

Risk-Preferences and Tax-Induced Dividend Clienteles: Evidence from the Insurance Industry

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ABSTRACT

This study investigates the effect of differential tax treatment between life and property-liability insurers on their common stock investments. The empirical methodology is based on an after-tax mean-variance model which predicts life insurers prefer higher dividend yields than property-liability insurers at any systematic risk level. After controlling for regulation, liquidity, and risk effects, test results show that each group of insurers forms a distinct tax-induced dividend clientele.

Introduction

Investments are an important source of income for insurance companies; therefore, insurers are very concerned about investment decisions. The insurance literature supports the notion that investment income affects the pricing of insurance contracts. For example, Hill (1979) and Fairley (1979) note that double taxation of investment income results in higher insurance premiums in order to provide adequate returns to a company's stockholders. Also, Ang and Lai (1987) argue that asset-liability hedging (i.e., matching investment income with claims payments) can reduce insurance premiums. Although the investment activities of insurers have been of great interest to academic researchers, the existing literature has not adequately addressed insurers' investments in common stocks. The purpose of this article is to provide more insight into this issue.

Common stocks are viewed by insurance regulators as much riskier than bonds, preferred stocks, money market securities, or other typical insurance investments. An investigation of insurers' common stock investments should consider the risk factor. Moreover, since an insurer is taxed as a corporation,

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the effect of taxes on insurers' common stock investments should also be considered. Because of the concern over risk and tax effects on insurers' common stock investments, an after-tax mean-variance model is used to predict insurers' common stock portfolio decisions. These predictions are then tested empirically. The empirical investigation focuses on the tax-induced dividend choices of life and property-liability insurers at related risk levels. The effects of non-tax factors, such as safety regulations and liquidity requirements, on both insurers' common stock investments and dividend yields are also examined.

The Life Insurance Company Income Tax Act of 1959 allows life insurers to obtain some tax exemption on their dividend income. If a life insurer and a property-liability insurer are in the same corporate tax bracket, the life insurer is taxed at a lower tax rate on dividend income than the property-liability insurer. This differential tax treatment could cause life insurers to prefer higher dividend yields than property-liability insurers.¹

The after-tax mean and variance model predicts that such tax-induced differences in dividend preference between the two types of insurers can be identified empirically if the risk level is properly controlled. Empirical tests using the actual common stock portfolio data of the largest life and property-liability insurers show that sample life insurers obtain higher portfolio dividend yields than sample property-liability insurers at a given beta level. Moreover, such differences in dividend yields are more pronounced at higher beta levels than those at lower beta levels.

To further study whether the observed differences in portfolio dividend yields between the two types of insurers can be explained by non-tax factors, such as safety regulations and liquidity requirements, the basic characteristics of stocks in the sample life insurers' portfolios are compared with those in the sample property-liability insurers' portfolios. Although both types of insurers are found to avoid high-variance or low-liquidity stocks, systematic differences in investment opportunities between the two types of insurers appear to be absent. Specifically, the variance of returns, the average trading volume, and the dividend yields on the individual stocks in the sample life insurers' portfolios are similar to those in the sample property-liability insurers' portfolios. Given this similarity of investment opportunities, life insurers will not, persistently at specific beta levels, obtain portfolio dividend yields higher than those of property-liability insurers unless factors such as taxes have induced two types of insurers to apply different portfolio weighting strategies to achieve distinct dividend targets. Taxes, in addition to safety regulations and liquidity requirements, have affected insurers' common stock portfolio decisions.

The next section introduces a model that shows optimal portfolio dividend

¹ Miller and Modigliani (1961) note that differential tax rates on dividend income and capital gains might induce investors with a common tax status to prefer a specific dividend yield. Litzenberger and Ramaswamy (1980) further show that a lower tax rate on capital gains could cause higher tax bracket individuals to prefer lower dividend yields.

choices among investors with the same tax status and heterogeneous risk preferences, and optimal portfolio dividend choices among investors with different tax status at a given systematic risk level. The following section addresses testable hypotheses and several significant assumptions related to the empirical study. Next the data and sampling criteria are described, followed by the test methodology and results. The effects of non-tax factors, such as regulatory safety and liquidity requirements, on insurers' common stock investments and dividend yields are then analyzed and presented, followed by conclusions.

A Theory of Dividend Preferences Under Risk

Insurance companies consider the effect of taxes on expected returns when forming portfolios. In addition, they consider risk and opportunities for diversification. Therefore, empirical models of insurers' portfolio choices should address both tax and risk effects. This objective can be achieved by applying an extension of Long's (1977) work.

Long notes that an investor's optimal portfolio dividend choices are limited to the dividend yields on after-tax efficient portfolios. He graphs (Figure 5, p.39) the dividend yields on after-tax efficient portfolios. The mathematical form of Long's graphical model can be expressed as:²

$$\delta\beta^{(K)} = c_0^{(K)} + c_1^{(K)}E(\bar{R}\beta^{(K)}), \quad (1)$$

where $\delta\beta^{(K)}$ and $E(\bar{R}\beta^{(K)})$ are the before-tax dividend yield and the before-tax expected return on an after-tax efficient portfolio for investor K, and $C_0^{(K)}$, $C_1^{(K)}$ are constants for investor K. This equation implies that there is an infinite number of after-tax efficient portfolios available for investor K. However, if investor K has chosen an after-tax efficient portfolio with a specific before-tax expected total return, he or she will receive the portfolio dividend yield given by equation (1).³

Long's model does not consider the market equilibrium pricing effect of dividends. Therefore, the impact of investors' risk preferences on the optimal choices of portfolio dividend yield in market equilibrium remains unclear. To obtain the equilibrium condition for investors' optimal portfolio dividend choices, equation (1) needs to be combined with a model of market

²In Figure 5 of his work, Long (1977) uses the ray $F(\gamma, \tau)$, which represents a linear relationship between expected returns and dividend yields, to illustrate after-tax efficient portfolios. This linear relationship [expressed as Equation (1)], rather than all the implications of Long's work, is used to develop the theoretical model in this study. Although mathematical details of the model are not presented, they are available from the author upon request.

³Equation (1) is a necessary, but not a sufficient, condition for after-tax portfolio efficiency. If individual securities in the market reveal a linear relationship between dividend yields and expected returns, an investor's portfolio dividend yield will be linearly related to the portfolio's expected return regardless of portfolio decisions. However, in the absence of a linear relationship in the market between dividend yields and expected returns for individual securities, Equation (1) can be tested across portfolios of investors in a specific tax class to investigate whether these investors seek after-tax portfolio efficiency. To the author's knowledge, no existing study has reported such a test.

equilibrium. Assume that the market equilibrium condition follows either the before-tax CAPM (Sharpe - Lintner - Mossin):

$$E(\bar{R}_i) = \gamma_0 + \gamma_1 \beta_i \quad (2)$$

or the after-tax CAPM (Brennan):

$$E(\bar{R}_i) = \gamma'_0 + \gamma'_1 \beta_i + \gamma'_2 \delta_i, \quad (3)$$

where $E(\bar{R}_i)$, β_i , and δ_i are the expected before-tax return, the before-tax beta, and the before-tax dividend yield on security i , respectively. Substituting (2) or (3) into (1) yields a linear relationship between before-tax dividend yield and before-tax beta on each of investor K 's after-tax efficient portfolios at market equilibrium; i.e.,

$$\delta_P = \begin{cases} (C_0 + C_1 \gamma_0) + C_1 \gamma_1 \beta_P & \text{if before-tax CAPM holds, or} \\ (C_0 + C_1 \gamma'_0)/(1 - C_1 \gamma'_2) + [C_1 \gamma'_1 / (1 - C_1 \gamma'_2)] \beta_P & \text{if after-tax CAPM holds.} \end{cases} \quad (4)$$

Equation (4) suggests that optimal dividend yields, for an investor group subject to the same tax rates but heterogeneous risk preferences, can be represented as a straight line in the dividend yield - beta space. For example, in Figure 1, the ray $L^{(0)}$ represents the after-tax efficient portfolios for investors A and B who face identical tax rates. Therefore, only if the slope of the after-tax efficient ray is zero will investors with different risk preferences hold after-tax efficient portfolios with the same dividend yield. If the slope of the after-tax efficient ray is negative (positive), less risk-averse investors, such as A, will choose after-tax efficient portfolios with lower (higher) dividend yields than more risk-averse investors, such as B, will choose.

Now consider how risk preferences influence portfolio dividend yield choices among investors subject to different tax rates. Long's model suggests that the slope of the after-tax efficient ray is negatively related to an investor's tax rate variable $(t_d - t_g)/(1 - t_g)$ where t_d , t_g are the investor's dividend and capital gains tax rates, respectively. Furthermore, after-tax efficient rays for investors of different tax rates radiate from a common starting point, i.e., the after-tax minimum-variance portfolio. For example, in Figure 1, investors C, D, and E face the same tax rate on capital gains as do investors A and B. However, the dividend tax rate for investors C, D, and E is higher than that for investors A and B. Because of the negative relation between the slope of the after-tax efficient ray and the tax-rate variable, the ray $L^{(1)}$ that represents the after-tax efficient portfolios for C, D, and E will lie below the ray $L^{(0)}$, except at the common starting point 0.

Investors A and D will hold after-tax efficient portfolios with the same dividend yield even though investor A has a lower dividend tax rate than does investor D. Furthermore, investor A prefers a lower dividend yield portfolio than does investor C but prefers a higher dividend yield portfolio than investor E prefers. In summary, optimizing investors with the same tax rates but with different risk preferences may hold portfolios with different dividend yields;

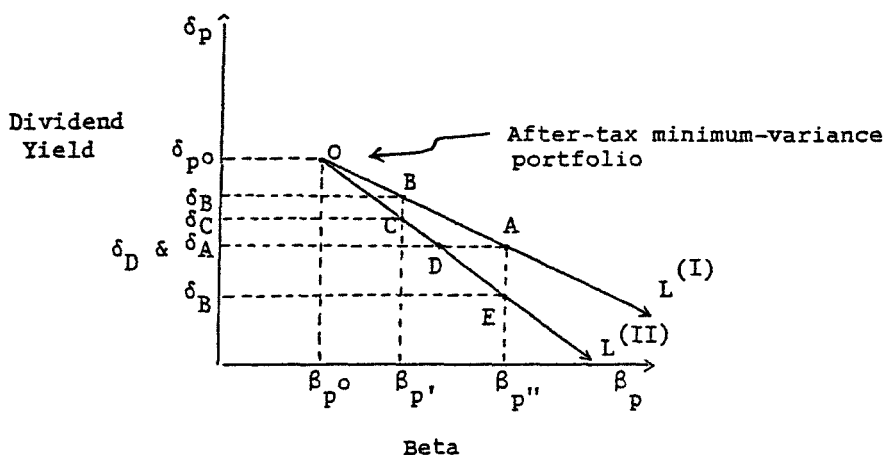


Figure 1. Optimal Portfolio Dividend Yield Choices among Investors with the Same Tax Rates and among Investors with Different Tax Rates

optimizing investors with different tax rates may hold portfolios with the same dividend yield; and optimizing investors with one set of tax rates may prefer either higher or lower portfolio dividend yields than will investors with another set of tax rates. Consequently, no simple cross-sectional relation between investors' tax status and their portfolio dividend yields may exist, and a direct comparison of portfolio dividend yields among investors with different tax status may not detect the tax-induced dividend clienteles.

The above model does suggest, however, that the relative preferences for portfolio dividend yield among investors with different tax status are perfectly predictable at a given beta level. For example, in Figure 1, at the given beta level β_P , the investor, such as B, with a lower dividend tax rate will always prefer a higher portfolio dividend yield than will investor C, who has a higher dividend tax rate. Therefore, if investors are divided into systematic risk subgroups, differential preferences for portfolio dividend yields will exist among investors with different tax status within each risk subgroup.

This, however, does not suggest that the tax-induced dividend clienteles (hereafter, TIDCs) can be identified easily within every systematic risk subgroup. Figure 1 shows that the tax-induced differential dividend preferences within a high systematic risk subgroup, e.g., between investors A and E, are more pronounced than those within a low systematic risk subgroup, e.g., between investors B and C. If estimation or sampling errors occur, the identification of TIDCs among a group of conservative investors (those who are holding low systematic risk portfolios) is less likely than it would be among a group of aggressive investors. In order to detect TIDCs, the testing sample should consist of investors holding high beta portfolios.

The data (to be introduced later) show that although the sample insurers hold portfolios with betas of very wide range, the number of companies holding high beta portfolios is relatively small. Fortunately, the model also

leads to a two-step testing procedure for TIDCs. Specifically, the first step groups insurance companies with identical or similar values of the tax-rate variable into the same tax category and then tests for a cross-sectional linear relation between portfolio dividend yield and systematic risk within each tax category. If a cross-sectional linear relationship exists within each tax category, then the second step is to test whether the slope of the linear relationship for the category with a lower value of the tax-rate variable is larger than the slope for the category with a higher value of the tax-rate variable.

Assumptions and Testable Hypotheses

Before introducing testable hypotheses and data, the tax treatment of insurance should be examined. Insurance companies are taxed as corporations. During the testing period prior to 1986, insurance companies with a taxable income in excess of \$100,000 were in the highest marginal corporate income tax bracket of 46 percent. Therefore, the effective tax rates on the dividend income and the taxable net long-term capital gains for a property-liability insurer having a large taxable income were 6.9 percent and 28 percent, respectively.⁴ However, under the Life Insurance Company Income Tax Act of 1959, the net investment income of a life insurer is divided into two shares—one share allocated to policyholders and the other to the company.⁵ Life insurers are exempt from taxation on the policyholders' share. This tax exemption results in smaller effective tax rates on dividend income for life insurers than for property-liability insurers. For example, if the policyholders' share were 80 percent of the net investment income for a life insurer in the highest corporate tax bracket, the effective tax rate on this company's net dividend income would be only 1.38 percent. In contrast to the difference in effective dividend tax rates, the long-term marginal capital gains tax rate of 28 percent is applied to both life insurers and property-liability insurers in the highest corporate tax bracket.

Given that the effective dividend tax rate for a life insurer depends upon its policyholders' share, holding other things constant, life insurers having different policyholders' shares will have different effective dividend tax rates. However, if it is assumed that the sample life insurers have identical policyholders' shares, these life insurers will also have the same tax rates.

Based on the assumptions of the highest corporate tax bracket for both sample life and property-liability insurers and a uniform policyholders' share

⁴The Tax Reform Act of 1986 repealed the favorable tax treatment of long-term capital gains. However, this tax law change has a limited impact on the differential tax structure for insurance companies. For example, the effective marginal tax rates on the dividend income and net realized long-term capital gains for a property-liability company in the highest corporate tax bracket are 6.8 percent and 34 percent, respectively, after the tax reform.

⁵The policyholders' share, expressed as a percentage of a life insurer's net investment income, is calculated by a formula specified in the law to meet the expected future payments to policyholders and other contractual liabilities.

for sample life insurers, the model introduced earlier leads to following testable hypotheses:

- H1: For property-liability insurers, portfolio dividend yields are linearly related to portfolio betas.
- H2: For life insurers, portfolio dividend yields are linearly related to portfolio betas.
- H3: The slope coefficient from the regression of portfolio dividend yields on portfolio betas is larger for life insurers than for property-liability insurers.

Data and Sampling Criteria

A list of all life and property-liability insurers operating in California was obtained from the One-Hundred-Fifteenth Annual Report of the Insurance Commissioner of the State of California.⁶ From this insurance company population, the hypotheses and related assumptions call for a selection of companies in the highest corporate tax bracket. Since the effective tax rate on capital gains is a function of the expected holding period, the sample companies should also have an identical decision horizon. In addition, the sample life insurers should have the same policyholders' share. A sampling procedure is, therefore, employed based on the assumption that insurance companies of similar size are more likely to have similar decision horizons and similar policyholders' shares than are companies of significantly different size.⁷ Although either large or small companies of similar size could be considered, large, rather than small, companies are selected based on an additional assumption that large companies are more likely to earn large taxable incomes than are small companies. Because a few large companies dominate the insurance industry, a relatively small number of insurers are included in the sample. Specifically, the data on the 1982 year-end common stock portfolios were gathered for 56 large life and 55 large property-liability insurers from the 1982 annual statements filed with the California State Department of Insurance.^{8,9} Because the primary interest of this study is to

⁶This list consists of 629 life insurers and 640 property-liability insurers.

⁷The California Insurance Department keeps insurers' annual statements for only the most current three years. Therefore, very limited information on the insurers' historical portfolio turnover could be obtained. Moreover, the policyholders' share is computed by a highly complex formula. The information on several key variables in the formula is not publicly available. Recognizing that the sample insurers may have different decision horizons and that the sample life insurers may have different policyholders' shares, a later section will investigate whether an empirical finding of differential portfolio dividend yields between life and property-liability insurers can be attributed to non-tax factors, including the sampling bias.

⁸The original sample contains the 60 largest life and the 60 largest property-liability insurers. Of this original sample, the annual statements of two life insurers and two property-liability insurers were not available. In addition, two life insurers and three property-liability insurers were not investing in common stocks as of December 31, 1982.

⁹The total assets of these companies represented 74 percent and 56 percent of the total assets of all life insurers and property-liability insurers, respectively, operating in California.

determine how taxes may affect insurers' investments, only the common stocks acquired for investment purposes are included in the sample portfolios (hereafter, the stock portfolios).¹⁰

The 56 life (55 property-liability) sample companies had earned an average after-tax net income of \$49.38 (\$58.52) million in 1981 and \$53.27 (\$53.41) million in 1982. Therefore, it is reasonable to assume that, at the end of 1982, the sample companies expected the highest marginal tax rates on their future taxable income earned from 1982 year-end portfolios.¹¹

Most of the sample life and property-liability insurers have invested only a small portion of their total assets in common stocks.¹² If the stock portfolio is very small compared to the insurer's total portfolio, even though the insurer requires after-tax efficiency for its total portfolio, its common stock portfolio may not be after-tax efficient. To mitigate this problem, companies were eliminated from the original sample if their stock portfolios represented less than 1.5 percent of their total assets. This criterion eliminated fifteen life insurers and four property-liability insurers from the original sample.

In this study, the beta of each individual stock in an insurer's portfolio is estimated by regressing monthly returns of the stock on monthly returns of the Standard & Poor's 500 index over the 60 months from January, 1978 through December, 1982. Monthly returns on the stock and Standard & Poor's 500 index are calculated from information available on the PDE COMPUSTAT tape (hereafter, the PDE tape) and the CRSP daily stock returns tape (hereafter, the CRSP tape). Unfortunately, some stocks in the sample stock portfolios do not have information for 1978 through 1982 on either tape.¹³ The betas on these stocks were not estimated, and hence could not be used to estimate the portfolio beta. For those companies on which beta estimations could be based on only a small portion of stock portfolios, estimation errors might be large. To limit potential errors, an insurer is included in the final sample only if the stocks used in estimating the portfolio beta represent at least 85 percent of the 1982 year-end market value of the company's stock portfolio. This criterion eliminated another ten life insurers and nine property-liability insurers from the sample. Thirty-one life insurers and 42 property-liability insurers comprise the final sample.

¹⁰The state insurance authorities require insurance companies to report their stock holdings acquired for controlling purposes separately from those acquired for investment purposes.

¹¹One life and three property-liability insurers in the sample had reported negative net income in either 1981 or in 1982. Furthermore, it is possible that some sample insurers reported a large positive after-tax net income even though they were in a lower tax bracket due to carry-forwards of previous years' losses. Since the objective of the study is to investigate insurers' long term common stock investment strategies, expected, rather than current, tax rates should be used. Large insurers, regardless of whether they could take tax deductions from loss-carry-forwards or had losses in the current year, should expect to earn a yearly net income higher than \$100,000 (reaching the highest corporate tax bracket during the testing period) in the long run.

¹²Ninety percent of the 56 life (55 property-liability) insurers allocated 7.7 (19.5) percent or less of their total assets to common stock investments.

¹³These stocks primarily are foreign stocks, restricted stocks and stocks of investment companies.

Table 1

Descriptive Statistics of Final Sample
Insurers' 1982 Year-End Common Stock Portfolios

	Common Stock Investments			
	(1)	(2)	(3)	(4)
	Market Value (\$Million)	Number of Issues	As a Proportion of Total Assets (%)	Proportion Applied to Estimate Portfolio Beta & Dividend Yield (%)
	(a) Mean & Std. Dev.	(a) Mean & Std. Dev.	(a) Mean & Std. Dev.	(a) Mean & Std. Dev.
	(b) Ten-Ninety Percentile	(b) Ten-Ninety Percentile	(b) Ten-Ninety Percentile	(b) Ten-Ninety Percentile
Life (31 Insurers)	266.01 406.15	98.87 122.22	5.35 7.72	93.43 4.23
	43.3-569.3	34-123	1.6-10.4	87.2-98.8
Property- Liability (42 Insurers)	286.28 272.47	84.81 46.69	13.65 9.33	93.94 4.01
	71.4-652.4	35-144	5.0-19.5	87.8-98.8

Some descriptive information about the final sample is summarized in Table 1. Column (a) of Item (2) indicates that, on average, the final sample life and property-liability companies held 98.87 and 84.81 different stock issues, respectively, in their common stock portfolios. These data suggest that the final sample insurers seemed to hold relatively diversified stock portfolios.

Test Methodology And Results

Testing the hypotheses advanced above requires estimates of the portfolio beta and dividend yield on each sample insurer's stock portfolio. The estimation of insurers' stock portfolio betas is obtained from

$$\beta_j = \sum_{i=1}^{m_j} \frac{n_{ij}P_i}{\left(\sum_{i=1}^{m_j} n_{ij}P_i\right)} \beta_i, \quad (5)$$

where:

β_j : the estimated beta on the j th insurer's stock portfolio,

β_i : the estimated beta on security i ,

n_{ij} : the number of shares of stock i in the j th insurer's stock portfolio,

P_i : the 1982 year-end market price of stock i , and

m_j : the number of stocks in the j th insurer's stock portfolio that have sufficient information on the PDE or CRSP tape to calculate monthly returns for 1978 through 1982.

The insurer's portfolio dividend yield was also estimated by a value-weighted average of dividend yields on the securities in the stock portfolio. An estimate of 1983 total regular cash dividends on each individual security was obtained by multiplying the last regular cash dividend paid per share in 1982 by the number of times it was paid during 1982.^{14,15} These total cash dividends were then divided by the 1982 year-end price to approximate the 1983 dividend yield expected by an insurer that held the security on December 31, 1982.

The information needed to estimate the security's dividend yield was collected primarily from the PDE tape. For those securities not contained on the PDE tape but having 1978 through 1982 return information on the CRSP tape, Standard and Poor's Stock Guide was used to obtain the dividend information. Thus, the dividend yield on an insurer's stock portfolio was estimated as:

¹⁴Litzenberger and Ramaswamy (1980) distinguish between the expected dividend yield in an ex-dividend month and the yield in a non-ex-dividend month. Miller and Scholes (1978) argue that such a distinction is not appropriate if the objective is to investigate investors' long-term portfolio decisions that are affected by differential tax rates on dividend income and long-term capital gains.

¹⁵The last regular cash dividend in 1982 was used to forecast the 1983 regular cash dividend based on the assumption that firms change cash dividend payments relatively infrequently. This assumption is consistent with the evidence provided by Fama and Babiak (1968) and Lintner (1956).

$$\delta_j = \sum_{i=1}^{m_j} \frac{n_{ij}P_i}{(\sum_{i=1}^{m_j} n_{ij}P_i)}, \delta_1 \quad (6)$$

where n_{ij} , P_i , and m_j have been defined in (5) and δ_i , δ_j are the estimated dividend yields on stock i and the j th insurer's stock portfolio.

Table 2
Distributions of Portfolio Betas and Portfolio Dividend Yields

	Thirty One Life Insurers		Forty Two Property-Liability Insurers	
	Portfolio Beta	Portfolio Dividend Yield	Portfolio Beta	Portfolio Dividend Yield
Range	.685 - 1.243	.029 - .065	.661 - 1.258	.019 - .069
Median	.8806	.0466	.8760	.0458
Mean	.9077	.0484	.8964	.0452
Standard Deviation	.1385	.0103	.1133	.0120

The median, mean, and standard deviation of these portfolio betas and dividend yields are presented in Table 2. Both life and property-liability insurers held portfolios with a wide range of betas (from .685 to 1.243 for life insurers and from .661 to 1.258 for property-liability insurers). Similarly, both life and property-liability insurers' portfolio dividend yields were widely distributed (from 0.029 to 0.065 for life insurers and from .019 to .069 for property-liability insurers).

The Regression Relation Between Portfolio Dividend Yield and Beta

To test the hypothesis that portfolio dividend yield and portfolio beta are linearly related, the following simple regression is estimated separately for life insurers and property-liability insurers.

$$\delta_j = a_k + b_k\beta_j + e_j, \quad (7)$$

where

$$k = \begin{cases} 1 & \text{if life insurers} \\ 2 & \text{if property-liability insurers,} \end{cases}$$

and δ_j , β_j are estimated from (6) and (5), respectively. The t-statistics for testing whether or not $b_k = 0$ are presented in Table 3. Both b_1 (for life insurers) and b_2 (for property-liability insurers) are statistically different from zero at the significance level of 0.005. A residual plot shows that the residuals of the regression tend to fall within a horizontal band centered around zero and display no systematic tendencies to be positive or negative. In addition, the quadratic regression (presented in Table 3) shows that the slope coefficient of the squared term is not statistically different from zero at the significance

level of 0.005. These results are consistent with the hypothesis of a linear cross-sectional relation between portfolio dividend yield and beta for life (property-liability) insurers.

Table 3
Regression Relation between Portfolio Dividend Yield and Beta

		Regression Equation (Coefficient t-Statistic)	R ² (Adjusted R ²)
Simple Regression	Life (31 Insurers)	$\delta_j = .086 - .041 \beta_j$ (8.09) (-3.56)	.304 (.280)
	Property- Liability (42 Insurers)	$\delta_j = .113 - .076 \beta_j$ (10.66) (-6.45)	.510 (.498)
Quadratic Regression	Life (31 Insurers)	$\delta_j = .122 - .119 \beta_j + .041 \beta_j^2$ (2.01) (-.92) (.61)	.313 (.264)
	Property- Liability (42 Insurers)	$\delta_j = .134 - .122 \beta_j + .024 \beta_j^2$ (2.37) (-.99) (.38)	.512 (.487)

The negative coefficient of the regression implies that, on average, life (or property-liability) insurers with higher-risk stock portfolios tended to obtain lower portfolio dividend yields even though these insurers might have similar tax rates. Although these findings are consistent with the first and second hypotheses, they need not support a tax effect. The observed negative linear relation between portfolio dividend yield and beta could be attributable to the general tendency of low beta stocks to pay higher dividend yields.¹⁶ An investigation of the tax effect requires further comparison of the regression lines between the two insurance groups.¹⁷

Differential Dividend Preferences Between the Two Types of Insurers

To test whether the linear regression line for life insurers has a larger slope than that for property-liability insurers, the following regression equation is applied:

¹⁶Evidence for such a tendency was given in Beaver, Kettler, and Scholes (1970), Bildersee (1975), and Thompson (1976), among others.

¹⁷Because of the negative relation between portfolio dividend yield and portfolio beta, a direct comparison of portfolio dividend yields between two types of insurers may not serve to identify the tax-induced dividend clientele effect. Specifically, the mean portfolio dividend yields for life and property-liability insurers are .04837 and .04525, respectively. The null hypothesis of equal mean yields cannot be rejected at a significance level of .10.

$$\delta_j = a_2 + b_2\beta_j + a^*X + b^*X\beta_j + e_j, \quad (8)$$

where $X = \begin{cases} 0 & \text{if property-liability insurers} \\ 1 & \text{if life insurers} \end{cases}$

Therefore, the hypothesis that the slope of the regression equation for life insurers is larger than that for property-liability insurers can be stated as follows:

$$H_0 : b^* \leq 0 \text{ vs. } H_1 : b^* > 0.$$

The regression results are:

$$\delta_j = .1132 - .0758 \beta_j - .0276 X + .0348 X\beta_j, \quad (9)$$

(10.55) (-6.68) (-1.84) (2.12)

where the t-statistics are given in the parentheses.¹⁸ The R^2 (adjusted R^2) for this regression is .4484 (.4245). Given a one-tail test, the p-value with 69 degrees of freedom is 0.017. The null hypothesis can be rejected at the 0.05 level of significance. This significant difference in the slopes implies that differential dividend preferences exist between the two types of insurers at a given beta level; moreover, the differential dividend preferences change across beta levels.¹⁹

The Effect of Non-Tax Factors

State insurance regulators allow life and property-liability insurers to acquire only those stocks which meet certain safety standards. In addition, insurance companies generally hold a large dollar volume of each security in their portfolios.²⁰ Because of the large dollar volume of each stock held, the insurance companies may be concerned about their ability to buy or sell stocks quickly at the prevailing market price. Therefore, it is necessary to investigate

¹⁸ The regression lines for life insurers and for property-liability insurers intercept at the point of (.79, .0531).

¹⁹ In his study, Pettit (1977) assumes constant tax-induced dividend clientele effect across all beta levels. Following Pettit's assumption, the regression model will be:

$$\delta_j = a_2' + a^*X + b_2'\beta_j + e_j',$$

where the preference of higher dividend yields by life insurers than by property-liability insurers will be shown by a positive a^* . Using the same data of 31 life and 42 property-liability insurers, the regression results are:

$$\delta_j = .0969 + .0037 X - .0577 \beta_j.$$

(12.58) (1.76) (-6.85)

The p-value for the test of $H_0 : a^* \leq 0$ vs. $H_1 : a^* > 0$ is .041. By comparison, the p-value of .017 obtained from the approach applied in this study is much lower. Therefore, a test which does not account for the systematic changes in differential dividend preferences across beta levels is less likely to identify the tax-induced dividend clientele effect.

²⁰ For example, the average size of each single issue in the sample portfolios of 31 life insurers and 42 property-liability insurers is \$2.69 million and \$3.38 million, respectively.

whether the observed distinct dividend preferences by the two types of insurers are due to safety regulations and/or liquidity requirements.

Using variance of return and monthly dollar trading volume as proxies for safety and liquidity, Tables 4 and 5 show the difference in the basic characteristics of variance and trading volume between the stocks in the insurers' (life or property-liability) stock portfolios and the stock population on the PDE tape. Specifically, the variance of each individual stock's returns was estimated using the 60 monthly returns on the stock from 1978 through 1982. The trading volume was estimated by multiplying the total number of shares traded in each month by the month-end stock price and then taking the average of these 60 monthly dollar trading volumes. There are 3,434 stocks on the PDE tape for which variance of returns and trading volume can be estimated. Of this stock population (hereafter, the PDE stocks), 923 stocks were held by 31 sample life insurers (hereafter, the held-by-life stocks), and 873 stocks were held by 42 sample property-liability insurers (hereafter, the held-by-property-liability stocks).

Column (5) of Table 4 (Table 5) shows that 50.99 percent (67.21 percent) of the PDE stock population appears in the highest variance (lowest trading volume) category and much lower percentage of PDE stocks appears in other categories. By contrast, about 20 percent of held-by-life stocks and held-by-property-liability stocks (Columns (1) and (3), respectively) fall into

Table 4
The Impact of Safety Regulations on
Life and Property-Liability Insurers' Common Stock Investments

Variance of Monthly Rate of Return	Stocks Held by Life Insurers		Stocks Held by Property-Liability Insurers		Stocks on the PDE Tape	
	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Issues & Proportion (%)	Mean Dividend Yield (%)	Number of Issues & Proportion (%)	Mean Dividend Yield (%)	Number of Issues & Proportion (%)	Mean Dividend Yield (%)
Under	184	7.58	174	7.51	347	7.75
.00476	19.93		19.93		10.10	
.00476-	184	4.88	174	5.01	322	4.94
.00668	19.93		19.93		9.38	
.00668-	185	4.12	153	4.17	384	3.99
.00899	20.04		17.53		11.18	
.00899-	185	3.30	183	3.09	630	3.00
.01389	20.04		20.96		18.53	
Over	185	1.51	189	1.30	1,751	0.85
.01386	20.04		21.65		50.99	
Total	923	4.27	873	4.15	3,434	2.67
	100.00		100.00		100.00	

Table 5

The Impact of Liquidity Requirements on Life and Property-Liability Insurers' Common Stock Investments

Average Monthly Dollar Trading Volume (\$000)	Stocks Held by Life Insurers		Stocks Held by Property-Liability Insurers		Stocks on the PDE Tape	
	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Issues & Proportion (%)	Mean Dividend Yield (%)	Number of Issues & Proportion (%)	Mean Dividend Yield (%)	Number of Issues & Proportion (%)	Mean Dividend Yield (%)
Over	185	4.22	181	4.23	191	4.12
35,415	20.04		20.73		5.56	
16,439-	185	4.42	167	4.71	206	4.35
35,415	20.04		19.13		6.00	
8,348-	185	4.49	150	4.62	276	3.57
16,439	20.04		17.18		8.04	
3,290-	184	4.28	160	3.64	453	2.95
8,348	19.93		18.33		13.19	
Under	184	3.96	215	3.72	2,308	2.24
3,290	19.93		24.63		67.21	
Total	923	4.27	873	4.15	3,434	2.67
	100.00		100.00		100.00	

each variance or trading volume category.²¹ These findings suggest that both types of insurers appear to avoid high variance and low liquidity stocks.

Avoiding high variance or low liquidity stocks may systematically affect life and property-liability insurers' choices of dividend yields. Specifically, Column (6) in Table 4 (Table 5) shows that the mean dividend yield of stocks on the PDE tape tends to be larger in the low variance (high liquidity) categories. Therefore, holding other things constant, choosing safer (lower variance) or more liquid (larger dollar trading volume) stocks is more likely to result in higher dividend yields.

If these safety and liquidity restrictions do not apply equally to life and property-liability insurers, systematic differences in the portfolio dividend yield may occur between the two types of insurers even though none of the insurers' investment decisions is affected by taxes. For example, if the regulatory safety requirements are stricter for life insurers than for property-liability insurers, the life insurers may acquire lower variance stocks which usually pay higher dividend yields. Similarly, the importance of liquidity is a function of the variability and predictability of the insurer's cash

²¹ A Chi-Square Contingency-Table test is applied to test whether the frequencies of PDE stocks in various categories are the same as the frequencies of held-by-life (held-by-property-liability) stocks in the corresponding categories. The null hypothesis of an equal frequency can be rejected at the significance level of 0.001 for both insurers.

flows. If the life insurers have more stable cash flows, and, therefore, are able to predict cash flows more accurately than the property-liability insurers, the life insurers may acquire less liquid stocks which usually have lower dividend yields.

Table 6

The Comparison of the Influence of Safety and Liquidity On Life Insurers' vs. Property-Liability Insurers' Common Stock Investments

Variance of Monthly Rate of Return	Average Monthly Dollar Trading Volume (\$000)	Stocks held by Life Insurers		Stocks Held by Property-Liability Insurers	
		(1)	(2)	(3)	(4)
		Number of Issues	Proportion (%)	Number of Issues	Proportion (%)
Under .00476	Over 39,356	37	4.01	37	4.24
	19,171 - 39,356	37	4.01	37	4.24
	10,600 - 19,171	37	4.01	37	4.24
	4,000 - 10,600	37	4.01	29	3.32
	Under 4,000	36	3.90	34	3.89
.00476- .00668	Over 46,971	37	4.01	37	4.24
	19,976 - 46,971	37	4.01	34	3.89
	10,491 - 19,976	37	4.01	36	4.12
	3,928 - 10,491	37	4.01	29	3.32
	Under 3,928	36	3.90	38	4.35
.00668- .00899	Over 33,199	37	4.01	36	4.12
	16,674 - 33,199	37	4.01	34	3.89
	7,716 - 16,674	37	4.01	28	3.21
	4,176 - 7,716	37	4.01	23	2.63
	Under 4,176	37	4.01	32	3.67
.00899- .01389	Over 29,217	37	4.01	37	4.24
	13,561 - 29,217	37	4.01	28	3.21
	7,639 - 13,561	37	4.01	23	2.63
	2,863 - 7,639	37	4.01	47	5.38
	Under 2,863	37	4.01	48	5.50
Over .01389	Over 29,004	37	4.01	34	3.89
	12,481 - 29,004	37	4.01	27	3.09
	5,827 - 12,481	37	4.01	34	3.89
	2,049 - 5,827	37	4.01	49	5.61
	Under 2,049	37	4.01	45	5.15
Total		923	100.00	873	100.00

To test whether this type of systematic difference in dividend yield exists while controlling the interaction effect of both factors, the held-by-life stocks in each of the five variance categories described earlier are again divided into five liquidity categories with each category containing an approximately equal number of held-by-life stocks. This procedure generates 25 variance-liquidity

categories which are presented in Table 6. The Chi-Square Contingency-Table test for equal distribution between Column (1) and Column (3) shows a p-value of .70. With such a high p-value, one can conclude that the stocks used by life insurers to form portfolios have variance and liquidity properties similar to those used by property-liability insurers. The investment restrictions that cause life and property-liability insurers to avoid high variance and low liquidity stocks could not systematically result in differences in dividend yield between the two types of insurers.

Biases Arising from Sampling and Estimation Procedure

Although safety regulations and liquidity requirements cannot explain the empirical findings of different portfolio dividend yields between the two types of insurers, one may suspect that sampling and estimation errors could account for those findings. Specifically, while one of the sampling objectives is to select life (property-liability) insurers in the highest corporate tax bracket, the sample life (property-liability) insurers do not necessarily meet such a requirement. Even if the sample companies do expect to fall in the highest tax bracket, they do not necessarily face the same effective capital gains tax rate if their decision horizons differ. Furthermore, the sample life insurers might have different policyholders' shares and, therefore, face different effective rates on dividend income. Additionally, because some securities in the sample stock portfolios are omitted to estimate portfolio betas and dividend yields, estimation errors can occur.

The sampling and estimation errors identified, however, will result in a larger variance around the regression line. This larger variance reduced the probability of finding a significant regression line as well as detecting a significant difference in the slopes of the regression lines. In other words, sampling and estimation errors should reduce, rather than increase, the likelihood of obtaining the empirical results shown earlier.

Moreover, even if the assumption of homogeneous tax rates for each type of insurer does not hold, it is still well-argued that the Life Insurance Company Income Tax Act of 1959 generally lets large life insurers face lower effective tax rates on dividend income than do large property-liability insurers. An observation of higher portfolio dividend yields for large life insurers than for large property-liability insurers at specific beta levels should be best explained by a tax effect, especially if factors other than taxes have failed to explain such an observation.

To further affirm the argument that the observed difference in portfolio dividend yields between the two types of insurers is due to a tax effect, the following evidence is provided.

Dividend Yield Opportunities between the Two Types of Insurers

In Table 7 the 3,434 PDE stocks, 923 held-by-life stocks and 873 held-by-property-liability stocks are divided separately into 20 beta categories

Table 7

Average Dividend Yields on Held-by-Life Stocks, Held-by-Property-Liability Stocks, and the PDE Stocks at Different Beta Levels

Beta	Stocks Held by Life Insurers		Stocks Held by Property-Liability Insurers		Stocks on the PDE Tape		t-Statistic for $H_0: \delta_1 = \delta_2$
	(1)	(2)	(3)	(4)	(5)	(6)	
	Number of Issues	Mean Dividend Yield δ_1 (%)	Number of Issues	Mean Dividend Yield δ_2 (%)	Number of Issues	Mean Dividend Yield δ_3 (%)	
Under .41	46	9.15	41	8.69	261	4.19	.75
.41 - .50	46	8.54	41	8.71	161	5.38	-.23
.50 - .61	46	6.13	44	6.29	191	4.15	-.25
.61 - .70	46	5.34	38	5.44	178	3.64	-.19
.70 - .76	46	4.23	45	4.94	142	3.71	-1.56
.76 - .82	46	4.79	41	5.05	159	3.70	-.50
.82 - .86	46	4.70	46	4.70	132	3.42	.00
.86 - .91	46	4.30	41	3.79	144	3.15	.96
.91 - .96	46	4.27	41	4.58	132	3.30	-.56
.96 - 1.01	46	3.94	41	3.99	137	3.10	-.09
1.01 - 1.06	46	3.94	48	3.81	141	2.66	.27
1.06 - 1.10	46	3.59	43	3.16	137	2.28	.83
1.10 - 1.16	46	3.42	47	3.17	125	2.51	.58
1.16 - 1.20	46	4.08	34	3.91	123	2.48	.32
1.20 - 1.26	46	3.75	50	3.30	147	2.39	.97
1.26 - 1.34	46	3.33	44	3.07	157	1.84	.61
1.34 - 1.41	46	2.86	38	2.85	145	1.78	.02
1.41 - 1.52	47	2.84	44	2.54	174	1.57	.61
1.52 - 1.77	47	1.61	61	1.97	293	.91	-.96
Over 1.77	47	.72	45	.81	355	.43	-.33
Total	923	4.27	873	4.15	3,434	2.67	.83

ranking from the lowest to the highest beta level.²² The mean dividend yield is calculated for stocks in each category and presented in Columns (2), (4), and (6). Comparing Column (6) with either Column (2) or (4) reveals that the dividend yield for the PDE stock population tends to be smaller than that for held-by-life stocks or held-by-property-liability stocks in each beta category. Such differences in dividend yield could be due either to safety and liquidity requirements or to other factors, including taxes.²³ However, the t-statistics

²² The cut-off points for each category are determined so that approximately five percent of 923 held-by-life stocks will fall into each beta category.

²³ The phenomenon of high dividend yield on stocks selected by life and property-liability insurers is consistent with the general belief that the exclusion of 85 percent of intercorporate dividend payments from taxation will induce corporate investors to prefer dividend income over capital gains. However, because safety regulations and liquidity requirements may also induce

presented in Column (7) suggest that there is no difference in the mean dividend yield between held-by-life and held-by-property-liability stocks in each of the twenty beta categories. In other words, even though the two insurance groups appear to obtain different *portfolio* dividend yields at each beta level, systematic differences in their choices of *individual stocks* with certain dividend yields at each beta level appear to be absent.

Given similar dividend yields on individual stocks at every beta level, life and property-liability insurers could not be expected to hold portfolios with different dividend yields persistently at any beta level unless factors such as taxes have induced the two types of insurers to apply different portfolio weighting strategies in order to achieve distinct dividend targets. In summary, even though possible biases may arise from sampling and estimation, they cannot explain why sample life and property-liability insurers, having been given the same dividend opportunities, obtain different portfolio dividend yields persistently. This suggests that the observed differential in portfolio dividend yields between the two types of insurers is consistent with the tax effect.²⁴

It is important to note that the empirical study follows from a model of after-tax mean-variance efficiency and tests a joint hypothesis that insurers hold after-tax efficient portfolios and that the TIDC effect exists among insurers. Therefore, the empirical findings that life and property-liability insurers use similar stocks to form portfolios of distinct dividend yields could also be interpreted as some evidence of insurers seeking after-tax efficiency of their common stock portfolios.

Conclusion

Because large life insurers can deduct policyholders' shares from their investment income when computing their tax base, they tend to experience lower effective marginal tax rates on dividend income than do large property-liability insurers. Given this situation, the after-tax mean-variance efficiency model predicts that large life insurers should prefer higher dividend yields than large property-liability insurers at any given systematic risk level and that these differential dividend preferences will be more pronounced at higher risk levels. These predictions are supported by the data.

Additional investigation reveals that external investment restrictions, such as insurance regulations and liquidity requirements, affect an insurer's selection of common stocks. However, these investment restrictions cannot

insurance companies to select stocks of high dividend yield, the observation of life and property-liability insurers holding high dividend yield stocks cannot be used as evidence for the tax effect.

²⁴Based on the above findings, an important notion emerges: even though the tax-induced dividend clientele effect is reflected in investors' preferences of specific *portfolio* dividend yields, the TIDC effect is not necessarily reflected in investors' choices of *individual stocks* with certain dividend yields. Therefore, one cannot reject the tax-induced dividend clientele effect by simply showing that investors with different tax status did not acquire stocks of different dividend yields at given beta levels.

explain the observed difference in dividend preferences between the two types of insurers. A further study of both insurers' dividend yield opportunities provides additional evidence supporting the notion that insurers apply portfolio strategies to achieve after-tax efficiency and that the tax-induced dividend clientele effect exists among insurers.

An insurer's interest in pursuing after-tax efficiency will lead to maximizing the tax advantage of dividend income. Although there is no direct evidence to suggest that this tax advantage has been passed on to policyholders in the form of lower premium rates, such a transfer should occur in a competitive insurance market. For example, Smith (1989) shows that insurers pass the tax arbitrage benefits of municipal bond investments on to policyholders. Therefore, the tax advantage obtained from an insurer's efficient investments in common stocks should also be transferred to policyholders. Future research of this issue could help insurance regulators determine premium rates.

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