DIVIDEND POLICY

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Abstract

This paper contains a survey of the literature on dividend policy. We start with a description of the Miller-Modigliani dividend irrelevance proposition and then consider the effect of relaxing the assumptions it is based on. In particular, we consider the role of taxes, asymmetric information, incomplete contracting possibilities and transaction costs.

1. Introduction

Why is dividend policy so interesting? One reason is that deciding on the amount of earnings to pay out as dividends is one of the major financial decisions that a firm's managers face. Another is that a proper understanding of dividend policy is crucial for many other areas of financial economics. In particular, theories of asset pricing, capital structure, mergers and acquisitions, and capital budgeting all rely on a view of how and why dividends are paid.

Five empirical observations have played an important role in discussions of dividend policy:

1. Corporations typically pay out a significant percentage of their earnings as dividends.
2. Historically, dividends have been the predominant form of payout; share repurchases were relatively unimportant until the mid 1980s.
3. Individuals in high tax brackets receive large amounts in dividends and pay substantial amounts of taxes on these dividends.
4. Corporations smooth dividends.
5. The market reacts positively to announcements of dividend increases and negatively to announcements of dividend decreases.

The first observation that corporations pay a substantial portion of their after-tax profits out as dividends is illustrated by table 1. This shows the after-tax profits (with inventory valuation and capital consumption adjustments) and dividends for all U.S. corporations from 1971 through 1992. It shows that in recent years, U.S. corporations have paid between 50 and 70 percent of their profits out as dividends. This compares with a range of 40 to 60 percent in earlier years.

The second observation is illustrated in table 2. Using data from the Compustat database, which includes the largest and most significant market participants from the major stock exchanges. Table 2 shows the net income, dividends, and share repurchases for these firms for the period 1973 through 1991. The first thing to notice is that for large firms, the percentage paid out is somewhat lower and also

somewhat more stable when payout is measured as a percentage of net income (as opposed to after-tax corporate profits). In the 1980s, it was usually between 40 and 50 percent, compared to 30 and 40 percent in the 1970s. As Bagwell and Shoven (1989) stress, there was an important change in 1984 and 1985 in the repurchases made by corporations. Before that time, the amount repurchased was usually around 5 percent of net income. Since then, it has ranged between 25 and 47 percent of net income. An important question concerns why this change in repurchases occurred. The data in table 2 suggests that dividends as a proportion of net income did not decrease to compensate for the increase in repurchases. In a careful study, Dunsby (1993) finds some evidence of a small substitution of repurchases for dividends, but this does not appear to be very significant. Instead, the increase in repurchases appears to correspond to an increase in the overall level of payouts. It is notable that the other major form of payout from the corporate to private sector, namely mergers and acquisitions, also increased dramatically during the mid 1980s. This is documented in table 3, which shows the total dollar value of mergers and acquisitions from 1971 to 1992.

The third observation is that individuals pay substantial taxes on the large amounts they receive in dividends. Peterson, Peterson and Ang (1985) conducted an extensive study of the tax returns of individuals in 1979. More than $33 billion was included in gross income that year. Table 1 shows that the total amount of dividends paid out by corporations in 1979 was $52 billion, so individuals received over two-thirds of the total. The average marginal tax rate on these dividends received by individuals (weighted by dividends received) was 40 percent. Most dividends were received by individuals in high tax brackets.

The fact that individuals pay large amounts of taxes on dividends has been particularly important in the dividend debate, because there is a substantial tax disadvantage to dividends compared to repurchases. When dividends are received by shareholders, they are taxed as ordinary income. Before the implementation of the 1986 Tax Reform Act (TRA), share repurchases were taxed on a capital gains

basis. Since the tax rate on capital gains was significantly lower than the tax rate on ordinary income, this meant there was a substantial advantage to repurchasing. Even after the 1986 TRA, which equalized the tax rate on capital gains and dividend income, there was a tax disadvantage to dividends: the basis of repurchased shares is not taxed, so the tax liability is effectively postponed. If stocks are held for the long term, this advantage can be substantial. Under the current tax code, individual investors' marginal tax rate on capital gains income is at most 28 percent, while the highest marginal tax rate on dividend income is 39.6 percent. The fact that large amounts of taxes are paid on dividends despite the existence of another, relatively untaxed, payout method has been termed the "dividend puzzle" by Black (1976).

The fourth observation is that corporations smooth dividends. Table 4 shows the dividend behavior of five large corporations from 1950 through 1990. It can be seen that dividends were stable for long periods of time, particularly in the 1950s and 1960s. For example, USX's dividend was unchanged from 1957 to 1960. Dividends are usually increased gradually and are rarely cut. Table 5 shows the number of dividend increases and decreases for over 13,000 publicly-held issues, for the years 1971 to 1993. In each year, the number of dividend cuts is much smaller than the number of dividend increases. For example, in 1992, there were 1,437 dividend increases or initiations and only 395 cuts or omissions.

In a classic study, Lintner (1956) showed that this behavior was fairly widespread. He started with over 600 listed companies and selected 28 to survey and interview. These companies were not selected as a statistically representative sample, but were chosen to encompass a wide range of different situations. Lintner made a number of important observations concerning the dividend policies of these firms. The first is that firms are primarily concerned with the stability of dividends. They do not set dividends de novo each quarter. Instead, they first consider whether any change from the existing rate is necessary. Only when they have decided a change is necessary do they consider how large it should be. Managers appear to believe strongly that the market puts a premium on firms with a stable dividend

policy.

Second, Lintner observed that earnings were the most important determinant of any change in dividends. Management needed to explain to shareholders the reasons for its actions, and needed to base its explanations on observable indicators. The level of earnings is the most important of these. Most companies appeared to have a target payout ratio; if there was a sudden unexpected increase in earnings, firms adjusted their dividends slowly. Firms were very reluctant to cut dividends.

Lintner's third finding was that dividend policy was set first. Other policies were then adjusted, taking dividend policy as given. For example, if investment opportunities were abundant and the firm had insufficient internal funds, it would resort to raising outside funds.

Lintner suggested the following model captured the most important elements of firms' dividend policies. For firm i,

$$D^*_{it} = \pi_i E_{it},$$

$$D_t - D_{t-1} = a_i + c_i(D^*_{it} - D_{i(t-1)}) + u_{it},$$

where for firm i

D^*_{it} = desired dividend payment during period t

D_{it} = actual dividend payment during period t

π_i = target payout ratio

E_{it} = earnings of the firm during period t

a_i = constant relating to dividend growth

c_i = partial adjustment factor

u_{it} = error term

This model was able to explain 85 percent of the dividend changes in his sample of companies. Fama and Babiak (1968) undertook a more comprehensive study of the Lintner model's performance, using data for 392 major industrial firms over the period 1946 through 1964. They also found the

Lintner model performed well. Over the years, other studies have confirmed this.

The fifth observation is that the market reacts positively to announcements of dividend increases and negatively to announcements of dividend decreases. This phenomenon was documented by many studies such as Pettit (1972), Charest (1978), and Aharony and Swary (1980). This evidence is consistent with markets in which managers know more than outside shareholders [e.g., Bhattacharya (1979) or Miller and Rock (1985)], or when contracts are incomplete as suggested by Grossman and Hart (1982), Jensen (1986) and Easterbrook (1984).

The challenge to financial economists has been to develop a dividend policy framework based on firms maximizing profits and investors maximizing utility, that is consistent with these observations and is not rejected by careful empirical tests. The seminal contribution to research on dividend policy was Miller and Modigliani (1961). Prior to their paper, it was widely accepted that the more dividends a firm paid, the more valuable the firm would be. This view was derived from an extension of the discounted dividends approach to firm valuation, which says that the value V_0 of the firm at date 0, if the first dividends are paid one period from now at date 1, is given by the formula:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r_t)^t}$$

where

D_t = the dividends paid by the firm at the end of period t

r_t = the investors' opportunity cost of capital for period t

Gordon (1959) argued that the investor's required rate of return r_t would increase as a result of increased retention of earnings. Although the future dividend stream would presumably be larger as a result of the increase in investment (i.e., D_t would grow faster), he felt that higher r_t would overshadow this effect. The reason for the increase in r_t would be the higher uncertainty concerning cash flows due to delaying the dividend stream.

Miller and Modigliani pointed out that this view of dividend policy was flawed, and they developed a rigorous framework for analyzing dividend policy. This framework has formed the foundation of subsequent work on dividends. Section 2 characterizes their analysis. Subsequent sections recount the literature that has relaxed their assumptions in various ways.

2. The Miller-Modigliani dividend irrelevance proposition

Miller and Modigliani (1961) showed that with perfect and complete capital markets, a firm's dividend policy will not affect its value. The basic premise of their argument is that firm value is determined by choosing optimal investments. The net payout is the difference between earnings and investment, and is simply a residual. Because the net payout consists of dividends and share issues/repurchases, a firm can adjust its dividends to any level with an offsetting change in shares outstanding. From the perspective of investors, dividend policy is irrelevant, because any desired stream of payments can be replicated by appropriate purchases and sales of equity. Thus, investors will not pay a premium for any particular dividend policy.

To illustrate the argument behind the theorem, suppose there are perfect and complete capital markets (with no taxes). At date t, the value of the firm is

$$V_t = \text{Present Value of Payouts}$$

where payouts includes dividends and repurchases. For ease of exposition, it is simplest to initially consider the case with two periods, t and t + 1. At date t a firm has

- earnings, E_t, (earned previously) on hand.

It has to decide on

- the level of investment, I_t
- the level of dividends, D_t
- the amount of shares to be issued, ΔS_t (or repurchased if ΔS_t is negative).

The level of earnings at t + 1, denoted $E_{t+1}(I_t, \theta_{t+1})$, depends on the level of investment I_t and a random variable θ_{t+1}. Since t + 1 is the final date, all earnings are paid out at t + 1. Given complete markets, let

$$p_t(\theta_{t+1}) = \text{time t price of consumption in state } \theta$$

Then it follows that

$$V_t = D_t - \Delta S_t + \int p_t(\theta_{t+1})E_{t+1}(I_t, \theta_{t+1})d\theta_{t+1}$$

The sources and uses of funds identity says that in the current period t:

$$E_t + \Delta S_t = I_t + D_t$$

Using this to substitute for current payouts, $D_t - \Delta S_t$, gives

$$V_t = E_t - I_t + \int p_t(\theta_{t+1})E_{t+1}(I_t, \theta_{t+1})d\theta_{t+1}$$

The first insight from Miller and Modigliani's analysis can be seen immediately from this equation. Since E_t is given, the only determinant of the value of the firm is current investment I_t.

This analysis can be easily extended to the case with more than two periods. Now

$$V_t = E_t - I_t + V_{t+1}$$

where

$$V_{t+1} = E_{t+1}(I_t, \theta_{t+1}) - I_{t+1} + V_{t+2}$$

and so on, recursively. It follows from this extension that it is only the sequence of investments I_t, I_{t+1}, ... that is important in determining firm value. Firm value is maximized by an appropriate choice of investment policy.

The second insight from the Miller-Modigliani analysis concerns the firm's dividend policy which involves setting the value of D_t each period. Given that investment is chosen to maximize firm value, the firm's payout in period t, $D_t - \Delta S_t$, must be equal to the difference between earnings and investment, $E_t - I_t$. However, the level of dividends, D_t, can take any value, since the level of share issuance, ΔS_t, can always be set to offset this. It follows that dividend policy does not affect firm value at all; it is only investment policy that matters.

The above analysis implicitly assumes 100 percent equity financing. It can be extended straightforwardly to include debt financing. In this case, dividends can be financed by debt issues as well as equity issues. This added degree of freedom does not affect the result. As with equity-financed dividends, no additional value is created by debt-financed dividends, since capital markets are perfect and complete.

The third and perhaps most important insight of Miller and Modigliani's analysis is that it identifies the situations in which dividend policy may affect firm value. It may matter, not because dividends are "safer" than capital gains as was traditionally argued, but because one of the assumptions underlying the result is violated. In particular, perfect and complete capital markets have the following elements:

1. No taxes
2. Symmetric information
3. Complete contracting possibilities
4. No transaction costs
5. Complete markets

It is easy to see the role played by each of the above assumptions. The reason for assumption 1 is clear. In the no-taxes case, it is irrelevant whether a firm pays out dividends or repurchases shares; what is important is $D_t - \Delta S_t$. If dividends and share repurchases are taxed differently, this is no longer the case. Suppose, for example, dividends are taxed at a higher rate than capital gains from share repurchases. Then it is optimal to pay no dividends and instead to pay out any residual funds by repurchasing shares. The issues raised by relaxing assumption 1 are considered in section 3.

Assumption 2 is that all participants (including the firms) have exactly the same information set. In practice, this is rarely the case. Managers are insiders and are likely to know more about the current and future prospects of the firm than outsiders. Dividends may reveal some information to outsiders about the value of the corporation. Moreover, insiders may even use dividends deliberately to change

the market's perception about the firm's value. Again, dividend policy may affect firm value. Section 4 considers the effect of asymmetric information.

The complete contracting possibilities specified in assumption 3 mean that there is no agency problem amongst managers and security holders. In this case, motivating the decisions of managers is possible through the use of forcing contracts. Without complete contracting possibilities, dividend policy may, for example, help to ensure that managers act in the interest of shareholders. A high payout ratio may force the management to be more disciplined in the use of the firm's resources and consequently increase firm value. These issues are considered in section 5.

Assumption 4 concerns transaction costs. These come in a variety of forms. For example, firms can distribute cash through dividends and raise capital through equity issues. If flotation costs are significant, every trip to the capital market reduces the firm's value. By the same token, transaction costs incurred by investors when selling securities and making decisions about such sales may also result in an optimal dividend policy. Section 6 develops several transaction-cost-related theories of dividend policy.

Finally, Assumption 5 is that markets are complete. To see why this is important, assume that because trading opportunities are limited, there are two groups with different marginal rates of substitution between current and future consumption. By adjusting its dividend policy, a firm may be able to increase its value by appealing to one of these groups. Explanations along these lines for dividend policy have received very little attention in the literature.[1] Nevertheless, they may be important if some investors desire stocks with a steady income stream, and markets are incomplete because of high transaction costs. Further analysis in this area may provide some insights into dividend policy.

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[1] One exception is Bagwell and Judd (1989).

3. Taxes

A large part of the literature on dividend policy has focused on the importance of taxes, and has tried to reconcile the first three empirical observations discussed in the introduction. Firms pay out a large part of their earnings as dividends and many of the recipients are in high tax brackets. Firms have not traditionally used repurchases as a method of payout. The basic aim of the tax-related literature on dividends has been to investigate whether there is a tax effect: Other things being equal, are firms that pay out high dividends less valuable than firms that pay out low dividends?

Two basic ideas are important to understanding how the results of these investigations should be interpreted:

1. Static clientele models:

   (i) Different groups, or "clienteles", are taxed differently. As Miller and Modigliani (1961) argued, firms have an incentive to supply stocks that minimize the taxes of each clientele. In equilibrium, no further possibilities for reducing taxes will exist and all firms will be equally priced.

   (ii) A particular case (labeled as the simple static model), is when all investors are taxed the same way, and capital gains are taxed less than dividend income. In this case, the optimal policy is not to pay dividends. Firms with high dividend yield would be worth less than equivalent firms with low dividend yield.

2. Dynamic clientele model: If investors can trade through time, tax liabilities can be reduced even further. The dividend-paying stock will end up (just before the ex-dividend day) in the hands of those who are taxed the least when the dividend is received. Such trades will be reversed directly after the ex-day.

The empirical studies of dividend policy have tried to distinguish between the different versions of these models by trying to identify one or more of the following:

(i) Is there a tax effect so that low-dividend-paying stocks are more valuable than high dividend stocks?

(ii) Do static tax clienteles exist so that the marginal tax rates of high-dividend stockholders are lower than those of low-dividend stockholders?

(iii) Do dynamic tax clienteles exist so that there is a large volume around the ex-dividend day, and low-tax-rate investors actually receive the dividend?

This literature has traditionally been divided into CAPM-based studies and ex-dividend day studies. In our view, more insight is gained by considering *static* versus *dynamic* models. In the static models, investors trade only once. Thus, investors have to make a long-term decision about their holdings with the objective of minimizing taxes (keeping all else constant). The buy-and-hold CAPM studies, such as Litzenberger and Ramaswamy (1979), and Miller and Scholes (1982), fall into this category. The Elton and Gruber (1970) study is also in this category: Investors are allowed to trade only once, either on the cum-day or on the ex-day, but not on both. As we shall see shortly, a static view is appropriate when transaction costs are exceedingly high, or when tax payments have been reduced to zero in the static clientele model.

In contrast, in dynamic models investors are allowed to take different positions at different times taking into account risk, taxes, and transaction costs. In particular, just before the ex-day, dividend paying stocks can flow temporarily to investors who value them the most.

In section 3.1, we describe the setting for the formation of a static or holding tax clientele. We then discuss the structure and the findings of the static models. In section 3.2, we proceed to the dynamic models.

3.1 Static models

The static clientele model

First consider the special case where all investors are taxed in the same way and the tax rate on dividend income is higher than the tax rate on capital gains income. The optimal policy, in otherwise perfect capital markets, is to pay no dividends. Equity holders are better off receiving profits through capital gains rather than dividends. If corporations do not have enough positive (or non-negative) NPV projects to exhaust earnings, profits should be distributed through other means, such as share repurchases. As table 2 shows, this prescription has not been followed by U.S. corporations: Most firms have paid dividends regularly and have rarely repurchased their shares. On the face of it, this behavior is puzzling, especially if we believe that agents in the market place behave in a rational manner.

The basic assumption of this simple static model is that all investors are taxed such that there is a substantial tax disadvantage to dividends because they are taxed (heavily) as ordinary income, while share repurchases are taxed (lightly) as capital gains. In reality, of course not all investors are taxed as individuals. Many financial institutions, such as pension funds and endowments, do not pay taxes. They have no reason to prefer capital gains to dividends, or vice versa. Not only do individuals hold stocks directly or indirectly, corporations do also. One of the principal reasons corporations hold dividend-paying stocks as a form of near-cash assets as well as an investment is because, under the U.S. tax code, a large fraction of intercorporate dividends are exempt from taxation, while intercorporate (or government) interest payments are not. Under the old tax code, only 15 percent of dividends, deemed taxable income, were taxed so the effective tax rate on dividends received was 0.15 x 0.46 (marginal corporate tax rate) = 6.9%. But corporations had to pay the full amount of taxes on any realized tax gains. Under the current tax code, 30 percent of dividends are taxed.[2]

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[2]Prior to the 1986 Tax Reform Act (TRA), individual investors who held a stock for at least six months paid a lower tax on capital gains (20%) than on ordinary dividends (50%). The TRA eliminated all distinction between capital gains and ordinary income. However, it is still possible to defer taxes on

In a clientele model, taxpayers in different groups hold different types of assets, as illustrated in the stylized example below. Low-dividend-payout stocks are held by individuals. Medium-dividend-payout firms are owned by people who can avoid taxes, or by tax-free institutions. High-dividend-payout stocks are owned by corporations. Firms must be indifferent between the three types of stock; otherwise, they would increase their value by issuing more of the type that they prefer.

How are assets priced in this model? Since firms must be indifferent between the different types of assets, they must be priced so they are equally desirable. To see how this works, consider the following example:

Suppose there are three groups that hold stocks:

(i) Individuals who have high tax brackets and pay high taxes on dividend-paying stocks. In particular, these investors are subject to a 50 percent tax rate on dividend income and a 20 percent tax rate on capital gains.

(ii) Corporations whose tax situation is such that they pay low taxes on stocks that pay dividends. In particular, their tax rate on dividend income is 10 percent and is 35 percent on capital gains.

(iii) Institutions that pay no taxes.

Group	Asset holdings
High tax bracket	Low-dividend-payout assets
Corporations	High-dividend-payout assets
Tax-free institutions	Any assets

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capital gains by not realizing the gains. Before the 1986 TRA, a corporation that held the stock of another corporation paid taxes on only 15% of the dividend. Therefore, the effective tax rate for dividend income was 0.15 x 0.46 = 0.069. After the TRA, the corporation income tax rate was reduced to 34%. The fraction of the dividend exempted from taxes was also reduced to 70%. The effective tax rate for dividend income was therefore increased to 0.3 x 0.34 = 0.102. In both time periods, the dividend exemption could be as high as 100% if the dividend-paying corporation was a wholly-owned subsidiary of the dividend-receiving corporation.

Assume that these groups are risk neutral, so risk is not an issue; all that matters is the after-tax returns to the stocks.[3]

There are three types of stock. For simplicity, each stock is assumed to have earnings per share of $100. The only difference between these shares are the form of payout. We describe below the after-tax cash flow for each group if they held each type of stock:

		High dividend payout	Medium dividend payout	Low dividend payout
Before-tax earnings/share		$100	$100	$100
Payout policy:				
	Dividends	$100	$ 50	$ 0
	Capital gains	$ 0	$ 50	$100
After-tax payoff/share for group:				
(i)	Individuals	$ 50	$ 65	$ 80
(ii)	Corporations	$ 90	$ 77.5	$ 65
(iii)	Institutions	$100	$100	$100
Equilibrium price/share		$1000	$1000	$1000

In this situation, individuals with high tax brackets will hold low-payout shares, corporations will hold the high-payout shares, and institutions will be prepared to hold all three. Let's suppose that in equilibrium, the total dollar value of holdings of each group in each type of stock are as below:

		High payout	Medium payout	Low payout
(i)	Individuals	$0	$0	$320M
(ii)	Corporations	$110M	$0	$0
(iii)	Institutions	$500M	$730M	$220M
Total		$610M	$730M	$540M

[3]Note that in this stylized market, a tax clientele is a result of both the risk neutrality assumption *and* the trading restrictions.

To see why the shares must all have the same price, suppose the price of low-payout shares was $1050 and the prices of the high- and medium-payout stocks was $1000, what would happen? High- and medium-payout firms would have an incentive to change their dividend policies and increase the supply of low-payout stocks. This would put downward pressure on the price of low payout stock. What amount of stock do investors demand? Individuals would still be prepared to buy the low-payout stock, since $80/$1050 = 7.62 percent, which is greater than the 6.5 percent ($65/$1000) they would obtain from holding medium-payout stocks, or the 5 percent ($50/$1000) they would obtain from holding low-payout stocks. What about institutions? They won't be prepared to hold low-payout stocks, since the return on them is $100/$1050 = 9.52 percent. This is less than the 10 percent ($100/$1000) they can get on the other two stocks, and they will try to sell. Again, there is downward pressure on the price of low-payout stock. Hence the price must fall from $1050 to $1000 for equilibrium to be restored. A similar argument explains why the prices of other stocks are also $1000. Thus, in equilibrium the price is independent of payout policy and dividend policy is irrelevant, as in the original Miller and Modigliani theory.

Simple ways of distinguishing between the static models' theories

A number of studies have attempted to distinguish between the case of the static model, where everybody is taxed the same and the static clientele model where investors are taxed differently. Perhaps the easiest way to make the distinction is to investigate the relationship between the marginal tax rates of stockholders and the amount of dividends paid.

Friend, Blume and Crockett (1974) find some evidence from survey data that there is a modest (inverse) relationship between investors' tax brackets and the dividend yield of the stocks they hold. In a more recent study, Lewellen, Stanley, Lease and Schlarbaum (1978), using individual investor data supplied by a brokerage firm, find very little evidence of an effect of this type. Both studies indicate that

investors in high tax brackets hold substantial amounts of dividend-paying stock. According to the clientele theory, this should not occur; firms should be able to increase their value by switching from a policy of paying dividends to repurchasing shares.

Elton and Gruber (1970) sought to identify the relationship between marginal tax rates and dividend yield using an ex-dividend date price data. They argue that when people are about to sell a stock around its ex-dividend date, they will calculate whether they are better off selling just before it goes ex-dividend, or just after. If they sell before the stock goes ex-dividend, they get a higher price, and their marginal tax liability is on the capital gain, represented by the difference between the two prices. If they sell just after, the price will have fallen because the dividend has been paid. They will receive the dividend plus this low price, and their marginal tax liability will be their personal tax rate times the dividend. In equilibrium, stocks must be priced so that individuals' marginal tax liabilities are the same for both strategies.

Assuming investors are risk-neutral and there are no transaction costs, it is necessary that

$$P_B - t_g(P_B - P_0) = \bar{P}_A - t_g(\bar{P}_A - P_0) + D(1 - t_d)$$

where

P_B	=	stock price cum-dividend (the last day the stock is traded with the dividend)
$\bar{P}_A$	=	expected stock price on the ex-dividend day (the first day the stock is traded without the dividend)
P_0	=	stock price when purchased initially
D	=	dividend amount
t_g	=	personal tax rate on capital gains
t_d	=	personal tax rate on dividends.

The left-hand side represents the after-tax receipts the seller would receive if he sold the stock cum-dividend and had bought it originally for P_0. The right-hand side represents the expected net receipts from sale on the ex-dividend day. Rearranging,

$$\frac{P_B - \bar{P}_A}{D} = \frac{1-t_d}{1-t_g} .$$

If there are clienteles with different tax brackets, the tax rates implied by the ratio of the price change to the dividend will differ for stocks with different levels of dividends. It will be greater the higher the dividend yield, and, hence, the lower the tax bracket of investors. Elton and Gruber found strong evidence of a clientele effect that was consistent with this relationship.

The role of risk

In the simplest versions of the theories presented above, risk has been ignored. In practice, risk is likely to be of primary importance, and so needs to be explicitly incorporated in the analysis.

As Long (1977) points out, implicit in the argument of a tax clientele when there is risk, is the assumption that there are redundant securities in the market. An investor can achieve the desired portfolio allocation in risk characteristics, without regard to dividend yield. In other words, investors can create several identical portfolios in all aspects but dividend yield. Indeed, Keim (1985) presents evidence that indicates that stocks with different yields also have different risk characteristics.[4] Zero-dividend-yield stocks and stocks with low-dividend-yield have significantly higher beta than high-yield stocks. This finding implies that it may be a non-trivial task to freely choose the optimal risk-return tradeoff while ignoring dividend yield.

Depending on the precise assumptions made, some models that incorporate risk are similar to the simple static model in that there is a tax effect and dividend policy affects value. On the other hand,

[4]See also Blume (1980).

others are similar to the static clientele model in that there is no tax effect and dividend does not affect value. Most of the literature has therefore focused on the issue of whether or not there is a tax effect.

Brennan (1970) was the first one to develop an after-tax version of the CAPM. Litzenberger and Ramaswamy (1979, 1980) extend the model to incorporate borrowing and short-selling constraints. In both cases, however, the basic result is that for a given level of risk, the compensation for higher dividend yield is positively related to the differential taxes between dividends and capital gains:

$$E(R_{it}-R_{ft})=a_1+a_2\beta_{it}+a_3(d_{it}-R_{ft}) \qquad (1)$$

Equation (1) describes equilibrium relationships between a security expected return $E(R_{it})$, its expected dividend yield (d_{it}), and its systematic risk (β_{it}). Finding a significantly positive a_3 is interpreted as evidence of a tax effect.

Tests of such relationship were carried out by several researchers, including Black and Scholes (1974), Blume (1980), Morgan (1982), Poterba and Summers (1984), Keim (1985), Rosenberg and Marathe (1979), Miller and Scholes (1982), Chen, Grundy and Stambaugh (1990), and Kalay and Michaely (1993). The empirical results are mixed. Several of these authors find a positive yield coefficient, which they attribute to differential taxes.

The earliest (and one of the more influential) test was done by Black and Scholes (1974). Using annual data, and a slightly different version than that stated in equation (1) they test the tax effect hypothesis.

$$\tilde{R}_i=\gamma_0+\left[\tilde{R}_m-\gamma_0\right]\beta_i+\gamma_1(d_i-d_m)/d_m+\varepsilon_i, \quad i=1,\ldots,N \qquad (2)$$

where

$\tilde{R}_i$ = the rate of return on the ith portfolio

γ_0 = an intercept term that should be equal to the risk-free rate, R_f, according to the CAPM

$\tilde{R}_m$ = the rate of return on the market portfolio

β_i = the systematic risk of the ith portfolio

γ_1 = the dividend impact coefficient

d_i = the dividend yield on the ith portfolio, measured as the sum of dividends paid during the previous year divided by the end-of-year stock price

d_m = the dividend yield on the market portfolio measured over the prior 12 months

ε_i = the error term.

The null hypothesis is that the dividend yield coefficient is not significantly different from zero. This hypothesis can not be rejected for the entire time period (1936 through 1966) or for any of the 10-year subperiods. Black and Scholes concluded that "... it is not possible to demonstrate that the expected returns on high yield common stocks differ from the expected return on low yield common stocks either before or after taxes."

In a series of papers, Litzenberger and Ramaswamy (1979, 1980, 1982) re-examined this issue.[5] Their experimental design differs from that of Black and Scholes in several important aspects: They use individual instead of group data; they correct for the error in variables problems in the beta estimation

[5] The econometric technique used by Litzenberger and Ramaswamy to correct for the errors in variables problem represents a significant contribution to the empirical asset pricing literature. It will not be reviewed here, however, given the focus of this chapter.

by using maximum likelihood procedures; and perhaps most importantly, they classify stock into yield classes by using a monthly definition of dividend yield rather than a long-term dividend yield definition as in Black and Scholes (1974).

The Litzenberger and Ramaswamy experiment involves three steps. First, the systematic risk of each stock is estimated for each one of the test months. The estimation uses the market model regression. Formally,

$$R_{it}-R_{ft}=a_{it}+\beta_{it}(R_{mj}-R_{fj})+\epsilon_j \qquad j=t-60,\ldots,t-1, \tag{3}$$

where R_{mj} is the return on the market portfolio during period j, R_{ij} is the rate of return on stock i during period j, β_{it} is the estimated beta for stock i for period t, the riskless rate of interest during period t is R_{fj}, and ϵ_{it} is a noise term. The second stage uses the estimated beta for stock i during month t, β_{it}, and an estimate of stock i's expected dividend yield for month t, d_{it}, as independent variables in the following cross-sectional regression for month t:

$$R_{it}-R_{ft}=a_{1t}+a_{2t}\beta_{it}+a_{3t}(d_{it}-R_{ft})+\epsilon_i \qquad i=1\ldots N \tag{4}$$

The experiment requires an ex-ante estimate of the test month dividend yield. The estimate of expected dividend yield for month t is obtained from past observations. For cases in which the dividends were announced at month t-1, the estimate is simply d_t/p_{t-1}. When announcement and ex-date occur in month t, Litzenberger and Ramaswamy have to estimate the market's time t expected dividend as of the end of month t-1. The estimate they chose is the last dividend paid during the previous 12 months. If no dividends were paid during this period, the expected dividend is assumed to be zero.

The second step is repeated for every month included in the period 1936 to 1977. β_{it+1} is estimated using the previous 60 months of data. An updated estimate of the expected dividend yield for each stock is provided for each one of the test months.

This sequence of cross-sectional regressions results in time series of a_3's. The estimate of a_3 is

the mean of this series. The standard error of the estimate is computed from the time series of the a's in a straightforward manner. Litzenberger and Ramaswamy (1979, 1980) find a_3 to be positive and significantly different from zero. Using MLE and GLS procedures, Litzenberger and Ramaswamy corrected for the error in variables and heteroskedasticity problems presented in the data. However, the empirical regularity they document -- a positive and statistically significant dividend yield coefficient -- is not sensitive to the methodology employed. The various methodologies yielded similar estimated coefficients with minor differences in the significance level. Litzenberger and Ramaswamy interpret their finding as consistent with Brennan's (1970) after-tax CAPM. That is, the positive dividend yield coefficient is evidence of a dividend tax effect.

Miller and Scholes (1982) argue that the positive yield coefficient found by Litzenberger and Ramaswamy is not a manifestation of a tax effect, but an artifact of two information biases. First, Litzenberger and Ramaswamy's estimate of next-month dividend yield can be correlated with month t information. Of the firms paying dividends, about 40 percent announce and pay the dividend (i.e., the ex-dividend day) at the same month. The use of the Litzenberger and Ramaswamy yield definition assumes that the ex-dividend month is known a priori even for ex-months in which dividends were not declared in advance.

Second, Litzenberger and Ramaswamy ignore the potential effect of dividend omission announcements. An omission announcement, which is associated with bad news, will tend to bias upward the dividend yield coefficient, since it reduces the return of the zero yield group. The effect of these informational biases has been the center of the debate between Litzenberger and Ramaswamy (1982) and Miller and Scholes (1982).

Miller and Scholes show that when only dividends declared in advance are included in the sample, or when the dividend yield is defined as the dividend yield in month t-12, the yield coefficient is statistically insignificant. Based on these results, Miller and Scholes attributed the Litzenberger and

Ramaswamy results to information rather than tax effects. Responding to this criticism, Litzenberger and Ramaswamy (1982) constructed a dividend yield variable that incorporated only information that investors could possess at the time. The sample contained only stocks that either declared in month t-1 and paid in month t, or stocks that paid in month t-1 and therefore were not likely to repay in the current month. Using the "information-free" sample, Litzenberger and Ramaswamy find the yield coefficient to be positive and significant.

The question still remains whether the positive yield coefficient found by Litzenberger and Ramaswamy can be attributed to taxes. Kalay and Michaely (1993) argue that while the single-period model derived by Brennan (1970) and Litzenberger and Ramaswamy (1979) predicts cross-sectional return variation as a function of dividend yield, the Litzenberger and Ramaswamy test of Brennan's model, in contrast, is inadvertently designed to discover whether the ex-dividend period offers unusually large risk-adjusted returns (i.e., time-series return variation). Time-series return variation, per se, is not evidence of a tax effect. As mentioned above, the Litzenberger and Ramaswamy experiment categorizes stocks as having positive dividend yield only in the ex-dividend month. Hence, two-thirds of the time (assuming quarterly dividend payments), a dividend-paying stock is categorized as a zero-yield stock. This experimental design makes it very difficult to relate the dividend yield coefficient to taxes, since these static models predict cross-sectional variation in returns, not time-series variation. In fact, this experiment's design can even result in a rejection of the tax effect hypothesis when it is true. For example, assume that a tax effect exists and that the tax-related premium is evenly spread throughout the year. By putting stocks in the zero-yield group two-thirds of the time (in all the non-ex-dividend months), the yield coefficient may become insignificant despite the fact that cross-sectional variation in returns exists. Thus, their experiment is not designed to uncover cross-sectional return variations. It is therefore important to identify whether the positive yield coefficient arises because of time series or cross-

sectional return variation.[6] Separating the time series from the cross-sectional return variations, Kalay and Michaely cannot detect any cross-sectional return variation across stocks with different yields. This is inconsistent with the Brennan's and Litzenberger and Ramaswamy's buy and hold models.

Another potential problem is whether some omitted risk factors (other than beta) that are correlated with dividend yield, rather than taxes, can explain the positive yield coefficient. As a first indication of the potential importance of some omitted risk factors, Miller and Scholes (1982) demonstrate that when the reciprocal of price, (1/P), is incorporated in the regression equation instead of the dividend yield, (D/P), its coefficient is still positive and significant. The issue was thoroughly investigated by Chen, Grundy and Stambaugh (1990). Categorizing all dividend-paying stocks into 20 portfolios according to size and yield, they find that: (1) When a single risk factor is used, large firms with high dividend yield are the only ones to experience positive yield coefficient; (2) when two risk factor models are used, the yield coefficient is significant for only one of the 20 portfolios.

As also suggested by Miller and Scholes (1982) and Hess (1983), Chen, Grundy and Stambaugh (1990) present evidence that dividend yield and risk measures are cross-sectionally correlated. When they allowed the risk measures to vary, the yield coefficient was found to be positive but insignificant. Chen, Grundy and Stambaugh show that the positive association between yield and their portfolios' returns can be explained by a time-varying risk premium that is correlated with yield. Thus, they conclude that there is no reliable relationship between cross-sectional variation in returns and dividend yield that is a consequence of tax penalty.

Summing up, a growing body of evidence shows that within static, single-period equilibrium models, there is no convincing evidence of a significant cross sectional relationship between stocks'

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[6]It should be noted that since the Black and Scholes study uses a long-term definition of dividend yield, a finding of positive yield coefficient is indicative of cross-sectional variation in return due to dividend yield. However, as noted earlier, Black and Scholes did not find a significant yield coefficient.

returns and their dividend yields. Perhaps a more promising avenue for investigating this issue is to examine a model that allows for dynamic trading around the ex-dividend day.

3.2 Dynamic models

An important development in the literature on taxes and dividends was the realization that investors could trade dynamically to reduce their tax liability. The first paper to emphasize this aspect was Miller and Scholes (1978). They argued that there were a number dynamic strategies that allowed taxes to be avoided. In particular, with perfect capital markets all taxes could be avoided, bringing us back to the case where dividend policy is irrelevant. In practice, however, the transaction costs of pursuing these strategies appear to be too high to make them empirically significant. An area where dynamic strategies appear to be more empirically relevant is trading around the ex-date. A number of studies, starting with Kalay (1982), have considered the implications of this. We consider the two types of approach in turn.

Dynamic tax avoidance strategies

Miller and Scholes (1978) suggested an ingenious strategy for avoiding taxes. By borrowing and investing the proceeds with tax-free institutions, such as insurance companies or pension funds, it is possible to create an interest deduction that allows taxes to be avoided. Since there are assets that are held to offset the borrowing, the position can be closed out at an appropriate point.

A number of other dynamic tax avoidance strategies have been suggested by Stiglitz (1983). If individuals can easily launder dividends so they don't have to pay taxes on them, we're essentially back in a Miller and Modigliani world, and dividend policy is irrelevant. However, there is little evidence that this or other such strategies are actually being used by investors. Peterson, Peterson and Ang (1985), for example, show that the marginal tax on dividend income faced by individual investors has been about

double the marginal tax rate they pay on capital gains income. This evidence is not consistent with a widespread use of tax avoidance strategies of the type described by Miller and Scholes. It suggests that the transaction costs of such strategies are too high to be useful to investors.

Dynamic ex-dividend day strategies

A number of studies have considered dynamic trading strategies around the ex-dividend day. The basic idea is that investors may change their trading patterns around the ex-dividend day to capture or avoid the upcoming dividend. As first argued by Kalay (1982), in a risk neutral world, without any restrictions or imperfections such as transaction costs, dynamic arbitrage may eliminate a tax effect in prices. Traders with a zero-tax rate on dividends and capital gains will buy the stock before it goes ex-dividend and sell it just after. Without risk or transaction costs, the arbitrage will ensure the price drop is equal to the dividend, i.e., $\left(P_B - \bar{P}_A\right)/D = 1$. If there are transaction costs, and no price uncertainty, then $\left(P_B - \bar{P}_A\right)/D$ must lie within a range around 1. This range will be larger the greater are transaction costs.

Kalay (1982), however, did not explicitly account for the risk involved in the ex-day trading. In what follows, we describe the framework used by Michaely and Vila (1993) to describe the ex-day price formation within a dynamic equilibrium framework in which agents have heterogeneous valuation of a publicly traded asset. The intuition behind this model is as follows: An investor equates the marginal benefit of trading arising from being more (less) heavily invested in the dividend-paying stock with the marginal cost which arises from the deviation from optimal risk sharing.

Agents trade because they have heterogeneous valuation of dividends relative to capital gains (on

an after-tax basis). This framework incorporates short-term, corporate, and individual investors' desires to trade around the ex-dividend day. It differs from other models in several ways: First, it explicitly accounts for the risk involved in the trade, and therefore concludes that it is not arbitrage, but equilibrium, that determines prices and volume.[7] Consequently, no trader will attempt to take an unlimited position in the stock, regardless of his or her tax preference. Second, while two-period models like those of Brennan (1970) or Litzenberger and Ramaswamy (1979), adequately describe the effect of taxes on portfolio holdings in a static equilibrium, they mask a qualitative difference between models of financial markets with and without taxation, namely, optimal tax-induced trading. Because of the dynamic nature of the model, it is possible to derive volume as well as price behavior implications. As it turns out, the second moment of the heterogeneity distribution (i.e., the dispersion in the after-tax valuation of dividends) can be extracted from the trading volume around the ex-day.

Using this framework, it is possible to show that in equilibrium, the expected price drop in relation to the dividend reflects the average preference of *all* traders, weighted by their risk tolerance and wealth, and the risk involved in the ex-dividend day transaction.

Specifically,

$$E(Pr)=\{P_c-E(P_e \mid P_c)\}/D=\bar{\alpha}-\frac{X(\sigma_e^2/K)}{D} \qquad (5)$$

where

$E(Pr)$ is the expected price drop in relation to the dividend amount (hereafter, "the premium")

P_c is the cum-day price

[7]This point was first noted by Heath and Jarrow (1988).

P_e is the ex-day price

D is the dividend amount

σ_e^2 is the ex-day variance

K is the after-tax weighted average of investors' risk tolerance

X is the supply of securities

$\alpha_i = \frac{1-T_d^i}{1-T_g^i}$ is the relative tax preference of dividend relative to capital gains

$\bar{\alpha} = \frac{\sum_{i=1}^{N} k_i \alpha_i}{\sum k_i}$ is the average of investors tax preferences weighted by their risk tolerance.

As it turns out, unless a perfect tax clientele exists, in which different groups hold different stocks rather than just different quantities of the same stock, it is not possible to infer tax rates from price alone. However, the cross-sectional distribution of tax rates can be inferred by using both price and volume data. By observing the premium alone, we can infer only the weighted-average relative tax rates, not the entire distribution of tax rates for the trading population. As shown in Michaely and Vila (1993), the second moment of the distribution can be extracted from the volume behavior on the ex-dividend day.

This point can be illustrated by using the following stylized example: Assume that there are three groups of traders in the marketplace with a marginal rate of substitution between dividends and capital gains income of 0.75, 1.0, and 1.25, respectively. Assume further that the average price drop relative to the dividend amount is 1.0. Using the standard analysis, we may conclude that the second group

dominates the ex-dividend day price determination. However, this may not be the case. For example, suppose that half of the traders are from the first group and half are from the third group, and both have the same effect on prices. This market composition will also result in relative price drop equal to the dividend amount. The only way to distinguish between the two scenarios is by incorporating volume into the analysis. In the first case, there are no gains from trade, and, consequently, no excess volume will be observed on the ex-dividend day. In the second case, there are gains from trade, excess volume is observed, and the particular equilibrium point is at a relative price drop equal to one. The model presented here allows us to distinguish between such cases.

More formally,

$$AV - \frac{1}{2}\{D\sum_{i=1}^{N} \mid (\alpha^i - \bar{\alpha})(K^i/\sigma^2) \mid \}, \tag{6}$$

where AV is the abnormal trading volume on the ex-dividend day.

The Elton and Gruber (1970) and Kalay (1982) analyses are also incorporated in equation (5). Both assume an arbitrage framework in the sense that the last term in equation (5) is zero, i.e., there is no risk involved in the trade. Elton and Gruber assume that for some exogenous reason (e.g., transaction costs), the only trade around the ex-day will be done by investors within the same tax clientele group. In other words, if a perfect holding clientele exists and all trading is intra-group, then the relative price drop will reflect the marginal value of dividends relative to capital gains. (Note that in this scenario, the marginal and the weighted average values are the same.) There are two reasons why, in this case, there will be no abnormal trading volume around the ex-dividend day. First, since all trades are within the same clientele group, all relevant traders value the dividend equally, and there are no gains from trade. Second, there are no incentives for investors within the clientele group to delay or accelerate trades because of the upcoming dividends as Grundy (1985), for example, suggested. In other words, Elton and Gruber suggest that taxes affect price, but do not locally affect investors' behavior [no extra trading, as in equation (6)]. Kalay, on the other end of the spectrum, takes the opposite view: Taxes affect behavior

but not prices, i.e., the arbitrageurs will make sure (through their tradings) that the price drop equals the dividend amount. Since Kalay uses the arbitrage framework, he can show that short-term investors may take an unlimited position in the stock as long as the expected price drop is not equal to the dividend amount.

Tests of these propositions have taken several forms. Most studies have examined the price behavior and infer investors' preferences and behavior from prices. With only a few exceptions [Grundy (1985), Lakonishok and Vermaelen (1986), and Michaely and Vila (1993, 1994)], much less attention has been devoted to a direct examination of the effect of differential taxes on investors' trading behavior through volume.

Researchers have almost always found the average price drop between the cum- and the ex-day to be lower than the dividend amount [see Elton and Gruber (1970), Kalay (1982), Eades, Hess and Kim (1984), and Poterba and Summers (1984), among others].[8] Another finding across many of these studies is that the average premium increases with dividend yield [see, for example, Elton and Gruber (1970), Kalay (1982), Lakonishok and Vermaelen (1986) and Boyd and Jagannathan (1994)]. The latter findings are consistent with tax clientele: Corporations, which prefer dividends over capital gains, and tax free institutions, which are indifferent to the form of payment, hold high-yield stocks. The ex-day premium reflects those preferences.[9] Eades, Hess and Kim's (1984) findings of a premium greater than one for preferred stock is also consistent with this notion. That is, this group of stocks pays high dividend yield, and the dominant traders of these stocks (at least around the ex-day) are the corporate traders, who prefer dividends.

Another way to examine the effect of taxes on ex-day price behavior is to examine the effect of tax changes. If taxes affect investors' decisions on buying or selling stocks around the ex-day, a change in the relative taxation of dividends to capital gains should affect prices. Poterba and Summers (1984)

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[8] For international evidence, see Kato and Loewenstein (1993) for the Japanese market, Lakonishok and Vermaelen (1983) for the Canadian market, and Michaely and Murgia (1993) for the Italian market.

[9]It is important to note that the tax clientele we are alluding to can be either a holding clientele or a trading clientele. Only examination of trading volume can separate the two.

looked at the British market before and after tax changes and found evidence consistent with the existence of a tax effect. Barclay (1987) compared the ex-day price behavior prior to the introduction of federal taxes in 1913 with its behavior in the years 1962 to 1985. He found that the average premium was not significantly different from one before the enactment of the federal taxes, and significantly below one after. Barclay concluded that the higher taxes on dividends after 1913 caused investors to discount their value.

Michaely (1991) examined the effect of the 1986 Tax Reform Act (TRA) on ex-day stock price behavior. The 1986 TRA eliminated the preferential tax treatment of long-term capital gains that had been adopted in 1921; dividend income and realized capital gains were taxed equally after the reform. If taxes are at work, we would expect the premium to be closer to one after the 1986 TRA. Surprisingly, this was not the case. The average premium, both before and after the TRA, is not lower than one. Comparing his results to the Elton and Gruber study, which uses data from the 1960s, Michaely concludes that the change in the relative pricing of dividends between the 1960s and the 1980s is not because of taxes, but because of the change in weights of the various trading groups. Facing lower transaction costs in the equity, options, and futures markets, institutional and corporate investors seem to trade more around the ex-day in the latter period. Thus, their preferences have a greater effect on the price formation. These results are summarized in table 6.

While in static models, such as Brennan (1970) or Elton and Gruber (1970), transaction costs can be safely ignored (since investors trade only once), they are potentially much more important in the dynamic models. If investors trade in and out of stocks because of taxes, the multiple rounds of trades may result in a non-trivial cost of transacting. Disregarding risk, Kalay shows that the "arbitrage" by the short-term traders will take place as long as the level of transaction costs is low enough. Indeed, Karpoff and Walkling (1988, 1990) show that excess returns are lower for stocks with lower transaction costs. This is especially pronounced for stocks with high dividend yields, both on the NYSE/AMEX and for NASDAQ stocks. In other words, corporations and short-term traders have a greater effect on the ex-day

prices in stocks with lower levels of transaction costs.[10]

When the risk involved in the ex-day trading is accounted for, the effect of transaction costs on trading is not as straightforward. Michaely and Vila (1994)) develop a formal model that incorporates the effect of both transaction costs and risk on ex-day prices and trading. As expected, transaction costs are predicted to reduce the volume of trade. More interesting is the interaction between transaction costs and risk. First, with or without transaction costs, risk reduces volume. Unlike prices, however, volume is negatively affected by the level of idiosyncratic risk. As the level of transaction costs increases, systematic risk negatively affects the volume of trade. The reason is simple: Without transaction costs, investors can afford to hedge all of the systematic risk. In the presence of transaction costs, the systematic risk is not completely hedged; consequently, it affects the amount of trading.

Empirical evidence supports these results. As documented in Grundy (1985), Lakonishok and Vermaelen (1986), and Michaely and Vila (1994), the abnormal volume on and around the ex-day is significant. This evidence indicates that a perfect tax clientele where investors hold strictly different stocks, does not exist. (In a perfect clientele, no ex-day trading will take place.) Moreover, it questions the notion that the marginal tax rate can be inferred from prices alone.

Michaely and Vila (1994) provide evidence that both risk and transaction costs affect volume. They show that (i) stocks with lower transaction costs experience higher abnormal volume; (ii) idiosyncratic risk significantly affects trading volume; (iii) market risk has a greater effect (negative) on trading volume when the level of transaction costs is higher.

Koski (1991) reports that ex-day trading volume increases by more than ten times when traders are able to arrange the cum-day/ex-day trading using non-standard settlement days. That is, by reducing the risk exposure and transaction costs, volume increases significantly. In particular, Koski examines very large block trades around the ex-day. Those trades involve a large purchase and subsequent sale of the dividend-paying stock within minutes (with a different settlement day for each transaction). These trades are done through bilateral bargaining between the two parties involved, usually Japanese insurance

[10]See also Boyd and Jaganathan (1994).

companies on the buying side and a U.S. institution on the selling side. This procedure substantially reduces the risk exposure (and transaction costs) relative to "conventional" dividend-capture trading.[11]

3.3 Dividends and taxes -- conclusions

Differential taxes affect both prices (at least around the ex-dividend day) and investors' trading decisions. On average, in most periods examined the price drop is less than the amount of dividend paid, implying a negative effect on value. Thus, the evidence from the ex-day studies seems to indicate that from a tax perspective, dividends should be minimized. The volume of trade around these events is much higher than usual, indicating that the shares change hands from one investors' group to the other. This evidence tells us that taxes affect behavior. The facts also indicate that a perfect holding clientele does not exist: There is clear evidence for inter-group ex-day trading that is motivated by taxes. It is also apparent that ex-day trading volume increases as the degree of tax heterogeneity among investors increases (Michaely and Vila 1993, 1994 and Michaely and Murgia, 1993), indicating that as the benefits of trading increase, so does trading volume. Also, a direct examination of portfolio holdings by the various tax groups shows that even investors in the highest tax brackets hold high dividend-paying stocks.

While in perfect and complete capital markets dividends may not affect value, this is much less clear in incomplete markets with transaction costs. The theory and some of the empirical evidence indicate that taxes do matter and dividends reduce value when risk cannot be fully hedged and transactions are costly.

In light of the above discussion, it may be less surprising that tests of the static models with taxes have not been proven successful: These tests cannot accommodate dynamic trading strategies, which seem to be important in this context. In addition, as shown by Chen, Grundy and Stambaugh (1990),

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[11]Consistent with the notion that low transaction costs enhance ex-day trading, Michaely and Murgia (1993) show that the trading volume of both block trades and non-block trades (on the Milan stock exchange) increases substantially for stocks with high dividend yield and low transaction costs.

time-varying risk may result in spurious positive yield coefficients. Indeed, the ex-dividend day studies that account for these have been more successful in identifying the extent to which taxes affect prices and traders' behavior.

4. Asymmetric information – Signaling and adverse selection models

4.1 Theory

The clientele model is not the only approach to understanding the dividend policy suggested by Miller and Modigliani (1961). Another possibility is that capital markets are informationally imperfect. In particular, Miller and Modigliani suggested that dividends might convey information about a firm's prospects. However, it was not until the late 1970s and early 1980s that any signaling models were developed. The best known of these are Bhattacharya (1979), Miller and Rock (1985), and John and Williams (1985). The basic intuitive idea in all these models is that firms adjust dividends to signal their prospects. A rise in dividends typically signals the firm will do better, and a decrease suggests that it will do worse. These theories may explain why firms pay out so much of their earnings as dividends, and thus consistently prove the first empirical observation. However, one of the central questions that arises in this context is why firms use dividends and not share repurchases, or some other less costly means of signaling, to convey their prospects to investors.

Bhattacharya (1979) considers a two-period model where the firm's managers act in the original shareholders' interests. At time zero, the managers invest in a project. The expected profitability of this investment is known to the managers, but not to investors. At this time, the managers also "commit" to a dividend policy. At time 1, the project generates a payoff that is used to pay the dividends committed to at time zero. A crucial assumption of the model is that if the payoff is insufficient to cover the dividends, the firm must resort to outside financing and incur transaction costs in doing so. Just after the dividends are paid, the firm is sold to a new group of shareholders, who receive the payoff generated

by the project at time 2. The payoffs in the two periods are independent and identically distributed. The price that the new shareholders are prepared to pay at time 1 clearly depends on their beliefs concerning the profitability of the project. At time zero, the managers can signal that the firm's project is good by committing to a large dividend at time 1. If a firm does indeed have a good project, it will usually be able to pay the dividend without resorting to outside financing and, therefore, will not have to bear the associated transaction costs. It is not worthwhile for a firm with a bad project to do this, because it will have to resort to outside financing more often and thus will bear higher transaction costs. If the dividends are high enough, these extra costs will more than offset the advantage gained from the higher price received at time 1. Since the critical trade-off in the model is between the transaction costs incurred by committing to a large dividend and the price paid at time 1, it follows that similar results hold when the dividends are taxed.

Bhattacharya's model is a significant step forward. It is apparently consistent with the observation that firms pay dividends even when these are taxed. However, it has been criticized on the grounds that it does not explain why firms use dividends to signal their prospects. It would seem that firms could signal better by using share repurchases instead. This would result in the same tradeoff between the transaction costs of resorting to outside finance and the amount received when the firm is sold but would result in lower personal taxes than when dividends are used.

A number of Bhattacharya's assumptions are also the subject of criticism. For example, it is not clear precisely what is meant by firms "... committing to a certain level of dividends."

The dissatisfaction with early models led to the development of a number of alternative signaling theories. Miller and Rock (1985) also consider a two-period model. Initially, at time zero, firms invest in a project, the profitability of which cannot be observed by investors. At time 1, the project produces earnings, and the firm uses these to finance its dividend payment and its new investment. Neither earnings nor the new level of investment can be observed by investors. Some shareholders sell their

holdings in the firm at time 1. At time 2, the firm's investments again produce earnings. A critical assumption of the model is that the firm's earnings are correlated through time. This means that the firm has an incentive to make shareholders believe that the earnings at time 1 are high so that the shareholders who sell then receive a high price. Since both earnings and investment are unobservable, a bad firm can pretend to have high earnings by cutting its investment and paying out high dividends instead. A good firm must pay a level of dividends that is sufficiently high to make it unattractive for bad firms to reduce their investment enough to achieve the same level.

The Miller and Rock theory has a number of attractive features. The basic story -- that firms shave investment to make dividends higher and signal high earnings -- is a plausible one. Unlike the Bhattacharya (1979) model, it does not rely on assumptions that are difficult to interpret, such as firms being able to commit to a dividend level. What are its weaknesses? It is vulnerable to the standard criticism of signaling models; it is not clear that if taxes are introduced, dividends remain the best form of signal. It would seem that share repurchases could again achieve the same objective, but at a lower cost.

In Bhattacharya (1979), the dissipative cost that allowed signaling to occur was the transaction cost of 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) present a theory in which the taxes themselves are the dissipative cost. The theory thus meets the criticism that the same signal could be achieved at a lower cost if the firm were to repurchase shares instead.

What is the reasoning behind this result? John and Williams' starting point is the assumption that the shareholders in a firm have liquidity needs they must meet by selling some of their shares. The firm's managers, in the interest of the original shareholders, know the true value of the firm; outside investors do not. If the firm is undervalued when the shareholders must meet their liquidity needs, then they would be selling at a price below the true value. However, suppose the firm pays a dividend, which

is taxed. If outside investors take this to be a good signal, then the share price will rise; the shareholders will have to sell less equity to meet their liquidity needs and will maintain a higher proportionate share in the firm.

Why is it that bad firms do not find it worthwhile to imitate the good ones? When the dividends are paid it is costly to shareholders because they must pay taxes on them. But there are two benefits: First, a higher price is received for the shares that are sold. Second, and more importantly, a higher proportionate share in the firm is retained. If the firm is actually undervalued, this higher proportionate share is valuable to the shareholder. If the managers' information is bad and the firm is overvalued, the reverse is true. It is this difference that allows separation. Only firms that are actually good will benefit enough from the higher proportionate share to make it worthwhile bearing the cost of the taxes on the dividends.

John and Williams' model thus avoids the objection to most theories of dividends. Firms do not repurchase shares to avoid taxes, because it is precisely the cost of the taxes that makes dividends desirable. This is clearly an important innovation.

What are the weaknesses of the John and Williams' theory? In terms of assumptions, they take it as a given that shareholders must meet their liquidity needs by selling their shares. The use of debt, either by the firm or the shareholders themselves, is ruled out. One question asks why the firm does not borrow and use the proceeds to repurchase its shares. Again, this would meet the liquidity needs of investors and would only be worthwhile if the firm's shares were undervalued. It would seem that it should be possible to signal the firm's value costlessly. Even if, for some reason, corporate borrowing is not possible, an alternative is for the investors to borrow on their personal accounts instead of selling shares. Again, this would allow them to meet their liquidity needs without incurring the cost of signaling.

A more important criticism of the John and Williams model is that it is not obvious that its empirical implications are consistent with the smoothing of dividends. The best way to extend it over

a longer time is not entirely clear. If firms' prospects do not change over time, then once a firm has signalled its type, no further dividend payments will be necessary and payouts can be made through share repurchases. If firms' prospects are constantly changing, which seems more plausible, and if dividends signal these, we would expect the dividends to constantly change, also. This prediction of the model is difficult to reconcile with the fourth observation, that corporations smooth dividends and in many cases do not alter them at all for long periods of time. A similar criticism of the other signaling models can also be made.

After the Miller and Rock (1985) and John and Williams (1985) papers, a number of other theories with multiple signals were developed. Ambarish, John and Williams (1987) develop a single-period model with dividends, investment, and stock repurchases. Williams (1988) develops a multiperiod model with these elements. He shows that in the efficient signaling equilibrium, firms typically pay dividends, choose their investments risky assets to maximize net present value, and issue new stock. Constantinides and Grundy (1989) focus on the interaction between investment decisions and repurchase and financing decisions in signaling equilibria. With investment fixed, a straight bond issue cannot act as a signal but a convertible bond issue can. When investment is chosen optimally rather than being fixed, this is no longer true; a straight bond issue can act as a signal.

The signaling models presented are important contributions. However, they do not provide an entirely satisfactory explanation of firms' dividend behavior. They are either difficult to reconcile with the evidence on smoothing, or they do not meet the objection that firms could do better by repurchasing shares.

Two recent theories progress in meeting these criticisms. Kumar (1988) provides a "coarse signaling" theory that is consistent with the fact that some firms do not vary their dividends for long periods of time. This does not explain why firms use dividends rather than repurchases. However, building on work by Ofer and Thakor (1987) and Barclay and Smith (1988), Brennan and Thakor (1990)

suggest that repurchases have a disadvantage in that informed investors are able to bid for undervalued stocks and avoid overvalued ones. Thus, there is an adverse selection problem. Dividends do not suffer from this problem because they are pro rata.

In Kumar's (1988) model, managers have better information about their firm's productivity than outside investors. The sequence of events is that the managers learn the firm's productivity type, signal it to investors through the level of dividend payments, and the shareholders then decide how much to invest. Both managers and investors own shares in the company proportional to their respective investments in it. Firms' production functions have a diminishing marginal product of capital. Since managers' resources are fixed, increasing outside shareholders' investment has two effects: It increases output, but reduces the share of the managers. When the marginal product of capital is large, managers are made wealthier as the amount of investment increases, but eventually there comes a point where the fall in the managers' shares offsets this.

If the managers and outside shareholders have the same degree of risk aversion, they agree on this optimal level of investment. However, if the managers are more risk-averse than the shareholders, they require a higher level of output to compensate them for a given level of risk. This means their preferred level of investment is smaller than that of the outside shareholders. Therefore, to get closer to their desired investment level, the managers have an incentive to pay a dividend that corresponds to a lower level of productivity than their true one. As a result, a fully revealing equilibrium cannot exist: Given any set of common beliefs, the shareholders can always deduce the managers' true productivity type. This, however, is inconsistent with managers' desire to underreport. Although no fully revealing equilibrium exists, Kumar shows that a coarse signaling equilibrium is possible. Within any given interval of productivity, the different types cluster at a particular dividend level. If a firm's managers deviated from the cluster that corresponds to their true productivity level, they would be worse off, because they would get a share of the firm at a significantly different level from their desired level.

Kumar's theory is consistent with smoothing, since small changes in productivity will not lead

to changes in dividends. It thus provides an interesting explanation of the smoothing phenomenon. In particular, it is consistent with the fact that many firms leave dividends unchanged for long periods of time. Kang and Kumar (1991) have looked at the empirical relationship between firm productivity and the frequency of dividend changes. Their results are consistent with Kumar's analysis.

One drawback of Kumar's model is that it uses dividends as the only vehicle for signaling. It would appear that share repurchases could be used instead of dividends, and would be superior because they are taxed less. In an important paper, developing on an insight of Ofer and Thakor (1987) and Barclay and Smith (1988), Brennan and Thakor (1990) provide an explanation for why firms may prefer dividends to share repurchases despite the differences in tax treatment. Moreover, this explanation is consistent with Kumar's model.

When some shareholders are better informed about the prospects of the firm than others, they will be able to take advantage of this information when there is a repurchase. They will bid for stock when it is worth more than the tender price, but will not bid when it is worth less. Uninformed buyers will receive only a portion of their order when the stock is undervalued, but will receive the entire amount when it is overvalued. This adverse selection means that they are at a disadvantage in a share repurchase. When money is paid out in the form of dividends, the informed and the uninformed receive a pro rata amount, so there is no adverse selection. As a result, uninformed shareholders prefer dividends to repurchases; this preference will persist even if dividends are taxed more heavily than repurchases, provided the tax disadvantage is not too large. On the other hand, the informed will prefer repurchases because this allows them to profit at the expense of the uninformed.

Brennan and Thakor argue that the method of disbursement chosen by firms will be determined by a majority vote of the shareholders. If the uninformed have more votes than the informed, dividends will be used, but if the informed predominate, repurchases will be chosen. When there is a fixed cost of obtaining information, the number of informed will depend on the distribution of shareholdings and the amount paid out. For a given payout, investors with large holdings will have an incentive to become

informed. When a small amount is paid out, only the investors with the largest holdings will become informed; most shareholders will remain uninformed and will prefer dividends. When a larger amount is paid out, more shareholders become informed, so repurchases may be chosen.

The Brennan and Thakor model is an intriguing explanation of the preference firms appear to have for dividends. It answers the question of why firms prefer to use dividends even though they are taxed more heavily. Unlike the John and Williams' theory, it is consistent with dividends being smoothed. It is not above criticism, however. The range of tax rates for which dividends are preferred to repurchases because of adverse selection is usually small. In order to explain the predominance of dividends, we must use another argument that relies on shareholders being homogeneous. For tax rates above the level where adverse selection can explain the preference for dividends, everybody will tender in a repurchase, so it will be pro rata. The tax code specifies that if repurchases are pro rata they will be treated the same as dividends, so firms might as well pay dividends. It is critical to this argument that shareholders are the same, so that they all tender. In practice, Bagwell (1991) has provided evidence that there is considerable shareholder *heterogeneity* so this part of the explanation for dividends is not very convincing. Another criticism is that if adverse selection were a serious problem, firms could gather the relevant information and publicly announce it. Nevertheless, Brennan and Thakor's theory, particularly when combined with that of Kumar, comes closest to being able to explain the four empirical regularities of dividends that have been focused on.

4.2 Empirical Evidence

In their original article, Miller and Modigliani suggested that if management's expectations of future earnings affect their decision about current dividend payouts, then changes in dividends will convey information to the market about future earnings. This notion is labeled "the information content of dividends". As discussed earlier in this section, this notion has been formalized in two ways: In the

first, dividends are used as an ex-ante signal of future cash flow as, for example, in Bhattacharya (1979). In the second, dividends provide information about earnings as a description of the sources and uses of funds identity as, for example, in Miller and Rock (1985). The latter alternative can be interpreted as claiming that the fact that dividends convey information does not necessarily imply that they are being used as a signal. This distinction may be subtle, but it is crucially important in interpreting the empirical tests as supporting the signaling theory. Most, if not all, of the empirical tests we are aware of cannot help us in distinguishing between these two alternatives.

The information/signaling hypotheses contain three important implications that have been tested empirically:

(i) Dividend changes should be followed by subsequent earnings changes in the same direction.

(ii) Unanticipated changes in dividends should be followed by revisions in the market's expectations of future earnings in the same direction as the dividend change.

(iii) Unanticipated dividend changes should be accompanied by stock price changes in the same direction.

It is important to note that all of the above implications are necessary, but insufficient, conditions for dividend signaling. The condition that earnings changes will follow dividend changes is perhaps the most basic one. If this condition is not met, we may conclude that dividends do not even have the potential to convey information, let alone to signal. The evidence about the relationship between dividend changes and subsequent earnings changes is mixed. Watts (1973) was among the first to test the proposition that the knowledge of current dividends improves the predictions of future earnings, over and above knowledge of current and past earnings. Using 310 firms with complete dividend and earnings information for the years 1946-67, and annual definitions of dividends and earnings, Watts tests whether earnings in year $t+1$ can be explained by current (year t) and past (year t-1) levels of dividend and

earnings. For each firm in the sample, Watts estimates the current and past dividend coefficients (while controlling for earnings). While the average dividend coefficients across firms were positive, the average t-statistic was very low. In fact, only the top 10 percent of the coefficients were marginally significant. Using change in levels yielded similar results. He concludes that: "... in general, if there is any information in dividends, it is very small." Gonedes (1978) reaches a similar conclusion.[12]

Recent evidence, such as Healy and Palepu (1988), however, indicates that extreme dividend changes contain some information about future changes in earnings. Healy and Palepu show that earnings changes following dividend initiations and omissions are at least partially anticipated at the dividend announcement. Using a cross-sectional regression, Benartzi (1993) shows that dividend changes have some predictive power about subsequent quarterly earnings changes.

The overall accumulated evidence lends, at best, only weak support to the assertion that dividend changes convey information about future changes in earnings. The important point is that such a relationship is a crucial initial condition for any dividend signaling model. As Miller and Rock (1985) suggested, dividends may convey information about current earnings through the sources and uses of funds identity, and not because of signaling.[13]

More encouraging news is found in the second implication of the information/signaling hypothesis. These tests examine the relationship between dividend changes and analysts' forecasts of future earnings. Ofer and Siegel (1987), for example, find that analysts revise their earnings forecast by an amount that is positively related to the size of the announced dividend change. They also provide evidence that their revision is positively correlated with the market reaction to the announced dividend.

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[12]Penman (1983) shows that managements' earnings forecasts are a better predictor of future earnings than dividend announcements. After accounting for these earnings forecasts, there is not much information conveyed in the dividend announcements themselves. Another interesting point in this study is the finding that many firms with improved future earnings do not adjust their dividends accordingly.

[13]It is important to note that most firms declare their quarterly dividends several days before they report their quarterly earnings.

The result of this study is consistent with the information/signaling hypothesis. It is also consistent with the agency explanation of why firms pay dividends. If higher dividend payouts discipline management, then we may expect better performance by those firms in the future, hence positive price reaction and a like revision in analysts' forecasts.[14]

The third set of tests questions whether the market perceives changes in dividends as conveying new information about the value of the firm (or the value of the equity).[15] The answer to this question is almost uniformly "yes". There are numerous studies that show that dividend changes cause a like change in security prices. For example, Pettit (1972) shows that announcements of dividend increases are followed by a significant price increase, and announcements of dividend decreases are followed by a significant price drop. Aharony and Swary (1980) show that these relationships hold even after controlling for contemporaneous earnings announcements. Most studies find an average excess return of about 0.4 percent around dividend increase and -1.3 percent for a dividend decrease. Focusing on extreme changes in dividend policy, Asquith and Mullins (1983) (dividend initiations), Healy and Palepu (1988), and Michaely, Thaler and Womack (1993) (dividend omissions) show that the market reacts quite severely to those announcements. The average excess return is around 3 percent for initiation and -7 percent for omissions.[16] All in all, there seems to be an overall agreement that dividend changes are

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[14]The findings of revisions in earning expectations following analysts' forecasts are not consistent with the wealth transfer hypothesis [e.g., Handjinicolauo and Kalay (1984)]. We discuss the agency explanations in more detail in the next section.

[15]The new information can be about the firm value, or about the equity value alone. The latter may be the case if the change in dividend payments represents a wealth transfer from bondholders to equity holders. We address this issue in the next section.

[16]The apparent asymmetry between the market reaction to announcements of increases and decreases can be partially explained by the magnitude of the dividend change: Reductions in dividends are less frequent and more dramatic in magnitude. Also, Michaely, Thaler and Womack (1993) show that when the dividend yield is defined as the dividend amount over the beginning-of-the-year price, and the magnitude of the change is accounted for, the market reacts in the same way to initiations and omissions (in absolute value).

associated with like changes in stock price.

In summary, the empirical evidence is far from conclusive. The relationship between dividend changes and subsequent earnings changes is positive, but not significant. Given these, it is rather hard to interpret any of the evidence as supporting the information signaling hypothesis. Researchers find that significant market reaction to dividend changes is positively related to the size of the dividend change and that analysts revise their expectation in the direction of the dividend change. The latter evidence deepens the puzzle. How can it be that analysts interpret dividend changes as a good proxy for subsequent earnings changes, but we cannot detect strong empirical relations between dividends and subsequent earnings? It is safe to say that more research is needed on this topic.

5. Incomplete contracts – Agency models

Relaxing the assumption of complete (and fully enforceable) contracts comes from the realization that a firm is more than just a black box. The different forces that operate within a firm may, at different points in time, pull it in different directions; the interests of different groups within a firm may conflict. In particular, the three groups that may be affected the most by a firm's dividend policy are stockholders, bondholders, and management.

The first potential conflict of interest that may be affected by dividend policy is between stockholders and bondholders. As Myers (1977) and Jensen and Meckling (1976) have so persuasively argued, there are some situations in which equity holders may try to expropriate wealth from debtholders. This wealth expropriation may come in the form of excessive (and unanticipated) dividend payments. Shareholders can reduce investments and thereby increase dividends (investment-financed dividends), or they may raise debt to finance the dividends (debt-financed dividend). In both cases, if the shareholders' action is not anticipated by debtholders, the market value of debt will go down, and the market value of equity will rise.

To test this proposition empirically, Handjinicolaou and Kalay (1984) examine the effect of dividend change announcements on bond prices as well as on the prices of equity. They contrast two competing hypotheses. The agency hypothesis implies that in the event of dividend increase (decrease), stock prices should go up (down) and bond prices should go down (up). The alternative is the information content of dividends hypothesis. Dividend increases (decreases) convey good (bad) news about the firm. Consequently, both debt and equity prices will move in the direction of the unanticipated dividend change. Handjinicolaou and Kalay find that bond prices drop significantly at the announcement of dividend decreases, and do not change significantly at dividend increase announcements. These results do not lend support to the wealth expropriation hypothesis, but are consistent with the information content of dividends.[17]

As suggested by Myers (1977) and Jensen and Meckling (1976), both equity holders and bondholders may a priori agree on restricting dividends. Indeed, most bond covenants contain constraints that limit both investment-financed dividends and debt-financed dividends. Kalay (1982) examines these constraints. He finds that firms hold significantly more cash (or cash equivalents) than the minimum they should hold, according to the bond covenants. This finding can be interpreted as a reverse wealth transfer. That is, if debt were priced under the assumption that only the minimum cash will be held by the corporation, then a positive reservoir would increase the market value of debt at the expense of equity holders.

There are several possible reasons for this finding. First, it may be that given the covenants, dividend policy is not driven by the desire to expropriate bondholders. The positive reservoir is consistent with Myers and Majluf's (1984) argument that because of adverse selection, a firm is better off having some cash in hand, rather than being forced to the capital market each time it has an opportunity to

[17]The asymmetry in the bond price reaction may be explained by several factors. Among them is the fact that dividend decreases are larger in absolute value than dividend increases and therefore have a more significant impact on both bond and stock prices.

invest. Second, most, if not all, of the models that allude to this potential conflict of interests, are single-period models. Much of the problem will disappear if equity holders and debtholders have to interact on a continual basis, which is the case in practice: Corporations issue new debt on an ongoing basis.

We can readily see how a one-time wealth transfer from existing bondholders to equityholders may result in a long-run loss because of the increase in the cost of capital. When would the problem arise? In precisely those cases where there is a large probability that the firm's time horizon is short, e.g., the firm is in financial distress, or is about to be taken private. The evidence documented by DeAngelo and DeAngelo (1990) is consistent with this assertion. They show that firms in financial distress are reluctant to cut their dividends. In these cases, not cutting dividends may constitute a significant wealth transfer from debtholders to equity holders. This is still an open question that is worth further consideration.

The other potential conflict of interest that may affect dividend policy is between management and stockholders. As suggested by Jensen and Meckling, managers of a publicly held firm may allocate resources to activities that benefit them, but are not in the shareholders' best interest. These activities can range from lavish expenses on corporate jets to unjustifiable acquisitions and expansions. In other words, too much cash in the firm may result in overinvestment. Grossman and Hart (1982), Easterbrook (1984) and Jensen (1986) have suggested a partial solution to this problem. If equity holders can minimize the cash that management controls, it will make it much harder for management to go on (unmonitored) spending sprees. The less discretionary cash management has, the harder it is for them to invest in negative NPV projects. One way to take unnecessary cash from the firm is to increase the level of dividend payouts.[18]

This "free-cash flow" problem is likely to be more pronounced in stable, cash-rich companies in

[18]As Grossman ahd Hart (1982) and Jensen (1986) argue, a more effective mechanism to achieve this goal is to increase the level of debt. It is harder for management to renege on a debt commitment relative to a dividend commitment.

mature industries without many growth opportunities. Lang and Litzenberger (1989) exploit this feature to test the free-cash flow hypothesis, and to contrast it with the information-signaling hypothesis. The basic idea is that, according to the free-cash flow hypothesis, an increase in dividends should have a larger (positive) price impact for firms that overinvest than for firms that do not. Empirically, they have identified overinvesting firms as ones with Tobin's Q less than unity.[19] Considering only dividend changes that are greater than 10 percent (in absolute value), they find that for dividend increase announcements, firms with Q less than unity experience a larger price appreciation than firms with Q greater than one. For dividend decrease, firms with Q lower than one experience a more dramatic price drop. The larger effect (in absolute value) of dividend changes on firms with lower Q is consistent with the free-cash flow hypothesis. The information-signaling hypothesis, on the other hand, would have predicted a symmetric effect regardless of the ratio of market value to replacement value.

Repeating the experiment for a longer time period, Yoon and Starks (1993) find that the reaction to dividend decrease is the same for high and low Tobin-Q firms. The fact that the market reacts negatively to dividend decrease announcements by the value-maximizing (high Q) firms is not consistent with the free-cash flow hypothesis. Like Lang and Litzenberger, they find a differential reaction to announcements of divided increases. However, controlling for other factors such as the level of dividend yield, firm size and the magnitude of the change in the dividend yield (through a regression analysis) Yoon and Starks find symmetric reaction to dividend changes (both increases and decreases) between high and low Tobin's Q firm. This evidence is inconsistent with the free-cash flow hypotheses.

Bernheim and Wantz (1991) investigate the market reaction to dividend changes during different tax regimes. In periods when the relative taxes on dividends are higher than taxes on capital gains, the signaling hypothesis implies that the market reaction to dividend increases should be stronger because it is more costly to pay dividends. Since it is more expensive to signal, it is more revealing for those who

[19]Tobin's Q is defined as market value over replacement value.

choose to use it. The free-cash flow hypothesis has the opposite prediction. Since it is more expensive to pay dividends and the benefit presumably does not change, in periods of higher relative taxes on dividends the market should react less favorably to dividend increases. These results are consistent with the dividend signaling hypothesis: in periods of higher relative taxes on dividends, the market reaction to dividend payments is more favorable.[20]

To summarize, the last two sections presented two opposing views of why dividends are paid. The first view is that dividends convey good news. The alternative view is that dividends are good news (they resolve agency problems). There is, at best, weak empirical support for the former explanation and practically no support for the latter. A priori, we expect that the different incentives in the firm will interact more strongly with dividend policy. As we mentioned earlier, we believe this is an important area for future research.

6. Transaction costs and other explanations

Under certain circumstances, it is possible that, despite the tax disadvantage of dividends relative to capital gains, investors would prefer dividends. In this section we describe four potential reasons for such a preference.

The first explanation of why firms pay dividends is because of "prudent man" roles. Various institutions are constrained to hold only dividend-paying stocks. This role may be in place because it may seem like a simple rule of thumb of how to constrain the agents (the fund managers for example) not to take too much risk. Also, some trust and endowment funds are constrained to only spend income and not capital gains. Such a constraint will create a preference for dividends on the part of these market participants. If these constraints are binding and if those institutions who are subject to those constraints

[20]In a recent article, Bernhardt et al. (1994) account for the nonlinear properties common to many of the dividend-signaling models. Applying nonparametric techniques to an experiment similar to Bernheim and Wantz, they find no evidence to support dividend signaling.

represent a signfiicant portion of the market wealth, then dividend payment on the part of the corporation is optimal.

The second is the transaction costs argument. If investors want a steady flow of income from their capital investment (say, for consumption reasons), then it is possible that dividend payments would be the cheapest way to achieve this goal. This may be the case if the cost of the alternative (i.e., to sell a portion of the holdings and receive capital gains) involves non-trivial costs. These costs may be the actual transaction costs for selling the shares, which can be quite high for retail investors, or the time and effort spent on these transactions.

If this effect is in fact substantial, it will lead to an optimal dividend policy on the aggregate level. As Black and Scholes (1974) argue, however, firms will adjust their dividend policy such that the demand for dividends by this clientele would be fulfilled. Thus, in equilibrium, any specific firm should be indifferent to dividend policy. So, while this explanation can account for positive payouts despite the adverse tax consequences, it cannot explain why in equilibrium firms care about the level of dividends paid.

The third explanation as to why investors may prefer dividend-paying stocks is suggested by Shefrin and Statman (1984). Rather than developing an economic model based on maximizing behavior, they eliminate the maximizing assumptions that are the cornerstone of neoclassical economics, and which we have maintained throughout. Instead, Shefrin and Statman develop a theory of dividends based on a number of recent theories of behavior. The basic idea is that even if the eventual cash received is the same, there is a significant difference in whether it comes in the form of dividends, or as share repurchases. In other words, form is more important than substance. We will illustrate Shefrin and Statman's approach with the theory they develop, based on Thaler and Shefrin's (1981) theory of self-control.

Thaler and Shefrin have suggested that people have difficulties behaving rationally when they want to do something but have problems carrying it through. Examples that illustrate this suggestion are

the prevalence of smoking clinics, credit counselors, diet clubs, and substance abuse groups. Individuals wish to deny themselves a present indulgence, but find that they yield to temptation. Thaler and Shefrin represent this conflict in a principal-agent form. The principal is the individual's internal planner, which expresses consistent long-run preferences. However, the responsibility for carrying out the individual's action lies not with the planner, but with the doer, the agent.

There are two ways the planner can control the agent. The first is will power. The problem is that this causes disutility. The second is to avoid situations where will power has to be used. This is accomplished by adopting rules of behavior that make it unnecessary for people to question what they are doing most of the time.

Shefrin and Statman suggest that by having money in the form of dividends rather than capital gains, people avoid having to make decisions about how much to consume. Thus, they avoid letting the agent in them behave opportunistically. They postulate that the benefit of doing this is sufficient to offset the taxes on dividends.

As with the transaction costs story, the self-control explanation can account for an aggregate positive payout policy, but not an individual firm optimal payout policy. That is, in equilibrium, firms will adjust their dividend policy such that the marginal firm is indifferent to the level of dividend paid out. Thus, neither the transaction costs explanation nor the behavioral explanation can account for the positive price reaction to dividend increases and the negative price reaction to dividend decreases.

It should also be noted that both explanations rely heavily on the effect individual investors have on market prices. The need for a steady stream of cash flow combined with significant transaction costs (the transaction costs story) may be adequate to describe small retail investors, but this argument may not hold when applied to corporate and institutional investors. Likewise, self control as an explanation for why firms pay dividends is more persuasive when individual investors are the dominant force in the marketplace. An immediate implication of these explanations is that the amount of dividends paid by

corporations should decline as the market share of individual investors declines (as we have experienced in the past two decades). As the evidence in table 1 indicates, the level of dividend payout did not decrease through time, which is inconsistent with the self-control and transaction costs explanations.

Consistent with these explanations, however, is Long's (1978) study of Citizens Utilities (CU). CU stocks are an almost perfect medium for examining the effect of dividend policy on prices. The reason is that this company had, from 1955 until 1989, two types of common stocks that differed only in their dividend policy. Series A stock paid a stock dividend and series B stock paid a cash dividend.[21] The company's charter required that the stock dividend on series A stock be of equal value with series B cash dividends. In practice, however, the board of directors have chosen stock dividends that average 10 percent higher than the cash dividends. Even without taxes, we would expect the price ratio of series A stock to series B stock to be equal to the dividend ratio, i.e., to 1.1. Long finds that the price ratio was consistently below 1.1 in the period considered. This price ratio implies a preference for cash dividends over stock dividends despite the tax penalty.

Poterba (1986) revisited the Citizens Utilities case. For the period 1976-84, he found that the price ratio and the dividend ratios were comparable: the average price ratio was 1.134 and the average dividend ratio was 1.122. Roughly speaking, this evidence implies indifference between dividend and capital gains income. Poterba also examined the ex-dividend day behavior of CU for the period 1965-84, and found that, on average, the ex-day price decline was less than the dividend payment. This is consistent with the ex-dividend day studies discussed previously. It is hard to reconcile the ex-day evidence of the CU stocks with the relative prices of the two stocks on ordinary days.

Hubbard and Michaely (1994) examined the relative prices of these two stocks after the passage of the 1986 TRA. Since the 1986 TRA substantially reduced the advantage of receiving stock dividends

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[21] CU received a special IRS ruling so that for tax purposes, the series A stock dividends would be taxed in the same way as proportionate stock dividends are treated for firms having only one series of common stock outstanding. The special ruling expired in 1990.

rather than cash dividends, they hypothesized that the price ratio should decrease. Indeed, they found that during 1986, the price ratio was considerably lower than in the previous years. However, in the years 1987 through 1989, the price ratio rose and stayed consistently above the dividend ratio.

It seems that the evidence from the price behavior of Citizens Utilities deepens the dividend mystery, rather than enlightening us. It is difficult to know just how to interpret it.

Another rationale for paying dividends (that is not consistent with efficient markets), is as follows: If managers know more about their firm than the market does, and they can time their equity issues decisions to periods when their firm is highly overvalued, then a positive payout is optimal. That is, if investors prefer constant cash flow and managers can sell additional equity when it is overvalued, investors will be better off receiving a steady stream of dividends and leaving the timing of the sales to the firm. However, in efficient markets, outside investors will realize that when a firm sells its securities, it implies that the firm is overvalued (see Myers and Majluf, 1984, for example), and its price (post announcement) will reflect that. In such a case, current equity holders are not better off, even if the managers know more about the firm's value than the market does. The attempt to raise equity will result in a reduction in the existing equity value; the new shares will be sold at fair value, which renders dividend policy irrelevant.

A growing number of studies present evidence that is not consistent with the market rationality described above. Specifically, the evidence presented is consistent with the notion that: (i) managers can time the market; and (ii) the market underreacts to some financial policy decisions, such as seasoned equity issues (Loughran and Ritter, 1993), Initial Public Offerings (Ritter 1991 and Michaely and Shaw, 1994), and repurchases (Ikenberry, Lakonishok and Vermaelen, 1994). While it is well established that announcements of seasoned equity issues are associated with a price decline (e.g., Masulis and Korwar, 1986), and share repurchases announcements are associated with price increase (e.g., Vermaelen, 1981), these studies show that a significant price movement in the same direction continues several years after

the event. Hence, one may argue that paying dividends is the optimal policy.[22]

The literature on dividend policy is plentiful. Due to a lack of space, many contributions have not been covered in detail. One theory that has received considerable attention in the economics literature, but not in the finance literature, was developed by King (1977), Auerbach (1979), and Bradford (1981). They have developed a framework where it is assumed that the prohibition on repurchasing shares is binding, and paying dividends is the only way firms can distribute cash to investors. The market value of corporate assets is therefore equal to the present value of the after-tax dividends firms are expected to pay. Because dividend taxes are capitalized into share values, firms are indifferent to the margin between policies of retaining earnings or paying dividends. Thus, the model is consistent with the fact that a significant portion of corporate earnings is paid out as dividends. The reason the theory has not received much attention in the finance literature is its assumption that dividends are the only way the firm can pay out money to shareholders.[23]

This is an appropriate assumption in some countries, such as the U.K., where repurchases have historically been illegal. It is not appropriate for the U.S., where they are legal, provided some justification other than tax avoidance can be given. It is usually argued that this can be done fairly easily.

7. Concluding remarks

In perfect and complete capital markets, firms can not alter their value by changing dividend policy. Because markets are less than perfect, dividends, or more generally, payout policy, represents one of the most important financial decisions faced by corporate financial managers. The theoretical

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[22] None of the above studies directly relates equity issues (and subsequent performance) to dividend policy. The relationship between the timing of issuance, repurchase decisions, and dividend policy should receive a closer look before arriving at any definite conclusions.

[23]Some models have been criticized on the grounds that they implicitly assume that dividends cannot be financed by equity or debt issues. See Hasbrouck and Friend (1984) and Sarig (1984).

work on this issue tells us that there are five potential imperfections to be considered when dividend policy is determined.

(i) Taxes. If dividends are taxed more heavily than capital gains, and investors can not avoid this higher taxation by dynamic trading strategies, then minimizing dividends is optimal.

(ii) Asymetric Information. If managers know more about the true worth of their firm, dividends may be used to convey that information to the market, despite the costs associated with paying those dividends.[24]

(iii) Incomplete Contracts. If contracts are incomplete or are not fully enforceable dividends may, under some circumstances, be used by equityholders to discipline managers or to expropriate wealth from debtholders.

(iv) Institutional Constraints. If various institutions avoid investing in non-dividend (or low dividend) paying stocks because of legal restrictions, it may be optimal to pay dividends despite the tax burden it causes to individual investors.

(v) Transaction Costs. If dividend payments minimize transaction costs to equityholders (either direct transaction costs or the efforts of self control), positive dividend payout may be optimal.

The empirical evidence on the importance of dividend policy is, unfortunately, very mixed. Much work remains to be done before definite conclusions on prescriptions for managers.

At this stage, we cannot recommend an optimal dividend policy. There are, however, several general (and, admittedly, somewhat speculative) suggestions we can come up with:

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[24]It should be noted that with asymetric information, dividends can also be viewed as bad news: Firms that pay dividends are the ones without positive NPV projects to invest in.

1. To the greatest extent possible, firms that are associated with a high degree of information asymmetry and large growth opportunities should avoid paying dividends. The significant costs associated with raising equity capital for these firms makes payment of dividends even more costly. Stated differently, in periods when a firm faces many good investment opportunities, a dividend reduction may not be such a bad idea.

2. Firms that, for whatever reason, are primarily interested in institutional investors for shareholder base should pay higher dividends than otherwise. First, these shareholders are not affected by the adverse taxes associated with dividends. Second, various "prudent man" roles constrain some institutions to hold only dividend-paying stocks.

3. Given the restrictive dividend-related covenants and the fact that firms interact with bondholders more than once, the use of dividends to extract wealth from debtholders should be avoided. Most times, it does not work. And even when it does, the long-run result can be detrimental to equity holders.

4. Repurchases should be used much more frequently than they have been historically. Investment and repurchase policies should be coordinated to avoid the transaction costs of financing. When there are positive NPV investments, repurchases should be avoided. In years where they are low, unneeded cash should be paid out by repurchasing shares.

5. We can not think of a good reason why most U.S. firms pay dividends on a quarterly basis instead of on an annual basis. Longer intervals between payments would allow investors that are interested in long-term capital gains to sell the stock before the ex-day, avoid paying tax on the dividend, and maintain the long-term tax status of the stock. It would also allow corporations who may be interested in dividend income to minimize transaction costs and deviation from optimal asset allocation while capturing the dividend. Finally it will save the dividend paying corporation administrative and mailing costs

associated with dividend payments.

6. Avoid costly "signals". Hopefully, the firm is going to stay alive for a long time. Managers can find cheaper and more persuasive ways to credibly convey the company's true worth to the market.

7. The differential taxes between dividends and capital gains make high-yield stocks less attractive to individual investors in high tax brackets. Such investors should try to hold an otherwise identical portfolio with low-yield stocks.

Other people might disagree with these suggestions. However, until our understanding of the subject is improved, they represent a logical way for managers and investors to proceed. Much more empirical and theoretical research on the subject of dividends is required before a consensus can be reached.

Table 1

After-Tax Profits and Dividends for all Corporations
1971-1992

Year	After-Tax Corporate Profits[25] ($Billion)	Dividends ($Billion)	Dividends/ Profits
1971	53	24	45%
1972	61	26	42%
1973	67	30	45%
1974	53	30	58%
1975	71	30	42%
1976	83	36	43%
1977	103	41	40%
1978	116	46	40%
1979	115	52	46%
1980	93	59	64%
1981	101	69	69%
1982	88	70	79%
1983	135	81	60%
1984	170	83	49%
1985	184	92	50%
1986	165	110	67%
1987	193	106	55%
1988	228	115	51%
1989	221	135	61%
1990	242	153	63%
1991	240	137	57%
1992	261	150	57%

Source: Based on Table B-88 from the 1994 Economic Report of the President.

[25] After-tax corporate profits with inventory valuation and capital consumption adjustments.

Table 2

Aggregate Share Repurchases and Dividends

Data is from the 1,000 largest firms (by book value of assets) from the combined industrial and research files on compustat for each year. Repurchases is cash spent on common equity and preferred shares. Dividends is cash dividends declared on common equity. Earnings is earnings before extraordinary items. Amounts are in millions of 1991 dollars (except for ratios).

Year	Repurchase	Dividends	Assets	Repurchases / Dividends	Repurchases / Earnings	Dividends / Earnings
1973	8,050	48,373	2,103,711	.166	.061	.365
1974	3,992	47,794	2,171,683	.084	.030	.363
1975	2,168	46,576	2,208,012	.047	.019	.403
1976	3,506	50,516	2,285,521	.069	.026	.374
1977	6,886	56,979	2,381,092	.121	.049	.405
1978	7,263	58,260	2,477,665	.125	.048	.383
1979	8,676	59,778	2,603,041	.145	.050	.348
1980	9,844	61,759	2,694,689	.159	.061	.382
1981	7,788	57,584	2,585,671	.135	.053	.392
1982	13,090	59,888	2,695,448	.219	.114	.522
1983	11,711	60,331	2,739,986	.194	.095	.490
1984	34,974	55,255	2,670,838	.633	.260	.410
1985	51,239	60,438	3,028,599	.848	.445	.524
1986	46,523	65,461	3,167,161	.711	.446	.627
1987	56,608	67,330	3,315,037	.840	.413	.491
1988	51,931	77,454	3,322,015	.670	.322	.481
1989	46,751	68,106	3,438,869	.686	.323	.470
1990	39,187	66,697	3,514,739	.588	.306	.521
1991	21,742	64,181	3,488,678	.339	.247	.730

Source: Based on tables 1 and 2 of Dunsby (1993).

Table 3

Value of Mergers and Acquisitions 1971-1992

Year	Total Dollar Value (Billions)
1971	12.6
1972	16.7
1973	16.7
1974	12.5
1975	11.8
1976	20
1977	21.9
1978	34.2
1979	43.5
1980	44.3
1981	82.6
1982	53.8
1983	73.1
1984	122.2
1985	179.8
1986	173.1
1987	163.7
1988	246.9
1989	221.1
1990	108.2
1991	71.2
1992	96.7

Source: Grimm's Mergerstat Review 1993

Table 4
Dividend Histories for Five Corporations 1950-1990 ($Million)

Year	Dow Chemical	GE	GM	IBM	USX
1950	12	97	539	11	118
	17	86	363	12	104
	18	86	362	12	104
	22	122	362	13	104
	24	131	450	16	111
1955	23	146	606	16	148
	25	172	566	20	170
	30	173	568	25	187
	31	174	572	31	187
	31	174	575	37	187
1960	37	176	577	55	187
	40	176	720	63	188
	47	178	863	83	161
	47	183	1,149	118	133
	53	198	1,279	166	134
1965	54	217	1,510	211	134
	60	235	1,311	231	119
	66	234	1,097	243	130
	73	235	1,240	293	130
	77	235	1,240	408	130
1970	79	235	984	548	130
	81	250	985	598	98
	82	255	1,286	626	87
	90	273	1,514	654	92
	111	291	986	819	119
1975	139	293	701	969	152
	176	333	1,603	1,204	173
	212	477	1,958	1,488	182
	237	570	1,726	1,685	136
	272	624	1,533	2,008	138
1980	302	670	874	2,008	140
	342	715	731	2,023	178
	348	760	750	2,053	188
	352	852	892	2,251	187
	347	930	1,524	2,507	260
1985	341	1,020	1,617	2,703	282
	364	1,081	1,663	2,698	361
	411	1,209	1,668	2,654	395
	486	1,314	1,658	2,609	398
	578	1,537	1,964	2,752	403
1990	711	1,696	1,956	2,774	360

Source: From Corporate Annual Reports.

Table 5

Comparative Annual Dividend Changes 1971-1993
(based on data from approximately 13,200 publicly held issues)

	Type of Dividend Change			
Year	Increase	Decrease	Resume	Omit
1971	794	155	106	215
1972	1,301	96	124	111
1973	2,292	55	154	95
1974	2,529	100	162	225
1975	1,713	215	116	297
1976	2,672	78	133	153
1977	3,090	92	135	168
1978	3,354	65	127	144
1979	3,054	70	85	115
1980	2,483	127	82	122
1981	2,513	136	82	226
1982	1,805	322	97	319
1983	2,006	137	183	172
1984	2,085	95	162	199
1985	1,898	104	99	231
1986	1,685	148	93	257
1987	1,822	84	114	186
1988	1,858	83	62	175
1989	1,869	89	65	218
1990	1,433	195	52	328
1991	1,135	204	44	412
1992	1,364	133	73	294
1993	1,622	137	113	258

Source: 1993 Moody's Dividend Record.

Table 6
Ex-Dividend Day Premiums[a]

Average premiums (price drop relative to dividend paid) is calculated for three time periods. The first period, 1966 and 1967, is in Elton and Gruber (1970) and Kalay (1982); the second and third periods, 1986 and 1987, are the periods before and after the implementation of the 1986 TRA. Premiums are adjusted to the overall market movements using the OLS market model, and are corrected for heteroskedasticity.

Period	Mean Premium	S.D.	Z Value[b]	% above One	Fisher Test
1966-67	0.838	1.44	-7.23	46.1	-4.94
1986	1.054	1.32	2.32	49.9	-0.03
1987	1.028	1.229	1.33	50.7	0.80
1988	0.998	0.821	0.168	NA	NA

[a]Results are taken from Michaely (1991) Tables 2 and 3.

[b]Test the null hypothesis that the mean premium equals one.

References

Aharony, Joseph and Itzhak Swary, 1980, "Quarterly Dividend And Earnings Announcements and Stockholders' Returns: An Empirical Analysis," *Journal of Finance, 35* (1), 1-12.

Ambarish, Ramasastry, Kose John and Joseph Williams, 1987, "Efficient Signaling with Dividends and Investments," *Journal of Finance, 42* (2), 321-343.

Asquith, Paul and David W. Mullins, Jr., 1983, "The Impact Of Initiating Dividend Payments On Shareholders' Wealth," *Journal of Business, 56* (1), 77-96.

Auerbach, Alan J., 1979, "Wealth Maximization and the Cost of Capital," *Quarterly Journal of Economics, v93(3)*, 433-446.

Bagwell, Laurie Simon and Kenneth Judd, 1989, "Transaction Costs and Corporate Control," Working Paper, Northwestern University.

Bagwell, Laurie Simon and John Shoven, 1989, "Cash Distributions to Shareholders," *Journal of Economics Perspectives, 3(3)*, 129-140.

Bagwell, Laurie Simon, 1991, "Shareholder Heterogeneity: Evidence and Implications," *American Economic Review, 81* (2), 218-221.

Barclay, Michael J. and Clifford W. Smith, Jr., 1988, "Corporate Payout Policy: Cash Dividends versus Open-Market Repurchases," *Journal of Financial Economics, 22* (1), 61-82.

Barclay, M., 1987, "Dividends, Taxes, and Common Stock Prices: The Ex-dividend Day Behavior of Common Stock Prices Before the Income Tax, *Journal of Financial Economics, 14,* 31-44.

Bernhardt, Dan, J. Fiona Robertson and Ray Farrow, 1994, "Testing Dividend Signaling Model," Working Paper, Queen's University.

Bernheim, Doug and Adam Wantz, 1992, "A Tax-based Test of the Dividend Signaling Hypothesis," NBER working paper #4244.

Benartzi, Shlomo, 1993, "Evidence that Investors Underreact to the Implications of Dividend Changes for Subsequent Earnings," Working Paper, Cornell University.

Bhattacharya, Sudipto, 1979, "Imperfect Information, Dividend Policy, and 'The Bird In The Hand' Fallacy," *Bell Journal of Economics, 10* (1), 259-270.

Black, Fischer, 1976, "The Dividend Puzzle," *Journal of Portfolio Management, 2,* 5-8.

Black, Fischer, and Myron Scholes, 1974, "The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns," *Journal of Financial Economics, 1,* 1-22.

Blume, Marshal E., 1980, "Stock Return and Dividend Yield: Some More Evidence," *Review of Economics and Statistics, 62,* 567-577.

Blume, Marshal E., Jean Crockett and Irwin Friend, 1974, "Stock Ownership in the United States: Characteristics and Trends," *Survey of Current Business,* 16-40.

Boyd, John and Ravi Jagannathan, 1994, "Ex-Dividend Price Behavior of Common Stocks: Fitting Some Pieces of the Puzzle," *Review of Financial Studies,* forthcoming.

Bradford, David F., 1981, "The Incidence and Allocation Effects of a Tax on Corporate Distributions", *Journal of Public Economics, 15,* 1-22.

Brennan, Michael J. and Anjan V. Thakor, 1990, "Shareholder Preferences and Dividend Policy," *Journal of Finance, 45* (4), 993-1019.

Brennan, Michael J., 1970, "Taxes, Market Valuation and Financial Policy, *National Tax Journal, 23,* 417-429.

Charest, Guy, 1978, "Dividend Information, Stock Returns and Market Efficiency - II, *Journal of Financial Economics, 6,* 297-330.

Chen, Nai Fu, Bruce Grundy and Robert F. Stambaugh, 1990, "Changing Risk, Changing Risk Premiums, and Dividend Yield Effects," *Journal of Business, 63,* S51-S70.

Christie, William, 1990, "Dividend Yield and Expected Returns: The Zero-Dividend Yield Puzzle," *Journal of Financial Economics, 28.*

Constantinides, George M. and Bruce D. Grundy, 1989, "Optimal Investment with Stock Repurchase and Financing as Signals," *Review of Financial Studies, 2* (4), 445-466.

DeAngelo, Harry and Linda DeAngelo, 1991, "Dividend Policy and Financial Distress: An Empirical Investigation of Troubled NYSE Firms," *Journal of Finance, 46* (5), 1415-1432.

Dunsby, Adam, 1993, "Share Repurchases and Corporate Distributions: An Empirical Study," Working Paper, University of Pennsylvania.

Eades, Ken, Pat Hess and Han E. Kim, 1984, "On Interpreting Security Returns During the Ex-dividend Period," *Journal of Financial Economics, 13,* 3-34.

Easterbrook, Frank H., 1984, "Two Agency-Cost Explanations of Dividends," *American Economic Review, 74* (4), 650-659.

Elton, Edward, Martin Gruber and J. Rentzler, 1984, "The Ex-dividend Day Behavior of Stock Prices: A Re-examination of the Clientele Effect," *Journal of Finance, 39,* 551-556.

Elton, Edward and Martin Gruber, 1970, "Marginal Stockholders' Tax Rates and the Clientele Effect," *Review of Economics and Statistics, 52,* 68-74.

Fama, Eugene F. and Harvey Babiak, 1968, "Dividend Policy: An Empirical Analysis," *Journal of the American Statistical Association, 63(324),* 1132-1161.

Fama, Eugene F. and James D. Macbeth, 1973, "Risk, Return and Equilibrium: Empirical Tests," *Journal of Political Economy, 81,* 607-636.

Gonedes, Nicholas J., 1978, "Corporate Signaling, External Accounting, and Capital Market Equilibrium: Evidence on Dividends, Income, and Extraordinary Items," *Journal of Accounting Research, 16* (1), 26-79.

Gordon, Myron, 1959, "Dividends, Earnings and Stock Prices," *Review of Economics and Statistics, 41,* 99-105.

Gordon, Roger J. and David F. Bradford, 1980, "Taxation and the Stock Market Valuation of Capital Gains and Dividends: Theory and Empirical Results," *Journal of Public Economics, 14,* 109-136.

Grossman, Sanford J. and Oliver D. Hart, 1982, "Corporate Financial Structure and Managerial Incentives," in J. McCall, ed., *The Economics of Information and Uncertainty*, Chicago: University Press.

Grundy, Bruce, 1985, "Trading Volume and Stock Returns Around Ex-dividend Dates," Working paper, University of Chicago (Chicago, IL).

Handjinicolaou, George and Avner Kalay, 1984, "Wealth Redistributions or Changes in Firm Value: An Analysis of Returns to Bondholders and the Stockholders around Dividend Announcements," *Journal of Financial Economics, 13* (1), 35-63.

Hasbrouck, Joel and Irwin Friend, 1984, "Why Do Companies Pay Dividends?: Comment," *American Economic Review, 74,* 1137-1141.

Healy, Paul M. and Krishna G. Palepu, 1988, "Earnings Information Conveyed by Dividend Initiations and Omissions," *Journal of Financial Economics, 21* (2), 149-176.

Heath, D. and R. Jarrow, 1988, "Ex-dividend Stock Price Behavior and Arbitrage Opportunities," *Journal of Business, 61,* 95-108.

Hess, Pat J., 1983, "Test of Price Effects in the Pricing of Financial Assets," *Journal of Business, 56,* 537-554.

Hess, Pat J., 1982, "The Ex-dividend Day Behavior of Stock Returns: Further Evidence on Tax Effects," *Journal of Finance, 37,* 445-456.

Hubbard, Jeff and Roni Michaely, 1994, "Revisiting Citizens Utilities After the 1986 Tax Reform Act," Working Paper, Cornell University.

Ikenberry, David, Josef Lakonishok and Theo Vermaelen, 1994, "Market Underreaction to Open Market Share Repurchases," Working Paper, University of Illinois at Urbana-Champaign.

Jensen, Michael C., 1986, "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers," *American Economic Review, 76* (2), 323-329.

Jensen, Michael C. and William H. Meckling, 1976, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics, 3* (4), 305-360.

John, Kose and Joseph Williams, 1985, "Dividends, Dilution, and Taxes: A Signaling Equilibrium," *Journal of Finance, 40* (4), 1053-1070.

Kalay, Avner and Roni Michaely, 1993, "Dividends and Taxes: A Reexamination," Working Paper, Cornell University.

Kalay, Avner and Uri Loewenstein, 1986, "The Information Content of the Timing of Dividend Announcements," *Journal of Financial Economics, 16,* 373-388.

Kalay, Avner and Uri Loewenstein, 1985, "Predictable Events and Excess Returns: The Case of Dividend Announcements," *Journal of Financial Economics, 14,* 423-449.

Kalay, Avner, 1982, "The Ex-dividend Day Behavior of Stock Prices: A Re-examination of the Clientele Effect," *Journal of Finance, 37,* 1059-1070.

Kalay, Avner, 1982, "Stockholder-Bondholder Conflict and Dividend Constraint," *Journal of Financial Economics, 10,* 211-233.

Karpoff, Jonathan M. and Ralph A. Walkling, 1990, "Dividend Capture in NASDAQ Stocks," *Journal of Financial Economics, 28* (1/2), 39-66.

Karpoff, Jonathan M. and Ralph A. Walkling, 1988, "Short-Term Trading around Ex-Dividend Days: Additional Evidence," *Journal of Financial Economics, 21* (2), 291-298.

Kato, Kiyoshi and Uri Loewenstein, 1993, "The Ex-dividend-day Behavior of Stock Prices: The Case of Japan," Working paper, University of Utah.

Keim, Don, 1985, "Dividend Yields and Stock Returns: Implications of Abnormal January Returns," *Journal of Financial Economics, 14,* 473-489.

King, Mervyn, 1977, *Public Policy and the Corporation*, London Chapman and Hall.

Koski, Jennifer, L., 1991, "Market Segmentation and the Identification of Marginal Traders on Ex-Dividend Days: A Microstructure Analysis," Working Paper, Stanford University.

Kumar, Praveen, 1988, "Shareholder-Manager Conflict and the Information Content of Dividends," *Review of Financial Studies, 1* (2), 111-136.

Lakonishok, Joseph and Theo Vermaelen, 1986, "Tax Induced Trading Around Ex-dividend Dates," *Journal of Financial Economics, 16,* 287-319.

Lakonishok, Joseph and Theo Vermaelen, 1983, "Tax Reform and the Ex-dividend Day Behavior," *Journal of Finance, 38,* 1157-1179.

Lang, Larry H. P. and Robert H. Litzenberger, 1989, "Dividend Announcements: Cash Flow Signaling vs. Free Cash Flow Hypothesis," *Journal of Financial Economics, 24* (1), 181-192.

Lewellen, Wilbur G., Kenneth L. Stanley, Ronald C. Lease and Gary G. Schlarbaum, 1978, "Some Direct Evidence on the Dividend Clientele Phenomenon," *Journal of Finance, 33* (5), 1385-1399.

Lintner, John, 1956, "Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes," *American Economic Review, 46(2),* 97-113.

Litzenberger, Robert and Krishna Ramaswamy, 1982, "The Effects of Dividends on Common Stock Prices: Tax Effects or Information Effects?," *Journal of Finance, 37,* 429-443.

Litzenberger, Robert and Krishna Ramaswamy, 1980, "Dividends, Short Selling Restrictions, Tax Induced Investor Clientele and Market Equilibrium," *Journal of Finance, 35,* 469-482.

Litzenberger, Robert and Krishna Ramaswamy, 1979, "The Effects of Personal Taxes and Dividends on Capital Asset Prices: Theory and Empirical Evidence," *Journal of Financial Economics, 7,* 163-195.

Long, John B., Jr., 1978, "The Market Valuation of Cash Dividends: A Case to Consider," *Journal of Financial Economics, 6* (2/3), 235-264.

Long, John B., 1977, "Efficient Portfolio Choice with Differential Taxation of Dividend and Capital Gains," *Journal of Financial Economics, 5,* 25-53.

Loughran, Tim and Jay Ritter, 1993, "The Timing and Subsequent Performance of New Issues," Working Paper, University of Illinois.

Masulis, Ronald W. and Ashok N. Korwar, 1986, "Seasoned Equity Offerings: An Empirical Investigation," *Journal of Financial Economics, 15* (1/2), 91-118.

Michaely, Roni, Richard H. Thaler and Kent Womack, 1994, "Price Reactions to Dividend Initiations and Omissions: Overreaction or Drift?," Working Paper, Cornell University.

Michaely, Roni and Wayne H. Shaw, 1994, "The Pricing of Initial Public Offerings: Tests of the Adverse Selection and Signaling Theories," *Review of Financial Studies,* forthcoming.

Michaely, Roni and Jean-Luc Vila, 1993, "Investors' Heterogeneity, Prices and Volume Around the Ex-Dividend Day," Working Paper, Massachusetts Institute of Technology.

Michaely, Roni and Maurizio Murgia, 1993, "The Effect of Tax Heterogeneity on Prices and Volume Around the Ex-dividend Day: Evidence from the Milan Stock Exchange," Working Paper, Cornell University.

Michaely, Roni and Jean-Luc Vila, 1994, "Trading Volume with Private Valuations: Theory and Evidence from the Ex-dividend Day," Working Paper, Massachusetts Institute of Technology.

Michaely, Roni, 1991, "Ex-dividend Day Stock Price Behavior: The Case of the 1986 Tax Reform Act," *Journal of Finance, 46,* 845-860.

Miller, Merton and Franco Modigliani, 1961, "Dividend Policy, Growth and the Valuation of Shares," *Journal of Business, 34,* 411-433.

Miller, Merton and Kevin Rock, 1985, "Dividend Policy Under Asymmetric Information," *Journal of Finance, 40* (4), 1031-1051.

Miller, Merton and Myron Scholes, 1982, "Dividends and Taxes: Empirical Evidence," *Journal of Political Economy, 90,* 1118-1141.

Miller, Merton and Myron Scholes, 1978, "Dividends and Taxes," *Journal of Financial Economics, 6,* 333-264.

Morgan, Ian G., 1982, "Dividends and Capital Asset Prices," *Journal of Finance, 37,* 1071-1086.

Myers, Stewart C. and Nicholas S. Majluf, 1984, "Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have," *Journal of Financial Economics, 13* (2), 187-221.

Myers, Stewart C., 1977, "Determinants of Corporate Borrowing," *Journal of Financial Economics, 5* (2), 147-175.

Ofer, Aharon R. and Anjan V. Thakor, 1987, "A Theory of Stock Price Responses to Alternative Corporate Cash Disbursement Methods: Stock Repurchases and Dividends," *Journal of Finance, 42* (2), 365-394.

Ofer, Aharon R. and Daniel R. Siegel, 1987, "Corporate Financial Policy, Information, and Market Expectations: An Empirical Investigation of Dividends," *Journal of Finance, 42* (4), 889-911.

Penman, Stephen H., 1983, "The Predictive Content of Earnings Forecasts and Dividends," *Journal of Finance, 38* (4), 1181-1199.

Peterson, Pamela, David Peterson and James Ang, 1985, "Direct Evidence on the Marginal Rate of Taxation on Dividend Income," *Journal of Financial Economics, 14,* 267-282.

Pettit, R. Richardson, 1972, "Dividend Announcements, Security Performance, and Capital Market Efficiency," *Journal of Finance, 27* (5), 993-1007.

Poterba, James, 1986, "The Market Valuation of Cash Dividends: The Citizens Utilities Case Reconsidered," *Journal of Financial Economics, 15,* 395-406.

Poterba, James and Lawrence H. Summers, 1984, "New Evidence that Taxes Affect the Valuation of Dividends," *Journal of Finance, 39,* 1397-1415.

Ritter, Jay R., 1991, "The Long Run Performance of Initial Public Offerings," *Journal of Finance, 46* (1), 3-28.

Rosenberg, Bar and Vinay Marathe, 1979, "Tests of Capital Asset Pricing Hypotheses," *Research in Finance, 1,* 115-224.

Sarig, Oded, 1984, "Why Do Companies Pay Dividends?: Comment," *American Economic Review, 74,* 1142.

Shefrin, Hersh M. and Meir Statman, 1984, "Explaining Investor Preference for Cash Dividends," *Journal of Financial Economics, 13* (2), 253-282.

Stiglitz, Joseph E., 1983, "Some Aspects of the Taxation of Capital Gains," *Journal of Public Economics, 21,* 257-296.

Thaler, Richard H. and Hersh M. Shefrin, 1981, "An Economic Theory of Self-Control," *Journal of Political Economy, 89* (2), 392-406.

Vermaelen, Theo, 1981, "Common Stock Repurchases and Market Signaling: An Empirical Study," *Journal of Financial Economics, 9* (2), 138-183.

Watts, Ross, 1973, "The Information Content of Dividends," *Journal of Business, 46* (2), 191-211.

Williams, Joseph, 1988, "Efficient Signaling with Dividends, Investment, and Stock Repurchases," *Journal of Finance, 43* (3), 737-747.

Yoon, Pyung S. and Laura Starks, 1993, "Signaling, Investment Opportunities, and Dividend Announcements," Working Paper, University of Texas at Austin.