show that unexpected dividend changes based on the naive model had the strongest impact on stock prices.

Additionally, in order to separate the dividend announcement from the earnings announcement, they focused on dividend announcement dates that differ from

earnings announcement dates by at least 11 days. For dividend increases they found statistically significant average excess returns of 1% over a two-day announcement period. Their findings support the hypothesis that changes in quarterly cash dividends provide useful information beyond that provided by corresponding earnings figures. Hence, the effect of earnings announcements cannot explain the observed stock price behavior around dividend announcements.

Following a similar line of investigation, Kane, Lee and Marcus (1984) also selected a set of firms whose quarterly dividend and earnings announcements were separated by at least 10 days, and used a «naive expectation model», in which cumulative abnormal returns were a function of earnings and dividend surprise. Their findings also support the hypothesis that dividend announcements have a significant effect on stock prices. In addition, they found that dividend surprises have a greater effect on the price of the stock (20) than earnings surprises, and that there is an interaction, or corroboration effect, between dividend and earnings surprises which is statistically significant. However, Leftwich and Zmijewski (1991), who did a similar study, did not find such a relation when they used a three-day period.

Studies based on Lintner-type expectation models. This «naive expectation model» was criticized in Kwan's (1981) paper (21) because of its assumption that the market has the same expectations about possible rises or falls of the dividends. In order to measure market reaction toward unexpected dividend changes, he improved Pettit's approach by excluding from the portfolio of dividend changes those which could be expected by the market. First, he constructed dividend prediction intervals employing Lintner and Fama-Babiak models (22). All dividend decreases in a 95% prediction interval around expected dividend payments were excluded from the sample. Additionally, he excluded all cases where, within five trading days of the dividend announcement, other relevant corporate news was released to the market. Kwan assumed relevant information to be anything reported daily in the *Wall Street Journal* and summarized in the *Wall Street Journal Index*.

The empirical evidence for the period 1973-1977 showed support for the information content of dividends. In contrast to Pettit, Kwan found that cumulative average residuals for the subgroup of unexpectedly large dividend changes (with 45 announcements) lies above that of smaller deviations (with 69 announcements). This is strong backing for information relevance because it shows that the further away the announced dividend is from its expected figure, the more information the announcement conveys.

Investigations based on dividend initiations. So far we have seen some trends in empirical findings which have been used to evaluate the information content of dividends. This evaluation depends on the level of expectation. The amount of information that dividends send is related to the deviation from what is expected. In Pettit's study the change in dividends was tested, so it was assumed that share price reaction was directly linked to the change in dividends. Later studies try to separate dividend information from other announcements which could be relevant to share prices. In Kwan's (23) last analysis paper the author tries to predict market expectations about dividend levels. In order to do this, he employs expectation models about dividend payments. He uses Lintner and Fama-Babiak models, which are analyzed later, in which the predicted dividend payment depends on the previous level of dividends and current and past profit figures. This approach adds weight to the findings because the test of dividend relevance is linked to the test of dividend smoothing models.

Asquith and Mullins (1983) tried to avoid this path in their study. In order to find the effects of dividend surprises they looked at cases where the dividend expectation is near 0. This happens in firms which have just started dividend payments, or who have not paid them for a long time. Asquith and Mullins considered a sample of 168 companies that had not paid dividends for at least 10 years. For these firms the initiation of dividends comes as a surprise and the magnitude of the new dividend is then a measure of the degree of surprise. If dividend initiation is unexpected, and initial dividends are most likely to be unexpected, the market reaction on announcement day should capture the full effect.

The empirical results of this study show large and significant positive excess returns for two-day announcement periods, both for initial and subsequent dividend increases. Excess returns were 3.7% with t -statistic equal to 6.56 for all 160 dividend announcements. In order to separate the dividend announcement effect from other relevant information which could influence the result, Asquith and Mullins screened the announcement cases to 88 where no other events took place within ± 10 days. The two-day excess returns and associated t -statistics for this sample were even better, at 4.7% and $t=5.88$ respectively. These results suggest that dividends convey unique and valuable information to investors and that the market's positive reaction to the dividend announcement is not caused by other events.

Apart from the studies we have looked at so far, there have been works by Charest (1978), Eades (1982), Woolridge (1982) and Brickley (1983), who use event-studies approaches and, assuming the semi-strong efficiency of the market, have found a significantly positive association between dividend changes and abnormal stock return.

Charest's paper examined investment performance with regard to trading based on quarterly dividend information. He found statistically significant abnormal returns in the months following the announcement of selected dividend changes. However, Charest did not isolate information already reflected in contemporaneous earnings figures from signals sent by dividends.

Brickley (1983) compares signals sent by specially-labeled dividends with ordinary ones. Although he found that dividends described by managers as «extra», «special», or «year-end» convey information to the market about the future potential of the firm, they convey less positive messages.

«More recently, Leftwich and Zmijewski (1991), Brown, Choi, and Kim (1991), Healy and Palepu (1988), and Bajaj (1991) find dividends have information content in unusual circumstances.[...] Leftwich and Zmijewski find that stock price and analyst forecast reactions to simultaneous announcements of earnings and dividends are reliably more negative only when the announcement reveals good news about earnings and bad news about dividends. Brown, Choi, and Kim find that stock price changes indicate that dividends have information content when the dividend surprise is opposite to the earnings surprise. Healy and Palepu find that firms that initiate (omit) dividends have systematically positive (negative) earnings changes. Bajaj reports that dividend omissions are followed by declines in long-term Value Line earnings forecasts.» (24)

A unique empirical study which found no evidence that dividend announcements convey valuable information were those carried out by Watts (1973) and Gonedes (1978). They were unable to find an economically significant relationship between dividends and subsequent earnings. Furthermore, they found that current and past dividends forecast future earnings no more accurately than other contemporaneous variables (e.g., earnings).

Watts, in his study, used the Fama-Babiak model for predicting expected dividends, a market model for finding the expected returns, and APIs for every company, computed as shown at the beginning of this section –(2.3.34). The API averages across 310 companies for 24 months around the dividend announcement were built in two sub-samples of firms that had anticipated dividend increases or decreases. Although the test suggests that on average the relationship between future earnings changes and current unexpected dividend changes is positive, and therefore consistent with the information hypothesis, the difference is actually very small. The difference between the two samples is only 0.7% in the month of the dividend announcement.

Assessment of the value of information contained in dividend changes. Asquith and Mullins' approach improved the findings of expected dividend payments, but on the other hand raised a problem associated with assessing the value of the new information. This happened because the information measured not only the effect of higher dividend payments but also the market's reaction to the firm's change in dividend policy. As Asquith and Mullins (1983) mentioned, excess returns associated with dividend announcements reflect not only favorable information about future returns, but are a sum of this information, transaction costs related with portfolio re-balancing and deadweight costs linked to dividend payments. The portfolio changes could be related to new tax investors attracted by the company. So, if there is a marginal preference for capital gain instead of cash moneys, the abnormal return will reflect only part of the positive readjustment of the company value, net of transaction costs and rises in the marginal personal tax liabilities. If there is a marginal preference for cash dividends, as proposed in Shefrin and Statman's (1984) behavioral model, then the abnormal return could be explained by a change in dividend policy without necessarily a change in perception of the future earnings stream. This could even explain the large positive excess returns found by Asquith and Mullins (1983). These questions raise the need for testing post-announcement changes in shareholders' tax liabilities.

From what we have already said it seems that the easy way to test this is to find out if personal tax liabilities exist. We presented this part of the empirical analysis in the previous subchapter. But even if we can find evidence of tax liabilities, it still does not mean that changes in dividend policy will alert shareholders at the time of the dividend announcement. Long (1977) and Modigliani's (1982) arguments about trade-offs between tax and risk dimensions would suggest that efficiency gains from quickly re-balancing a portfolio after personal tax could be small, especially in the short term after the first signal about changes in the dividend policy. The payment of transaction costs could be full, and, in addition, tax payments on capital gains collected through previous years will make the adjustment expensive. Hence, maybe a new dividend policy could attract new investors, but the old ones will not decide to sell their shares until the moment when increases in the share price would compensate the losses in transaction costs and lump sum capital gains tax payments. The need for readjustment will depend on the level of present value tax liability, which is related to dividend yield. Old investors could make their portfolio adjustment slowly, by gradually decreasing the level of their investment in the company by refusing to take part in new investments. This attitude could be put into practice by selling rights issues and new investment in other companies, or in a case of future re-balancing procedure, at the expense of this particular firm. However, this does not mean that it should be done just at the time of the announcement. This kind of scenario could bring the company's shares up at the time of the announcement without any signals about improvements in the company's prospects, but just because of changes in the dividend policy, which at a given moment could increase the demand for shares without compensation from the supply side.

Using the study by Hakansson, Kunkel and Ohlson (1982), it is possible to demonstrate that volume reaction to public information has two components. Trading in response to:

- 1) heterogeneity of beliefs;
- 2) a desire by investors to alter their risk-sharing arrangements (i.e., a shift in risk liabilities).

Asquith and Krasker (1985) and Richardson, Sefcik and Thompson (1986) tried to test the reasons for abnormal trading volumes (ATV) following dividend announcements.

Asquith and Krasker, in their study on the volume reactions, considered a sample of companies that had not paid dividends for at least 10 years. In order to examine abnormal volume in the announcement period, they compared two periods –the week directly following the announcement week and a four-week period beginning after the announcement week.

They find significant abnormal volume reaction in the announcement week on average and essentially no increase in volume subsequent to the announcement. As a proxy for information context Asquith and Krasker use dividend yield and show a significant correlation between the announcement week's abnormal volume and dividend yield.

Asquith and Krasker point out that the actual volume of shares traded is a small proportion of the firm, even if it is abnormally large in comparison with other periods. Based on their findings, they conclude that there is only weak evidence in favor of a liability theory. They hesitated to draw stronger conclusions based on their findings in the announcement period, because the duration of activity was, in their opinion, too short.

In another study on the volume reaction to dividend announcements, Richardson, Sefcik and Thompson (1986) separate abnormal trading volumes related to heterogeneity of beliefs from changes in tax clientele, where the information content of the announcement could be linked with the first component.

They assess that ATVs related with abnormal return represent the information content of the announcement, when the positive part associated with dividend yield and the negative part linked with accrued capital gain are liability related. There is a major conceptual difference between their study and the one by Asquith and Krasker, in that Richardson, Sefcik and Thompson assume that dividend yield is a proxy for liability effect, whereas Asquith and Krasker use dividend yield as a proxy for information content.

After extensive analysis of a sample consisting of 192 firms that paid a regular dividend for the first time during the period 1969-1982, excluding dividends classified as special, they found:

- 1) a highly significant increase in trading volume, on average, in the week of announcing the first dividend in the company's history;
- 2) during the period subsequent to the announcement week, up to and including the ex-dividend week, a marginally significant increase in trading volume on average;
- 3) in the announcement week, the largest portion of abnormal trading volume is related to the abnormal return (information content);

- 4) a significant part of the abnormal return is not related to information content, but is positively related to the size of the dividend and negatively related to the degree of prior price appreciation;
- 5) in the period from announcement to ex-dividend day, ATV is largely explained by the information content;
- 6) the portion of ATV unrelated to the abnormal return in the period from announcement to ex-dividend day appears insignificant.

Information effect over the expropriation effect. Most of the studies we have looked at so far try to find support for the hypothesis that dividend announcements have a significant effect on share prices. Existing evidence using event-studies as a methodology strongly support this. This study attempts to identify information content by examining security price reactions to announcements of policy changes. However, it cannot differentiate whether these stock price reactions are caused by information about the firm's economic performance or by other factors that could also be consistent with the observed price reactions. Observed abnormal returns subsequent to the announced changes in dividend policy could be caused by several factors. Change in the perceived risk position of the firm and change in the expected growth of future cash flow are two possibilities. The fact that the information content of dividend increases could be viewed as good news for shareholders does not automatically mean that this signals information about higher future cash flows. Maybe dividend increases are signals about higher cash flows for equity at the expense of bondholders or even tax recipients.

In the last ten years, some empirical studies have found a relationship between announcements of change in corporate financial policy and subsequent company performance. For example, Ofer and Natarajan (1987) documented a decrease in subsequent profitability of firms following calls of convertible bonds, and a decline in earnings following announcements of equity-for-debt swaps is reported in Lys and Sivaramakrishnan's (1986) paper. The first to suggest the wealth redistribution hypothesis as a possible explanation for stock price behavior around dividend announcements were Galai and Masulis (1976).

Woolridge (1983) and Handjinicolaou and Kalay (1984) investigated the effect of dividend announcements on bond prices in order to separate the expropriation effect from information about economic performance. If higher dividend payouts are signals about higher future cash flows, then, if there is no simultaneous expropriation effect, bondholders should feel better protected and we should see a rise in bond prices. If there is only an expropriation effect, any rise in share prices needs to be compensated by a decline in bond prices. In contrast, dividends decline if there is only the expropriation effect and bond prices stop rising. The information hypothesis should assume that bonds decline, because lower future cash flows equal a higher probability of bonds defaulting. Expected changes in security values under the different hypotheses are presented in Table 3.2.

Table 3.2. The effect of dividend announcements on security values according to the expropriation and information hypotheses

Hypothesis	Securities	Positive	Negative
		announcement of unexpected dividend change	
Information content	Common stocks	+	-
	Bonds	+	-
Expropriation effect	Common stocks	+	-
	Bonds	-	+

Woolridge (1983) studies the effect of unexpected dividend changes on the values of common stock, preferred stock and bonds. A sample of 411 dividend announcements from 225 randomly selected NYSE firms over the period 1970-77 was analyzed. After excluding from the sample all announcements which were overlapped by other significant news about the firm within two days of the announcement date, the sample was sifted to 411. Daily non-convertible bond returns were calculated using actual sale prices and adjustments were made for daily interest accruals and coupon payment dates. The comparison period return approach (CPRA) (25) was used to test for statistically significant price movements around dividend announcements. In days around dividend announcements, portfolios of common stock, preferred stock and bonds were formed. Around and on the event date, mean daily returns were computed by averaging daily security returns. In order to ascertain the market's perception of dividend changes, the means of return distributions for the event day and surrounding days were compared.

Woolridge's empirical results demonstrated that unexpected dividend increase was associated with positive debt and preferred stock returns and that surprise dividend decreases had a negative impact on preferred stock and debt. These findings support the signaling hypothesis as the predominant factor, although wealth transfer cannot be ruled out.

The «information content hypothesis» and the «wealth redistribution hypothesis» were investigated in Handjinicolaou and Kalay's (1984) paper by analyzing the behavior of bond prices around dividend announcements. An investigation of 255 straight bonds randomly chosen from NYSE firms which announced at least one dividend payment during 1975-76 support the existence of information content in dividend announcements. Their empirical evidence indicates that the price of bonds was unaffected by dividend increases –in Woolridge's (1983) studies they rise, but the significance of this was not high (compared with other results); *t* Statistic equal $t=1.36$ –means that the gains associated with positive reaction were made by stockholders. In a case of dividend reduction, bond prices react negatively, indicating that the losses were shared with the bondholders.

Measure of market expectation through analysis of earnings forecast. The previous study used exclusively event-study methodology in order to test for the information content of changes in dividend policy. Other studies try to find out about

the information content in unexpected earnings changes following unexpected changes in dividends. Penman (1983) found that dividends do not appear to be very good predictors of earnings. The studies by Aharony and Dotan (1985) and Healy and Palepu (1986) find a positive association between unexpected dividend changes and subsequent unexpected earnings of the firm. Ofer and Siegel (1987) criticized the use in these studies of *ad hoc* models of performance expectations as benchmarks in order to identify unexpected changes in performance. In order to avoid the doubtful surrogate for market expectations in the form of time-series models, they used analysts' forecasts as their proxy. Their choice was supported by the studies by Brown and Rozeff (1978) and Fried and Givoly (1982), which showed that forecasts of earnings by financial analysts are a superior substitute for market expectations compared with time-series models.

If forecasts of earnings are good proxies of market expectations, then the change of forecast could be perceived as a signal of changing expectations. If the cause of this revision is an unexpected change in dividend payment, then it could support the hypothesis about the information content of dividend policies.

Ofer and Siegel directly examined the effect of unexpected dividend changes on the expectations of market participants. They tested whether market analysts update their forecasts of earnings following an announcement of unexpected dividend changes. In their investigation they use individual forecasts of annual earnings per share collected on a monthly basis from all major brokerage firms of over 2000 companies listed on the NYSE and AMEX between 1976 and 1984. Ofer and Siegel found that after the announcement of an unexpected dividend change, analysts revise their forecasts of earnings. Additionally, they discovered a systematic relationship between forecast errors for earnings made before dividend announcements and either the size of the unexpected dividend change, or the change in stock price surrounding the announcement. This relationship disappears in forecasts made after the dividend announcement. These results are consistent with the hypothesis that dividends contain information about the economic performance of companies and therefore provide support for dividend-signaling models.

3.7. Summary and conclusions

The empirical evidence about the impact of dividend decisions on security values could be explained by the presence of information asymmetries. Information asymmetries between managers and investors may cause securities to be traded at a price that does not respect their «intrinsic» values. Since direct communications about a firm's prospects between insiders and investors are considered expensive due to the agency costs involved in the process, it is presumed that managers convey their expectations to the market through financial signals. In the models presented above, dividend payments convey information about the «true» value of a firm. In each instance it is costly for low-value firms to mimic the dividend payments of high-value firms. Hence, the credibility of this signal depends on whether false signaling is expensive to those who are signaling. In Bhattacharya (1979) the dissipative cost which allowed signaling to take place was the transaction costs arising from having to resort to outside financing. In Miller and Rock's (1985) and Ambarish, John and Williams' (1987) models the dissipative costs arise from the distortion in the firm's investment decision. John and Williams (1985) presented a theory where it is the taxes on dividends themselves that are the dissipative cost. In multiple signaling models the task of managers is to minimize the deadweight cost of sending the signal to investors. Although share repurchases have tax advantages in sending information signals, this advantage is traded against the agency costs associated with using share repurchase as a means of communicating with the market.

The evolution of empirical tests for dividend information content is closely related to the development of efficient capital market concepts. The measurement of abnormal returns around dividend announcements became the main target of investigation. At source, there was no distinction between observed dividends and those expected. Later, it was found that information sent by dividends could only have value if the dividend paid were different from that expected. In order to measure the level of dividend surprise, «naive», or Lintner-type prediction models were used. The dividend initiation case became its most developed example.

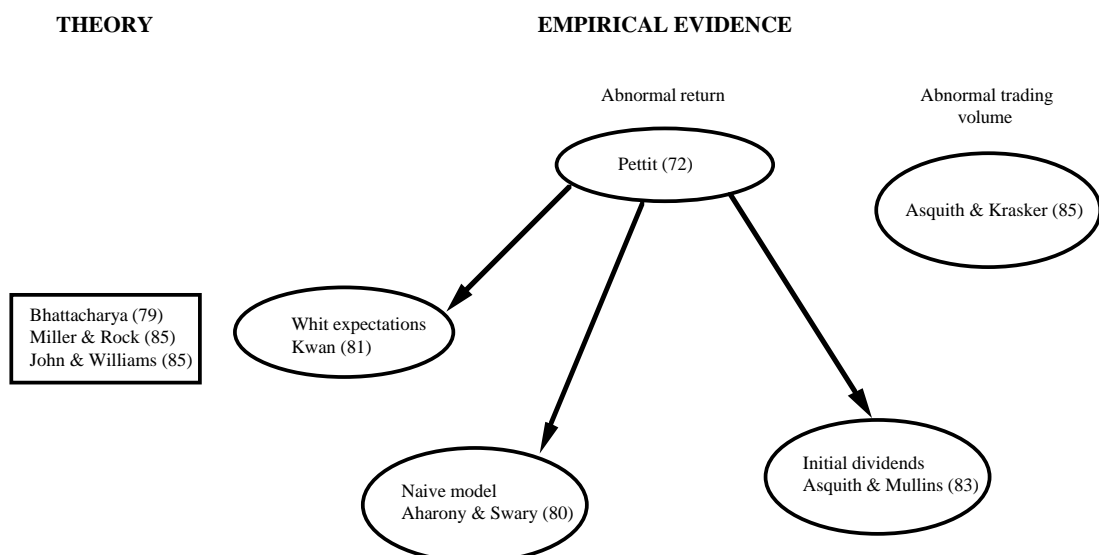
In order to assess the value of information contained in dividend announcements, the research moved towards testing the existence of tax liabilities and the separation of volume reactions following dividend announcements, partly related to the information effect and partly related to portfolio re-balancing. Because stock price reactions could be caused by other factors unrelated to information about the economic performance of the company, tests for separating the signaling effect from the expropriation effect were developed. A schema of the development of empirical research where event-study methodology was used in order to find the information contained in dividend announcements is presented in Figure 4.

Apart from this major research trend, parallel investigations on the predictive power of dividends were tested. The purpose in all of this is the same: to find evidence supporting the thesis about the value of dividends as a tool used by managers to send inside signals to investors.

The asymmetric information explanation of cash dividend payments is nowadays the preferred explanation of dividend policy relevance. The empirical studies described above overwhelmingly support the hypothesis about the information content of dividends. Hence, from changes in the firm's dividends, the market learns about managers' perceptions of the company's future cash flows.

Figure 4. Development of asymmetric information empirical tests

ASYMMETRIC INFORMATION MODELS



4. Models based on Agency Costs

«The directors of such [joint stock] companies, however, being the managers rather of other people's money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own. Like the stewards of a rich man, they are apt to consider attention to small matters as not for their master's honour, and very easily give themselves a dispensation from having it. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company. It is upon this account that joint stock companies [...] have seldom been able to maintain the competition against private adventurers.»

Adam Smith, The Wealth of Nations, (1776, II, p.233).

4.1. Overview of the theory

Classic economic literature usually assumes that managers are the perfect agents of investors. The existence of agency costs associated with stock ownership is one of the most important real world violations in the Modigliani-Miller assumptions. Removing this assumption requires the economic analysis of contractual relationships.

Models of dividend policy that are determined by costs due to conflicts of interest have begun to appear in the literature over the last 20 years. Research in this area was initiated by Jensen and Meckling (1976), who defined agency costs as the sum of:

- 1) the monitoring expenditures by the principal,
- 2) the bonding expenditures by the agent,
- 3) the residual loss.

They define an agency relationship as «a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent» (26).

Because managers of firms maximize their own utility, when the firm is not wholly owned by managers, conflicts between shareholders and managers arise. This divergence exists because managers prefer:

- 1) higher income levels and lower levels of effort;
- 2) to minimize the possibility of job termination;
- 3) short-term projects at the expense of investments with longer horizons;
- 4) to minimize the company's total risk;
- 5) less risky investments at the expense of more profitable but risky ones.

This form of conflict takes place, on the one hand, because managers do not bear the full cost of their actions through lower salaries, or a lower value of the stock held by them, and, on the other hand, because they are not fully compensated for their excess efforts.

When investors are concerned only about undiversified risk, managers try to minimize the total risk faced by the firm. This happens because investors can easily diversify their portfolio of stocks, whereas managers are heavily tied to the firm's risk by their current and future compensation, and by their personal stock holdings. Bankruptcy makes their stock worthless and, in addition, increases the likelihood of termination of their employment.

The time horizon for managers is shorter than for principals, because of their shorter benefit perspective. Riskier ventures benefit diversified investors because they are made at the expense of bondholders.

Managers have incentives to over-retain cash, as suggested by Smith and Watts (1983), in order to increase the amount of discretionary funds available inside the firm. This is in conflict with the shareholders, who have an interest in investing these funds outside the firm if the range of opportunities available inside the firm do not offer the best possible returns.

The role of monitoring and bonding activity in reducing agency costs. The owners could limit this difference by establishing an incentive for managers, by monitoring and binding their activity. They need to reduce agency costs so long as the marginal cost is less than the marginal gain from reducing the residual loss. If the owner-manager sells any equity claims to outside investors, then the agency cost will arise because of the divergence between his interests and that of outside investors. But outside investors realize this, and will take the costs into account, so the price which they are willing to pay will reflect a discount for the agency costs. «Thus, the wealth costs to the owner of obtaining additional cash in the equity markets rise as his fractional ownership falls», but «as the manager's ownership claim falls, his incentive to devote significant effort to creative activities such as searching out new profitable ventures falls» (27). Investors bear the full amount of monitoring and bonding expenditure, and the manager would reap the benefits only in proportion to his holding. The marginal costs of monitoring fall when minority stakes become larger and larger. This is because any one stockholder bears the full cost of monitoring, whereas the benefits are shared by all.

Research into agency costs has provided a deeper understanding of the variations in contracts across the different types of organizations. Fama and Jensen (1983) examine the nature of residual claims and agency costs for separating management and investors and come up with the theory of the determinants of alternative organizational forms. In their opinion, corporations, proprietorship, partnerships, mutuals and non-profits differ in the way they trade off the benefits of risk-sharing with agency costs.

Demsetz and Lehn (1985) argue that the extent to which the market for corporate control disciplines management is closely related to the distribution of voting rights amongst shareholders and the proportion of outstanding shares held by the management group. Besides, increasing the concentration of stockholders improves the effectiveness and lowers the agency costs. However, as a firm increases size, limited wealth and decreased diversification make holding the same amount of shares more costly for monitoring purposes.

4.2. Role of dividend payments in the reduction of agency costs

In his paper, Rozeff (1982) suggests that because shares are widely held nowadays, one shareholder can obtain only a little from the total gain from spending funds in order to cover agency costs. Because of this, investors would be wealthier if there was an intermediary acting as monitor for the collective interests of shareholders. Benston (1985),

Vancil (1987), Weisbach (1987), Byrd and Hickman (1992) suggest that outside directors perform an important role in monitoring management decisions that have been proposed for approval by the board of directors. However, information asymmetry about future cash flow between the board and the management, as well as the personal interests of outside directors, impose limits on the board's monitoring role.

Another kind of intermediary can be found if the firm is forced to be constantly in the market for new capital. By paying dividends, the managers are required to tap the capital market more frequently to obtain funds for investment projects. When firms raise new capital, their performance is carefully reviewed by an investment banker or some kind of indenture trustee who monitors managers on the investors' behalf. The same thing happens when the firm issues new debt. During this process, stockholders observe the terms under which new funds are raised. Because equity and debt providers are receiving new information about the uses for which the funds are intended, the shareholders gain new information about the firm's financial situation and the intentions of its managers. Rozeff (1982, p. 251) argues that this kind of information is of higher quality than the alternative where shareholders learn about the firm's market valuation and new investment programs from classic sources of information such as audited financial statements. Earnings figures can be manipulated by managers using clever accounting practices and may therefore be interpreted with skepticism by the investment community. Kaplan and Roll's (1972) empirical study supports this view. The general conclusion from these arguments could be that managers who need to receive money consistently are more likely to act in their shareholders' interests than managers who are able to raise funds internally. Additionally, this theory could explain why business firms issue new stock and around the same time pay a dividend, which for many is inexplicable (28).

Easterbrook (1984) divides investors in the company into older shareholders and newcomers. New investors are not obliged to invest in a new issue of company shares. Before investing, they carefully scrutinize every opportunity and they force the price of shares down to compensate any agency management costs. Because of this, new investors are better than old ones at forcing down agency costs. If managers want to raise new capital at the cheapest price for their new investments, they have the initiative to reduce agency costs. Like Rozeff (1982), Easterbrook presents support for the reliability of third party information as against that supplied by managers, auditors and stockbrokers' studies. Because underwriters and lenders are putting their own money at stake, they are taking the risk, which makes their opinion valuable to other investors (29). If the stake is proportionally large, the information could be obtained at a relatively lower cost. If dividends keep firms in the capital market, this form of verification makes for savings in agency costs.

This theory suggests that dividend payments depend on the company's cash flow and its variability. Rozeff (1982) argues that because firms with a higher variability in cash flow will need to use external finance more often, they will tend to have a lower dividend payout ratio. Similarly, if firms are going to the capital market anyway—for example, rapidly growing organizations with large and highly profitable investment projects, but without free cash flows—dividends are not serving their role of decreasing agency costs. Thus, if this occurs, Easterbrook (1984, p.250) argues that we should expect to see lower dividend payments. This is consistent with observations that firms which are growing fast do not pay dividends or have low dividend payouts. They start to pay dividends when their growth slows down, and in order to increase the rate again they must start paying dividends. As mentioned, according to Asquith and Mullins (1983), an information effect of the initiation of dividend payments is also consistent with the agency theory. In the curve of a firm's life the agency cost dividend role increases when the firm becomes mature and cash-rich.

Conflicts of interest between investors and managers are especially severe when the organization is mature and generating substantial free cash flow. At this stage, the role of dividends, their which reduce the resources under managers' control, decreasing power and making it more likely they will incur the monitoring of the capital markets, is especially important. Promising to pay out future cash flow by increasing dividends leaves managers without control over the use of a future free cash flow. If, in the future, they decide to cut dividends, the market will punish them with a large reduction in price, which is consistent with the signaling theory.

This theory of agency costs is criticized –even by the author, Easterbrook (1984, p.655)– because it does not explain why repurchases are not used, even though they would have the same effect with regard to forcing firms to subject themselves to the scrutiny of the capital market but would appear to result in lower taxes. This objection could be revised if we use Jensen's (1986, p.324) argument about market confidence and «promises» of stock repurchase. These «promises» are weak compared with dividends because, from a legal point of view, they cannot be regularly structured, and because share repurchases can easily be reduced in the future.

4.3. Empirical evidence

When a firm is in the market for new capital, the monitoring problems are less conspicuous. It could be expected that the size of dividend payments at a time when common stock is being issued would be less. This hypothesis is supported by Kalay and Shimrat's (1986) study about the dividend behavior of firms which make regular offerings of common stock. They found that, on average, firms unexpectedly decrease dividends over the two years preceding the stock offering as well as in the year of the offering. They also found that dividend payouts were relatively small for industrial firms in the two years prior to their stock offering, as well in the offering year.

Observations about firms which are growing fast but are not paying dividends or have low dividend payouts were tested by Smith and Watts (1992). Using industry-level data for the period 1965-1985, they found that measures of the firm's investment opportunities (such as the availability of growth options and firm size) are related to its dividend policy. In particular, they documented that firms with more growth options (i.e., greater access to positive net present value projects) have lower dividend yields, which is consistent with Rozeff (1982) and Easterbrook (1984). They also found that regulated firms have lower executive compensation and a less frequent use of stock-options and bonus plans. This is compatible with Demsetz and Lehn (1985), who argued that, as government regulation intensifies, the costs to stockholders of obtaining the same level of monitoring of management actions fall, which reduces manager-stockholder agency costs. Finally, they found that larger firms –where we can expect the stock holdings to be more diffuse– have higher dividend yields and higher levels of executive compensation, as is presented in the agency theory.

Rozeff (1982) suggests that high dividend payouts increase the flotation costs of raising external capital and decrease the agency costs due to the separation of ownership from control. To test this theory he selected a sample of 1000 firms in 64 non-related industries and examined their arithmetic average dividend payout ratios over the seven years 1974-1980. Five independent variables are used in a cross-sectional dividend payout regression model. The variables are proxies for the agency relationship. These variables are:

INS	– percentage of common stock held by insiders;
STOCK	– natural logarithm of number of common stockholders;
GROW1	– average growth rate of revenues, 1974-1979;
GROW2	– forecast growth rate of revenues, 1979-1984;
BETA	– beta coefficient;
CONST	– intercept term in regression.

The dependent variable:

PAY	– average payout ratio, 1974-1980.
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In this model, the variables INS and STOCK are proxies for the agency relationship. The hypothesis tested by the INS variable is that as inside equity holders own a larger share of the equity, they will demand a lower dividend payment in order to reduce agency costs. The STOCK variable represents the prediction that if the distribution of outsider holdings is diffuse, there will be a demand for higher dividends as part of the optimum monitoring package.

The results of estimating the regression model are shown in Table 4.1. The regression is highly significant and explains 48% of the cross-sectional variability in dividend payouts across firms. All independent variables are statistically significant and are consistent with Rozeff's prediction.

Table 4.1. Estimated regression of payout

	CONSTANT	INS	GROW1	GROW2	BETA	STOCK	R ²	F-statistic
(1)	47.81	-0.090	-0.321	-0.526	-26.543	2.584	0.48	185.47
(2)	(12.83)	(-4.10)	(-6.38)	(-6.43)	(-17.05)	(7.73)		
(2)	24.73	-0.068	-0.474	-0.758		2.517	0.33	123.23
	(6.27)	(-2.75)	(-8.44)	(-8.28)		(6.63)		
(3)	70.63		-0.402	-0.603	-25.409		0.41	231.46
	(40.35)		(-7.58)	(-6.94)	(-15.35)			
(4)	39.56	-0.116			-33.506	3.151	0.39	218.10
	(10.02)	(-4.92)			(-21.28)	(8.82)		
(5)	1.03	-0.102				3.429	0.12	69.33
	(0.24)	(-3.60)				(7.97)		

^at-statistics are shown in parentheses under estimated values of regression coefficients. R² is adjusted for degrees of freedom.

Source: M.Rozeff (1982), p.256.

4.4. Dividends and conflicts between shareholders and bondholders

In the aforementioned analysis, dividend payments are a useful way of decreasing the agency costs between shareholders and managers. This approach sees dividend payouts as the result of trade-offs between the benefits of reduced agency costs and the flotation costs of raising external capital. Although this conflict is the most important one, it could be worth mentioning the other kind of agency conflict that exists between stockholders and bondholders, which has an impact on dividend payments. There is a danger that stockholders could pay themselves by liquidating dividends and leave bondholders without assets; or they may choose risky projects at the expense of lenders, thereby justifying the existence of agency costs. These costs, arising at the time when dividends are paid, have the opposite effect to the previous example.

In order to protect themselves from such action by stockholders, bondholders make special provisions in a corporate bond contract, which have been analyzed by Jensen and Meckling (1976), Smith and Warner (1979) and Kalay (1982).

The empirical side of this analysis was tested by examining binding debt covenants in the firm facing financial difficulties. The observations have a low incidence in the early studies by Lintner (1956) and Kalay (1980) and significant incidence in DeAngelo and DeAngelo (1990). This last paper investigated dividend policy adjustment of 76 NYSE firms that experienced multiple losses during 1980-1985. They found that more than half –between 51.4% and 60.6% of the sample, depending on the classification scheme used, compared with 5% in Kalay (1980, p.863)– faced binding debt covenants in the years when managers reduced dividends. This finding supports the view of agency costs in dividend policy that we discussed, since it indicates that debt covenants influence the dividend decisions of large publicly held firms.

5. Behavioral models of dividend payments

«It is possible that many, many individual investors believe that stocks that don't pay dividends should not be held, or should be held only at prices lower than the prices of similar stocks that do pay dividends. This belief is not rational...».

Fisher Black (1976, p.7).

1. Overview of the theory

The second Miller-Modigliani assumption was a behavioral one. It assumed «rational behavior», which means that «investors always prefer more wealth to less and are indifferent as to whether a given increment to their wealth takes the form of cash payments or an increase in the market value of their holdings of shares.» (30) A payoff may be preferred because of institutional constraints, or when one abandons the assumption of Shefrin and Statman (1984) that individuals maximize expected utility.

Shefrin and Statman abandoned the rational behavior assumption when they made use of two new theories of individual choice behavior. The first, that of Thaler and Shefrin (1981), was the theory of self-control; the second, that of Kahneman and Tverski (1979), was the theory of choice under uncertainty.

Following the same line of inquiry as was presented in the case of agency conflict, Thaler and Shefrin demonstrated persistent departures in individual consumer choice from behavior predicted by the economic theory of the consumer. The departures are related to the inability of individuals to delay consumption because of a lack of self-control. As in the presented agency cost theory, where organizational structures needed to be constructed to minimize the rise of agency costs, the task became the same for individuals who wanted to reach their goals. In their theory, the authors support their view by presenting the Zimmerman (1979) study, where the allocation of overhead costs, in spite of admonitions that such allocations are arbitrary and serve no useful purpose, was explained by the reduction of agency costs. The allocation then became a useful tool in controlling managers' actions. Similarly «[t]he individual wishes to deny himself a present indulgence, yet simultaneously finds that he yields to the temptation.» (31) In order to resolve this conflict, individuals created a type of opportunity manipulation by imposing some internal rules, which could be enforced internally, by habit, or externally, e.g., by automatically deducting from the pension plan. Shefrin and Statman provided some typical examples of these rules:

- «– jog at least two miles per day;
- do not consume more than 1,200 calories per day;
- bank the wife's salary and only spend from the husband's paycheck;
- save at least two percent of every paycheck for children's college education, and never withdraw from this fund;
- never touch a drop...» (32).

Thaler and Shefrin pointed out that these kinds of rules could prevent the internal arbitrage that is assumed in the theory of consumer choice. A good example of this consists of people who automatically deduct funds for their children's future education on one banking account, and at the same time borrow money at a higher interest rate to purchase durable goods. Although these individuals are not behaving as typical utility maximizers, their rationale is clear; they are trying to avoid the possibility of depleting those funds because of a lack of willpower.

The presented theory plays an important role in Shefrin and Statman's analysis of dividends. Dividends are desirable because they allow individuals to consume only a certain fraction of their wealth each period. An individual may wish to determine his level of consumption by setting the dividend payout on his stock portfolio. In this case, the portfolio capital is not for consumption, but only for dividends. In the standard theory, a sale of stock serves as a perfect substitute for increased dividends, but not in the self-control framework. It is «[b]ecause of possible self-control difficulties, allowing oneself the discretion of selling stock for current consumption may cause the portfolio to be consumed more quickly than is consistent with one's long-term goals.» (33)

A preference for dividend payments can be explained using the framework of the theory of choice developed by Kahneman and Tversky (1979). This theory concerns the way individuals confront risk; decision-makers who face risky prospects consistently confuse the issues of form and substance. Individuals are risk-averse in gains and risk-seeking in losses, with losses looming larger than gains. Additionally, they prefer to integrate losses and segregate gains, which could be compared to wanting two pieces of bad news at the same time, or two presents wrapped separately, in order to be able to experience the pleasure of opening each one individually. The influence on dividend policy exists because investors

choosing stocks with positive expected capital gains are willing to segregate them if such a gain materializes, thereby generating a strong tendency to select dividend-paying stocks.

Another behavioral theory of Shefrin and Statman's dividend preference is based on the Kahneman and Tversky (1982) theory of regret aversion. This theory suggests that the regret associated with a failure to act is less intense than the regret associated with the failure of the undertaken action itself. As an illustration, they presented a situation where two investors initially owned stocks in two different companies, deliberating where to invest their capital. The first investor, after having considered switching to the second company, decided not to do so and, as a result of the relative change in the prices of the shares, was better off. The second investor switched to the first company and was worse off by the same amount of money. In answer to the question of which of the two feels more regret, one is inclined to say that the second does, although the objective financial situation of the two investors in the end is identical –both own the stock of the same company and each of them arrived at this state through a deliberate decision. Kahneman and Tversky (1982) argue that regret and pride stem from a consideration of what might have been. If regret stimulates more powerful emotions than pride, then situations involving active decisions will tend to be avoided.

Shefrin and Statman argue that this theory could explain investors' preference for dividends. Through the above example, they showed that investors holding stocks that pay dividends do not have to make any active decisions and can therefore avoid the possibility of any regret. Consuming dividends constitutes a «standard procedure», in Kahneman and Tversky's terminology. Consequently, even if we abstract from other market imperfections, dividends and capital cannot be treated as perfect substitutes.

Behavioral explanations of dividend payments are radically different from the other theories considered here. In the Shefrin and Statman theory, a higher cost related with a higher dividend payment is the appropriate price paid by individuals for self-control, segregation, regret reduction, and, possibly, all three.

2. Empirical evidence

In the Shefrin and Statman paper, some empirical findings that support behavioral theory are presented. First, related to Charest's (1978) findings, it was shown that a dividend decrease causes a stronger investor reaction than a dividend increase, which is fully consistent with the Kahneman-Tversky value function. Secondly, in accordance with Brickley (1983), the fact that a market reaction in the year following dividend increases is significantly stronger for regular dividend increases than for specially designated dividends could be explained not only by the informational effect, but also by the Kahneman-Tversky prospect theory. By segregating dividend payment into «regular» and «extra» components, a company may prevent the shareholders' dividend reference point from shifting upward. Otherwise, a subsequent revision of the entire dividend payout might be interpreted as a loss, and could lead to larger losses than previously experienced.

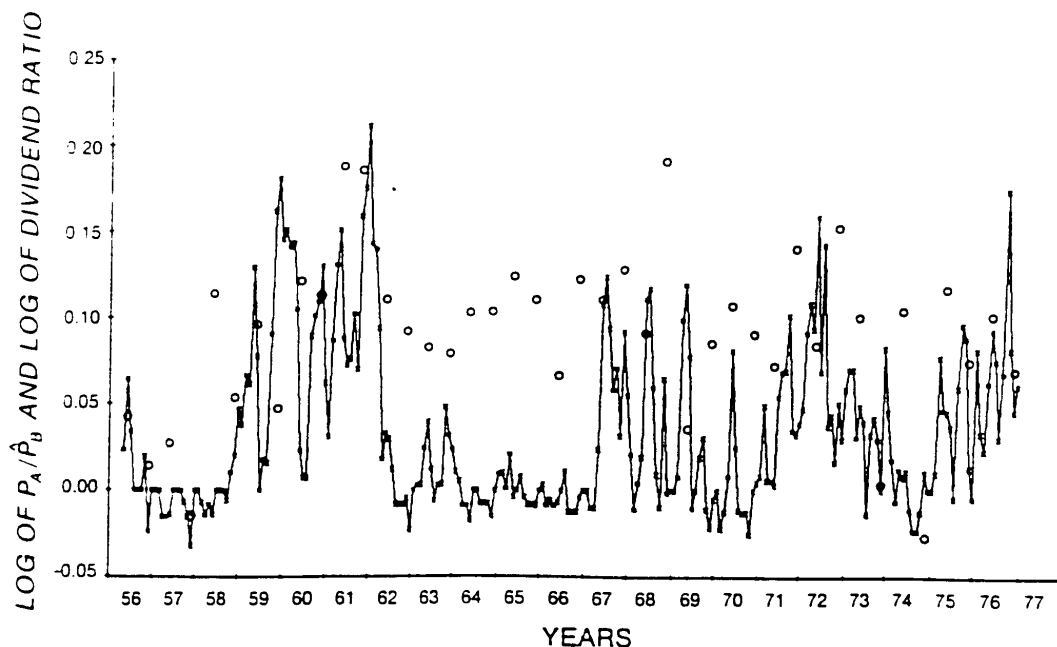
Finally, the direct portfolio study also supports the Shefrin and Statman theory. Earlier, in the section related to the clientele effect, Pettit's (1977) regressed dividend yield was presented. In accordance with behavioral theory, it showed a significantly positive correlation between the dividend yield and the age of the investors, and a significantly negative correlation between the dividend yield and the investors' income. This points to a likely increase in the portion of the investment that is consumed in the case of investors with a low income stream and as investors get older and retire.

Lease, Lewellen and Schlarbaum's (1976) study of the demographic attributes and portfolio composition of the same portfolio investors was more striking. Their data show that while young investors devote 27-34% of their portfolios to dividend income-generating securities, older working men devote 36%; and, finally, the figures for retired investors jump to 56-57%. Their rating of these securities, on a scale of 1 to 4, rose from 2.04-2.30 to 2.46 and then to 3.36-3.39. These percentages, together with the ratings, are consistent with the implications of the Shefrin and Statman theory.

Citizen Utilities Company case study. One of the few empirical studies to conclude that dividends are desirable for shareholders and require a lower rate of return on shares that pay a high dividend yield is the Long (1978) study. Long provided a detailed analysis of a unique set of securities issued by Citizen Utilities, which consisted of two classes of common equity. They were identical in all aspects except for the dividend payout form. While *Series B* shares received only cash dividends, *Series A* received only stock dividends that were not taxable as ordinary income, due to a special IRS ruling granted to Citizen Utilities in 1955 as well as to a «grandfather clause» in the 1969 Tax Reform Act (34). *Series A* was freely convertible on a one-for-one basis for *Series B*, but *Series B* was not convertible for *Series A*.

Given these circumstances, the price-dividend relationship of Citizen Utilities shares could provide a unique comparison of the effect of alternative dividend policies, free of uncontrolled variables. Hence, the information effect and the agency cost were the same in these two cases, so it was possible to analyze other factors.

Figure 5. Price-dividend relationship of Citizen Utilities shares



The connected monthly observations are the \ln of P_A / \hat{P}_B , the unconnected O's are the \ln of the semi-annual ratio of Series A to Series B dividends. P_B is the price per share of Series B stock with dividends reinvested during each half-year prior to payment of the semi-annual Series A dividend. The unconnected points representing the \ln of the dividend ratio are placed in the figure at the end of the half-years to which they refer.

Source: Long (1978, p.254)

The dividend policy set by Citizens Utilities resulted in semiannually declared stock dividends 8 to 10% larger than the equivalent cash dividends paid on a quarterly basis. In Figure 5, the natural logarithm of the ratio of the prices of the shares of *Series A* to those of *Series B* and the natural logarithm of their dividends are presented. Long found that Citizen Utilities' average ratio of its annual stock dividend to its cash dividend was 1.0972 for the period of 1956-1976, when the ratio of the two share prices P_A/P_B was below the dividend ratio for most of the time (which can be seen in the Figure 5). «During the [...] period (1962-1976) when 90% of the ex-post dividend ratios are greater than 1.07, over 80% of the monthly price ratios are below 1.07.» (35)

Long (1978, p.235) concludes that, even with a personal tax disadvantage, «claims to cash dividends have commanded a slight premium in the market over claims to equal amounts (before taxes) of capital gains», which is consistent with the Shefrin and Statman prediction.

The strength of this conclusion has in some way been weakened by Poterba's (1986) reexamination of the Citizen Utilities case. He found that for the more recent period of 1976-1984, the relative price of stock dividends has been higher. When the ratio of total stock dividend payments over cash dividends was 1.122, the average price ratio was 1.134. Some limited support for the Shefrin and Statman conjecture is provided by the finding that, during this period, the price ratio was below the average dividend ratio for most of the time - 55% of the trading days.

Poterba went further along in the study than did Long, examining the behavior of price changes at ex-dividend dates. He found evidence that cash and stock dividend shares exhibit different ex-dividend day behavior. The cash dividend shares' ex-date price decline is equal to 75% of the dividend payment, whereas the stock dividend shares fall by nearly their full (95%) dividend amount.

Additionally, he followed Eades, Hess and Kim's (1984) approach and tested excess return patterns on the days before and after each ex-dividend day. The data show that cash dividend shares earn a negative abnormal return in the month before the ex-date and in the month after, compared with stock dividends, which earn positive abnormal returns before the ex-dividend day and negative abnormal returns during the twenty trading days afterwards. Hence, Poterba (1986, p.402) concluded that «[t]he prevalence of negative excess returns on *Class B* shares may suggest that investors require lower returns on these shares than on *Class A* securities.»

Poterba's results are much more consistent with investors' preference for capital gains than for cash dividends. I am analyzing his results here instead of in the section dealing with personal tax solely because of their being related to the Long studies.

The Citizen Utilities case was reconsidered by Sterk and Vandenberg (1990), who used the 1986 tax revisions in order to examine the validity of the tax differential theory. They had hypothesized that if the tax differential theory were valid, the ratio P_A/P_B should have declined when it became relatively certain that the new legislation would pass. Sterk and Vandenberg found that the price ratio really fell in early December of 1985, when it became apparent that the Tax Reform Act would be passed. The average log of the daily stock price ratio was 1.08738 for the period of January to December 1985. For the period of January 1986 to January 1987, the ratio fell to an average value of 1.00791.

As this finding supports the tax clientele hypothesis, the fact that the presented ratio is much smaller than the dividend ratio of 1.12 suggests that the premium the investors are

willing to pay for cash dividends appears to be even larger than previously indicated by Long. The Sterk and Vandenberg study supports the existence of a personal tax premium, but at the same time indicates that it is overshadowed by an apparent preference for cash dividends.

Poterba (1986), in the previously analyzed study, found that cash and stock dividend shares exhibit different ex-dividend day behavior. Eades, Hess and Kim (1984) reported significantly negative ex-date returns for non-taxable cash dividends. Similarly, Shaw (1991) found a significantly positive excess return before the ex-date, together with a significantly negative excess return on the ex-dividend day return of a master limited partnership in which dividends are not taxable. Although tax arbitrage (short-term capital gains shelters) may explain the negative returns on non-taxable cash dividends, the non-tax related preference for dividends suggested by the behavioral school could be proposed too.

3. Dividend smoothing phenomena

A satisfactory theory of signaling with dividends should help to explain the empirical phenomena of dividend smoothing relative to cash inflows.

Theoretical explanations of dividend smoothing existed even in the older signaling models. For example, Ambarish, John and Williams (1987, pp.338-339) proposed to extend their model from a single period to a repeated game with reputation. «In a sequential equilibrium, outsiders would recognize the relationship between current dividends and future returns, pay higher prices for stocks with historically higher dividends, other things being equal, and thereby induce insiders to smooth dividends over time relative to corporate cash flow.»

On the other hand, the Kumar (1988) dividend signaling model suggests that dividends are signals of the level of productivity of the firm. Hence, because productivity changes are rather small, the changes in the dividend payments likewise need to be low.

In the line of Kumar's arguments lies the polemic between Shiller (1981, 1986) and Marsh and Merton (1986) about the rationality of stock volatility compared with dividend movements. Shiller adopts the perspective that a dividend represents the intrinsic value of a company when he questions the rationality of stock price movements: if stock prices are rational, then why are they so volatile relative to dividends?

Marsh and Merton (1986), on the other hand, try to show that a dividend is not a rational indicator of the intrinsic value of a company because a dividend's volatility is lower than that of stock prices, which behave rationally. Marsh and Merton reply that dividends, like aggregate account earnings, investment and consumption, are smoothed either by economic agents that control them, or by the statistical methods which are used to measure them.

A behavioral model of dividend smoothing. Lintner (1956), after conducting interviews with companies, found that managers, in order to minimize adverse stockholder reactions, try to avoid making changes in dividend rates that might have to be reversed in the foreseeable future. «Stockholder reactions in such situations have been sufficiently vigorous and effective in enough companies that the fear of such a reaction is an effective “burr under the saddle” to all management, including those which have been in such difficulty themselves» (36). Based on this finding, he constructs a theoretical model of corporate *i* dividend behavior, which can be explained on the basis of the following equation:

$$(5.1) \quad \Delta D_{it} = a_i + c_i(D_{it}^* - D_{i,t-1}) + u_{it}$$

$$(5.2) \quad D_{it}^* = r_i P_{it}$$

Where:

ΔD_{it} – the change in dividend payments;

a_i – a constant;

c_i – the speed of adjustment to the difference between a «target» dividend D_{it}^* payout and the preceding year's payout $D_{i,t-1}$;

D_{it}^* – the target dividend payout;

$D_{i,t-1}^*$ – preceding period's payout;

u_{it} – a normally distributed random error term;

r_i – a target payout ratio;

P_{it} – the current year's profit.

This model shows that managers have a target dividend payout ratio in mind. If there are no earnings shocks, they set the dividend level equal to the fraction r_i of the period's earnings. In the presence of earnings shocks, managers do not instantaneously adjust the dividend level to pay out the same fraction of the new earnings, but change it gradually to the new target level. The acceleration of the adjustment factor c_i characterizes the speed with which they adjust the dividend to the new target level. The constant a_i is included to reflect managers' greater reluctance to reduce dividends and the fact that dividends tend to increase over time.

Although Lintner built a theoretical model of dividend smoothing, he fell short of providing a convincing explanation of manager behavior. He gave only an intuitive explanation, based on sustained earnings, of why managers smooth temporary fluctuations in earnings when paying dividends. This explanation is similar to Friedman's microeconomic permanent income consumption model, where personal consumption is based on permanent income, and not on temporary fluctuations. However, in order to be able to make this analogy, it must hold that firms have similar preferences to consumers. As Miller (1987) (37) noted, in the case of firms there exists no analogous motive.

An interesting theory of managers' propensity to smooth dividend payments is to be found in Warther's (1991) paper. Warther tries to build a theoretical explanation of Lintner's findings on shareholders' behavioral attitudes toward dividend policy, comparing shareholders to sleeping dogs. They sleep undisturbed when dividends are paid and rise, but wake up immediately when the dividend level drops.

This model describes equilibrium behavior in an asymmetric information game between shareholders and managers.

It assumes that managers (38):

- 1) have superior information about the firm's current profitability, and in equilibrium, dividends reveal some of this information;
- 2) act to maximize the size of the firm and the resources under their control and that they suffer difficulty if fired;
- 3) care about the shareholders' happiness only insofar as happy shareholders are less likely to fire them.

The last two assumptions mean that managers are risk-averse and that their involvement in the firm is impossible to diversify.

In Warther's two-period model a coarse equilibrium exists, where most firms pay a dividend which convinces shareholders that the firm has earnings equal to or higher than the minimum acceptable level. Only the worst managers pay lower dividends, showing that they are indeed worse, and thus risk being fired. After achieving the minimum acceptable dividend level, managers are safe from the threat of dismissal and have no incentive to pay higher dividends. Hence, both good and mediocre managers choose the same dividend level, although their earnings achievements are different. This can be explained by the fact that in Warther's (1991) infinite period model, paying higher dividends makes this action risky. If in the following periods earnings fall, managers could find themselves short of cash to pay out higher dividends. In that case they would be risking their job satisfaction.

Compared to other models, here, the managers and the shareholders are less aligned. This allows dividend payments to become costly to managers, even if they are not expensive to shareholders. The credibility of dividend signaling arises from the fact that sending false signals is expensive for managers.

This theoretical model explains some empirical findings, namely:

- 1) that dividends are poor predictors of future earnings, since all firms within a wide range of earning levels pay the same dividends;
- 2) that dividend cuts indicate a long-term decline in earnings.

Myers' organizational theory of dividend payments. In comparison to Warther's (1991) behavioral explanation of dividend smoothing, one could find a similar theory in Myers' (1993) paper. This theory starts from an assumption about the divergence of interests between organizations and investors, and drops the assumed objective of shareholder wealth maximization.

In order to equalize corporate wealth W to the sum of equity E and employee surplus S ($W=E+S$), Myers (1993) used Donaldson's (1984, p. 22) definition that «[c]orporate wealth is *that wealth over which management has effective control*». From this he finds that corporate wealth declines by a dollar per share at the time of dividend payments, and that this amount is no longer under the effective control of management. Later in the model he uses Treynor (1981) and Donaldson's assumption that the goal of the organization as a whole is to maximize W .

In Myers' model, the firm's dividend payment is in the form of a commitment which protects investors from being expropriated from their capital. The firms bind themselves to distributing cash to shareholders. Otherwise, if the new issue were to dilute the dividend payment, the old shareholders would have to absorb a capital loss. But if the firm were to break that promise, it is doubtful that it would be able to find any new shareholders.

If the share issue were to fully «cover» the newly issued shares in the form of an obligation to maintain dividends per share and to pay out additional future dividends (with a PV equal to today's issue), corporate wealth W would rise by the issue amount. However, the organization surprise S will not rise; part of it will only shift from old to new equity, and the employees will have better security on their junior claims to the firm's assets. Myers notes that this transfer could explain the markets' negative reaction to stock issues.

Such a view of dividend payments as being a promise to shareholders could explain firms' reluctance to raise dividends when profits unexpectedly increase. If this were to happen, then the firms would prefer to accumulate retained earnings and the employees would be free to deploy much of the rise of the S part. On the other hand, if there were an unanticipated shortfall, then E would still be protected by the dividend promise payout, and much of the blow would be absorbed by a decline in the employment surplus S .

This theory can help to explain the dividend smoothing phenomenon and the low borrowing by the best firms, and is the alternative to capital structure theories based on shareholder wealth maximization.

Empirical evidence. Lintner's 28 companies were selected from a pool of over 600 well-established companies which had at least three of the fifteen previously determined readily observable factors. In Lintner's opinion these factors could have an important bearing on dividend payments and policy.

In studying 196 company-years of dividend action (1947-1953 period), Lintner found no instance in which the question of how much should be paid in a given period was asked without regard to the existing rate. The dependent variable in the decision-making process was the change in the existing rate, not the level of the newly established rate as such (39).

Later he tested his theoretical model (5.2) –which was presented here before– by taking the annual data from 1918 through 1941. The model explains 85% of the changes in dividends; the average speed of adjustment was approximately 30% per year, and the target payout was 50% of earnings. Additionally, Lintner converted his model into the form:

$$(5.3) \quad D_{it} = a_{it} + bP_{it} + dD_{i,t-1} + u_{it}$$

Where $b=cr$ and $d=(1-c)$.

This regression gave results of high significance for the period 1918-1951 and for all the major subgroups of those years.

The Lintner model, together with others, was later investigated by Fama and Blomquist (1968), in order to find an explanation of dividend behavior. They used a sample of 412 firms, later divided into two subsamples of 201 and 191 firms, and annual data for the period 1947-1964 in order to test the explanatory power of different models. Of all the models that

they tested the Lintner model was one of the best. Only model 5.4, presented below, in which the constant term is suppressed and the level of earnings for $t-1$ is added, provided a better prediction of dividends on a year of data not used in fitting the regression.

$$(5.4) \quad \Delta D_t = \beta_1 D_{t-1} + \beta_2 E_t + \beta_3 E_{t-1} + u_t$$

where E is the profit term.

Empirical support for the dividend smoothing phenomenon can be found in DeAngelo and DeAngelo's (1990) paper. These authors analyzed the dividend policy adjustments of 80 NYSE firms suffering financial distress as a result of multiple losses over the period 1980-1985.

Almost all the sample firms reduced dividends, but in the absence of binding debt covenants, dividends were cut more often than omitted. This suggests a managerial reluctance to omit, rather than simply reduce, dividends. The sample yields evidence that managers are likely to cut dividends voluntarily in order to reduce the chances of having to omit them in the future. This is supported by the fact that voluntary dividend cuts significantly exceed voluntary dividend omissions. For the full sample, this difference is significant at a level of 0.005 under the Chi-square test, 0.01 for the years of the initial reduction.

Managers' reluctance to omit dividends is a function of the length of the firm's dividend record –managers of companies with long dividend histories appear especially reluctant to omit dividends and thereby to break the continuous record of payments to stockholders.

DeAngelo and DeAngelo's findings that half of the firms which reduced dividends faced binding debt covenants is in contradiction to Kalay's (1980) results. In Kalay's dividend reduction sample of 197, only 10, less than 5%, were forced to make reductions. If the former result provides strong support for managers' preference to smooth dividend payments, the latter could be interpreted as a firm signal that information is conveyed by dividend payments.

Another stream of empirical study which is related to dividend smoothing is the investigation of the actions leading to dividend reduction and omission. DeAngelo, DeAngelo and Skinner's (1992) paper showed evidence of managers' reluctance to cut or to omit dividends in the face of financial trouble. The authors analyzed a sample of NYSE firms with and without losses during the period 1980-1985. They found that the necessary condition for a dividend reduction was a financial loss –only 1% of the 440 firms that had no losses during the period under investigation decided to cut dividends. The fact that 49.1% of the firms from the initial sample of firms with losses did not cut dividends supports the opinion that although the existence of losses is a necessary condition for cutting dividends, it is not a sufficient one. In the firms which decided to cut dividends, there was a reluctance to omit them entirely –only 30% of the firms which decided to cut dividends also decided at times to omit them. In their logit analysis, the authors found that firms are more likely to reduce dividends the greater their losses are, or when the bottom line includes unusual loss items, or when the firms have deeper and more persistent earnings problems.

Similar studies were conducted in Canada, too, where Mantripragada and Bishara (1974) investigated 100 Canadian firms over the period 1950-1969 (40). They found that Canadian directors are as reluctant to cut dividends as their American counterparts, and that dividend cuts are generally larger than dividend increases.

All these findings are consistent with the dividend smoothing hypothesis.

Summary and general conclusions

In this paper, we have presented different models of dividend policy. They consist of five complementary frames of reference for analyzing dividend policy. In the absence of all market imperfections, the Modigliani-Miller theory about dividend irrelevance is found to hold. In the «real world», however, it is suggested that dividend payments are influenced by four factors, related to asymmetric information, agency cost, personal tax and behavioral preference.□

- (1) Allen (1989, p.27).
- (2) Brennan (1970, p.423).
- (3) Elton and Gruber (1970, p.71).
- (4) Kalay (1982a, p.1068).
- (5) Gulf Oil Corporation-Takeover (p.3).
- (6) Based on Hess (1982, p.445).
- (7) Hakansson (1982, p.416).
- (8) Modigliani and Miller (1959, p.667).
- (9) For example, Friend and Puckett (1964), Fama (1969).
- (10) Solomon (1963), Van Horne (1968), Mao (1969), Weston and Brigham (1969) –based on Watts (1973, p.191).
- (11)«[T]he current valuation is unaffected by differences in dividend payments in any future period and thus that dividend policy is irrelevant for the determination of market prices, given investment policy.» Miller and Modigliani (1961, p.429).
- (12) Example based on Allan (1989 p. 39-45) and Bhattacharya (1979), (1980, p. 16-22).
- (13) Bhattacharya (1979, p.270).
- (14) Empirical support in Vermaelen (1981, p.160).
- (15) Vermaelen (1981, p.159).
- (16) Barclay and Smith (1988, p.63,69) argue that IRS «has never imposed such a ruling on a large public corporation», «[h]owever, [they] have not observed firms substituting regular inter-firm tender offers for cash dividend payments».
- (17) Based on Vermaelen (1981, p.140).
- (18) Barclay and Smith (1988, p.67).
- (19) But if dividend payments are forcing the company to issue equity, then there is no transaction cost advantage.
- (20) A 1% surprise in earnings leads to a 0.034% increase in stock prices, whereas a 1% surprise in dividend payments leads to a 0.07% rise - Kane, Lee and Marcus (1984, p.1096).
- (21) This criticism directed at Aharony and Swary's (1980) paper was not fully justified because although Aharony and Swary preferred the 'naive model', they also used in their study the Fama-Babiak model used by Kwan. This model, adjusted for quarterly data, provided results similar to those reported in the paper. Aharony and Swary (1980, p.3).
- (22) They are broadly analyzed in the next subchapter –models (2.5.1) and (2.5.2).
- (23) But this comment is relevant to all papers using prediction models.
- (24) DeAngelo, DeAngelo and Douglas J. Skinner (1992, p.1857-1858).
- (25) For a detailed presentation of this method see Masulis (1980).
- (26) Jensen and Meckling (1976, p. 308).
- (27) Jensen and Meckling (1976, p. 313).
- (28) «It would be uneconomic as well as pointless» –Miller and Rock (1982, p.13).
- (29) «This obviously is not altogether different from information or signaling explanations of dividends. One could re-characterize part (but not all) of this treatment as an assertion that investment bankers and other financial intermediaries send signals to investors by putting their reputations (and, in underwritten offerings, money) on the line and certifying that the new securities are backed by the represented earnings potential. The information interpretation of this agency-cost treatment at least offers a plausible explanation why dividends (rather than, say, earnings announcements) carry essential information.» Easterbrook (1984, p.655).
- (30) Miller and Modigliani (1961, p.412).
- (31) Shefrin and Statman (1984, p.256).
- (32) Shefrin and Statman (1984, p.257).
- (33) Shefrin and Statman (1984, p.258).
- (34) Although the tax-exempt status of the A shares was due to end in 1990.
- (35) Long (1978, p.255).
- (36) Lintner (1956, p.101).
- (37) Based on Warther (1991, p.6).
- (38) Warther (1991, p.1).
- (39) Lintner (1956, p.99).
- (40) Based on Khoury and Smith (1980, p.21)

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