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The Puzzle of Financial Leverage Clienteles

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ABSTRACT

Empirically, it appears that common stock of publicly traded corporations with high-debt ratios tends to be held by investors with relatively low marginal taxes while the stock in companies with little debt is held by investors in high-tax brackets. A number of authors have argued that in an equilibrium similar to the one described by Miller [8], these clienteles should exist. We argue that standard portfolio theory does not imply financial leverage clienteles for publicly traded firms. We explain the empirical relationship between investor tax rates and leverage ratios by the existence of dividend clienteles and a positive relationship between dividend yield and leverage ratios.

EMPIRICALLY, THERE APPEARS TO be financial leverage clienteles. Investors with relatively low marginal tax rates tend to hold common stock of publicly traded corporations with high-debt ratios while investors in high-tax brackets tend to hold stock in companies with little or no debt (see, e.g., Harris et al. [3] or Kim et al. [5]). A number of authors have argued that such clienteles should exist within the context of an equilibrium similar to that described by Miller [9]. These arguments can be grouped into two categories.

The first considers the composition of investors' portfolios, taking corporate leverage as given (e.g., Miller [9] and Kim et al. [5]). This argument holds that an investor's tax status, together with a firm's debt level, determines, or at least affects, the amount the investor will invest in the firm's common stock. We refer to this explanation of financial leverage clienteles as the "static portfolio argument."

The second argument assumes that stock ownership is given and focuses on how the investor's tax status affects the way the investor votes on proposals to change the firm's debt level (e.g., Taggart [16] and Kim [4]). We refer to this explanation as the "dynamic leverage argument."

We disagree with these arguments, largely because we reject their implicit premises. In Section I, we show in Proposition I that the static portfolio argument is false, that is, an investor's optimal portfolio choice is unaffected by the amount of leverage a firm has.

In Section II, Proposition 2 shows that, under mild restrictions, shareholders will unanimously favor (marginal) leverage decisions that increase stock price. That is, their tax rates will not affect their vote, so that the dynamic leverage argument is false as well. Our conclusion differs from those of the prior research

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largely because we allow security markets to remain open so that investors can rearrange their portfolios after they vote, and we assume that investors predict the effect of a leverage change rationally, that is, they understand how leverage alters corporate and investor cash flows and they use observed market prices to value such changes.

Since Propositions 1 and 2 show that the current explanations of observed financial leverage clienteles are invalid, we are left with the puzzle of why they exist. In Section IV, we suggest an explanation that does not require a causal relation between investor tax rates and firm leverage ratios. We argue that leverage clienteles can be found when investors form tax-motivated dividend clienteles and when, for other reasons, dividend yields and financial leverages are positively correlated.

I. Portfolio Theory and Financial Leverage Clienteles

The recent literature on financial leverage clienteles appears to derive from a comment appearing in Miller's [9] important and seminal Presidential Address. Although it was not central to his major argument, Miller stated that

> Companies following a no-leverage or low-leverage strategy (like IBM or Kodak) would find a market among investors in the high tax brackets; those opting for a high leverage strategy (like the electric utilities) would find the natural clientele for their securities at the other end of the scale (p. 269).

This static portfolio argument, which suggests that investors are influenced by the leverage of firms whose stock they buy, has been formalized in Kim et al. [5].

In this section, we argue that this type of a clientele is inconsistent with standard portfolio theory. Consider a two-period equilibrium model of an investor's portfolio decisions, where the decisions are made in the initial period and random returns are realized in the second. (We will present notation and specific assumptions in the next section. However, the case against the static portfolio argument can be made verbally.)

The idea behind our argument is straightforward: as long as investors' utility functions depend only on consumption, they will be concerned only with the after-tax payoffs provided by different securities. Given the cash flows the firm generates, how those cash flows are taxed, and how they are related to various risk factors, all other firm-specific variables such as the location of the firm, the product it manufactures, and its financial leverage are irrelevant. While the above argument may be convincing to many, this irrelevance proposition can also be proved by contradiction.

PROPOSITION 1. *In an arbitrage-free equilibrium, a firm's debt level does not affect investors' positions in its equity.*

Proof: Suppose the contrary were true. Consider two firms (A and B) whose future stock prices were perfectly correlated and generated by identical probability distributions. Suppose their future dividends were perfectly correlated and identically distributed as well.

Next suppose A has more debt. If the proposition is false, A and B are not perfect substitutes for some investors. Since the future (after-tax) payoffs of A and B are identical, they can be imperfect substitutes only if their current prices differ. But if they differ, there will be a riskless arbitrage opportunity, contradicting our initial assumption. Q.E.D.

The logic of Proposition 1 is simple: in standard portfolio theory, investment decisions take place after corporate operating decisions have been made. Knowledge of the distribution of future share price and of dividend policy[1] is then sufficient for the investor's decision problem. It follows that the composition of the clientele holding a security is independent of any characteristics of the issuer of the security that affect neither dividend policy nor the distribution of future share price.

II. Effect of Taxes on the Valuation of Changes in Corporate Leverage

In Section I, we argued that, given the distribution of a firm's future dividends and stock prices, an investor's choice of a stock portfolio is independent of corporate leverage. However, once they are stockholders, investors may try to change corporate leverage. Taggart [16, p. 654] argues that if stockholders are in different tax brackets, they will disagree, in general, about whether a firm should increase or decrease its debt level. This dynamic analysis of financial leverage clienteles (later analyzed by Kim [4], is the focus of this section.

We do not argue that the results of previous research are mathematically incorrect. Rather, we reject an assumption that underlies these results. More precisely, while previous research assumed that investors cannot rearrange their portfolios after they vote on a capital structure change, we assume that securities markets remain open and that such trading is possible.

In our analysis, we follow Ekern and Wilson [1] and Leland [6] and consider the space spanned by existing financial assets. We argue that as long as the contemplated capital structure change does not change shareholders' opportunity sets in terms of future (state contingent) consumption,[2] they will unanimously vote for corporate debt policies that maximize share price. Further, under these conditions, the quantitative effect of a leverage change on share price can be determined from the prices of existing securities.

To formalize this point, we assume a two-period model in which a typical stockholder is endowed with the fraction α_0 of the firm's total equity. After voting on the leverage question, the stockholder can rearrange his or her portfolio by buying or selling shares, which he then liquidates at the end of the period.

The stockholder seeks to maximize a standard two-period von Neumann-Morgenstern utility function, $E\{U[c_0, \tilde{c}_1]\}$, where c_0 and $\tilde{c}_1$ represent current

[1] In multiperiod models where capital gains taxes are paid only upon sale of the stock, one must also consider the factors affecting the timing of investors' tax-motivated decisions about when the stock should be sold.

[2] Formally, we assume that the change in end-of-period after-tax cash flows induced by the leverage change is spanned by traded securities. The spanning condition is a form of competitive securities market in that it assumes that firms cannot offer unique securities. This is equivalent to Taggart's assumption that there are "a number of firms in each risk class" (Taggart [16, p. 654]).

consumption and next period's (risky) consumption, respectively. The shareholder's opportunity set is given by

$$c_0 = w_0 + \alpha_0(S + D) - \alpha_1 S - w_1$$

$$\tilde{c}_1 = \tilde{R}w_1 + \alpha_1(1 - \tau_s)(1 - \tau_c)(\tilde{X} - rD)$$

where, in addition to the variables defined above,

w_0 = value of stockholder's initial endowment (excluding the value of the endowment of α_0),
D = amount of (risk-free) debt issued by the firm (firm decision variable),
S = total value of the firm's equity after a (tax-free) reorganization involving the issuance of D and the use of the proceeds to repurchase equity,
r = 1 plus the taxable rate of interest,
w_1 = value of the stockholder's portfolio (excluding the value of the investment represented by α_1),
α_1 = fraction of firm owned by stockholder at end of period 0 (stockholder decision variable),
$\tilde{R}w_1$ = after-tax return from investment in w_1 (a random variable),
τ_s, τ_c = marginal tax rate on stock and corporate income respectively, and
$\tilde{X}$ = firm's earnings before interest and taxes (a random variable).

For simplicity, r now represents one plus the rate of interest and we assume that the tax rates apply to the entire cash distributions paid at period one. (Although the model has but a single period, the tax rate assumption gives results similar to those obtained in multiperiod models where only interest and dividends are taxed.)

Now we come to the question of whether the stockholder will vote for more corporate debt or less. To address this issue in the context of the existing literature, we will begin by following the procedure of Taggart [16].[3] Substituting the budget constraints into the expected utility function, taking the derivative with respect to D, and rearranging yields

$$\frac{\partial E[U]}{\partial D} = \alpha_0 E[U_1]\frac{\partial(S+D)}{\partial D} - \alpha_1\left\{(1-\tau_s)(1-\tau_c)rE[U_2] - \frac{\partial S}{\partial D}E[U_1]\right\}. \quad (1)$$

If (1) is positive, the shareholder will vote for a (small) increase in corporate debt; if it is negative, he will vote against.

The first term on the right-hand side of (1) is multiplied by α_0, the stockholder's initial endowment in the firm, and represents the wealth effect of the proposed change in corporate debt. For an investor to be a stockholder, and thus have a vote, α_0 must be positive. Since $\partial(S + D)/\partial D$ equals the change in the market value of the firm due to the change in corporate debt, the sign of the wealth effect depends only on the effect of the change in debt on total firm value. A

[3] Kim's [4] dynamic analysis of financial leverage clienteles uses the mean-variance framework. Noting that his analysis yields the same risky portfolio of (risky) corporate assets an argument similar to the one in this section yields unanimous shareholder valuation of leverage changes.

change that increases the market value of the firm (and thus the stock price) will have a positive wealth effect.

The second term on the right-hand side of (1) captures the effect of the capital structure change on the future payoffs from the firm's common stock. Implicit in this term (and the absence of any others) is the assumption that shareholders cannot rearrange their portfolios after the capital structure vote. For example, there is no term involving $\partial\alpha_1/\partial D$, that is, a change in the stockholder's investment in the firm due to the leverage. Neither are there terms dealing with the rearrangement of other parts of the investor's portfolio (which, in our analysis, would alter the distribution of $\tilde{R}w_1$).

Rather than deal with the complexities of these additional terms, it is simpler to approach the issue in terms of spanning arguments. We will present examples in Section III where these spanning arguments hold.

PROPOSITION 2. *As long as the opportunity set of attainable bundles of state-contingent claims to future consumption is unaffected by an (infinitely small) contemplated change in financial leverage, all shareholders (with optimal portfolio holdings strictly in the interior of their opportunity sets) will vote unanimously for leverage changes that increase the value of the firm and against changes that decrease the value of the firm.*

Proof: Note that if the consumption opportunity set remains the same, then a change in corporate leverage will change only the wealth of the stockholder. Since their initial optimal portfolio is strictly in the interior, investors will be able to restore their optimal future consumption plan by making marginal changes in the portfolio composition (see, e.g., Leland [6], Theorem I and its proof). Mathematically, this implies that the second term in (1) will be exactly cancelled by terms reflecting changes in securities that span the change in the payoff to shareholders (see Section III for illustrative examples). Thus, (1) simplifies to

$$\frac{\partial E[U]}{\partial D} = \alpha_0 E[U_1] \frac{\partial (S + D)}{\partial D}. \tag{2}$$

Since $\alpha_0 E[U_1]$ is positive, our proof will be complete when we show that stockholders agree on the sign of $\partial(S + D)/\partial D$.

The derivative $\partial(S + D)/\partial D$ is the market value of a change in the firm's after-corporate-tax cash flows due to a small change in debt. Let Δy represent a row vector of state-contingent changes in the firm's after-corporate-tax cash flows. By the assumption of the proposition, this vector is spanned by the cash flow vectors of existing securities

$$\Delta y = \alpha Y$$

where

Y = a matrix composed of the row vectors of each existing security's state-contingent cash flows

α = the row vector of portfolio weights that replicates Δy.

Since the spanning securities are traded, all investors value Δy as the value of the replicating portfolio, α:

Using Ross' [14] linear pricing operator (in arbitrage-free economies), L, we get

$$\frac{\partial(S + D)}{\partial D} = L(\Delta y) = L(\alpha Y)$$

$$= \alpha L(Y)$$

$$= \alpha p$$

where p is the column vector of existing security prices. Since α and p are observable, all shareholders will agree on the sign of $\partial(S + D)/\partial D$. Q.E.D.

Since the logic of Proposition 2 is straightforward, it is important to explain why our analysis yields results that differ from those of Taggart [16]. In our analysis, we assume that corporations do not offer unique (i.e., not spanned) securities. In our analysis, investors do not use personal state prices in the valuation of the change in their state-contingent consumption (following a leverage change). Rather, the prices of the traded financial assets that span this change will uniquely determine the valuation effect of the change.

We have not discussed the effect of the various provisions of the tax code that are designed to prevent unlimited tax arbitrage. These provisions make corner solutions possible for some investors and increase the chance that a change in corporate debt might change the consumption opportunity sets of one or more of the firm's stockholders. While theoretically possible, we feel the empirical impact of this on leverage clienteles is likely to be limited.

III. Examples of Spanned Changes of Financial Leverage

In proving Proposition 2, we argue that the second term in Equation (1) disappears if stockholders can undo the corporate leverage change by changing their other security holdings. In our model (as in Taggart's model), corporate debt is risk-free, and the leverage change affects only riskless cash flows. Thus, the conditions required for spanning are relatively weak:[4] stockholders must be able to change their holdings of (appropriately taxed) riskless cash flows.

We mention two conditions, either of which is sufficient to allow stockholders the required flexibility to rebalance their portfolio. One case occurs if there is a riskless firm whose after-corporate-tax payoffs are taxed at τ_s at the investor level. Another occurs if there are two portfolios of equity securities with different levels of debt, but whose cash flows before interest and taxes are perfectly correlated.

In the first case, if the firm issues more debt, the stockholder could offset its effect on his or her personal portfolio by buying more of the riskless firm. In the second case, an increase in corporate debt can be offset on personal account by selling the more highly levered portfolio and buying the less levered portfolio.

[4] Note that if the changes in cash flows can be spanned by appropriately taxed securities, unanimity results even if corporate debt is not default-risk-free.

More precisely, define V as the market value of one "unit" of the less levered portfolio and $V - \lambda D$ as the market value of one "unit" of the more levered one, where D represents the additional (riskless) debt in the riskier portfolio, and λ is the amount by which each dollar of debt reduces the value of levered equity. Suppose that our firm increases its debt level by ΔD. To offset this increase (without changing α_1), our shareholder should invest a total of $\alpha_1 \Delta D \lambda$ by buying $\alpha_1 \Delta D/D$ units of the safer portfolio and selling the same number of units of the risker portfolio. Next period, this will result in an additional debt payment to our shareholder of exactly $\alpha_1 \Delta D$ (before both corporate and personal taxes), which exactly offsets the shareholder's additional obligation of $\alpha_1 \Delta D$ (before all taxes) due to our firm's higher debt level.

As long as the opportunity set for future consumption bundles does not change, stockholders prefer debt decisions that increase firm value. Market prices and the freedom to trade make preference and tax differences among initial shareholders irrelevant. The result is a unanimous choice of the value maximizing capital structure and an absence of financial leverage clienteles.

IV. Empirical Evidence

Why then are firms with high debt ratios held by investors with low tax rates while low-debt firms are held by high tax-bracket investors (see Kim et al. [5] and Harris et al. [3])? As discussed in previous sections, we do not think there is a direct causal link between corporate leverage and portfolio holdings. Rather, we believe the correlation between firm leverage and investor tax brackets to be indirect and due to tax-induced *dividend* clienteles.

Although not without controversy, the theory of tax-induced dividend clienteles has a straightforward result: investors in high tax brackets find stocks with low dividend yields more attractive than do investors in low tax brackets. Conversely, high-tax-bracket investors find high dividend yields relatively unattractive (see, e.g., Miller and Modigliani [10], Miller and Scholes [11], and Litzenberger and Ramaswamy [7]). The first part of our explanation is that there exists a relationship between shareholder tax rates and dividend yields due to the dividend clientele argument.

The second part of our explanation is that, additionally, there exists a positive relationship between dividend yield and leverage. Given such a relationship, leverage will appear to be related to investor tax status even though shareholder tax status itself does not cause leverage clienteles. Rather, leverage is related to dividend policy, and it is dividend policy that causes investor tax clienteles.

Causal observation suggests a positive relationship between leverage and dividend yield: electric utilities tend to have both high dividend yields and high leverage ratios, while for firms like IBM and Texas Instruments, yields and leverage ratios are low. This relationship has several possible, and possibly complementary, explanations.

Explanation One: At a mechanical level, if investment policy is held constant and if the firm engages in no external equity financing, then the firm's budget constraint requires that dividend increases be funded by additional debt, thereby creating a positive relationship between dividend yield and leverage.

Table I

Correlation Between Dividend Yield[a] and Financial Leverage

Year	Leverage	
	Book Value[b]	Market Value[c]
1968	0.206	0.390
1970	0.099	0.285
1972	0.205	0.367
1974	0.211	0.311
1976	0.281	0.258
All	0.171	0.375

[a] Dividend Yield = Annual Dividend per Share/Year-end Share Price.

[b] Leverage – Book Value = Long-Term Liabilities/(Long-Term Liabilities + Book Value of Equity).

[c] Leverage – Market Value = Total Liabilities/(Total Liabilities + Market Value of Equity).

Explanation Two: Growth firms have low dividend yields because a large portion of their value is due to their future growth opportunities. They also have high bankruptcy and agency costs because their tangible assets are low relative to their going-concern value. Thus, they are more likely to suffer from the problems described by Myers [12] and will tend to have low debt ratios as well.

Explanation Three: Sarig [15] has shown that informational asymmetry can cause corporate insiders to use capital structure and dividend policy as a joint (costly) signal of firm quality. In this signalling equilibrium, safer firms (e.g., utilities) are both more levered and pay higher dividends than riskier firms (e.g., high growth firms).

A full empirical test of our explanation would test whether the dividend yield clienteles induced by tax rate differences entirely explain the observed inverse relationship between shareholder tax rates and corporate leverage. In the absence of data on shareholder tax rates and investment portfolios, we consider the two empirical relationships separately. First, we note the empirical support for tax-induced dividend clienteles based on security price data provided by Elton and Gruber [2] and Litzenberger and Ramaswamy [7, 8] (contrary arguments are provided by Miller and Scholes [11]), as well as that based on actual investor portfolio holdings reported in Pettit [13].

To examine the empirical validity of the second part of our answer, we investigated the relation of dividend yields to the measures of financial leverage used in the empirical examinations of leverage clienteles (see, e.g., Kim et al. [5] and Harris et al. [3]). For compatibility considerations, we used the same test period[5] as Harris et al. [3] and confined our sample to NYSE firms included in

[5] We have also estimated the correlation coefficients in all other years for which Compustat information is available. The resulting coefficients are very close to those reported in Table I.

the Compustat Industrial and Utility tapes whose fiscal year ends on December 31.[6]

As is evident from Table I, dividend yields are indeed positively correlated with corporate leverage, especially when leverage is measured using equity's *market* value. More recently, in 1980, the correlation between dividend yields and leverage (measured in market values) for 894 NYSE industrial corporations alone was 0.364.

The positive correlation between dividend yield and leverage combined with tax induced *dividend* clienteles is consistent with an empirical correlation between investor tax rates and corporate leverage. Thus, the "leverage clienteles" found by Kim et al. [5] and Harris et al. [3] need not be explained as a direct causal relationship. Rather, it can be seen as additional evidence supporting the existence of dividend clienteles.

[6] December fiscal year was required in order to facilitate the computation of equities' market values using reported December 31 share prices.

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