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Dividend policy theories and their empirical tests

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Abstract

The subject of corporate dividend policy has captivated economists for a long time, resulting in intensive theoretical modeling and empirical examinations. A number of conflicting theoretical models lacking strong empirical support define current attempts to explain the puzzling reality of corporate dividend behavior. The purpose of this paper is to determine if the method of analysis employed, sample period, and/or data frequency are responsible for this inconsistent support. The results presented here are consistent with the contention that no dividend model, either separately or jointly with other models, is supported invariably.

JEL classification: G35

Keywords: Dividend policy; Dividend theory; Empirical test of dividend policy

1. Introduction and background

Corporate dividend policy has captured the interest of economists of this century and over the last five decades has been the subject of intensive theoretical modeling and empirical examination. A number of conflicting theoretical models (all are lacking in strong empirical support) define current attempts to explain corporate dividend behavior. The purpose of this paper is to examine the academic efforts to model dividend policy and to test the empirical validity and significance of the paradigms they fashion.

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Initial forays into theorizing corporate dividend policy are divided as to their prediction of the dividend payment's effect on share price. Over the last century, three schools of thought have emerged. One faction sees dividends as attractive and as a positive influence on stock price. A second bloc believes that stock prices are negatively correlated with dividend payout levels. The third group of theories maintains that firm dividend policy is irrelevant in stock price valuation.

Theoretical and empirical models of corporate dividend policy of late better separate into a different taxonomy. In this taxonomy, the qualifying criterion is the nature of the market structure and/or the underlying rationale of the investor. Accordingly, recent models are broadly segregated, based on their rationale, into models formulated in states with full information, models in states with information asymmetries and models using behavioral principles.

Section 2 is a brief review of theoretical models based on the last categorization. Section 3 presents the statistical analysis of empirical research into dividend policy. In Section 4, we offer our summary and concluding remarks.

2. Dividend theories[2]

2.1. Full information models—the tax factor

Tax-adjusted models surmise that investors require and secure higher expected returns on shares of dividend-paying stocks. The imposition of a tax liability on dividends causes the dividend payment to be grossed up to increase the shareholder's pretax return. Under capital asset pricing theory, investors offer a lower price for the shares because of the future tax liability of the dividend payment.

One consequence of the tax-adjusted model is the division of investors into dividend tax clienteles, an argument first proposed in the seminal work of Miller and Modigliani (1961). In later research, Modigliani (1982) finds that the clientele effect is responsible for only nominal alterations in portfolio composition rather than the major differences predicted by Miller (1977). Masulis and Trueman (1988) model cash dividend payments as products of deferred dividend costs. Their model predicts that investors with differing tax liabilities will not be uniform in their ideal firm investment/dividend policy. As the tax liability on dividends increases (decreases), the dividend payment decreases (increases) while earnings reinvestment increases (decreases). Differences are minimized by segregation of investors into clienteles.

The model developed by Farrar and Selwyn (1967) assumes that investors maximize after-tax income. In a partial equilibrium framework, investors have two choices. Individuals choose the amount of personal and corporate leverage and also whether to receive corporate distributions as dividends or capital gains. This model contends that no dividends should be paid; rather, that share repurchase should be used to distribute corporate earnings.

[2] In this section, we discuss the logic of the dividend classes, the reference to papers is purposefully minimal, and it is done solely for the reason of typifying the papers that belong to a particular class. A much more comprehensive, albeit not total, reference list is in Table 2, which deals with the statistical tests.

The Farrar and Selwyn (1967) model is extended into a general equilibrium framework by Brennan (1970). In this setting, investors maximize their expected utility of wealth. Although the model is more robust, the predictions are similar to those of the Farrar and Selwyn model; an equilibrium with dividend-paying firms is not consistent with a zero required return per unit of dividend yield.

Auerbach (1979a) develops a discrete-time, infinite-horizon model in which shareholders (as opposed to firm market value) maximize their wealth. If a capital gains/dividends tax differential exists, wealth maximization no longer implies firm market value maximization. Subsequently, Auerbach (1979b) posits that dividend distributions occur because of the consistent, long-term undervaluation of corporate capital. The undervaluation is the result of a dynamic process encompassing multiple periods of total reinvestment of all firm profits followed by firm returns less than the returns expected by investors.

Tax-adjusted models are criticized as incompatible with rational behavior; this criticism prompts Miller (1986) to suggest a strategy of tax sheltering of income by high-tax-bracket individuals. Individuals can refrain, of course, from purchasing dividend-paying shares to avoid the tax liability of these payments. Alternatively, using a strategy first advanced by Miller and Scholes (1978), shareholders can purchase dividend-paying stocks and receive the distributions, then simultaneously borrow funds to invest in tax-free securities.

The use of dividend-specific, personal tax shelters (for example, the existing dividend income exemption) to avoid tax liabilities is advanced by DeAngelo and Masulis (1980). They contend that the Miller and Scholes' (1978) tax shelter strategy is not sufficient to induce positive dividend payment at equilibrium. Fung and Theobald (1984) model tax shelters that are not based on interest charges and apply the theoretical results to French, German, British, and U.S. tax systems.

2.2. Models of information asymmetries

2.2.1. Signaling models

The market imperfection of asymmetric information is the basis for three distinct efforts to explain corporate dividend policy. The mitigation of the information asymmetries between managers and owners via unexpected changes in dividend policy is the cornerstone of dividend-signaling models. Agency cost theory uses dividend policy to better align the interests of shareholders and corporate managers. The free cash flow hypothesis is an ad hoc combination of the signaling and agency costs paradigms; the payment of dividends can decrease the level of funds available for perquisite consumption by corporate managers.

Akerlof's (1970) model of the used car market as a pooling equilibrium in the absence of signaling activities illuminates the costs of information asymmetries. The generalization of Akerlof's model by Spence (1973, 1974) became the prototype for all financial models of signaling. The model defines a unique and specific signaling equilibrium in which a job seeker signals his/her quality to a prospective employer. Although the scenario is developed using the employment market, Spence contends that extension to a *limited* number of other settings (admissions procedures, promotions, and credit applications) is possible.

Ambarish, John, and Williams (1987), Bar-Yosef and Huffman (1986), Bhattacharya (1979, 1980), Hakansson (1982), John and Williams (1985), Kale and Noe (1990), Kumar (1988), Makhija and Thompson (1986), Miller and Rock (1985), Ofer and Thakor (1987), Rodriguez (1992), Talmor (1981), and many others offer signaling models of corporate dividend policy. The proponents of signaling theories believe that a corporate dividend policy used as a means of putting the message of quality across has a lower cost than other alternatives.[3] The use of dividends as signals implies that alternative methods of signaling are not perfect substitutes (Asquith & Mullins, 1986).

2.2.2. Agency cost

The recognition of potential agency costs associated with the separation of management and ownership is not new; differences in managerial and shareholder priorities have been recognized for more than three centuries. Adam Smith (1937) adjudged the management of early joint stock companies to be negligent in many of their activities. These problems were especially prevalent in the British East Indies Company and attempts to monitor managers were largely unsuccessful because of inefficiencies and costs associated with shareholder monitoring (Kindleberger, 1984). Carlos (1992) and Scott (1912) question these assertions—while control and organization were less than ideal, the continued success and long life of the corporation imply generally sound managerial practices. Although some fraud no doubt existed, the majority of managerial activities coincided with shareholder desires.

Modern agency theory seeks to explain corporate capital structure as the result of attempts to minimize the costs associated with the separation of corporate ownership and control. Agency costs are lower in firms with high managerial ownership stakes because of the better alignment of shareholder and manager goals (Jensen & Meckling, 1976) and in firms with large block shareholders that are better able to monitor managerial activities (Shleifer & Vishney, 1986). Agency problems result from information asymmetries, potential wealth transfers from bondholders to stockholders through the acceptance of high-risk and -return projects by managers, and failure to accept positive net present value projects and perquisite consumption in excess of the level consumed by prudent corporate managers (Barnea, Haugen, & Senbet, 1981).

Dividend policy influences these relations in two ways. Fama and Jensen (1983a, 1983b) espouse that potential shareholder and bondholder conflicts can be mitigated by covenants governing claim priority. These orderings can be circumvented by large dividend payments to stockholders.[4] Debt covenants to minimize dividend payments are necessary to prevent bondholder wealth transfers to shareholders (John & Kalay, 1982). Although potentially

[3] This is, of course, the same circular argument as the contention of the early architects of the capital asset pricing model that, at equilibrium, all assets would be held in proportion to their market value, because otherwise it would not be in equilibrium. In not one of the signaling studies is there any evidence regarding the costs of alternative methods.

[4] That this argument is largely ad hoc is accentuated by the more plausible argument that payment of large dividends to shareholders can result in the rejection of positive, net present value projects, misuse of low-cost capital, and the consequent suboptimization of shareholders' wealth (Myers, 1977).

substantial in precipitation of agency costs, its dividend policy is not a major source of bondholder wealth expropriation. In firms where dividend payouts are limited by bondholder covenants, dividend payout levels are still below the maximum level allowed by the constraints (Kalay, 1982b).

The second way dividend policy affects agency costs is the reduction of these costs through increased monitoring by capital markets. Large dividend payments reduce funds available for perquisite consumption and investment opportunities and require managers to seek financing in capital markets. The efficient monitoring of capital markets reduces less than optimal investment activity and excess perquisite consumption and hence reduces the costs associated with ownership and control separation (Easterbrook, 1984).

2.2.3. The free cash flow hypothesis

Prudent managers working in the shareholders' best interests should invest in all profitable opportunities. Management and owner separation affords corporate managers the temptation, however, to consume or otherwise waste surplus funds. The inefficient use of funds in excess of profitable investment opportunities by management was first recognized by Berle and Means (1932). Jensen's (1986) free cash flow hypothesis updated this assertion, combining market information asymmetries with agency theory. The funds remaining after financing all positive net present value projects cause conflicts of interest between managers and shareholders. Dividend and debt interest payments decrease the free cash flow available to managers to invest in marginal net present value projects and manager perquisite consumption. This combination of agency and signaling theory should better explain dividend policy than either theory alone, but the free cash flow hypothesis does a better job of rationalizing the corporate takeover frenzy of the 1980s (Myers, 1987, 1990) than it does of providing a comprehensive and observable dividend policy.

2.3. Behavioral models

No paradigm discussed thus far completely explains observed corporate dividend behavior. Investor behavior is substantially influenced by societal norms and attitudes (Shiller, 1984). Unfortunately, this motivation has been ignored by financial theorists for the most part because of the difficulty of introducing investor behavior into traditional financial pricing models (Arbel, Carvell, & Postnieks, 1988). According to Shiller (1989), including these influences in modeling efforts can enrich the development of a theory to explain the endurance of corporate dividend policy.

Ordinary investors are faced not with risk, but with uncertainty—a lack of concise judgment and sense of objective evidence (Knight, 1964). Social pressures can lead to errors in judgment and trading activities by shareholders that cannot be logically explained. These errors in judgment are only mistakes, not lapses of rational investment activity. Mass investor psychology profoundly influences aggregate market activity (Shiller, 1984).

Dividend policy is inconsistent with wealth maximization of the shareholder and is better explained by the addition of a socioeconomic–behavior paradigm into economic models. Dividend payouts can be viewed as the socioeconomic repercussion of corporate evolution—

the information asymmetries between managers and shareholders cause dividends to be paid to increase the attractiveness of equity issues (Frankfurter & Lane, 1992).

The systematic relation between industry type and dividend policy reported by Michel (1979) implies that managers are influenced by the actions of executives from competitive firms when determining dividend payout levels. Managers, realizing that shareholders desire dividends, pay or increase dividends to mollify investors (Frankfurter & Lane, 1992). Dividend payments to shareholders should help increase the corporation's stability by serving as a ritualistic reminder of the managerial and owner relationship (Ho & Robinson, 1992). As Frankfurter and Lane (1992) contend, dividends are partially a tradition and partially a method to allay investor anxiety.

2.3.1. Managerial surveys

Lintner (1956) surveyed corporate chief executive officers and chief financial officers (CFOs) and found that dividend policy is an active decision variable because managers believe that stable dividends lessen negative investor reactions. The active determination of dividend policy implies that the level of retained earnings and savings is a dividend decision byproduct. Darling (1957), Fama and Babiak (1968), and Turnovsky (1967) find empirical support for Lintner's findings; dividends are a function of current and past profit levels and expected future earnings, and are negatively correlated with changes in the level of sales. Current income remains the critical determinant of corporate dividend policy 25 years after Lintner's original survey (DeAngelo, DeAngelo, & Skinner, 1992).

Other factors not considered by Lintner (regulatory constraints, investment magnitude, debt, and firm size) also affect dividend policy. Variations in dividend policy are primarily due to a combination of endogenous and exogenous elements (Dhrymes & Kurz, 1964).

Harkins and Walsh (1971) find that shareholder dividend desires and management need of retained earnings for investment opportunities conflict. A compromise policy partially satisfying both parties is chosen. Managers consider current and expected earnings, dividend payment history, dividend level stability, cash flows and investment opportunities, and shareholder desires in their determination of the payout level.

Surveys of CFOs by Baker et al. (Baker & Farrelly, 1988; Baker, Farrelly, & Edelman, 1985) confirm the Lintner (1956) results. The CFOs cite the importance of dividend continuity, the belief that share prices are affected by dividend policy, and the difference in classification of regular and unusual cash flows as important determinants of dividend policy.

Managerial views of dividend policy are essentially unchanged 30 years after Lintner's study; dividends are paid because shareholders expect continued dividend growth and managers believe investors want to receive dividends. Managers believe that dividend payments are necessary to maintain or increase share price and to attract new investors. Dividend payout policy is determined using criteria including sustainability, current firm profitability, future cash flow expectations, and industry norms.

2.3.2. Theoretical behavioral models

Feldstein and Green (1983) model the corporate dividend decision as the last step in a process that evaluates inputs from five sources. First, dividend policy is a consequence of

investor consumption needs. The tax liabilities from dividend payment are less than the transaction costs of selling shares to provide income if earnings are retained. Second, the market value of retained earnings is less than the market value of dividends. Third, dividend payment is consistent with steady state growth and an optimal debt/equity ratio. Fourth, dividend payments are a byproduct of the separation of corporation owners and managers; dividend payments help to diminish the agency costs arising from separation of corporate owners and managers and are used for signaling activities. Finally, although asymmetric information and agency costs are present in the model, the paradigm is not dependent on these market imperfections. The involvement of shareholders with diverse tax liabilities and diversification goals in an equilibrium with uncertainty results in dividend payments.

Shefrin and Statman (1984) explain dividend preference by using the theory of self-control (Thaler & Shefrin, 1981) and the descriptive theory of choice under uncertainty (Kahneman & Tversky, 1982). Information models are used to justify the presence of corporate dividends while the tax liability of dividends is used as a counterargument. This model is also consistent with dividend clienteles.

Dividends and capital gains are not always perfect substitutes (even in a world without taxes and transaction costs) because of a lack of self-control to delay gratification (Thaler & Shefrin, 1981). In financial theory, dividends and capital gains have the same value; this is not the case in a world modeled using the theory of self-control. Dividend checks are appreciated more than capital gains and provide an automatic control device on spending levels (Thaler, 1980). Risky alternatives, costs, and payoffs are evaluated separately.

The greater effects shown following dividend decreases also support this contention; losses are more significant than gains. Kahneman and Tversky (1982) posit that the sale of shares of stock causes more investor regret and anxiety than the spending of the cash received from dividend payments. A subsequent price rise of shares sold for income needs increases the shareholders' contrition. Clearly, in this model, capital gains and dividends are not perfect substitutes. Regret aversion can induce a preference for dividends through the use of a consumption rule based on the utilization of dividends, not invested capital. Dividend yields are positively correlated with the planned dissaving rate. If dissaving is positively related to age and negatively related to income, portfolio dividend yields will be positively correlated with age and negatively correlated with income.

Marsh and Merton (1986) develop a rational expectations model of dividend policy as management's response to permanent earnings. In equilibrium, dividend levels are determined using future earnings expectations. Using dividends as signals is incompatible with this model.

3. Analysis of empirical tests of dividend theories

The conflicting results of empirical analyses are commonly blamed on differences in modeling, method of analysis, data type, or sample period. The choice of variables included in or omitted from a model (Frankfurter & Gong, 1993; McCabe, 1979; Watts, 1976b) and the definition used in the estimation of important factors (Miller & Scholes, 1982) can

significantly influence a study's results. Roll (1977) asserts that the lack of an adequate proxy can make a theoretical model untestable.[5] The use of different methods across studies can limit the comparability of the results (Morgan, 1982).

As shown by Baker and Farrelly (1988), attempts to empirically validate theoretical dividend models are thus far inconclusive or in some cases even contradictory. Numerous rationales have been offered as explanations for these divergent results; the model and empirical method of analysis applied (Morgan, 1982; Watts, 1973), the frequency of sample observation (Laub, 1976; Watts, 1976a), and the period of the sample (Watts, 1973) are specified as possible causes of the inconsistencies. The purpose of this analysis is to examine the empirical studies of corporate dividend policy and determine whether the choice of method of analysis, frequency of sampling observation, or sample period influences the results of the tests of dividend policy.

This examination is important for several reasons. Results that cannot be duplicated over diverse sample periods are likely to be the artifacts of a particular period. In contrast, findings that persist through time can lead to the development of more descriptive models. Finally, results that change over time can be indicative of changes in the returns-generating mechanism (Amihud & Mendelson, 1987).

3.1. Method of analysis

The categorical data analysis method (CDAM) is used to determine whether the method of analysis, observation frequency, and sample period can predict and explain the results of a study. CDAM is a specialized, multivariate analysis technique for evaluation of response and explanatory variables via weighted least squares (WLS) procedures. This approach is useful in the examination of dichotomous (i.e., studies supporting or failing to support a hypothesis), nonordered, polytomous (i.e., differences in method of analysis), and ordered polytomous (i.e., early, middle, and late sample periods) discrete variables.

CDAM had been around for quite some time (Fienberg, 1980). The technique uses a multidimensional contingency table to cross-classify data into categories. Each category count represents the frequency of a unique combination of categorical variables in the sample. The population variable-level combination probability is estimated using iterative WLS and the observed frequency. Iterative WLS improves WLS estimates by first estimating the weights, fitting the regression function, and calculating the residuals using WLS. The residuals from the first estimation are then used to re-estimate the weights and to refit the regression. The process repeats itself until no significant changes occur in the weights.

The explanatory variables used in the analysis are assumed to represent true categorical variables and not a blend or combination of the explanatory variables. Each of the variables used in the analysis is an independent categorical variable. In addition, explanatory variables

[5] Taking Roll's statement at face value and applying strict Popperian criteria to determine the scientific value of empirically untestable theories would be tantamount to their instantaneous disqualification.

are assumed to be fixed, play a defining role, and can be either continuous or discrete. The method also assumes that explanatory variables are mutually independent—the knowledge of one of the independent categorical variables does not ensure correct prediction of another explanatory variable. In CDAM, the table frequencies presupposed to follow a product multinomial distribution. This is a requirement for each observation in the sample to be classified based on its unique combination of explanatory variables.

CDAM and analysis of variance (ANOVA) are similar methods of analysis and belong to the family of general linear models. CDAM and ANOVA are similar to the extent that they both estimate the interaction between variables. Yet, there is a difference; ANOVA models estimate the effects of the independent variables on the dependent variable and partition the overall variability of the model. CDAM, on the other hand, reflects on the structural relation between the variables by estimating the parameters and testing hypotheses about linear combinations of these parameters. That is why we think that, although rarely if ever used in financial economics, the CDAM fits better the objective and purpose of this study.

The null hypothesis is formulated so as to test the fit of the model. The test statistics calculated are generalized Wald (1943) statistics that approximate an asymptotic χ^2 distribution.

The multidimensional contingency table displays cross-classified counts based on each of several sets of categories and facilitates CDAM. The table rows represent samples determined by unique combinations of independent variables, while the table columns are determined by

Table 1
The CDAM classification framework

Method of analysis	Data type	Sample period
Abnormal returns[a]	daily	pre-1976
		post-1976
	other[b]	pre-1976
		post-1976
Other[c]	daily	pre-1976
		post-1976
	other	pre-1976
		post-1976
Abnormal returns	daily	pre-1976
		post-1976
	other	pre-1976
		post-1976
Other	daily	pre-1976
		post-1976
	other	pre-1976
		post-1976

[a] Abnormal returns methods of analysis include event study and abnormal returns. A listing of method of analysis classifications is found in Appendix A.

[b] Other data includes weekly, monthly, quarterly, semiannual, and annual observations.

[c] Other methods of analysis include regression analyses and other methods (see Appendix A).

Table 2
Empirical studies of corporate dividend policy

Author(s)	Period	Data	Method of analysis[a]
Empirical studies of the Miller and Modigalini (1961) dividend irrelevance proposition			
Dhrymes and Kurz (1967)	1951–1960	annual	XSRA, 2SLS, 3SLS
Brigham and Gordon (1968)	1958–1962	annual	MRA
Higgins (1972)	1961–1965	annual	XSRA
Fama (1974)	1946–1968	annual	TSRA, OLS, 2SLS
McDonald, Jacquillat, and Nussenbaum (1975)	1962–1968	annual	XSRA, OLS, 2SLS
Bar-Yosef and Kolodny (1976)	1963–1971	annual	XSRA
McCabe (1979)	1966–1973	annual	XSRA, OLS, 2SLS
Anderson (1983)	1963–1977	quarterly	TSRA
Peterson and Benesh (1983)	1975–1979	annual	XSRA, 3SLS, SUR
Smirlock and Marshall (1983)	1958–1977	annual	GC
Jensen, Solberg, and Zorn (1992)	1982–1987	annual	XSRA, 3SLS
Frankfurter and Gong (1993)	1979–1990	quarterly	TSRA, XSRA, VAR
Empirical studies pricing the tax on dividends by adding a variable to the capital asset pricing model			
Black and Scholes (1974)	1936–1966	monthly	MRA
Litzenberger and Ramaswamy (1979)	1936–1977	monthly	MRA
Rosenberg and Marathe (1979)	1931–1966	monthly	MRA, 2SLS
Litzenberger and Ramaswamy (1980)	1936–1977	monthly	XSRA
Gordon and Bradford (1980)	1926–1978	monthly	MRA
Green (1980)	1962–1977	daily	XSRA, TSRA
Blume (1980)	1936–1976	quarterly	XSRA
Morgan (1982)	1931–1977	monthly	MRA, OLS, BJM
Litzenberger and Ramaswamy (1982)	1936–1980	monthly	XSRA
Miller and Scholes (1982)	1940–1978	monthly	XSRA
Hess (1982)	1962–1979	daily	MRA
Hess (1983b)	1951–1980	monthly	MRA
Auerbach (1983)	1963–1977	daily	MRA
Elton, Gruber, and Rentzler (1983)	1936–1976	annual	MRA
Ang and Peterson (1985)	1973–1983	annual	XSRA
Christie (1990)	1946–1985	monthly	MRA
Naranjo, Nimalendran, and Ryngaert (1998)	1963–1994	monthly	MRA
Empirical studies of changes in price during the period surrounding ex-dividend days			
Elton and Gruber (1970)	1966–1967	daily	EG
Long (1978)	1956–1976	daily	P_A/P_B
Finnerty (1981)	1978	daily	EG
Kalay (1982a)	1966–1967	daily	MEG
Eades, Hess, and Kim (1984)	1962–1980	daily	MEG
Lakonishok and Vermaelen (1986)	1970–1981	daily	ES
Kaplanis (1986)	1979–1984	daily	OP
Poterba (1986)	1965–1984	daily	P_A/P_B
Bailey (1988)	1976–1983	daily	C_A/C_B
Karpoff and Walkling (1988)	1964–1985	daily	XSRA, OLS
Bajaj and Vijh (1990)	1962–1987	daily	ES
Karpoff and Walkling (1990)	1973–1985	daily	ES
Skinner and Gilster (1990)	1980–1985	daily	EG

Table 2 (*continued*)

Author(s)	Period	Data	Method of analysis[a]
Empirical studies of changes in price during the period surrounding ex-dividend days			
Sterk and Vandenberg (1990)	1984–1986	daily	P_A/P_B
Venkatesh (1991)	1988	intraday	MEG
Stickel (1991)	1972–1980	daily	ES
Dubofsky (1992)	1962–1987	daily	MEG
Empirical studies of changes in the tax liability of dividends			
Feldstein (1970)	1953–1964	quarterly	XSRA, IV, ALS
Khoury and Smith (1977)	1962–1973	annual	TSRA
Morgan (1980)	1968–1977	monthly	MRA, OLS, GLS
Lakonishok and Vermaelen (1983)	1971–1972	daily	MEG
Amoako-Adu (1983)	1968–1978	monthly	ES
Booth and Johnston (1984)	1970–1980	daily	EG
Poterba and Summers (1984)	1955–1981	daily	XSRA, GLS
Barclay (1987)	1900–1910	daily	EG
Crockett and Friend (1988)	1940–1985	annual	TSRA, OLS
Grammatikos (1989)	1975–1985	daily	MEG, ES
Robin (1991)	1984–1988	daily	ES
Michaely (1991)	1986–1989	daily	MEG
Ang, Blackwell, and Megginson (1991)	1969–1982	annual	Means
Givoly, Hayn, Ofer, and Sarig (1992)	1983–1987	annual	XSRA
Hearth and Rimbey (1992)	1984–1988	daily	EG, NP
Wu and Hsu (1992)	1984–1990	daily	ES
McKenzie and Thompson (1995)	1985–1986	daily	ES
Bond, Chennells, and Devereux (1996)	1970–1990	annual	OLS
Kalay and Michaely (2000)	1936–1977	multiple	OLS, GLS, MLE
Empirical studies of the information content of dividends hypothesis			
Fama, Fisher, Jensen, and Roll (1969)	1927–1959	monthly	ES, TSRA
Pettit (1972)	1964–1969	daily	ES, XSRA
Watts (1973)	1946–1965	monthly	XSRA, OLS
Ezell (1974)	1966–1970	annual	MRA
Ang (1975)	1966–1971	quarterly	CSA
Griffen (1976)	1968–1973	monthly	XSRA, ES
Laub (1976)	1946–1965	annual	MRA
Petitt (1976)	1946–1965	monthly	MRA
Charest (1978)	1962–1969	daily	ES
Gonedes (1978)	1946–1972	annual	XSRA
Empirical studies supporting the information content of dividend hypothesis			
Aharony and Swary (1980)	1963–1976	daily	ES
Kalay (1980)	1956–1975	annual	DCA
Kwan (1981)	1973–1977	quarterly	ES
Woolridge (1982)	1970–1977	daily	ES
Eades (1982)	1960–1979	monthly	MRA, ES
Woolridge (1983)	1971–1977	daily	ES, NP
Asquith and Mullins (1983)	1964–1980	daily	ES

(continued on next page)

Table 2 (*continued*)

Author(s)	Period	Data	Method of analysis[a]
Empirical studies supporting the information content of dividend hypothesis			
Brickley (1983)	1969–1979	daily	ES
Divecha and Morse (1983)	1977–1979	daily	ES
Penman (1983)	1968–1973	annual	TSRA, Means
Kane, Lee, and Marcus (1984)	1979–1981	daily	ES, MRA
Handjinicolaou and Kalay (1984)	1975–1976	daily	ES
Benesh, Keown, and Pinkerton (1984)	1971–1978	daily	ES
Dielman and Oppenheimer (1984)	1969–1977	daily	RCRA
Kalay and Lowenstein (1985)	1962–1980	daily	ES
Eades, Hess, and Kim (1985)	1962–1980	daily	ES
Asquith and Mullins (1986)	1964–1980	daily	ES
Kalay and Lowenstein (1986)	1979–1981	daily	ES
Richardson, Sefcik, and Thompson (1986)	1969–1982	daily	XSRA
Ofer and Siegel (1987)	1976–1984	daily	MRA, IV
Healy and Palepu (1988)	1954–1982	quarterly	XSRA
Eddy and Seifert (1988)	1983–1985	daily	ES
Fehrs, Benesh, and Peterson (1988)	1980–1984	daily	ES
Damodaran (1989)	1981–1985	daily	EPS/DPS, NP
Venkatesh (1989)	1972–1983	daily	NP
Manakyan and Carroll (1990)	1979–1983	quarterly	NP, GC
Easton (1991)	1978–1980	semiannual	MRA
Wansley, Sirmans, Shilling, and Lee (1991)	1973–1986	daily	ES, XSRA
Ghosh and Woolridge (1991)	1962–1984	daily	ES
Shrader and Milkman (1991)	1987–1988	daily	ES
DeAngelo et al. (1992)	1980–1985	annual	LOGIT, NP
Eddy and Seifert (1992)	1983–1985	daily	ES
Kao, Wu, and Lin (1992)	1965–1990	quarterly	TOBIT
Kim and Viswanath (1992)	1971–1980	daily	ES
Schatzberg and Datta (1992)	1963–1988	daily	ES, NP
Wong and Swindle (1992)	1970–1986	daily	NP
Gu and Clayton (1993)	1982–1986	quarterly	ANOVA RBD
Denis, Denis, and Sarin (1992)	1962–1988	daily	ES
Bajaj and Vijh (1995)	1962–1987	daily	ES
Bernheim and Wantz (1995)	1962–1988	daily	OLS
Michaely, Thaler, and Womack (1995)	1964–1988	daily	ES
Akhigbe and Madura (1996)	1972–1990	daily	ES
Firth (1996)	1980–1991	daily	ES
Amihud and Murgia (1997)	1988–1992	daily	ES
Desai and Jain (1997)	1976–1991	monthly	Bootstrap
Brook, Charlton, and Hendershott (1998)	N/A	annual	AR
Dyl and Weigand (1998)	1972–1993	daily	ES, OLS
Howe and Shen (1998)	1968–1992	daily	ES
Lipson, Maquieira, and Megginson (1998)	1980–1986	daily	ES
DeAngelo, DeAngelo, and Skinner (2000)	1962–1995	daily	ES
Garrett and Priestley (2000)	1977–1997	annual	ECM
Guay and Harford (2000)	1981–1993	quarterly	MRA
Kosedag and Michalyluk (2000)	1980–1996	daily	ES
Pan (2001)	1871–1993	annual	CCA

Table 2 (*continued*)

Author(s)	Period	Data	Method of analysis[a]
Empirical studies not supportive of the information content of dividend hypothesis and signaling models			
Riding (1984)	1974–1979	monthly	RRA, ES
Born, Moser, and Officer (1988)	1962–1985	daily	ES, MRA
McCann and Webb (1992)	1975–1987	daily	ES, MRA
Frankfurter and Gong (1992)	1986–1990	daily	ES
DeAngelo, DeAngelo, and Skinner (1996)	1980–1987	annual	AR
Benartzi, Michaely, and Thaler (1997)	1979–1991	annual	OLS
DeAngelo et al. (2000)	1962–1995	daily	ES
Jagannathan, Stephens, and Weisbach (2000)	1985–1996	annual	NP, Means
Empirical studies of agency cost theory			
Rozeff (1982)	1974–1980	annual	MRA
Dyl and Hoffmeister (1986)	1979	weekly	MRA
Crutchley and Hansen (1989)	1981–1985	annual	MRA
DeAngelo and DeAngelo (1990)	1980–1985	annual	LOGIT
Collins, Saxena, and Wansley (1992)	1989–1990	annual	MRA, OLS
Dempsey and Laber (1992)	1981–1987	annual	MRA
Sun (1992)	1979–1983	annual	MRA
Lippert, Nixon, and Pilotte (2000)	1992	annual	OLS
Empirical studies of the signaling versus free cash flow hypotheses			
Lang and Litzenberger (1989)	1979–1984	intraday	ARA
Barber and Castanias (1992)	1977–1989	annual	LOGIT, NP
Denis, Denis, and Sarin (1992)	1962–1987	daily	XSRA
Lee and Roberts-Glandoff (1992)	1975–1987	daily	ES
Maquiera and Megginson (1992)	1980–1990	daily	ES, MRA, NP
Moh'd, Perry, and Rimbey (1995)	1972–1989	annual	XSRA

[a] See Appendix A for abbreviations.

dependent variable response. The count in the (i,j)-th cell is the quantity of individuals in the i-th population that have the j-th response. The sample proportion,

$$p_{ij} = n_{ij}/n_j, \tag{1}$$

estimates the probability of the j-th response (π_{ij}). The proportion vector $\boldsymbol{p}$ is converted into a function vector $\boldsymbol{F} = \boldsymbol{F}(\boldsymbol{p})$. If the true probabilities for the entire table are represented by the vector $\boldsymbol{\pi}$, the functions of the probabilities $\boldsymbol{F}(\boldsymbol{\pi})$ follow the linear model

$$E_{\mathrm{A}}(\boldsymbol{F}) = \boldsymbol{F}(\boldsymbol{\pi}) = \mathbf{X}\boldsymbol{\beta}, \tag{2}$$

where E_{A} indicates the asymptotic expectation, $\mathbf{X}$ is the fixed constant design matrix, and $\boldsymbol{\beta}$ is the parameter vector that is estimated.

The WLS estimation method is used to estimate the structural relation between the variables. The weights are determined from the inverse covariance matrix of the $\boldsymbol{F}(\boldsymbol{p})$ functions of $\boldsymbol{F}$ and b ($\boldsymbol{\beta}$ estimate) and the weighted residual sum of squares is minimized. If $\mathbf{S}$

is defined as the estimated covariance matrix of $\boldsymbol{F}$, the fit of the model is determined using the test statistic

$$\boldsymbol{F}'\mathrm{S}^{-1}\boldsymbol{F} - b'(\mathbf{X}'\mathbf{S}^{-1}\mathbf{X})b, \tag{3}$$

which is asymptotically distributed χ^2. The goodness of fit of the model is tested with the null hypothesis

$$H_0 : \ \mathbf{C}\beta = 0,$$

where $\mathbf{C}$ is a matrix of arbitrary constants, against the alternate hypothesis

$$H_\mathrm{A} : \ \mathbf{C}\beta \neq 0.$$

The test statistic for the null

$$\boldsymbol{B}'\mathbf{C}'[\mathbf{C}(\mathbf{X}'\mathbf{S}^{-1}\mathbf{X})^{-1}\mathbf{C}']^{-1}\mathbf{C}b \tag{4}$$

follows an asymptotically χ^2 distribution if H_0 is true. Although the maximum likelihood estimation method of CDAM has a smaller variance, WLS regression CDAM is less complex and the difference in variance is not significant (Grizzle, Starmer, & Koch, 1969). We experimented with both and found no significant differences.

The implementation of CDAM is facilitated by the assignment of the sample's observations into classes based on some explanatory variable characteristic. The table developed from this classification process provides a concise summary of the data. The technique then uses a series of dummy variables representing the explanatory variable classes and tests the model using WLS estimation techniques.

3.2. Data

The data are the set of empirical studies performed to support or reject the theoretical models discussed in the preceding section. Table 1 displays the framework used in the assignment of the individual studies to CDAM populations. Table 2 is the list of these studies by theoretical categories.

Three attributes of each study are the variables of the tests. These variables, in order, are:

1. the method of analysis used, classified as methods analyzing changes in price or average return (event study or price change methods of analyses), as using regression analyses (least square analysis, logit analysis, etc.), or other methods;[6]
2. the data type, classified as either daily data or less frequent data (weekly, monthly, etc.); and

[6] See Appendix A for the assignment of methods of analysis to classes.

Table 3
CDAM analyses–WLS models: empirical studies of corporate dividend policy[a]

Panel A. All studies

Variable	Estimate	S.E.	$\chi^{2,b}$	Probability (P value)
Intercept	0.209	0.032	41.54	.001
Method of analysis	0.012	0.042	0.07	.777
Data type	−0.002	0.042	0.00	.976
Sample period	0.045	0.033	1.85	.152

Panel B. Information content hypothesis

Variable	Estimate	S.E.	$\chi^{2,c}$	Probability (P value)
Intercept	0.247	0.047	26.92	.001
Method of analysis	−0.003	0.052	0.00	.957
Data type	−0.043	0.058	0.55	.459
Sample period	0.025	0.050	0.23	.619

[a] The empirical studies evaluated are listed in Table 2.
[b] $n=150$ in this panel.
[c] $n=85$ in this panel.

3. the sample period, where, based on the midpoint of the sample period, the study is classified as either pre-1976 or post-1976.[7]

3.3. Results

A population profile succinctly summarizes the assignment of individual empirical studies to groups based on explanatory variable combinations. The sample size of each population is the frequency that each combination of categorical variables appears in the overall sample. The CDAM hypothesis tested is that any of the three explanatory variables (individually or in combination with the others) is significant in its ability to predict the outcome of the study. The CDAM tests are presented in Table 3 in two panels. Panel A is for all studies and Panel B is for studies dealing with the information content of dividends only.

As shown in Table 3, the WLS estimates of method of analysis, data type, and sample period coefficients do not differ significantly from zero and therefore do not influence the outcome of the analyses. The estimates of each explanatory variable are extremely small and

[7] The choice of 1976 as the dividing point is based on the publication of Jensen and Meckling's (1976) Agency Theory, which gave rise to intense examination of the costs of asymmetric information. Also, the approximate midpoint of the "modern" financial era (beginning with Modigliani and Miller's seminal paper of 1958) is 1976. In addition, this choice divides the studies in our sample into two approximately equal groups. We wish to emphasize, however, that our results are quite robust to the selection of the time period. Classifying the sample period using several other criteria did not alter results presented in this paper.

the reported *P* values range from .152 to .976. The intercept term representing the mean of the dependent variable is highly significant with a *P* value of $< .001$. These conclusions hold for both the total population and the information content population. Because the term represents all variables not included, factors absent from the model can cause the diverse results of the empirical tests.

Additional CDAM is performed using finer divisions of the explanatory variables. The ''method of analysis'' variable is divided into four groups—abnormal returns, price change,

periods. This is not an encouraging state of affairs, because such washouts do not contribute to growth in scientific knowledge, and perhaps obscure important factors. Model specification, variable definition, and proxy choice can also affect findings.

4. Summary and concluding remarks

Feldstein and Green (1983), following Black (1976), remark: "The nearly universal policy of paying substantial dividends is the primary puzzle in the economics of corporate finance." A number of conflicting theoretical models, all lacking strong empirical support, define current attempts by research in finance to explain the dividend phenomenon. Nor can corporate dividend policy be ascribed to existing regulatory constraints. The incomplete nature of current theories and the sensitivity of data to changes in specifications preclude any dogmatism (Brealey & Myers, 1991).

It has been argued that dividend policy is "sticky"—managers decrease dividends only when absolutely necessary—in the event of poor earnings with reserves insufficient to fund the dividend (DeAngelo et al., 1992; Myers, 1984). Furthermore, individual market imperfections do little to explain the underlying reasons for dividend payments (Black, 1976). The systematic time series behavior of corporate dividend policy implies that firm-specific, theoretical explanations of dividend policy—signaling and agency theories—cannot explain the practice (Marsh & Merton, 1987).

The majority of shareholders must pay taxes on dividend income. The majority of empirical works support the hypothesis that the returns on dividend-paying stocks are increased to offset the tax liability of dividend payments. The absence of a pronounced difference in the portfolios of high- and low-tax-bracket individuals casts doubts, however, as to the significance of taxes in the determination of corporate dividend policy. Kalay and Michaely (2000) find no empirical evidence for the tax effect although they suggest that perhaps more complex models will find such a connection. The opinion of the present authors is that ratcheting up complexity would only add confusion without any positive benefit of tying tax effect to dividend policy.

Dividends can relay information, but the use of dividends for this purpose fails to explain why firms pay dividends. Signaling's impact on the investor's preference for dividends is even less certain because of the ambiguity associated with signals. Further, if dividends are changed only to signal firm-specific information, aggregate dividend changes should be small and random rather than have a systematic time series pattern and a demonstrated positive trend (Marsh & Merton, 1987).

No single economic rationale can explain the dividend phenomenon. The preference of shareholders for dividends (Crockett & Friend, 1988) can instead be partially explained by a combination of factors: risk averse shareholders who have invested in capital-constrained firms, the costs associated with systematic liquidation of holdings, agency costs, and information transmission. The incompleteness of all theoretical models is largely due to a misconception of the nature of dividend payments. The continuance of dividends is based in the main on longstanding corporate traditions (Brealey & Myers, 1991).

The corporate tradition of paying dividends is the sum total of more than 300 years of *evolution* of the practice of dividend payments. Despite individual differences in policy, consistent, identifiable patterns of dividend payment recur through corporations. Managers are reluctant to reduce dividend payments, even in periods of financial distress. Moreover, dividends are increased only if a corporation's management is confident that the higher levels can be maintained. Executives believe that shareholders expect significant dividends to be paid and shareholders believe that they deserve these dividends. Finally, shareholders prefer dividend payments despite the tax liability. Myers (1990) surmises that dividend payments are in reality an unwritten contract between shareholders and corporate management.

Current models of corporate dividend policy by and large ignore behavioral and socioeconomic influences on managerial and shareholder activities. Unless these influences are incorporated into future models, dividend preference is difficult to explain, other than as an irrational desire by investors for dividends (Shiller, 1984). The exclusion of these motivations from financial models severely limits their application to corporate activities and policy determination. Dividend policy is influenced by the same fads and fashions that affect stock prices because the managers who determine dividend policy are motivated by behavioral and socioeconomic influences (Shiller, 1990). As Shiller (1986) argues, a model incorporating a combination of modern financial theories and behavioral and psychological influences might best explain corporate dividend policy. Until such model is developed, tests of dividend policy theories will remain both inconclusive and inconsistent.

Appendix A. Method of analysis abbreviations

A. Abnormal return methods of analysis

ARA	abnormal returns analysis
ES	event study method of analysis

B. Price change methods of analysis

C_A/C_B	price ratio between two classes of common stock
DCA	dividend change analysis
EG	Elton and Gruber
EPS/DPS	earnings per share/dividends per share
MEG	modified Elton and Gruber
OP	changes in option prices
P_A/P_B	price ratio between two issues

C. Regression analysis methods of analysis

ALS	augmented least squares regression
Bootstrap	bootstrap
IV	instrumental variables
LOGIT	logit
MRA	multiple regression
OLS	ordinary least squares regression
RCRA	random coefficient regression
RRA	recursive regression
SUR	seemingly unrelated regressions
TSRA	time series regression
2SLS	two-stage least squares
3SLS	three-stage least squares
TOBIT	tobit
XSRA	cross sectional regression

D. Other methods of analysis

ANOVA RBD	ANOVA randomized block design
BJM	Box Jenkins method
CCA	canonical correlation analysis
CSA	cross-spectral analysis
DA	aggregate data analysis
ECM	error correction model
GC	Granger causality test
Means	means test
NP	nonparametric tests
VAR	vector autoregression

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