Prime and Score Premia: Evidence against the Tax-Clientele Hypothesis

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Abstract

Primes and scores split the cash flows of a share of stock into dividend and capital gain components, respectively. An analysis of transaction prices reveals that the sum of prime and score prices exceeds the price of their underlying stock. This paper develops a tax-clientele explanation of this premium over the stock price. It tests jointly the clientele effect and an after-tax version of the Black-Scholes option pricing formula. The data reject this joint hypothesis in a manner that suggests the tax-clientele model is not supported.

Prime and Score Premia: Evidence against the Tax-Clientele Hypothesis

From 1983 to 1992, primes and scores traded on the American Stock Exchange. Investors were able to purchase these derivatives which split a share of stock into dividend and capital gains components on some widely traded stocks. The prime holder received all dividends paid to the stock and, at some maturity date, the lesser of the value of the stock and the strike price. The score holder received the remaining value of the stock on the maturity elate. i.e., the greater of the excess of the stock price over the strike price. For a limited time after the offering, investors could tender a share of stock in exchange for a score and a prime and at any time before maturity, a score and a prime could he exchanged for a share of stock.

The score can be recognized as a European call option on the underlying stock. Furthermore, since a portfolio of one prime and one score replicates the cash flow, from one share of stock, we might expect the sum of the prime and score prices to equal the stock price. In fact, the sum of the prime and score prices significantly exceeds the underlying stock price.

In frictionless markets, this premium presents an arbitrage opportunity: investors will buy the stock and short the prime and the score. Jarrow and O'Hara (1989) show that because of transaction costs a riskless arbitrage is not likely to exist. Transactions costs are one possible explanation of the premium addressed in this paper. Another explanation is taxes, which is the focus of this paper.

Our work extends earlier efforts in three ways. First, we directly address the issue or why score and prime clienteles may form and describe the link between these clienteles and the premia. Namely, we develop and test a tax-clientele explanation of score and prime premia. Second, while Jarrow and O'Hara use closing price data for five companies, we use transaction data for 26 companies. i.e., for all primes and scores traded over the sample period. Third, we analyze whether arbitrage opportunities exist and test our model using transaction prices.

Transaction data are important because theoretical price relationships across securities hold only for simultaneous prices. In markets with limited liquidity, like the market for primes and (although to a lesser extent) the market for scores, closing prices can be far from simultaneous.

Our hypothesis can he summarized as follows. If investors face different tax rules, they will usually disagree on the value of derivative securities relative to the price of an underlying security. Furthermore, each tax-bracket clientele will purchase those derivative securities it values most highly. In doing, so the clientele determines the market price of those derivatives. For any one tax bracket, the sum of score and prime valuations must add up to the price of the stock. However, this equality need not hold for market prices when the score ·s price is determined by one tax bracket and the prime's price by another.

Previous studies on the role of taxation in equity pricing (e.g. the tax effects of dividends[1] and corporate leverage[2]) have had to overcome several hurdles. First, information conveyed by dividend and leverage decisions might confound efforts to isolate tax effects. Second, diversification considerations, coupled with the uncertainty of dividend payments and interest deductions, might overshadow tax considerations.[3] Third, in the case of dividends, the possibility of arbitraging away tax-driven valuation differences might hamper the determination of tax effects on prices.[4]

Primes and scores, however, provide a more controlled experiment of tax effects. First. Company specific information should affect derivative securities, such as primes and scores, only through the observable stock price. Second, precise predictions can be made about the size of the

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[1] See, for example, Eades, Hess, and Kim (1984); Elton and Gruber (1970); Kalay (1982); Lakonishok and Vermaelen (1986); Miller and Scholes (1982); Lewellen, Stanley, Lease, and Schlarbaum (1978); Litzenberger and Ramaswamy (1982); Long (1978); Petit (1988); and Poterba (1986).

[2] See, for example, Harris, Roenfeldt, and Cooley (1983); Kim, Lewellen, and McConnell (1979); and Masulis (1980).

[3] See, for example, Modigliani (1982).

[4] See Kalay (1982) and Miller and Scholes (1982) for an exposition of this problem. See Lakonishok and Vermaelen (1986) on overcoming it.

tax effects. Third, because primes and scores were relatively long-term and liquid securities, arbitraging away tax-driven valuation differences might well have been prohibitively costly. Therefore, our study has important implications concerning tax clienteles and their effect on price that goes beyond the pricing of primes and scores and can be generalized to many situations where taxes and tax clienteles may affect prices.

Our main conclusion is that both transactions costs and tax clientele effects are too small to explain the premium, even when synchronous prices are used instead of closing prices. In addition, we show that scores should be held and priced by tax-exempt investors while primes should be held and priced by investors in the highest bracket. Lastly, primes are relatively well priced by the Black-Scholes model. This implies that most of the "mispricing” is due to the score.

Our paper is organized as follows. Section I formalizes the tax-clientele story and derives an expression for the score and prime premia in terms of the after-tax valuations of particular investor classes. We then present an after-tax version of the Black-Scholes option pricing model that can be used to make the tax-clientele theory operational. Section II describes the data set and presents summary statistics that overwhelmingly confirm the existence of positive premia. Section III presents evidence against the joint hypothesis of the tax-clientele and after-tax Black-Scholes models. Section IV discusses some interesting issues raised by the results. Section V concludes.

I. Tax-Clientele Equilibria

Investors in different tax brackets will not, in general, agree on the relative values of traded securities.[5] If transaction costs or regulatory considerations such as short-sale constraints prevent investors from arbitraging away their different security valuations, then clientele equilibria may emerge. In these equilibria, each investor tax class purchases assets with market prices at or

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[5] For a more detailed discussion of clientele equilibria, see Dammon and Green (1987); Dybvig and Ross (1986); and Schaefer (1982).

below its valuation of those assets. As a result, an asset's price reflects the valuation of the tax class that values that asset most highly.

The following two propositions formalize the intuition, given in the introduction, that clientele equilibria can generate score and prime premia. Begin by assuming the following:

(A1) There are K types of investors, with the k[th] type taxed at rates τ_k a vector containing the applicable rates on interest, dividend, and capital gains income.

(A2) The wealth of each investor group is very large relative to the market value of the primes and scores.

(A3) Primes and scores cannot be sold short.

Assumption (Al) is relatively innocuous. Assumption (A2) prevents any one tax bracket from pricing both primes and scores, thus allowing for clientele effects in prices. Furthermore, (A2) ensures that any one tax group can purchase all primes or all scores. In the process, that group determines the price of primes or scores. While this assumption is restrictive with respect to the theory of clienteles, it is empirically valid in the context of this paper. As we will show in Section II, the market value of all primes and scores was indeed very small relative to the stock holdings of the major investor tax classes. Assumption (A3) prevents unlimited arbitrage between tax brackets, thus permitting the sum of e4uilibrium score and prime prices to exceed the stock price. It would suffice, of course, to assume that short-selling primes and scores is sufficiently costly to inhibit arbitrage activity. The evidence presented by Jarrow and O'Hara (1989) supports this assumption.

Let S. P. and C be the market prices or the stock, the prime, and the score, respectively. Let S(τ_k), P(τ_k), and C(τ_k), be the valuation of the three securities by investor type *k*.

Proposition l: If the underlying stock is held in positive quantities by all investors, then

$$C + P - S = C(\tau *) - C(\tau **) = P(\tau **) - P(\tau **) \qquad (1)$$

where $\tau *=$ argmax$_{\kappa}$ $C(\tau_{\kappa})$ and $\tau^{**} = agmin_k C(\tau_k)$

Proof: See appendix.

Proposition 2: Define the variables τ and x* as follows:

$$\tau^{\dagger} = argmax_k C(\tau_k) \; and \; \tau^{\ddagger} = argmax_k P(\tau_k)$$

If investors in either the prime or the score also invest in the underlying stock, then

$$Max\left[C\left(\tau^{\dagger}\right) - C\left(\tau^{\ddagger}\right), P\left(\tau^{\ddagger}\right) - P\left(\tau^{\dagger}\right)\right] > P + C - S$$
$$> min[C(\tau^{\dagger}) - C(\tau^{\ddagger}), P(\tau^{\ddagger}) - P(\tau^{\dagger})] \tag{2}$$

If investors in either the prime or the score do not also invest in the underlying stock, then

$$P + C - S < min[C(\tau^{\dagger}) - C(\tau^{\ddagger}), P(\tau^{\ddagger}) - P(\tau^{\dagger})] \tag{3}$$

Proof: See appendix

These two propositions show that the premium of score and prime prices over the stock price is positive whenever holders of the score or the prime hold the “parent" stock as well. However, if the three assets are held by three different tax classes of investors, the premium can be either positive or negative.

In choosing between these propositions, we might prefer the assumption of Proposition I, namely, that all investors hold the underlying stock. In an after-tax capital asset pricing model (CAPM) framework. For example, we think of tax effects as being large enough to cause investors to tilt their portfolio holdings towards or away from high-dividend stocks, but not large enough to cause investors to completely shun high or low-dividend stocks.[6] In other words, the tax disadvantage of holding certain stocks is not considered large enough to outweigh the diversification benefit or holding positive quantities or each stock.

[6] See Modigliani (1982), particularly Section Ill.

This argument is especially appropriate for stocks with underlying primes and scores, since those stocks tend 10 have relatively high market values. Well diversified investors in any tax bracket would hold some shares of the largest companies in the market, such as American Express, AT&T. and IBM to name a few.

Proposition 1 has the additional merit of providing a precise description of the premium in terms of quantities that, given an option pricing model can be calculated. Proposition 2, on the other hand, offers only a range of possible premium values that depends on unobservable valuations of the underlying stock. (See the appendix for details.) Therefore, the tax clientele hypothesis of the premium is made operational through Proposition I.

The existence of a tax-driven premium does not depend on any particular option pricing model. Nevertheless, an after-tax option pricing model is necessary for empirical testing.

Ingersoll (1976) and Scholes (1976) both show how to value options in the presence of taxation. Since we can use their work to generalize, allowing different income, capital gains, and dividend tax rates, only the final result is presented here.[7]

Let δ be the stock's dividend yield and σ be the instantaneous standard deviation of the stock's rate of return. Let investor lax rates on interest income, dividend income, and capital gains be τ, τ_d, and τ_g, respectively. Finally, let r be the risk-free rate. Then, under the usual assumptions,[8] the price of a European call option with exercise price K and maturity T is given by

[7] This generalization assumes that capital gains or losses are realized instantaneously as required by the replication strategy. Since capital gains are, in fact, realized less frequently, the statutory capital gains rate is not directly comparable to capital gains parameters in the text. Note also that this generalization precludes any optimizing behavior with respect to the realization of capital gains and losses.

[8] Assumption (A3), stating that scores cannot .be sold short, does violate the frictionless market assumption required to derive Equation (4). Therefore, arbitrage arguments can argue only that the score price will be greater or equal to the value given by (4). Nevertheless, dominance arguments can support the use of (4) in this context. If scores sell for more than the value given by (4), investors holding scores would sell them and purchase replicating portfolios which contain either the stock itself or other traded options on the stock.

$$C = e^{-\delta' T}\overline{S}\Phi(x) - Ke^{-r'T}\Phi(x - \sigma^{1/2}) \quad (4)$$

where

$$r' = r(1-\tau)/(1-\tau), \delta' = \delta(1-\tau_d)/(1-\tau_g)$$

Φ is the standard normal distribution function, and

$$x = [\mathrm{In}(S/K) + (r' - \delta' + \sigma^2/2)T]/\sigma T^{1/2}$$

Taxes affect score valuation through both interest and dividend rates. First, assuming $\tau_g \leq \tau$, the effective rate r' is less than or equal tor, leading to a lower call value. This reflects the taxable investors' relative advantage when borrowing, which enables them to duplicate the option at lower cost. Second, δ' is less or greater than δ as τ_g is less or greater than τ_d. If δ' is greater than δ, then the effective dividend rate for taxable investors exceeds that of exempt investors, leading to a lower cost value. On the other hand, if δ' is less than δ, then the effective dividend rate is lower for taxable investors, leading to a higher call value.

More explicitly, under the assumption that $\tau_d = \gamma\tau$ and $\tau_g = \beta\tau$, and that for some constraints γ and β are less than one, it can be shown that

$$\partial C/\partial\tau = (1-\beta\tau)^{\wedge}2\ \{rC + e^{\wedge}(-\delta t)\ S\Phi(x)[(y-\beta)\delta/(1-\beta) - r]\} \quad (5)$$

Because the sign of $(\gamma-\beta)/(1-\beta) - r$ is ambiguous, the sign of the derivative is ambiguous. We can say more by noting that γ must be either one or 0.3. Either the investor is an individual who is paying tax on dividends at the rate τ, or the investor is a corporation that can deduct 70% of dividend income from taxable income.[9] For individuals with $\gamma = 1$. call value increases with the

In the presence of frictions in the trading of stocks and other options, (4), as usual, must be viewed as a popular approximation to option values.

[9] Corporations that hold large fractions of other corporations' stock can deduct larger amounts. However, since primes and scores are written on companies with very large equity values, 70% is the relevant figure for this study.

tax rate whenever dis greater than r. However, if r is sufficiently larger than δ, the call value can fall with the tax rate. For corporations with y=0.3, the sign of (y-β)δ/(1-β)-r is much more likely to be negative, and call value will often decrease in the tax rate.

II. Data Set Description and Summary Statistics

We obtained transaction data on score, prime, and stock prices for the 26 companies for which primes and scores existed for the first 11 months of 1989 from the Institute for the Study of Securities Markets (ISSM). This data set has a great advantage relative to closing price data because theoretical price relationships apply only to synchronous prices.

We formed a number of subset~ of the data to control for any effects of asynchronous prices. For purposes of computing premia, the largest subset of data consisted or one score, one prime, and one stock transaction price per company per day. The prices were chosen as follows: Each day, we selected the score and prime quotations closest in time. We then chose the stock quotation for that day by minimizing the sum of time differences between the stock and score quotations and between the stock and prime quotations.

The next largest data subset consisted of only those observations for which the largest difference between any two price quotations was less than two hours. The remaining subsets used filters of one hour, 30 minutes, 15 minutes, and five minutes.

Table 1 reports the number of observations in each of the data subsets. Recall that the daily observations include only the closest three quotations of the day. The table reveals that even these closest quotations can be quite far apart in time. Thus, closing price data, which are not even the closest set of quotations each clay, contain many prices that are far from synchronous.

Table 2 presents the mean premia as a percentage of the underlying stock price for each data subset. The table reveals that the mean premia are all positive. Apart from Exxon, all are significantly positive at the 5% level. Finally, the average premium for the data set is about 2% of the stock price.

Because the stocks in the sample trade relatively frequently, when only two synchronous prices are needed (as when comparing a derivative model price to its market price) the asynchrony problem is quite small. Consequently, the next section, which makes those comparisons, freely uses the largest of the data subsets.

In frictionless markets, any premium allows for a riskless arbitrage opportunity. Therefore, average premia or 2% of the stock price imply relatively large effective transaction costs. These include commissions, bid -ask spreads, interest foregone as a result of short sale restrictions, and market impact costs. Jarrow and O'Hara (1989) study these costs in detail. They conclude that for individual investors, the first three costs rule out arbitrage opportunities. For agents with lower costs. e.g., floor traders and professional arbitrageurs, the market impact costs are the most significant in ruling out riskless arbitrage. To make comparisons with their study, we calculate the average bid-ask spread for the stocks in our sample. As a percentage of the stock price, average bid-ask spreads were 1.15% for the primes. 0.54% for the scores, and 0 .50% for the stocks. It is important to note that professional arbitrageurs are likely to have their trades executed between the bid and ask prices. Consequently their effective spread is lower than the quoted spread (Lee 1993).

Because shorting widely traded stocks is not particularly difficult, we might expect only rare instances of negative premia. i.e., of stock prices that exceed the sum of score and prime prices. Table 3 confounds this expectation. Large proportions of negative premia are not uncommon, even at the finest filters. Furthermore, although not shown in the table, the average values of the negative premia do not tend to fall as the filter becomes more refined.[10] It seems unlikely, therefore, that noise in price quotations accounts for the negative premia.

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[10] We would like to thank Robert farrow for suggesting that we check these averages.

Leaving arbitrage considerations aside, the large proportions of negative premia pose difficulties for any theory of positive premia. If, for example, primes and scores sell at a premium to the stock price because they allow investors to economize on transaction costs. Why should the premia so often be negative'? In short, any successful theory must satisfactorily address the fact of negative premia.

Ill. Empirical Results

According to our theory, the investor class that values the score most highly will hold and price the score. The investor class that values the prime most highly will hold and price the prime. Therefore, we need only focus on the three classes of investors that represent the extremes of the tax code in 1989: tax-exempt investors, individuals in the highest lax bracket (i.e., interest and dividend income taxed at 33 %),[11] and corporations with dividend exclusions (i.e., interest income taxed at 34C/(and dividend income at (1-70%) 34% = 10.2%)[12]. Since the appropriate capital gains rate was harder to pin down, we assumed this rate was zero. However, other capital gains rates leave the qualitative conclusions of this section unchanged.

The justification for focusing exclusively on these three groups rests heavily on Assumption (A.2), i.e., that the wealth of each of these tax c lasses is very large relative to the market value of primes and scores, bracket. Data exist that support this assumption for both tax-exempt investors and individuals in the highest tax bracket. Over the Sample period, the average value of the stock underlying the outstanding quantity of primes and scores was, at most, $17 billion.[13] The tax-exempt class, made up of private pension funds and state and local government

[11] Dropping the top individual rate to its other possible value of 28% has too small an effect on model prices to change any of the qualitative conclusions drawn in this section. Raising the rate to 40%, in an effort to capture the effects of state taxation, also does not affect any qualitative conclusions.
[12] Raising the base rate to 40% to capture the effects of state taxation has too small an effect on model prices to alter any of the qualitative results of this section.
[13] This upper bound was obtained as follows: Barber (1990) reports the maximum number of shares allowed in each of the 26 trusts. Each of these was multiplied by the average price of its underlying stock over the sample period. The results were then added to obtain the dollar value given in the text.

retirement funds, held about $757 billion in stocks at year-end 1988.[14] Adding mutual funds to the tax-exempt class-since mutual fund managers may optimize the pre-tax returns--the dollar value invested in stocks by the tax-exempt class exceeded $944 billion. Therefore, (A2) is supported for tax-exempt investors.

At year-end 1988, direct holdings of stock by individual investors totaled $1,815 billion. The fraction or holdings by investors in the top tax bracket is conservatively estimated at two thirds.[15] Therefore, investors in the top tax bracket held directly more than $1,210 billion in stock. Hence, Assumption (A2) is also supported for individuals in the highest tax bracket.

Comparable data are not available on corporate ownership of stock. Therefore, the empirical work in this section assumes to possible scenarios. In the first, corporations invest enough in equities to allow them to purchase the entire supply of primes or scores and determine their prices. In the second, corporations invest relatively little in equities. While they may buy some primes or scores, they do not determine prices.

To examine whether tax clienteles are responsible for score and prime premia, we must first identify which of the three extreme tax classes will hold the scores and which will hold the primes. According to the earlier analysis, this identification depends on the relative magnitudes of the risk-free rate and the dividend yields. An interpolation of government bond yields of various maturities provides a risk-free rate that matches the maturity of the scores and primes. The most recent dividend divided by the stock price and adjusted for continuous compounding is used as a daily estimate of the dividend yield.[16] As it turns out, the dividend yields on the underlying stocks

[14] Data on stock holdings were obtained from the flow of funds accounts of the Federal Reserve Board of Governors.
[15] A 1983 study by the Survey Research Centre at the University of Michigan found that households with annual incomes in excess of $96,000 held almost two-thirds of all stock directly owned by households. See Mushkat (1988).
[16] The model with discrete dividends, assumed constant at the last announced level or assumed known at their realized levels, produces qualitative results identical to those presented in this section.

are almost all low relative to the risk-free rate. The average dividend yield over the sample is 3.87% with a standard error of l .36%. The average risk-free rate is 8.53%. Not surprisingly, then. using a reasonable measure of volatility, an analysis of $\partial C/\partial \tau$ from Equation (5) shows that for 22 of the 26 stocks, score value decreases as the tax rate increases over the entire sample period.[17] Therefore, these scores should always he held and priced by tax-exempt investors, and these primes held and priced by individuals in the highest bracket or by corporations.

The ownership pattern predicted in the paragraph above may surprise many who have thought about the role of primes and scores. Because scores isolate the capital gains portion of a stock and primes isolate its dividends, we might have thought that taxable investors would prefer scores. However, because the underlying stocks in this sample pay relatively low dividends. Equation (5) reveals that the interest rate effect dominates the dividend effect and exempt investors are the ones to prefer scores.

Having identified exempt investors as the predicted purchasers of 22 of the 26 scores, the tax-clientele theory predicts that the pre-tax Black-Scholes model will describe these 22 score prices netter than the after-tax model. Further. Black-Scholes describes scores prices equally well for both corporations and highly taxed individuals. To apply the model, however, a measure of volatility must be selected.

To give the tax-clientele theory the best chance of success, we choose a volatility measure that minimizes the pricing error of the pre-lax Black-Scholes model for the 22 scores held by exempt investors. The first column in Table 4 lists all the volatility measures that were considered, ranging from a rolling 600-day historical volatility to a rolling 600-day realized volatility. The second column gives the average pricing error. The third column gives the average

[17] For the four exceptions, Exxon, Ford, GTE, and General Motors, $\delta C/\delta \tau$ changes sign in the sample period.

absolute pricing error. Since the rolling 600-day historical measure gives the best fit by far, it is used in the analysis that follows.

Table 5 compares the market prices of scores to their valuations by tax-exempt investors, by individuals, and by corporations. Under the tax-clientele prediction that for these 22 companies, scores should reflect the valuation of tax-exempt investors-the average percentage error across all observations is 4.5%. This number is relatively small, and indicates a better average fit than the assumption that either taxable individuals or corporations own the scores. However, the table as a whole cannot be taken to support the tax-clientele hypothesis: Measured by average absolute percentage errors, only 11 of the 22 scores are best priced by the exempt model.

Table 6 repeats this analysis for the primes. The pricing model docs well regardless of the assumed ownership: average errors as a percentage of prime classes. Average absolute percentage errors are only 2.9%, 2.9%, and 3.3%. Despite the close fit with market prices, this table cannot support the prediction that corporate investors or individuals in the highest tax bracket hold and price the primes. First, measured by absolute percentage error, the exempt pricing function does as well, on average, as either taxable pricing function. Second, measured by absolute percentage error, 12 of the 22 primes are as well-priced under the assumption of exempt ownership as under the assumption of taxable ownership.

The following conclusions can be drawn from the combined evidence of Tables 4 and 5. First, the predictive power of the pre- and after- tax Black-Scholes models for primes argues for the appropriateness of that model. Second, because the predicted ownership pattern does not emerge when we examine which pricing function works best, the joint hypothesis of the tax-clientele model and the after-tax Black-Scholes model is not supported. Third, the fact that primes are relatively well priced by the Black -Scholes model, with and without taxes, indicates that the observed premia come from investor valuation of scores rather than of primes. Further supporting this last point (although not shown in the tables), we found that the average dollar error of the pre-tax Black-Scholes model across the entire sample is $1.22 for the scores but only $0.46 for the primes. Also, dividing the daily model errors by the daily premia reveals that about 84% of the dollar premia in the sample is due to overpricing of the scores; only about 16% is due to overpricing of the primes.[18]

The analysis above allows for an examination of the Jarrow and O'Hara (1989) transaction cost/market completion hypothesis. Under that explanation, investors value scores above their replication values because market frictions do not easily allow such replication. Therefore, the Black-Scholes model should underestimate score prices. Using c losing prices and a sample of five companies, Jarrow and O'Hara found that three of the five underestimated market prices. The transaction data for 26 scores show that the Black-Scholes model underestimates, on average, in only 12 cases.[19] Thus, these data provide some evidence against the transaction cost/market completion hypothesis as well.

Using the tax -clientele hypothesis, we can compare the magnitude of the observed premia with the magnitude of the predicted premia. According to Proposition 1, the premium equals the difference between the highest and lowest valuations of the score. The "Actual" columns of Table 7 report average premia in dollars and the standard deviation of that average. The "Theoretical: w/o Corporations" columns compute predicted premia under the assumption that corporations do not invest enough in primes to determine prices. Lastly, the " Theoretical: w/ Corporations" columns assume that corporations do invest enough in primes to determine prices.

According to Table 7, the majority of the average premia are significantly different from those that are predicted theoretically under either assumption about corporate participation in the

[18] However, we must consider the possibility that scores are priced less accurately because they are more sensitive to errors in estimates of volatility.
[19] Note that this computation uses data on all 26 companies, including the four not shown in Table 4. Using dollar error instead of percentage error (not shown in the tables), the model underestimates in only 8 cases.

market for primes. Assuming that corporations *do not* set prime prices, 21 of the 26 average premia differ significantly from theoretical predictions. Assuming that corporations *do* set prime prices, 23 of the average premia significantly from theory. In short, the observed premia are far from those predicted by the tax-clientele hypothesis.

Before concluding the empirical work, we not that controlling for potential out-of-the-money and in-the-money biases cannot save the tax-clientele hypothesis. This conclusion is reached by creating a subset of the data that contains only those observations for which the score is less than 10% in- or out-of-the-money. Using the pre-tax model, in this sample the average errors in pricing scores and primes are 3.9% and 1.08%, respectively, not very different from the errors reported in table 4 and 5. The average absolute errors in this subset are 9.9% for scores and 2.3% for primes, indicating a much better fit for scores in this subset than for the sample as a whole. So, while in- and out-of-the-money scores are subject to more deviations from model predictions, they are not, on average, priced very differently from at-the-money scores. Furthermore, of 12 stocks with enough at-the-money observations to draw inferences, nine scores and seven primes are best priced by the pre-tax model. In other words, the predicted ownership pattern fails to emerge from either the at-the-money data subset or the entire data set.

IV. Discussion

The results raise several interesting issues. First, given the empirical evidence of the premia, was an arbitrage opportunity that was not eliminated clue to institutional factors or unfamiliarity with the market? Market friction and the limited supply or arbitrage capital may provide some of the explanation for these results. Practitioners have provided some anecdotal evidence that primes and scores were relatively illiquid. The major arbitrageurs did not participate because the market was small. In addition, the expected return was not enough to compensate them for gearing up to follow a new market. Especially, since they knew that the market for scores and primes would be short-lived because of the revocation of the IRS ruling that the redemption of an original or recombined Unit of the Trust (score and prime) was a non-taxable event. This is consistent with the view that capital markets are efficient only up to transaction costs. In this case, transactions costs include the fixed costs of entering a new market. As a result, a small market can produce "incorrect" prices because it does not provide sufficient opportunities for arbitrageurs. The observed market prices are "'true"' only in the sense that they would provide an arbitrage opportunity for someone who was already a market participant. Therefore, research that assumes that the market prices are the “true" prices can often be incorrect.

The empirical evidence on the mispricing of scores and primes-relative to the stock is consistent with the empirical evidence on the market prices of options and futures during their first few years of trading. For example, many studies since the introduction of index futures contracts in the early 1980s have reported significant and persistent deviations of futures prices from fair values. Market frictions which make risk-free arbitrage difficult, including transactions costs, the uptick rule for short sales in the stock market, the limited supply of arbitrage capital, and position limits in the futures market, may provide most of the explanation for these results.

In the earliest period of index futures trading, index contracts systematically sold at large discounts to their theoretical values Modest and Sundarasan (1983). Cornell and French (1983 a, b) and Figlewski (l984 a, b), among others considered possible explanations for this discount. A primary issue was whether the discount indicated large foregone arbitrage opportunities (in which case the market would have been highly inefficient), or were simply a result of market frictions that were not included in the pricing model. Most of the studies tried to explain the mispricing: in terms of institutional factors that were excluded in the formula for the fair futures price in equilibrium. No single explanation for the discounts became widely accepted at the time. No academic seriously asserted market inefficiency. By contrast, Figlcwski (I 984a.b) suggested that the discount was largely the result of unfamiliarity with the new markets and a scarcity of arbitrageurs ready to implement the arbitrage trade efficiently. In that case, the mispricing would prove to be a transitory phenomenon. Figlewski (1984a) showed that the futures discount had been decreasing over time. It is possible that the market for scores and primes would have had an experience similar to the index futures market. As the market matured, more arbitrage capital would have become available and the premium would have decreased with time.

An alternative explanation is that the positive average premium is compensation for the risk that the premium could turn negative while the position is open.[20] For example, suppose that an investor buys the score and the prime when the sum of the prices of the score and the prime equals the price of the stock. At expiration, the investor will receive the underlying stock with certainty. However, if the position must be closed out prior to expiration, there is a chance that the return will be negative. A negative return will occur if the sum of the prices of the score and the prime is less than the price of the stock at that time. In fact, the premium is negative on average 12.4% of the time in our sample.

It is also possible that the premium could be the result of added value created by unbundling the expected cash flows of a stock, where the added value may be due to the opportunity cost associated with creating the desired investment attributes from existing securities. This implies that: 1) the market is incomplete: and/or, 2) the issuance of unbundled securities is less costly to the firm/investment bank than the cost of unbundling by investors. For example, suppose that the marginal pricer of scores is a risk seeker who will pay more for the volatile score than its value as a part of a bundled security. This investor's behavior is rational only if the score is the least cost route or obtaining the desired risk level. Alternatives include purchasing assets of equivalent risk such as call options or risky stock. Another example is that an investor would like to buy a five-year call option. She could buy a score or simply buy a series of call options over a five-year period. The score may sell at a premium relative to its theoretical

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[20] We would like to thank an anonymous referee for raising this point.

price as a result of the reduction in the price of uncertainty and transactions costs associated with buying a score instead of a series of calls.

Since the creation of scores and primes, other, similar derivatives have been introduced to the market. In 1988, Morgan Stanley created Preferred Equity Redemption Cumulative Stock (PERCS), which is similar to primes. Since then, PERCS have been issued by more than 20 companies, have a market value of over $10 billion, and are listed on the major stock exchanges in the US. In addition, long-term options, similar to scores, called Long-term Equity Anticipation Securities (LEAPS) were introduced by the Chicago Board Options Exchange. Other derivatives such as BOCNDS. DIVS, OWLS, and RISKS are expected to begin trading soon. These securities would not be engineered if they did not create value. As a result, companies should consider issuing securities similar to primes and scores in an attempt to reduce their cost of capital.

V. Conclusion

The transaction data obtained for this paper reveal that the sum of score and prime prices exceeded, on average, the prices of their underlying stocks. Even when the most synchronous prices are analyzed, premia existed, on average. A priori tax clienteles are a possible explanation of these premia. Each tax-bracket clientele will purchase and price the derivative asset, the score or the prime, it values most highly. As a result, the sum of the score and prime valuations could exceed the price of the stock. The empirical evidence failed to support a tax-clientele explanation. Empirically, the tax effect was too small relative to these premia.

A second possible explanation is a market completion or transaction cost theory. If investors like the payout patterns of primes and scores but find those patterns too expensive to replicate with a dynamically adjusted portfolio of the underlying stocks and bonds, then primes and score will command a premium relative to stocks. Some evidence presented here contradicts the transaction cost/market completion theory. Average bid/ask spreads, a proxy for transaction costs, were significantly less than the average premia.

A tax-option theory of the premia is the third possible explanation. The splitting of the security into parts allows an investor more flexibility in deferring capital gains and in realizing capital losses. This theory has not yet been tested, but the magnitude of that effect might not be large enough to explain observed premia.[21]

Another explanation is the fact that it was a new market that was known to end within five years. There was a scarcity of arbitrageurs because of the size and their unfamiliarity with the market.

These results pose a puzzle to financial economists since none of the explanations of the premia are convincing. A related puzzle concerns issuing corporations: If there are premia to be enjoyed by dividing a stock into its component parts why don't corporations issue primes and scores directly?[22] One of the reasons given for the fact that no new primes and scores have been created is that tax rules have changed. The division of a share of stock into a prime and a score is now considered a taxable event. This drawback would not hamper firms, however, from selling primes and scores as primary securities.

[21] Following the work of Constantin ides and Ingersoll (1984), splitting a security into two parts allows an investor more flexibility in deferring capital gains and in realizing capital losses. In this way, the tax-option theory predicts that primes and scores will command a premium. See Dammon, Dunn, and Spatt (1989) for a discussion of the magnitude of the tax-option effect.

[22] We would like to thank an anonymous referee for raising this point.

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Appendix

Proofs of Propositions (1) and (2)

Proof of Proposition 1: Since the underlying stock is held by all investors, S = S(τ*) = S(τ**). By construction of the scores and primes, S = C(τ) + P(τ) for all τ, implying that

$$\tau * = \text{aregmin}_k P(\tau_k) \text{ and } \tau ** = \text{argmax}_k P(\tau_k)$$

and that C(τ*) - C(τ**) = P(τ*). By the definition of τ* and τ**, C(τ*) > C(τ**) and, consequently, P(τ**) > P(τ*). If, as assumed, the market value of those scores and primes is small relative to the wealth of each investor group, only the tax type t* will hold scores, since they value them most highly. Likewise, only the tax type τ** will hold primes. Therefore, C = C(τ*) and P = P(τ**). Finally, P + C – S = P(τ**) + C(τ*) – S = C(τ*) – C(τ**).

Proof of Proposition 2: There are four cases to consider.

Case 1: Both tax groups hold the stock. Then, by the proof of proposition 1, the result of this proposition holds as well.

Case 2: Tax group $\tau^{\dagger}$ holds the stock but tax group $\tau^{\ddagger}$ does not. Then, S≤ S($\tau^{\dagger}$) = C($\tau^{\dagger}$) + P($\tau^{\dagger}$), C = C($\tau^{\dagger}$), and P = P($\tau^{\ddagger}$), so

$$P + C - S \leq P(\tau^{\ddagger}) + C(\tau^{\dagger}) - S(\tau^{\dagger}) = P(\tau^{\ddagger}) - P(\tau^{\dagger})$$

Similarly, since S ≥ S($\tau^{\ddagger}$),

$$P + C - S \leq P(\tau^{\ddagger}) + C(\tau^{\dagger}) - S(\tau^{\ddagger}) = C(\tau^{\dagger}) - C(\tau^{\ddagger})$$

Furthermore, since S($\tau^{\ddagger}$) ≤ S ≤ S($\tau^{\dagger}$),

$$P(\tau^{\ddagger}) + C(\tau^{\dagger}) - S(\tau^{\ddagger}) \geq P(\tau^{\ddagger}) + C(\tau^{\dagger}) - S(\tau^{\dagger})$$

$$\mathrm{C}(\tau^{\dagger}) - \mathrm{C}(\tau^{\ddagger}) \geq \mathrm{P}(\tau^{\ddagger}) - \mathrm{P}(\tau^{\dagger})$$

Case 3: Tax group $\tau^{\dagger}$ does not hold the stock but tax group $\tau^{\ddagger}$does. The proof of this case is symmetric to the proof of Case 2.

Case 4: Neither group holds the stock. Since P = P($\tau^{\ddagger}$), $C = C(\tau^{\dagger}), S > S(\tau^{\dagger}), and\ S > S(\tau^{\ddagger}),$

$$\mathrm{P}(\tau^{\ddagger}) + \mathrm{C}(\tau^{\dagger}) - \mathrm{S} < \mathrm{P}(\tau^{\ddagger}) + \mathrm{C}(\tau^{\dagger}) - \mathrm{S}(\tau^{\dagger}) < \mathrm{P}(\tau^{\ddagger}) - \mathrm{P}(\tau^{\dagger})$$

and,

$$\mathrm{P}(\tau^{\ddagger}) + \mathrm{C}(\tau^{\dagger}) - \mathrm{S} < \mathrm{P}(\tau^{\ddagger}) + \mathrm{C}(\tau^{\dagger}) - \mathrm{S}(\tau^{\ddagger}) < \mathrm{C}(\tau^{\dagger}) - \mathrm{C}(\tau^{\ddagger})$$

Putting together the four cases together completes the proof.

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Table 1. Number of Observations in Each Filter

The main data set is constructed by choosing daily transaction prices for each company's stock, prime, and score so as to minimize the problem of asynchronous observations. Data subsets are formed by filtering out observations that contain transactions separated by more than a given amount of time. For example, in the data subset formed by the 30-minute filter, no transaction prices that represent the market for the stock, prime, and score on a given day are taken more than 30 minutes apart. Entries in the table give the number of observations in particular data subsets across companies.

Company Name	Daily	2 Hours	1 Hour	30 Minutes	15 Minutes	5 Minutes
American Express	226	225	224	213	201	170
American Home Products	204	193	284	168	148	106
AT&T	241	241	241	241	241	239
Amoco	61	52	47	40	31	17
Atlantic Richfield	145	130	121	109	92	66
Bristol Myers	223	221	213	203	191	170
Chevron	211	211	201	190	172	148
Coca Cola	231	230	227	222	212	176
Dow	216	216	211	200	196	167
Du Pont	117	116	114	113	108	90
Eastman Kodak	227	225	223	219	206	189
Exxon	90	86	81	69	56	45
Ford	233	231	229	224	208	185
GTE	242	242	242	242	234	213
General Electric	226	222	219	211	195	165
General Motors	241	240	238	232	223	197
Hewlett-Packard	216	212	205	192	176	142
IBM	235	235	235	235	235	234
Johnson & Johnson	225	224	222	218	204	179
Merck	214	213	208	200	189	166
Mobil	229	229	224	218	203	168
Philip Morris	236	236	236	235	233	224
Procter & Gamble	181	177	170	160	150	119
Sears Roebuck	234	233	227	215	202	166
Union Pacific	165	154	139	116	90	62
Xerox	223	220	220	211	192	150
All Companies	5292	5214	5101	4896	4588	3953

Table 2. Average Premia as a Percentage of Stock Price-Standard Deviation of the Average Is Below the Average

The premium is defined as the sum of the prime and score prices minus the stock price. The table entries give the average premia as a percentage of the stock price and the standard deviations of those averages across companies and data subsets. In the data subset formed by the 30-minute filter, for example, no transaction prices taken to represent the market for the stock, prime, and score on a given day are more than 30 minutes apart.

Company Name	Daily	2 Hours	1 Hour	30 Minutes	15 Minutes	5 Minutes
American Express	2.590	2.600	2.600	2.640	2.660	2.740
	0.098	0.098	0.098	0.100	0.103	0.112
American Home Products	0.922	0.897	0.894	0.882	0.881	0.855
	0.059	0.059	0.060	0.062	0.069	0.084
AT&T	2.680	2.680	2.680	2.680	2.680	2.690
	0.082	0.082	0.082	0.082	0.082	0.083
Amoco	1.100	0.969	0.989	0.882	0.900	0.874
	0.217	0.232	0.243	0.250	0.285	0.336
Atlantic Richfield	0.708	0.714	0.702	0.687	0.743	0.767
	0.062	0.064	0.065	0.068	0.074	0.087
Bristol Myers	2.910	2.920	2.980	3.070	3.190	3.370
	0.158	0.159	0.163	0.168	0.174	0.189
Chevron	1.490	1.490	1.520	1.550	1.670	1.770
	0.102	0.102	0.106	0.109	0.113	0.123
Coca Cola	0.455	0.456	0.451	0.456	0.488	0.494
	0.067	0.067	0.068	0.069	0.070	0.080
Dow	4.240	4.240	4.300	4.390	4.400	4.780
	0.224	0.224	0.228	0.234	0.237	0.257
Du Pont	0.662	0.656	0.658	0.658	0.677	0.682
	0.066	0.066	0.067	0.068	0.069	0.074
Eastman Kodak	5.610	5.630	5.660	5.720	5.930	6.040
	0.225	0.226	0.227	0.228	0.234	0.237
Exxon	0.081	0.083	0.083	0.095	0.096	0.126
	0.048	0.049	0.051	0.056	0.064	0.071
Ford	2.270	2.280	2.280	2.290	2.320	2.360
	0.104	0.104	0.105	0.107	0.114	0.121
GTE	0.323	0.323	0.323	0.323	0.324	0.345
	0.056	0.056	0.056	0.056	0.058	0.061
General Electric	1.790	1.800	1.810	1.820	1.840	1.780
	0.082	0.083	0.084	0.085	0.088	0.093
General Motors	1.420	1.430	1.430	1.440	1.450	1.460
	0.068	0.068	0.068	0.069	0.071	0.077
Hewlett-Packard	1.730	1.780	1.830	1.890	2.000	2.080
	0.109	0.109	0.110	0.115	0.121	0.136

Table 2 con't

IBM	2.260	2.260	2.260	2.260	2.260	2.270
	0.120	0.120	0.120	0.120	0.120	0.121
Johnson & Johnson	2.040	2.050	2.060	2.080	2.100	2.180
	0.089	0.089	0.090	0.091	0.093	0.098
Merck	0.278	0.281	0.276	0.271	0.282	0.293
	0.040	0.040	0.041	0.042	0.043	0.045
Mobil	1.570	1.570	1.580	1.610	1.640	1.800
	0.076	0.076	0.077	0.077	0.078	0.078
Philip Morris	4.800	4.800	4.800	4.810	4.840	4.880
	0.167	0.167	0.167	0.167	0.167	0.170
Procter & Gamble	0.765	0.763	0.761	0.749	0.746	0.781
	0.051	0.052	0.052	0.054	0.056	0.064
Sears Roebuck	0.948	0.956	0.973	1.000	1.020	1.060
	0.094	0.094	0.095	0.099	0.103	0.114
Union Pacific	1.260	1.280	1.270	1.300	1.370	1.400
	0.057	0.059	0.062	0.068	0.070	0.079
Xerox	1.600	1.630	1.630	1.640	1.630	1.630
	0.069	0.068	0.068	0.069	0.073	0.083
All Companies	1.910	1.930	1.950	1.990	2.050	2.160
	0.029	0.030	0.030	0.031	0.033	0.036

Table 3. Proportion of Negative Premia.

The premium is defined as the sum of the prime and score prices minus the stock price. The table entries give the proportion of negative premia for each company data subset. In the subset formed by the 30-minute filter, for example, no transaction prices taken to represent the market for the stock, prime, and score on a given day are more than 30 minutes apart.

Company Name	Daily	2 Hours	1 Hour	30 Minutes	15 Minutes	5 Minutes
American Express	0.040	0.040	0.040	0.038	0.035	0.041
American Home Products	0.137	0.140	0.136	0.137	0.142	0.160
AT&T	0.000	0.000	0.000	0.000	0.000	0.000
Amoco	0.262	0.288	0.298	0.300	0.258	0.176
Atlantic Richfield	0.152	0.154	0.157	0.156	0.141	0.121
Bristol Myers	0.022	0.023	0.023	0.025	0.026	0.029
Chevron	0.166	0.166	0.164	0.163	0.151	0.135
Coca Cola	0.359	0.361	0.366	0.369	0.363	0.375
Dow	0.005	0.005	0.005	0.005	0.005	0.006
Du Pont	0.137	0.138	0.140	0.142	0.120	0.111
Eastman Kodak	0.031	0.031	0.031	0.027	0.029	0.026
Exxon	0.333	0.337	0.346	0.319	0.339	0.333
Ford	0.047	0.048	0.048	0.049	0.053	0.054
GTE	0.368	0.368	0.368	0.368	0.376	0.376
General Electric	0.084	0.086	0.087	0.085	0.087	0.097
General Motors	0.095	0.092	0.092	0.086	0.090	0.096
Hewlett-Packard	0.116	0.104	0.098	0.099	0.091	0.085
IBM	0.043	0.043	0.043	0.043	0.043	0.043
Johnson & Johnson	0.049	0.049	0.050	0.046	0.044	0.039
Merck	0.369	0.366	0.370	0.380	0.370	0.355
Mobil	0.100	0.100	0.098	0.096	0.094	0.065
Philip Morris	0.000	0.000	0.000	0.000	0.000	0.000
Procter & Gamble	0.149	0.153	0.147	0.156	0.153	0.143
Sears Roebuck	0.286	0.283	0.282	0.279	0.277	0.277
Union Pacific	0.030	0.032	0.036	0.043	0.033	0.032
Xerox	0.063	0.055	0.055	0.052	0.057	0.053
All Companies	0.124	0.123	0.123	0.122	0.120	0.115

Table 4. Pre-Tax Black-Scholes Valuation of Scores Using Different Volatility Measures

Using several measures of stock volatility in the pre-tax Black-Scholes model, this table compares market prices of scores with model prices. The sample includes daily data on the 22 scores that, according to the tax-clientele hypothesis, are held by exempt investors. All computed errors are expressed as a percentage of the score price.

Volatility Measure	Avg. Error as a % of Score Price	Avg. Absolute Error as a % of Score Price
600-day Historical Volatility	4.48%	20.78%
300-day Historical Volatility	19.25	28.92
100-day Historical Volatility	28.59	30.33
60-day Historical Volatility	28.34	30.25
30-day Historical Volatility	29.48	32.14
30-day Realized Volatility	26.77	30.89
60-day Realized Volatility	24.32	27.68
100-day Realized Volatility	22.83	26.33
300-day Realized Volatility	16.21	21.80
600-day Realized Volatility	27.29	31.07

Table 5. Tax-Adjusted Black-Scholes Valuation of Scores-Valuation Error as a Percentage of Score Price

Entries for a given company report the average percentage error and the average percentage absolute error of valuing that company's scores using an after-tax version of the Black-Scholes pricing formula. The three categories of investors are investors who are exempt from paying income taxes, individuals who are taxed on interest and dividend income at 33%, and corporations that are taxed at 34% on interest income, but at I 0.2% on dividend income.

	Exempt Investor		Taxable Individual		Corporate Investor	
Company Name	Avg % Err	Avg Abs % Err	Avg % Err	Avg Abs %Err	Avg % Err	Avg Abs %Err
American Express	-3.00	13.10	5.20	11.60	10.30	13.30
American Home Products	5.30	10.40	10.10	12.30	17.30	17.80
AT&T	5.80	7.70	9.20	10.10	13.90	13.90
Amoco	-37.10	37.10	-27.10	27.10	-11.90	12.20
Atlantic Richfield	0.80	18.40	5.20	18.70	15.60	21.20
Bristol Myers	-1.90	18.50	2.40	17.80	9.90	17.90
Chevron	0.00	19.90	2.90	19.70	13.80	21.60
Coca Cola	-12.90	13.70	-5.50	9.60	-0.80	9.30
Dow	16.50	23.80	22.20	25.50	28.10	28.90
Du Pont	-11.40	12.30	-6.30	9.80	1.90	11.10
Eastman Kodak	17.40	34.90	21.10	34.50	28.20	35.70
General Electric	-17.30	20.70	-8.50	16.60	-0.90	14.90
Hewlett-Packard	-10.90	29.00	2.40	26.00	4.20	26.20
IBM	59.00	59.00	64.30	64.30	69.10	69.10
Johnson & Johnson	2.50	13.60	11.80	17.19	16.30	19.80
Merck	-1.30	7.60	6.10	8.90	10.40	11.50
Mobil	-12.20	18.50	-9.60	17.10	1.40	16.20
Philip Morris	12.50	13.70	15.30	15.60	20.40	20.40
Procter & Gamble	-2.50	10.20	3.60	10.60	9.20	12.90
Sears Roebuck	6.40	26.60	10.40	25.50	20.00	25.80
Union Pacific	1.80	12.60	8.80	14.50	14.50	17.50
Xerox	35.30	35.80	39.50	39.60	47.50	47.50
All Companies	4.50	20.80	10.27	20.95	16.94	22.95

Table 6. Tax-Adjusted Black-Scholes Valuation of Primes-Valuation Error as a Percentage of Prime Price

Entries for a given company report the average percentage error and the average percentage absolute error of valuing that company's primes using an after-tax version of the Black-Scholes pricing formula. The three categories of investors are investors who are exempt from paying income taxes, individuals who are taxed on interest and dividend income at 33%, and corporations that are taxed at 34% on interest income but at I 0.2% on dividend income.

	Exempt Investor		Taxable Individual		Corporate Investor	
Company Name	**Avg % Err**	**Avg Abs % Err**	**Avg % Err**	**Avg Abs %Err**	**Avg % Err**	**Avg Abs %Err**
American Express	-3.2	3.3	1.6	2.2	0.6	1.8
American Home Products	-0.9	2.4	-2.2	3.0	-4.1	4.2
AT&T	0.4	1.8	-1.2	2.1	-3.4	3.6
Amoco	4.7	4.7	3.7	3.7	2.2	2.3
Atlantic Richfield	-0.2	2.4	-1.0	2.6	-2.6	3.3
Bristol Myers	2.8	3.1	1.8	2.7	0.2	2.3
Chevron	0.5	2.4	0.1	2.3	-1.5	2.5
Coca Cola	3.9	4.0	1.3	2.5	-0.3	2.5
Dow	0.1	2.8	-1.3	3.0	-2.8	3.7
Du Pont	2.9	2.9	1.6	1.7	-0.4	1.8
Eastman Kodak	1.3	2.6	0.6	2.6	-0.8	2.9
General Electric	3.9	3.9	2.6	2.8	1.5	2.1
Hewlett-Packard	3.9	4.7	1.5	3.4	1.1	3.4
IBM	-3.9	3.9	-4.4	4.4	-4.9	4.9
Johnson & Johnson	1.0	2.4	-1.3	2.7	-2.4	3.3
Merck	0.4	2.2	-2.3	3.0	-3.8	4.1
Mobil	3.2	3.5	2.7	3.1	0.7	2.0
Philip Morris	-1.5	2.5	-3.1	3.6	-6.0	6.0
Procter & Gamble	0.6	2.6	-1.4	3.0	-3.3	4.2
Sears Roebuck	0.0	2.4	-0.5	2.3	-1.8	2.5
Union Pacific	0.7	1.9	-0.8	2.2	-2.0	2.8
Xerox	-2.9	3.0	-3.5	3.5	-4.5	4.5
All Companies	0.9	2.9	-0.4	2.9	-1.9	3.3

Table 7. Actual vs. Theoretical Premia in Dollars

The "Actual" columns give the average sum of score and prime prices minus the stock price and the standard deviation of that average. The "Theoretical" columns describe the premia predicted by the tax-clientele hypothesis. The second pair of columns excludes corporations as a tax class that can set prices. The third pair of columns includes corporations as a tax class that can set prices.

	Actual		Theoretical: w/o Corporations		Theorectical: w/ Corporations	
Company Name	**Mean**	**S.D.**	**Mean**	**S.D**	**Mean**	**S.D.**
American Express	0.920	0.036	0.460	0.005	0.750	0.007
American Home Products	0.860	0.067	0.950	0.007	2.380	0.009
AT&T	0.980	0.030	0.400	0.004	0.960	0.004
Amoco	0.690	0.221	0.740	0.020	1.820	0.032
Atlantic Richfield	0.760	0.075	0.620	0.012	2.020	0.019
Bristol Myers	3.330	0.196	0.760	0.009	2.090	0.013
Chevron	1.010	0.069	0.230	0.006	1.010	0.011
Coca Cola	0.260	0.041	1.130	0.011	1.820	0.014
Dow	4.240	0.233	1.110	0.028	2.280	0.033
Du Pont	0.720	0.072	1.040	0.015	2.730	0.023
Eastman Kodak	4.070	0.157	0.420	0.011	1.230	0.022
Exxon	0.080	0.057	0.130	0.007	1.260	0.024
Ford	2.200	0.102	0.320	0.007	2.170	0.027
GTE	0.200	0.034	0.060	0.002	1.390	0.007
General Electric	2.030	0.096	1.210	0.010	2.240	0.015
General Motors	1.260	0.062	0.250	0.006	1.600	0.016
Hewlett-Packard	0.990	0.058	1.090	0.026	1.260	0.028
IBM	2.420	0.122	0.580	0.028	1.100	0.045
Johnson & Johnson	2.190	0.100	1.860	0.010	2.780	0.012
Merck	0.620	0.094	4.040	0.028	6.430	0.031
Mobil	0.900	0.043	0.210	0.006	1.100	0.008
Philip Morris	7.160	0.277	1.400	0.021	4.040	0.028
Procter & Gamble	0.860	0.065	1.740	0.018	3.300	0.027
Sears Roebuck	0.410	0.042	0.220	0.007	0.720	0.015
Union Pacific	1.030	0.053	0.910	0.011	1.650	0.017
Xerox	1.030	0.046	0.320	0.009	0.920	0.019
All Companies	1.770	0.035	0.840	0.012	1.940	0.017