

Can Risk Aversion Explain The Demand for Dividends?

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Abstract

In the United States and several other countries, dividends are a tax-disadvantaged way to distribute cash to shareholders. This article presents an argument that dividends may be a less risky way to collect cash than selling into share repurchases, and examines whether (given the magnitude of the tax disadvantage) reasonable levels of risk aversion can explain the demand for dividends. The case study of Citizens Utilities provides a useful means to distinguish the present argument from other explanations for cash dividend payout.

1 Introduction

Corporations in the United States pay a large amount of cash dividends to their shareholders. This has been a puzzle to financial economists since under the U.S. tax code, cash dividends are taxed more heavily than capital gains. This tax disadvantage results not only from the higher statutory rate that often pertains to dividend income, but also the tax deferral advantage that applies to capital gains income. Cash dividend income could instead be conveyed to shareholders as capital gains income either by retaining the earnings (which will increase the size of the company) or by repurchasing shares in the open market (which achieves the same cash distribution to shareholders as a cash dividend).

The amount of taxation involved is quite economically significant. Poterba and Samwick's [12] estimate that a dollar of dividends on average results in a tax bill 12 cents higher¹ than

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¹Generally, individuals face a higher tax bill on dividends than capital gains. Untaxed institutions of course face no tax differential, and corporations may even have a tax preference for dividends. The figure shown is a weighted average of the estimated effects for these three groups.

a dollar of capital gains. Given this, the fact that over \$250 billion of dividends² were paid in 1997 suggests that paying dividends (as opposed to retaining the earnings or distributing the same amount of cash by repurchasing shares) generates an added tax bill of \$30 billion annually.

Many efforts have been made to explain this dividend puzzle, and considerable progress has been made in understanding the decisions of companies to distribute cash. In general, models have focused on the supply of dividends – explanations from the corporate perspective of the choice to pay dividends – rather than reasons why investors might choose to demand dividends.

Explanations for dividend payouts include a signaling approach, in which being willing to distribute cash to shareholders (as in Bhattacharya [3]) and being willing to pay the dividend tax (as in Bernheim [2]) serve as signals of otherwise unverifiable financial strength. Dividend-paying companies are therefore rewarded with high stock prices. Numerous studies have found that dividend payouts do indeed have some informational value, as suggested by this hypothesis.

Other models take the desire to pay cash to shareholders as given, and suggest costs to repurchases that may make dividends the less costly alternatives. For example, repurchases may present the opportunity for insiders to manipulate the timing or quantity of the corporation's trades (Brennan and Thakor [4] and Barclay and Smith [1]), which creates a preference for dividends on behalf of outside shareholders. Alternatively, cash dividends may be preferred to repurchases as a means of generating cash income to shareholders without a transaction cost.

This paper proposes an additional piece to solve the dividend puzzle – the idea that from the viewpoint of an investor, collecting cash dividends may be a less risky way of generating a cash stream than selling shares in a company which does not pay dividends (and which may be repurchasing its shares in the open market). A model is shown which demonstrates this to be true for optimizing investors faced with imperfect information.

The next section addresses an interesting case study which provides evidence strongly supportive of the idea that dividend cash streams are discounted at a lower rate than capital gain

²Source: Federal Reserve Flow of Funds data [8], Table F.6

cash streams (presumably due to a risk premium associated with the latter). Section 3 outlines a simple model identifying the potential risk differences between collecting dividends and capital gains. Section 4 then uses simulations to answer the empirical question as to whether the risk-lowering advantage of cash dividends is likely to be sufficient to offset the tax cost, and the final section offers conclusions.

2 An Interesting Case: Citizens Utilities

Citizens Utilities is a publicly traded and highly diversified utility. From 1956 through 1989 it had a unique dividend policy, which created an interesting “controlled experiment” and resulted in the company drawing attention in the literature. Two classes of shares were created in 1956. Class A Shares paid dividends in additional shares of Class A stock. These were also convertible on a one-for-one basis into Class B shares. Class B shares paid cash dividends. Ordinarily, such a capital structure would result in the Class A shares being taxed as if they had received a cash dividend with the same value as the shares received. However, an IRS exemption granted in 1955 allowed the share dividends not to be a taxable event.³

As a multiple of dividends⁴, many existing explanations of dividend payout would suggest that the cash dividend shares should be valued less than the Class A shares, since the tax disadvantage should be capitalized. Signaling models, which suggest that cash dividends are paid to reveal private information about the company’s financial health, would suggest that the benefits of the information would benefit both classes of shares, while the tax costs accrue only to the Class B shares. Similarly, models in which paying cash dividends prevents managers from “empire-building” investments with negative NPV suggest that the benefits accrue to the

³Citizens Utilities was unexpectedly unable to obtain a permanent extension of their exemption. In order to preserve the tax advantages of the Class A shares, they began paying only stock dividends on both classes of shares. An optional program to facilitate the sale for cash of the class B shareholders’ dividends was instituted shortly thereafter.

⁴The value of the Class A dividends were consistently about 10% above the value of the Class B dividends. Although the corporate charter states that the dividends should be of equal value, these relative dividends were highly stable and appear to have been priced as such by the market. Accordingly, the literature has taken this into account.

company as a whole while only the Class B shareholders pay the tax penalty. Other models suggesting that cash dividends will be valued the same as capital gains at the margin despite the apparent tax disadvantage (for example, due to clientele effects) would suggest that both shares may be valued equally since their constituent dividends may be valued equally.

However, Long [10] and Poterba [11] find a surprising dichotomy in the data. Specifically,

- First, the value of each dividend can be estimated by looking at the drop in the price of the shares on the ex-dividend date⁵. Each share dividend valued by the Class A shares is valued at nearly the full value of the dividend, while each cash dividend paid by the Class B shares is valued at approximately three-quarters of the (pre-tax) dividend value. This reflects the tax disadvantage of the cash dividends.
- Second, the value of the shares (the claims to the dividend streams) can be observed directly. Since each class of shares is linked to the same company, and therefore the expectations of the future paths of dividends should be identical, the Class B shares should be expected to trade (as a multiple of dividends) at about three-quarters of the value of the Class A shares. In this way both shares would be valued equivalently relative to the value of their dividend streams mentioned above. Surprisingly, though, the market value of the Class B shares was at least as high (as a multiple of gross dividends) as the value of the Class A shares.⁶

In short, the data show that models such as signaling and constraint of management are not capturing the entire story of dividend payout. Hubbard and Michaely [9] also rule out other explanations for the differential pricing such as liquidity (it is the seemingly overpriced Class B shares that are less liquid) and clientele effects (institutional shareholders hold few of either

⁵The ex-dividend date is the first trading date on which the upcoming dividend belongs to the sellers and not the buyers. The price would therefore be expected to drop by the (after-tax) value of the dividend

⁶It could be suggested that class A shares have the risk that they could lose their special tax treatment and therefore an “expiration effect” could explain a lower price. However, as Poterba points out, this is inconsistent with the fact that the relative price of class A shares increased over time. Since the potential expiration date (1990) of the tax exemption was common knowledge, an expiration effect would have resulted in the relative price of class A shares falling over time. In addition, an expiration effect would still have resulted in class A shares being priced higher than class B shares. Only the magnitude of the difference would be reduced.

class of shares). Instead, it appears that cash dividends are being priced to generate a lower expected after-tax rate of return than share dividends. Since this discrepancy cannot be due to the (identical) underlying company, it must be due to the nature of dividends itself. It would appear, in short, that share dividends are given a higher risk premium than cash dividends. The next section presents a simple model of dividend demand which explores the circumstances in which cash dividends are a less risky way to generate an income stream than selling shares in the open market.

3 A Simple Model

This section presents a model showing the circumstances in which there is a risk differential between collecting dividend income and capital gains income. The model is one in which prices exhibit transitory fluctuations around their long-run price, and investors optimize given the constraint that they cannot decompose the market price contemporaneously into the transitory and permanent components. The model is used to demonstrate this risk difference theoretically and to provide a framework to estimate it empirically in the following section.

To keep the model simple and analytically tractable, some potential factors have not been incorporated. For example, the model focuses on the the equity portion of portfolios to the exclusion of other assets. Also, the possibility that corporate management could use superior information to trade against other investors is not represented. Since these factors do not qualitatively affect the primary result of the model and quantitatively would be likely to at least partially cancel out in terms of their effects on simulated dividend demand, the model has been kept in its present form.

3.1 Description of Model

This section presents a simple model in which share prices are determined by a market clearing condition. Companies supply shares to finance projects, investors demand shares to finance

consumption, and risk-averse market makers absorb the net supply or demand of the first two groups in exchange for an expected return.

The investors whose dividend demand will be explored need to finance a fixed consumption stream from an endowment of wealth invested in stocks. They care about the residual value of their holdings (perhaps due to a bequest motive or uncertain longevity) and are risk-averse with respect to this value. These investors face a tax τ on dividend income but (as a normalization) no tax on capital gains. They can divide their portfolio between dividend-paying and non-dividend paying shares, and thereby determine their dividend income. To the extent that the chosen dividend level does not finance the consumption requirement, shares must be sold in the open market to generate cash. These investors understand that stock prices fluctuate to some extent away from their “fundamental values” and understand the statistical properties of these fluctuations. However, they are unable at any given time to decompose the stock price into its fundamental and transitory components.

Companies require financing to finance projects. This can be raised via debt financing or equity financing. Since debt financing involves a legal obligation to repay, it incurs not only an explicit interest cost but also an implicit expected cost representing the possibility of deadweight losses from liquidity problems (such as represented in Ross [14]). We will take this debt financing to be (locally) perfectly elastic with a gross (of implicit costs) marginal cost to the company of ρ . Companies can issue shares costlessly⁷ but only after an underwriting delay.

There are many companies, so each lacks market power in the financial market. Companies will choose to raise capital in the market (debt or equity) with a lower cost of capital, which means companies will in equilibrium supply the number of shares which results in the marginal cost of equity capital being equal to the gross marginal cost ρ of debt capital.⁸ Because com-

⁷Equivalently, the underwriting cost of share issue may be thought of as equal to the underwriting cost of a bond issue or of arranging a line of credit.

⁸Note that since this is the gross (of implicit costs) cost of debt capital to the firm, this implies that the expected return from the investor’s perspective will be higher on equity than debt. Also, since this is the marginal cost over a potentially limited range, this is consistent with the *average* cost of equity capital to the firm being higher than the average cost of debt capital. The higher marginal cost would reflect the fact that

panies can costlessly adjust their capital structure for any cash payout (by substituting debt capital or new equity capital for the retired equity capital), they will be indifferent between paying cash dividends or not. A desire to minimize the cost of equity capital will result in both dividend-paying shares and non-dividend-paying shares having the same cost of capital. Long run supply of shares is therefore perfectly elastic, and the demand for dividends will determine the percentage of companies which pay cash dividends. The desire to minimize the cost of capital means that companies will accommodate any change in relative demand for shares. However, recent innovations in demand will not be reflected in supply due to the underwriting delay.

Risk-averse market makers will accept a transitory inventory of excess supply or demand, and the equilibrium market price will be that price which induces the market makers to hold that inventory. The transitory excess demand will therefore result in transitory (mean-reverting) changes in the market price.⁹

3.2 The Price of Shares

There is a zero-mean innovation of ϵ_t dollars of excess demand for shares in each period. Companies issue enough shares such that the expected gross cost of equity capital equals their cost ρ of debt capital. However, since there is an underwriting delay of θ periods, there will be excess demand for shares corresponding to the last θ innovations in investor demand:

$$N_t = \sum_{i=0}^{\theta-1} \epsilon_{t-i} \tag{1}$$

There are market makers who have the same cost ρ of funds as the share-issuing companies. Following a noise trader model of Shiller [15], their demand will be taken to be linear in the

additional debt financing pushes up the interest rate that must be paid on the inframarginal debt.

⁹The existence of mean reversion in stock prices has been well-documented in the literature. See for example Fama and French [7], Poterba and Summers [13], and Cutler, Poterba, and Summers [6].

expected excess return over a one-period time horizon:

$$M_t = \frac{(E_t R_t - \rho)}{\varphi} \quad (2)$$

where φ represents the risk aversion of the market makers.

Since firms are indifferent to their own dividend policy, the value of a firm will be invariant to its dividend policy. We can therefore find the expected return on a company which pays out all its earnings as dividends, that is, for whom the dividend payout D_t equals the earnings ξ_t . This company's expected return is given by

$$E_t R_t = \frac{E_t P_{t+1} + \xi_{t+1} - P_t}{P_t} \quad (3)$$

The market-clearing condition

$$M_t + \frac{N_t}{P_t} = 0 \quad (4)$$

can therefore be rewritten as

$$\frac{1}{\varphi} \left(\frac{E_t P_{t+1} + \xi_{t+1} - P_t}{P_t} - \rho \right) + \frac{N_t}{P_t} = 0 \quad (5)$$

$$(1 + \rho)P_t = E_t P_{t+1} + \xi_{t+1} + \varphi N_t \quad (6)$$

This equation has multiple solutions involving “bubbles”. However, assuming that the present discounted value of a share must remain finite yields the solution:

$$P_t = \sum_{i=0}^{\infty} \frac{\xi_{t+i+1} + \varphi E_t N_{t+1}}{(1 + \rho)^{i+1}} \quad (7)$$

This can be divided up into the present discounted value V_t of the dividends (the “fundamental”

value) and a transitory term reflecting the effects of innovations to demand:

$$P_t = V_t + \sum_{i=0}^{\infty} \frac{\varphi E_t N_{t+i}}{(1+\rho)^{i+1}} \quad (8)$$

which given the process (1) driving N_t can be rewritten as

$$P_t = V_t + \sum_{i=0}^{\theta-1} \frac{\varphi \sum_{j=0}^{\theta-i-1} \epsilon_{t-j}}{(1+\rho)^{i+1}} \quad (9)$$

For simplicity, the amount of earnings ξ_t and therefore the intrinsic value V_t will be taken to be fixed across periods.

Companies which do not pay cash dividends retain the earnings. In order to keep the meaning of a share independent of the dividend policy of a firm, we will model this as a stock dividend of $\frac{\xi}{V}$ shares per share held. Such companies will of course simply adjust their capital structure over time to remain near the optimal capital structure.¹⁰ Dividend policy will therefore not affect the intrinsic value of a share over time in equilibrium.

3.3 Dividend Demand

Attention is now turned to an investor with an endowment of k shares of stock who wishes to finance a consumption stream of $\$C$ in each period, and is concerned with her final wealth. Without loss of generality, we will assume that she chooses between companies which pay no cash dividends and companies that pay all of their earnings as cash dividends. The proportion of shares held in dividend-paying companies will be denoted δ . There is a normally-distributed innovation ϵ_t with zero mean and variance σ_ϵ^2 to share demand in each period.

An analytic solution will be derived for the one-period case. The investor will be taken to have utility with a constant coefficient γ of absolute risk aversion. In the one-period case,

¹⁰Indeed, this is likely to take the form of share repurchases over time if companies not paying cash dividends wish to retain the same amount of equity capital as companies which do pay cash dividends.

terminal wealth W will be normally distributed, so utility is given as a function of mean and variance of this wealth:

$$U(\mu_W, \sigma_W^2) = \mu_W - \frac{\gamma}{2}\sigma_W^2 \quad (10)$$

Such an investor collects $k\delta\xi$ in cash dividends, on which she incurs a proportional tax of τ . She must sell shares to finance the remaining $C - (1 - \tau)k\delta\xi$ dollars of consumption. After this sale and the share dividend on $k(1 - \delta)$ shares, the number of shares remaining is

$$k + k(1 - \delta)\frac{\xi}{V} - \frac{C - k(1 - \tau)\delta\xi}{P_t} \quad (11)$$

Given the one period environment, the stock price is simply

$$P = V + \frac{\varphi\epsilon}{1 + \rho} \quad (12)$$

so the final wealth is given by

$$W = kP + k(1 - \delta)\xi\frac{P}{V} - C + k(1 - \tau)\delta\xi \quad (13)$$

$$= k\left(V + \frac{\varphi\epsilon}{1 + \rho}\right) + k(1 - \delta)\xi\frac{V + \frac{\varphi\epsilon}{1 + \rho}}{V} - C + k(1 - \tau)\delta\xi$$

$$= kV + \frac{k\varphi\epsilon}{1 + \rho} + k(1 - \delta)\xi + \frac{k}{V}(1 - \delta)\xi\frac{\varphi\epsilon}{1 + \rho} - C + k(1 - \tau)\delta\xi$$

$$W = k(V + \xi) - (k\tau\delta\xi + C) + \frac{k\varphi}{V(1 + \rho)}(V + \xi(1 - \delta))\epsilon \quad (14)$$

The expected value of wealth is then just the gross value of the shares (including income) less the dividend tax and the consumption requirement:

$$\mu_W = k(V + \xi) - k\tau\delta\xi - C \quad (15)$$

and the variance of wealth derives from the shock to share demand ϵ :

$$\sigma_W^2 = \left(\frac{k\varphi}{V(1+\rho)}(V + \xi - \xi\delta) \right)^2 \sigma_\epsilon^2 \quad (16)$$

It is straightforward to see that increasing dividends (by increasing δ) lowers the expected wealth due to the tax bill:

$$\frac{d\mu_W}{d\delta} = -k\tau\xi \quad (17)$$

but also decreases the variance of wealth, since fewer shares must be sold at the noisy market price:

$$\frac{d\sigma_W^2}{d\delta} = -2\xi \left(\frac{k\varphi}{V(1+\rho)} \right)^2 (V + \xi - \xi\delta)\sigma_\epsilon^2 \quad (18)$$

From equation (10) the first order condition for dividend demand is given by:

$$\frac{dU(\mu_W, \sigma_W^2)}{d\delta} = \frac{d\mu_W}{d\delta} - \frac{\gamma}{2} \frac{d\sigma_W^2}{d\delta} = 0 \quad (19)$$

$$-k\tau\xi + \gamma\xi \left(\frac{k\varphi}{V(1+\rho)} \right)^2 (V + \xi - \xi\delta)\sigma_\epsilon^2 = 0 \quad (20)$$

$$V + \xi - \xi\delta = \frac{k\tau}{\gamma\sigma_\epsilon^2} \left(\frac{V(1+\rho)}{k\varphi} \right)^2 \quad (21)$$

which can be solved for the optimal level¹¹ of dividend demand

$$\delta^* = 1 + \frac{V}{\xi} - \frac{\tau}{k\gamma\xi\sigma_\epsilon^2} \left(\frac{V(1+\rho)}{\varphi} \right)^2 \quad (22)$$

Straightforward differentiation shows that comparative statics have the expected signs. Dividend demand is decreasing in the tax rate τ and increasing in investor risk aversion γ . Factors which make share prices deviate more from fundamental value, either directly (increasing the variance σ_ϵ^2 of demand shocks) or indirectly (increasing market makers' risk aversion φ and

¹¹Verifying the second order condition is straightforward.

thereby making them more reluctant to offset the demand shock) also increase investor dividend demand by making selling in the open market more risky.

4 Risk Aversion and Dividend Demand

The previous section explained the demand for dividends by risk-averse investors and have derived this demand analytically for the one period case. The present section demonstrates that these results extend to an intertemporal setting by showing the results of Monte Carlo simulations of the model. Since many studies in the literature have shown that companies with different dividend policies have systematically different fundamentals, it is necessary to use simulations to isolate dividend policy from other corporate factors empirically correlated with it.

Parameterization of the pricing function (9) has been done with the guidance of Campbell and Kyle's [5] empirical analysis of noise pricing. Since many dividends are payable quarterly, a period has been interpreted as three months. ρ , the real discount rate, is equal in this model to the return on equities. Since the historic average annual return on stocks has been found to be 8.2%, the value of ρ (a quarterly rate) has been set to 2%. The time horizon has been set to 40 quarters, and the persistence θ of noise originating in a period has been set to 20 periods, in accordance with findings of mean reversion on such horizons. Campbell and Kyle, using a slightly different model of noise pricing, find a much longer half-life of noise trading than this. This suggests a larger value of θ , which will be shown to strengthen the predicted dividend demand. The dividend tax rate τ has been set to 12%, in accordance with Poterba and Samwick's [12] recent estimate of dividend tax penalties under the U.S. tax code. Finally, the degree of noise trading is calibrated to generate a standard deviation of the return of about 7.9% per quarter, or 15.8% per year. This is less than the 18% observed annual standard deviation of stock market returns, although the present model does not incorporate fundamental shocks.

In order to have a familiar reference for the risk aversion parameter, investors have been

τ	δ^*	γ	δ^*	φ	σ_R	δ^*
0.08	0.92	2.25	0.14	0.90	0.070	0.13
0.10	0.70	2.50	0.38	0.95	0.074	0.37
0.12	0.57	2.75	0.48	1.00	0.079	0.57
0.14	0.46	3.00	0.57	1.05	0.084	0.76
0.16	0.34	3.25	0.64	1.10	0.089	0.91
0.18	0.13	3.50	0.70			

Table 1: Effects of the Dividend Tax (τ), Investor Risk Aversion (γ) and Price Volatility (σ_R) on Dividend Demand (δ^*)

given a constant coefficient γ of relative risk aversion. This means the expected utility function¹² is given by

$$U(W) = \frac{W^{1-\gamma}}{1-\gamma} \quad (23)$$

This coefficient has initially been set to 3. The investor must finance a consumption stream which has been set equal to 2% of initial wealth in each period. The dividend demand δ^* is then derived as that dividend holding which maximizes the utility function (23) over 100,000 trials.

For this base case, the optimal dividend demand is $\delta^* = 0.57$. This means that 57% of the shares will be held in dividend paying stocks. Given the parameterization, it also means that after paying a dividend tax, just over 50% of the consumption requirement will be financed by collecting dividends, with the remainder financed via share liquidation.

The comparative statics discussed in the previous section also hold in an intertemporal setting. As Table 1 shows, dividend demand decreases when the dividend tax increases, but increases when the investors' risk aversion increases. An increase in the variance of price away from fundamental values has been effected here by varying φ . As expected, a higher variance of price, by increasing the risk of selling shares, increases the demand for risk-lowering dividend payout.

¹²Negative wealth realizations (which the expected utility function cannot accept) are dealt with by trimming very small and very large wealth realizations. The number of these realizations is small. In addition, the resulting reduction in the variance of wealth biases the results *against* the demand for cash dividends, as will become apparent.

T	δ^*	θ	φ	δ^*
20	0.49	17	1.175	0.17
25	0.47	18	1.111	0.32
30	0.41	19	1.053	0.45
35	0.49	20	1.000	0.57
40	0.57	21	0.952	0.68
45	0.65	22	0.909	0.77

Table 2: Effects of the Time Horizon T and Price Persistence θ on Dividend Demand

Intertemporal factors which could not be addressed in the single-period model of the previous section can now be examined via simulations. Table 2 shows some results of this. The left columns of this table show the time horizon changing. The effect on dividend demand is not clear. Intuitively, a longer time horizon means a greater dividend tax bill from collecting dividends, but also a greater risk from not collecting dividends, and neither effect globally dominates.

The stronger results of Table 2 are shown on the right, in which the persistence of the demand shocks to share prices is varied. As modeled, an increase of this persistence θ by itself will increase the variance of prices (see equation (9)) by adding more terms to each period's demand shock. Since the effect of price variance has already been addressed in Table 1 and the desire now is to isolate the effect of persistence, the parameter φ is also varied to keep the variance of the share price constant in the face of changing persistence. As Table 2 shows, an increase in persistence strongly increases the demand for dividends. This is because it makes the risk from selling in the open market more systematic across periods.

5 Conclusions and Extensions

This paper began with an interesting case study in the literature, that of Citizens Utilities, which suggested that the shares representing claims to cash dividends are priced as lower-risk assets than shares representing claims to capital gains. A model of dividend demand was then presented to complement existing models (such as signaling) of dividend supply. In this

model, investors understand the dynamics of noisy asset prices although they cannot decompose any individual price into transitory and permanent components. Investors choose to collect dividends even though there is a tax disadvantage because it lowers the risk of the terminal value of their portfolio. Avoiding dividends lowers the individual's tax bill, but also forces the risky behavior of selling in the open market to finance consumption. Simulation results show that with realistic parameter values, risk aversion can explain a substantial level of dividend demand.

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