



A Time-Series Analysis of Corporate Payout Policies

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Abstract. I conduct a time-series analysis of corporate payout policies that accounts for the dynamic nature of these decisions and for the interaction among investment decisions and payout policies. The estimation is done with a VAR model of investments, earnings, total payout, and the split of the total payout between dividends and share repurchases. I control for changes in the legal treatment of share repurchases in 1982 and for changes in the relative taxation of dividends and capital gains. I find that: (i) an increase in the taxation of capital gains relative to dividends shifts the split of total payout away from share repurchase and toward dividends; (ii) corporate investment decisions lead payout policies and not the other way around; (iii) increases in corporate total payout are associated with long-term subsequent increases in earnings; (iv) changes in the composition of corporate payout away from share repurchases and toward dividends are associated with subsequent increases in earnings.

1. Introduction

Theoretical arguments suggest that taxation and firm prospects are important determinants of dividend policy.¹ Prior empirical studies, however, have produced ambiguous and conflicting evidence about the role of taxes and firm prospects in determining actual dividend policies. For example, while the tax-based theory of dividend policy predicts that firm value and dividend payout are negatively correlated, Fama and French (1998) report that, controlling for other effects, actual firm values and dividend payouts are *positively* correlated. DeAngelo et al. (1996) and Benartzi et al. (1997) report another negative result: dividend policy does not help forecast future earnings as signaling theories suggest.² This is despite the empirical evidence that stock, bond, and option prices react to dividend changes

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¹ See, for example, Brennan (1970), Miller and Scholes (1978), Bhattacharya (1979), Miller and Rock (1985), Ambarish et al. (1987), and Ravid and Sarig (1991).

² On the other hand, Healey and Palepu (1988) and Aharony and Dotan (1994) find that dividend changes are positively correlated with subsequent unexpected earnings.

(e.g., Aharoni and Swary, 1980; Handjicolaou and Kalay, 1984; Bar Yosef and Sarig, 1992, respectively) and that dividend changes are correlated with revisions of analyst earnings expectations (e.g., Ofer and Siegel, 1987).

One possible explanation for some of the negative results is that the studies cited above focus on dividend policy, which is just one element in firms' payout policies. Similar mixed results, however, are also reported with respect to share repurchases. Specifically, empirical evidence suggests that stock prices react positively to announcements of share repurchases (e.g., Dann, 1981; Comment and Jarrell, 1991), yet it seems that share repurchases are not correlated with subsequent changes in operating performance (e.g., Dann et al., 1991; Grullon and Michaely, 2004).³ Alternatively, the lack of empirical support for the role of taxes and firm prospects in determining dividend policies may be due to the use of cross-sectional analysis in prior studies, which may fail to account for the dynamic and multi-dimensional nature of firm decisions. This study augments the cross-sectional studies of dividends and repurchases by reporting the results of a time-series analysis of payout policies.

This time-series analysis of payout policies differs from prior studies in several important aspects. First, I carry out the analysis with the Vector Autoregressive (VAR) approach proposed by Sims (1982). The VAR model is capable of capturing both the dynamics of the decisions as well as the joint determination of multiple corporate decisions. Second, unlike most prior studies, which separately analyze dividend and share repurchase decisions, I jointly consider the determination of both the level of total payout and its split between dividends and share repurchases. Third, my analysis spans the years from 1950 through 1997 (the full set of years for which COMPUSTAT data are available on any of the COMPUSTAT tapes). The long sample period allows me to estimate the impact of macro-economic parameters on the distribution of corporate payout. Lastly, much of the preceding analysis of payout policies was concerned with price effects, the major exceptions being Lintner (1956) and, recently, Lee (1996), Lie and Lie (1999) and Fama and French (2001). In contrast, my focus is on payout levels. Thus, this study complements the vast body of literature on the price effects of payout policies.

To estimate the time-series relations, I use a sample of 156 firms for which all necessary data are available throughout the sample period. I assume that the model determining payout policies stays constant throughout the estimation interval. Specifically, the *relations* among the variables are assumed to be time invariant, while the firms' environment is allowed to change: the estimated VAR model accounts for changes in the firms' profits, investments, and tax environment. Thus, I implicitly assume that a given change in the firms' environment has the same impact on their payout policies throughout the sample period, while the actual environment need not be the same throughout the sample period.

³ Nohel and Tarhan (1998), however, find that some firms – low Q firms – exhibit improved performance following share repurchases, mostly due to asset sales.

The time-series analysis enables me to document several characteristics of payout policies that appear in line with theoretical arguments:

- An increase in the taxation of capital gains relative to dividends causes a shift in the split of the total corporate payout away from share repurchases toward dividends.
- Corporate investment decisions lead payout policies and not the other way around.
- Changes in total payout are positively correlated with long-run changes in earnings.
- Changes in the composition of corporate payout away from share repurchases and toward dividends are associated with subsequent increases in earnings.
- Changes in total payout that result from changes in earnings are achieved by share repurchase first and by dividend changes later (presumably as their permanence becomes more certain).

I conduct several diagnostic tests that document the robustness of the results to several modifications of the main analysis. In particular, I exclude from the main sample any firm that is not in the COMPUSTAT tapes during any part of the sample period, which may introduce a selection bias.⁴ To verify that the characteristics of payout policies of included firms are not different from those of excluded firms, I repeat the analysis for a shorter sub-period, the 30-year period of 1968–1997, with 403 more firms for which data are available throughout the reduced sample period. The estimated response functions are the same as those obtained with the full sample period (though with larger standard errors). Thus, the selection bias does not appear to entail an estimation bias as well.

The remainder of the paper is organized as follows. I describe the data and discuss the method of estimation and testing in Section 2. The results are reported in Section 3. Section 4 includes several diagnostic checks. In Section 5, I offer concluding remarks.

2. Data and Methodology

As explained above, the objective of this study is to conduct a time-series study of payout policies that accounts for the dynamic nature and mutual dependence of corporate decisions. To do this, I estimate a third-order, fully recursive, VAR model of investments (CAPX), earnings (EARNINGS), total payout (PAYOUT), and the fraction of the total payout issued in the form of dividends (SPLIT).⁵ Note

⁴ A firm may not be in all of the COMPUSTAT tapes because the shares were first issued after 1950, or because the shares were not traded part of the period, or because the firm was either liquidated or bought prior to 1997.

⁵ I also estimate the model with two lags and four lags. The Akaike and Schwartz information criteria are virtually the same with two, three, and four lags. Accordingly, the estimated response

that while CAPX measure *actual* investments, one can view CAPX as capturing the evolution over time of the firms' investment *opportunities* because investment opportunities and actual investments undertaken are correlated.

In addition to these endogenous variables, I include two exogenous variables in my basic VAR model: the relative taxation of capital gains and regular income (RELTX), calculated as the ratio of the maximal capital gains tax rate to the maximal regular income tax rate in each year, and a dummy variable (I82) that takes the value of 1 up to 1982 (inclusive) and 0 afterwards. The relative taxation variable captures the time variation in the tax incentive to prefer share repurchases to dividends and is related to Lie and Lie's (1999) finding that firms' likelihood of using share repurchases is related to taxes. The dummy variable is motivated by the SEC's adoption, at the end of 1982, of safe harbor rules under which share repurchases are presumed not to be share price manipulations. As Grullon and Michaely (2002) and others show, corporate share repurchase activity increased following this change in the legal attitude towards share repurchases.

The estimated model is:

$$Y_t = \alpha + \beta_1 \cdot Y_{t-1} + \beta_2 \cdot Y_{t-2} + \beta_3 \cdot Y_{t-3} + \gamma_1 \cdot \text{RELTX} + \gamma_2 \cdot \text{I82} + \varepsilon_t$$

where Y_t is the time- t vector of endogenous variables: CAPX, EARNINGS, PAYOUT, and SPLIT.

The sample consists of 156 firms that meet the following criteria:

- (i) they are included in any of the COMPUSTAT tapes in every year from 1950 through 1997;
- (ii) they are not a financial or otherwise regulated company;
- (iii) their fiscal year-end is December 31 throughout the sample period.

For each of the sample firms, I compute the components of their annual cash disbursements to stockholders – dividends and share repurchases. Details about the construction of the sample are contained in the Data Appendix.

The time-series of the above data allow me to examine the dynamics of payout policies of individual companies. Yet, when interpreting the estimated relations in firm level series, one faces the problem of determining and incorporating into test statistics the co-variation of firm level series. One solution to this problem is to report average estimates of firm-level parameters (as do, for example, Fama, 1974, who examines the relations between dividends and investment, and Chen and Wu, 1999, who examine the relations between dividends, earnings, and stock prices). This procedure implicitly assumes cross-sectional independence of firm statistics and may yield biased test statistics since the cross-section of investments, earnings, and payouts are correlated. An alternative approach is to aggregate firm-level data and examining the dynamics of the aggregate data (as do, for example, functions are hardly affected by the addition or deletion of a lag. Thus, I only report the results of the three-lag model.

Table I. Summary statistics of profits, investments, and payout series

The table includes summary statistics of the variables examined in this study. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The data refer to the aggregate variables of the sample firms adjusted to constant dollars (as of December 1997) using the GDP deflator. EARNINGS denotes annual net income before extra-ordinary items. PAYOUT denotes total annual payout-dividends plus share repurchases. SPLIT denotes the fraction of the total annual payout effected in the form of dividends. CAPX denotes annual capital expenditures on Plant, Property, and Equipment and on R&D. RELTAX is the year-end ratio of the maximal capital gains tax to the maximal regular income tax.

	Mean	Median	Max.	Min.	St. Dev.	Autocorr.
EARNINGS	73,197	75,048	128,282	27,581	26,803	0.829
PAYOUT	44,569	42,616	91,092	15,120	18,401	0.872
SPLIT	90.5%	95.9%	100.0%	60.7%	11.9%	0.820
CAPX	133,316	154,001	227,588	25,306	61,039	0.925
RELTAX	46.7%	40.0%	100.0%	27.5%	21.5%	0.924

Lamont, 1998 and 2000, who examines the relations between earnings, investments, and stock returns, and Marsh and Merton 1987, who examine the relation between dividends and prices). The advantage of examining aggregate data is that the aggregate series incorporate the cross-sectional correlation and retain the time-series dynamics. Hence, I use the latter approach: firm-level data is aggregated to overcome the problem of cross-sectional correlations, and the analysis focuses on the time-series, dynamic properties of the aggregate data. The descriptive statistics of the series analyzed in this paper are presented in Table I.

A key variable in the analysis of this study is the split of total payout between dividends and share repurchases. Figure 1 shows the total payout ratio of the sample firms from 1950 through 1997 and the payout split, that is, the fraction of aggregate dividends in the aggregate total payout. The total payout ratio is calculated as the ratio of total payout – dividends plus repurchases – to aggregate earnings, which is the value-weighted average of individual payout ratios. Interestingly, contrary to popular belief, the *total* payout of the sample firms increased in the 1980s and 1990s to over 60% of earnings versus about 50% in earlier years. Most of this increase is in the form of share repurchases. The change in payout patterns, especially following the change in the legal environment in 1982, is evident in the graph of the payout split: the ratio of dividends to total payout declines from virtually 100% up to 1982 to about two thirds in the 1990s. Figure 1 also shows a potentially important determinant of payout policy: the ratio of the maximal personal tax on capital gains to the maximal regular income tax. This ratio proxies for the relative taxation of share repurchases and dividends. As can be seen in the figure, the relative taxation

of dividends and capital gains changed quite often and quite substantially during the sample period: from a maximum of 100% (i.e., capital gains and dividends are taxed equally) to 27% (i.e., capital gains tax is about one fourth of dividend tax).

In interpreting the time profile of the payout series and the other results of this paper it is important to keep in mind that they largely pertain to the payout policies of dividend-paying firms. This is because, even though dividend payment is not required to be included in the sample, dividend-paying firms constitute the vast majority of the sample firms. Specifically, out of the 7,488 firm years in the sample, in only 333 firm years (4.4%) there was no dividend payment and of the 156 sample firms, only 41 firms (26.3%) have at least one year without dividends. When share repurchases are added, there are share repurchases in 67 of the 333 years without dividends so that in only 266 firm years (3.6%) there is no payout – either in the form of dividends or in the form of share repurchases. While the payout policies of these firms is the subject of analysis of this paper, as Fama and French (2001) point out, the universe of US publicly traded firms is increasingly populated by firms that do not pay dividends, about which this study of payout policies has little to say.

The correlation coefficients among the series and among their annual changes are reported in Table II. The most significant correlation coefficient, both for the series' levels and first differences, is the negative correlation between the total payout – PAYOUT – and the fraction of the total payout issued in the form of dividends – SPLIT. This negative correlation is also present in the estimated VAR model and probably results from the fact that special distributions are made as share repurchases. Consequently, transitory changes in the total payout cause the fraction of the dividends in the total payout to change in the opposite direction.

3. Empirical Results

Next I report the estimated parameters of the VAR model and examine the dynamic relations of investments, earnings, and payout policies.⁶ The estimated VAR model is reported in Table III. Several things are worth noting about the estimated model. First, while fairly parsimonious, the model is able to explain most of the variation over time in investments, earnings, total payout, and in the split of the payout between dividends and share repurchases. Second, the coefficient of I82, which captures the change in the legal view of share repurchase at the end of 1982, is of the right sign but insignificant. This is probably because I82 is significantly correlated with CAPX (−0.517), EARNINGS (−0.417), and RELTAX (−0.731), so that even though the simple correlation of I82 with SPLIT is high (0.890), it is

⁶ I use a VAR and not a VEC model even though the Philip-Perron test cannot reject the hypothesis that unit roots exist in some of the series (which obviously could be due to too small a sample). This is because the Johansen cointegration test indicates that there is no cointegrating equation in this system. See, in this regard, Sims et al. (1990) about the consistency of the regular VAR even if some unit roots are present

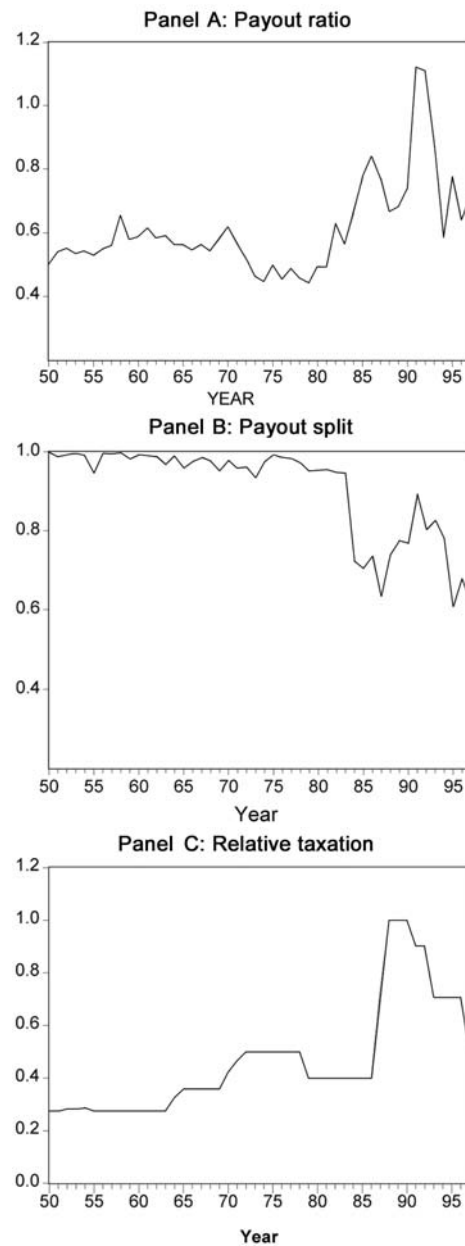


Figure 1. Payout ratio, payout split, and relative taxation of payout components. The figure describes the fraction of total corporate earnings paid out as either dividends or as share repurchase (“payout ratio”), the fraction of the payout issued in the form of dividends (“payout split”), and the relative taxation of the payout components – dividends and share repurchases – (“relative taxation”). Relative taxation is computed as the ratio of the maximal personal taxation of capital gains to the maximal personal regular income tax. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31.

Table II. Correlation among profits, investments, and payout policies

The Table includes correlation coefficients of the variables examined in this study. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The data refer to the aggregate variables of the sample firms adjusted to constant dollars (as of December 1997) using the GDP deflator. EARNINGS denotes annual net income before extra-ordinary items. PAYOUT denotes total annual payout-dividends plus share repurchases. SPLIT denotes the fraction of the total annual payout effected in the form of dividends. CAPX denotes annual capital expenditures on Plant, Property, and Equipment and on R&D. RELTAX is the year-end ratio of the maximal capital gains tax to the maximal regular income tax. The correlation coefficients among the annual levels of the variables are reported in the upper-right triangle and the correlation coefficients among the annual changes in the variables are reported in the lower-left triangle.

	EARNINGS	PAYOUT	SPLIT	CAPX	RELTAX
EARNINGS		0.827	-0.556	0.861	0.491
PAYOUT	0.081		-0.872	0.834	0.722
SPLIT	0.024	-0.782		-0.541	-0.638
CAPX	0.170	0.091	0.071		0.622
RELTAX	-0.182	0.047	-0.011	0.015	

difficult to estimate the separate effect of CAPX, EARNINGS, and I82 on SPLIT in this sample.

One of the interesting results reported in Table III is the significant estimated impact of the differential taxation of dividends and capital gains on payout policies. Prior empirical studies of the effect of taxation on corporate payout (e.g., Elton and Gruber, 1970; Litzenberger and Ramaswamy, 1980; Kalay, 1982; Fama and French, 1998) focus on the effect of taxation on stock *prices*. This analysis has yielded mixed results, suggesting that taxes may not play a major role in firm payout decisions. My analysis, which focuses on *quantities* – the composition of corporate payout – rather than on prices, shows that taxation significantly affects corporate payout policies. Specifically, *ceteris paribus*, an increase in the taxation of capital gains relative to regular income, which raises the cost of share repurchases relative to dividends, causes a significant shift in the composition of the total payout from share repurchases to dividends (*t*-statistic 2.925). This is in line with the cross-sectional results of Lie and Lie (1999), who use tax proxies to show that taxation affects firms' choice of the distribution means.

Lastly, even though the high autocorrelations of the explanatory variables make it difficult to interpret the individual coefficients of the VAR model, note that an increase in investments (CAPX) lowers the following year's PAYOUT. This is further born out by impulse response functions, which are reported below. It is also interesting that the coefficients of EARNINGS are of opposite signs in the PAYOUT and

Table III. A VAR model of profitability, investments, and payout policies

The Table includes the estimated coefficients of a VAR model of corporate profits, investments, and payout policies. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The data refer to the aggregate variables of the sample firms adjusted to constant dollars (as of December 1997) using the GDP deflator. EARNINGS denotes annual net income before extra-ordinary items. PAYOUT denotes total annual payout-dividends plus share repurchases. SPLIT denotes the fraction of the total annual payout effected in the form of dividends. CAPX denotes annual capital expenditures on Plant, Property, and Equipment and on R&D. RELTAX is the year-end ratio of the maximal capital gains tax to the maximal regular income tax. I82 is a dummy variable that takes the value of 1 for all years up to and including 1982, and the value 0 thereafter. The model estimated is a fully recursive VAR model with EARNINGS, CAPX, PAYOUT, and SPLIT as endogenous variables and RELTAX and I82 as exogenous variables. Numbers in parentheses are heteroskedasticity consistent *t*-values.

	CAPX	EARNINGS	PAYOUT	SPLIT
CAPX(−1)	0.772 (4.517)	−0.764 (−5.287)	−0.186 (−2.246)	0.096 (1.084)
CAPX(−2)	−0.100 (−0.396)	1.189 (5.559)	0.162 (1.326)	−0.028 (−0.216)
CAPX(−3)	0.020 (0.100)	−0.252 (−1.503)	0.0443 (0.461)	−0.131 (−1.277)
EARNINGS(−1)	0.551 (3.050)	0.802 (5.251)	0.199 (2.272)	−0.121 (−1.290)
EARNINGS(−2)	−0.377 (−1.664)	−0.237 (−1.241)	−0.066 (−0.600)	0.003 (0.023)
EARNINGS(−3)	0.200 (0.880)	−0.480 (−2.499)	−0.219 (−1.992)	0.269 (2.291)
PAYOUT(−1)	0.014 (0.025)	1.632 (3.478)	0.626 (2.326)	−0.063 (−0.218)
PAYOUT(−2)	1.696 (2.628)	0.884 (1.620)	0.223 (0.712)	0.150 (0.449)
PAYOUT(−3)	−1.165 (−1.658)	−1.565 (−2.637)	0.363 (1.067)	−0.423 (−1.162)
SPLIT(−1)	−0.452 (−1.021)	0.791 (2.115)	0.237 (1.104)	0.111 (0.485)
SPLIT(−2)	1.370 (2.777)	−0.253 (−0.608)	−0.298 (−1.247)	0.489 (1.917)
SPLIT(−3)	0.627 (0.974)	0.809 (1.488)	−0.080 (−0.256)	0.489 (1.469)
C	−185.552 (−2.727)	−156.475 (−2.720)	21.604 (0.655)	−20.652 (−0.586)
RELTAX	0.699 (2.655)	0.474 (2.129)	−0.224 (−1.759)	0.399 (2.925)
I82	3.850 (0.365)	16.603 (1.863)	−0.908 (−0.178)	4.312 (0.790)
R ²	0.986	0.948	0.964	0.916
Adj. R ²	0.979	0.924	0.948	0.877

in the SPLIT equations. This parallels the negative correlation between PAYOUT and SPLIT reported in the preceding section and probably reflects the smoothing of dividends by using repurchases for special distributions, while dividends change only when an earnings change is perceived to be permanent. Consequently, transitory changes in the total payout cause the fraction of the dividends in the total payout to change in the opposite direction.

The VAR model allows one to examine the overall impact of a change in any of the endogenous variables. These reactions are estimated by introducing a change to an endogenous variable and estimating its impact by rolling the shock forward using the estimated model. The sequence in which shocks are assumed to impact the *contemporaneous* endogenous variables is investments first (CAPX), profits second (EARNINGS), then total payout (PAYOUT), and lastly the fraction of total payout issued in the form of dividends (SPLIT).⁷ Since innovations in the endogenous variables are dynamically incorporated into their lagged values (which appear in the individual regression equations), the impact of the shocks gradually declines. Throughout, I present the impact of shocks through five years forward, a period that captures the initial impact of the shocks, their peak, and the beginning of the decline of all shocks.

I begin with an examination of a fundamental assumption of much of the theoretical analysis of dividend policies since Miller and Modigliani's (1961) seminal work. Miller and Modigliani set the benchmark for the analysis of payout policies by separating the financial and the operating decisions of the firm. Specifically, they assume that firms optimally choose their investments and that payouts are the residual decision: cash that is not invested in positive NPV projects is distributed to shareholders. Subsequent analysis suggests that payout policy may affect investment decisions, for example when payouts signal firm quality at the cost of foregone profitable investment opportunities (c.f. Miller and Rock, 1985). In this case, a payout *increase* should be associated with a *decline* in investments as firms forego positive NPV investments to gain higher immediate stock prices.

To date, there is little empirical evidence on this issue. Fama (1974) finds that treating dividends and investments as simultaneous decisions improves little the explanatory power of equations compared to estimation that treats them as separate decisions. On the other hand, Yoon and Starks (1995), who examine a cross-section of dividend changes, find that dividend changes are associated with significant equal sign changes in subsequent capital expenditures. Denis (1994) examines equity issuances – negative dividends – and finds no relation between *ex ante* measures of growth and market reactions to announcements of equity offerings, except for a subset of young high-growth firms.

Here, I use the estimated VAR model to examine whether dividends are a residual decision by examining the reaction firms' investments to a payout change (either dividends or share repurchases). While the *contemporaneous* payout and

⁷ While this order of the shocks is consistent with economic theory and intuition, as reported in Section 3, several alternative orders of the shocks yield similar results.

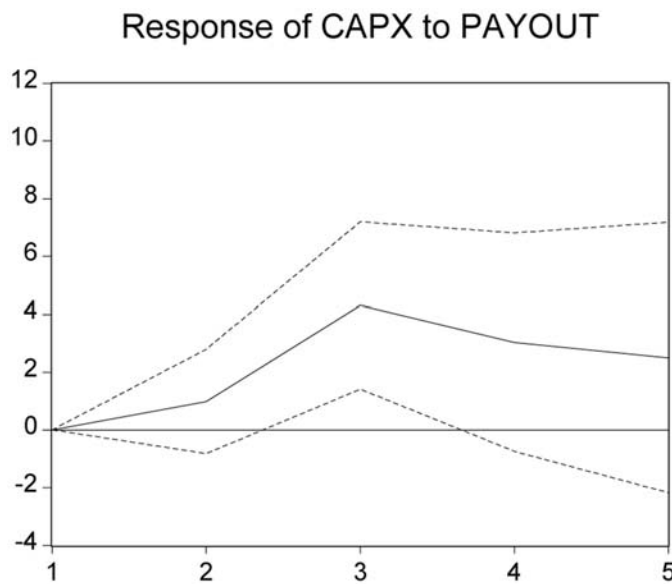


Figure 2. The dependence of corporate investment on payout policy. The figure describes the response of firms' investment decisions, CAPX, to a one-standard-deviation innovation in the total payout-dividends plus share repurchase, PAYOUT. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response function is derived from a fully recursive VAR model of investments, earnings, total payout, and the fraction of dividends in the payout using aggregate data for the sample firms. The solid line depicts the estimated response function and the dashed lines depict ± 2 standard errors.

investment decisions are tied by the cash flow identity, the impulse response functions capture the overall impact of a payout change on investments by introducing a change in payout and rolling it forward using the estimated VAR model.

Figure 2 presents the estimated response function of investments, CAPX, to a change in corporate payout. The response of investments to a one-standard-deviation innovation in payout (\$6.7 billion) is not significantly different from zero except in year three, where it is *positive* rather than *negative*. Thus, accounting for the joint determination and the dynamics of firm decisions, I find that an increase in firm payout does not *reduce* investments. Rather, investment decisions appear to be independent of payout decisions.

Next, I estimate the information content of payout policies – the extent to which changes in payout or in payout composition are based on anticipated future changes in firm profitability. As discussed in the introduction, several prior studies (e.g., DeAngelo et al., 1996; and Benartzi et al., 1997) did not find an association between dividend changes and subsequent long-run earnings changes. Here, the information content of corporate payout policies is depicted by the response of EARNINGS to changes in both the total payout and in its split between dividends

and share repurchases. If managers set total payouts in anticipation of future earnings, the response function of EARNINGS to a PAYOUT impulse should differ from zero. Moreover, if dividends represent a more permanent change in payout than share repurchases, both impulses (to PAYOUT and to SPLIT) will be associated with subsequent changes in EARNINGS in the same direction.

The estimated response functions of EARNINGS to a one-standard-deviation increase in total payout (\$3.25 billion) and to a one-standard-deviation increase in the fraction of dividends in the total payout (3.5%), SPLIT, are presented in Figure 3. Innovations to total corporate payout (dividends or share repurchase) have significant information content: following a payout change, earnings change significantly in the same direction as the payout change, with the reaction peaking after three years. Thus, the information content of a payout change is not short-lived as DeAngelo et al. (1996) and Benartzi et al. (1997) findings suggest. Interestingly, the size of the total payout innovation is about half the size of the subsequent earnings increase at its peak – roughly the change predicted by the average payout ratio. Figure 3 also shows that a dividend change is more informative about future earnings than an equal-size change in share repurchases. This can be seen in the estimated response of EARNINGS to innovations to SPLIT: changes in SPLIT (i.e., changes in the fraction of dividends in the total payout) are associated with subsequent changes in EARNINGS in the same direction (above and beyond the impact of PAYOUT).⁸

Lastly, I examine the response of firm payout policies, both PAYOUT and SPLIT, to a change in corporate income. The reaction of corporate payout policies to the introduction of a one-standard-deviation innovation to earnings (\$5.7 billion) is depicted in Figure 4. The peak response of the total payout to this shock (\$1.7 billion) is about 30% of the earnings shock, which is lower than the average payout ratio in the sample period (61.25%). Thus, Lintner's (1956) survey results, which indicate that managers gradually adjust dividend payments to earnings changes, seem to fit the actual payout policies of the sample firms even though my payout measure includes share repurchases (as well as dividends). This is further supported by the reaction of the payout split to a change in corporate income. Specifically, the estimated reaction of the fraction of dividends in the total payout following an earnings change indicates that earnings changes initially lead to increased share repurchases (i.e., a decline in SPLIT – the fraction of *dividends* in total payout) and only in later years to increased dividends. In other words, the estimates suggest that firms initially view changes in income as transitory, which justifies a corresponding change in share repurchases but not in dividend payments. In later years, the increase in the fraction of dividends indicates that eventually income changes translate into dividend increases, fitting Lintner's (1956) survey results. This is further seen in Figure 5 that shows the change in the dividends' fraction of the payout (SPLIT) following a one-standard-deviation increase in the *total* payout

⁸ As is shown in Section 4, this result continues to hold when firm profitability is measured by cash flows rather than by EARNINGS, which are used in the main model.

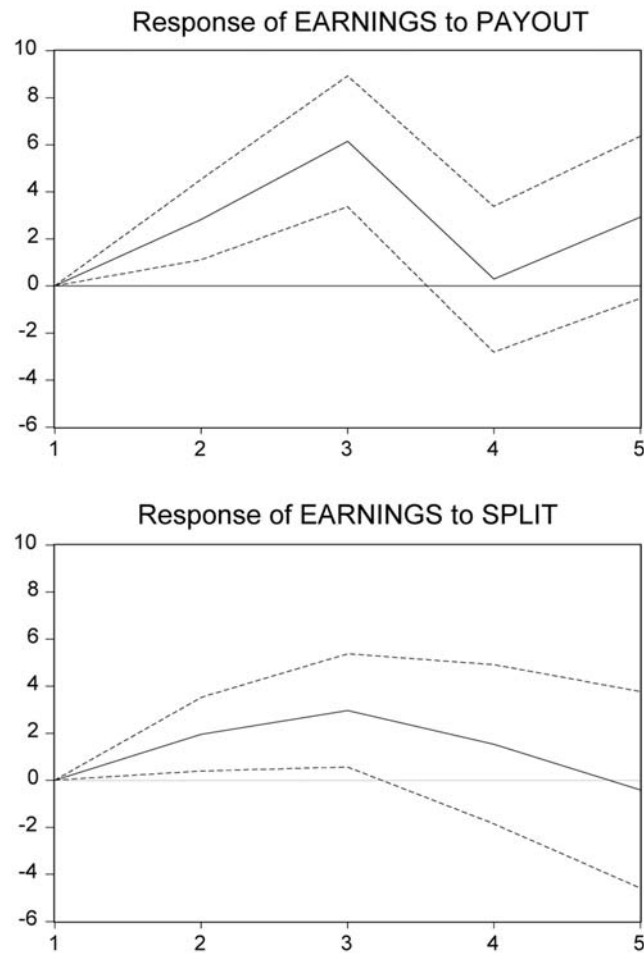


Figure 3. The information content of corporate payout policies. The figure describes the response of firms' earnings, EARNINGS, to a one-standard-deviation change in total corporate payout (dividends plus share repurchase), PAYOUT, and to a change in its split between dividends and share repurchases, SPLIT. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response functions are derived from a fully recursive VAR model of investments, earnings, total payout, and the fraction of dividends in the payout using aggregate data for the sample firms. The solid lines depict the estimated response functions and the dashed lines depict ± 2 standard errors.

(PAYOUT). The initial increase in repurchases is evident in the decline of the fraction of dividends when the total payout increases and the subsequent resumption of SPLIT to its average level. These results are similar to those reported by Lee (1996), who shows that aggregate payout primarily reacts to permanent changes in

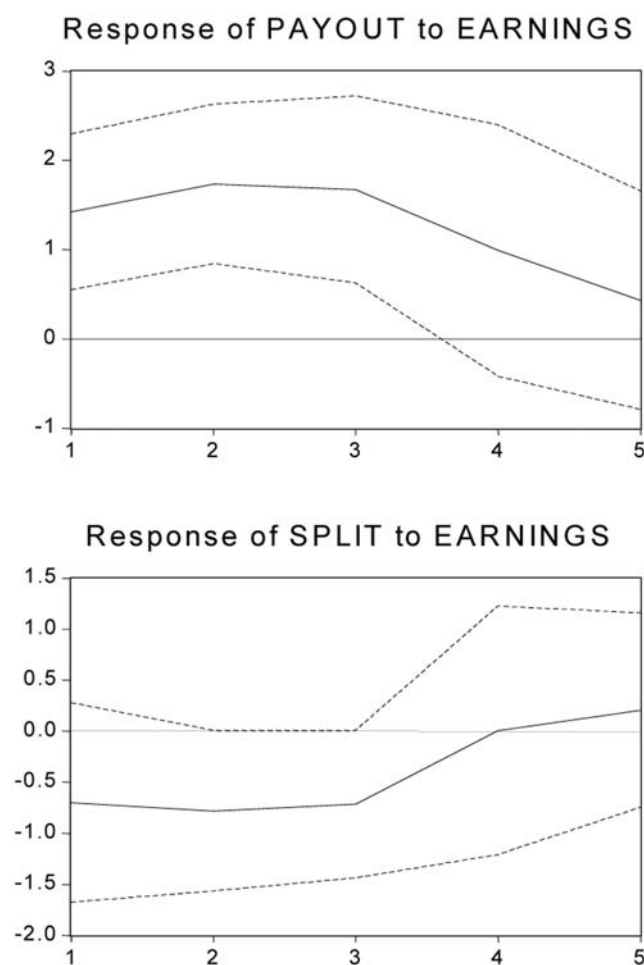


Figure 4. The reaction of corporate payout policies to income changes. The figure describes the response of firms' total payout – dividends plus share repurchase, PAYOUT, and its fraction effected via dividends, SPLIT, to a one-standard-deviation change in corporate earnings, EARNINGS. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response functions are derived from a fully recursive VAR model of investments, earnings, total payout, and the fraction of dividends in payout using aggregate data for the sample firms. The solid lines depict the estimated response functions and the dashed lines depict ± 2 standard errors.

earnings in a way that is consistent with partial adjustment of dividend payout to target levels.

In sum, the results reported here suggest that:

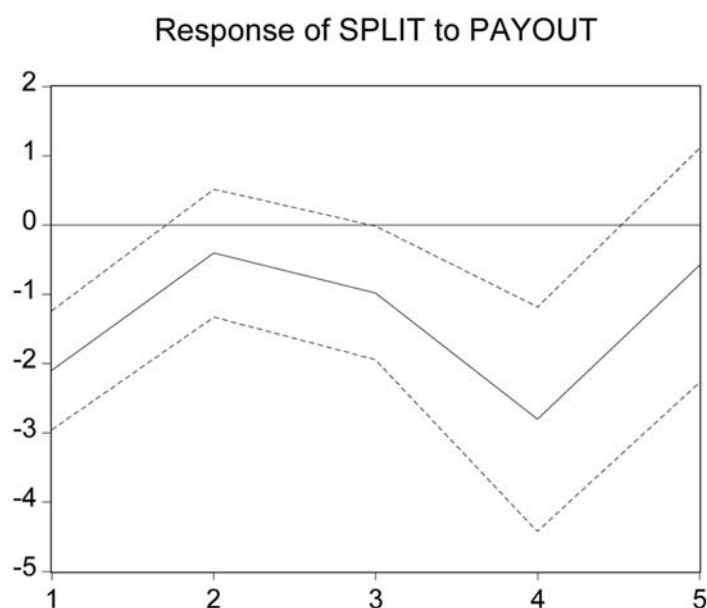


Figure 5. The reaction of payout split to changes in total payout. The figure describes the response of the fraction of firms' total payout – dividends plus share repurchase – that is effected by issuing dividends, SPLIT, to a one-standard-deviation change in the total payout. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response functions are derived from a fully recursive VAR model of investments, earnings, total payout, and the fraction of dividends in the payout using aggregate data for the sample firms. The solid lines depict the estimated response functions and the dashed lines depict ± 2 standard errors.

- An increase in the taxation of capital gains relative to dividends causes a shift in the split of the total corporate payout away from share repurchases towards dividends.
- Corporate investment decisions lead payout policies and not the other way around.
- Changes in total payout are positively correlated with long-run changes in performance.
- Changes in the total payout effected by changing dividends contain more information about future earnings than equal-size changes in share repurchases.
- Changes in corporate income are initially associated with changes in share repurchases in the same direction and only in later years with dividend changes.

4. Diagnostic Tests

In this section, I examine the robustness of the results to several modifications in the estimated model. Since the positive findings are that changes in payout are

followed by long-run changes in firm earnings and that changes in income affect payout policies, I present the impact of the modifications on these two estimates only. Nonetheless, the main conclusion – that the modifications considered hardly affect the conclusions – is also true for the other estimates that are not presented.

One of the criticisms of the use of VAR models to estimate the dynamic response of endogenous variables is that they assume a particular sequence according to which innovations affect the system contemporaneously. The primary model is based on the following order of innovation impact: CAPX, EARNINGS, PAYOUT, and SPLIT. Modifying the assumed order of the contemporaneous shocks, however, has little effect on the main conclusions. To illustrate this, Figure 6 shows the response function of EARNINGS to PAYOUT, which captures the long-run information content of payout policies, estimated under an alternative order. Specifically, the figure presents the response function estimated when the order of investment opportunities and profitability is reversed (i.e., unlike the primary model, here EARNINGS precede CAPX) both separately (in Panel A) and jointly with the original estimate (in Panel B). As is evident from the figure, the order in which innovations are assumed to affect the endogenous variables hardly affects the estimated response functions. This is also true of response functions estimated under alternative orders (not shown here to conserve space): they are little different from the estimated response functions that are based on the economically motivated, baseline sequence – investments first, earnings second, and payout policy last.

Next, I examine the impact of the selection criteria on the estimated reaction functions. The most restrictive selection criterion for firms to be included in the sample is that their data are available (in any of the COMPUSTAT tapes) in all 47 sample years. This criterion eliminates firms that had their IPO after 1950 or that, in any of the sample years, either had year-end not in December, or were purchased, went private, or were dissolved any time during the period 1950–1997. This means that the sample tends to overweigh long-surviving firms. While the selection bias is not a problem in and of itself, it may lead to an estimation bias: it is possible that the payout policies of *excluded* firms react differently to income innovations and have different information content than the policies of the *included* firms.

While it is not possible to completely overcome the survivorship selection bias, it is possible to gain some idea of whether it leads to an estimation bias as well by re-estimating the response functions using a larger sample over a shorter period. The larger sample consists of firms that exist in the 30-year period 1968–1997. Since the requirement for the availability of data is for fewer years, there are 559 firms included in the larger, less restricted sample. Figure 7 shows the estimated response functions of profitability and total payout estimated with the same fully recursive VAR model.

As is evident in Figure 7, the same properties of payout policies are observed in the longer, diagnostic sample. Specifically, changes in corporate payout are correlated with significant long-run subsequent changes in earnings. This suggests

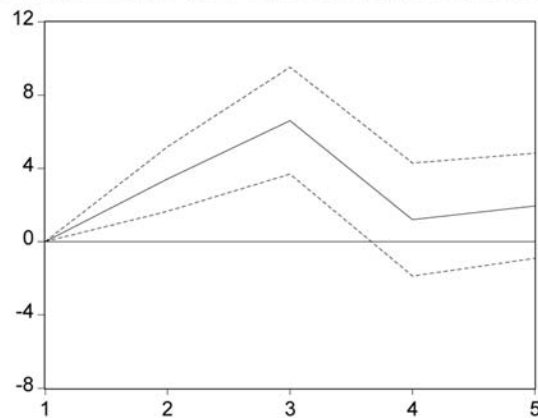
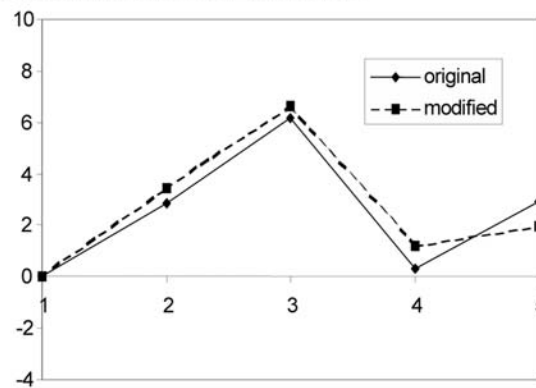
Panel A:**Response of EARNINGS to PAYOUT when EARNINGS precedes CAPX****Panel B:****Comparison of the Response of EARNINGS to PAYOUT under the Original Ordering and when CAPX precedes EARNINGS**

Figure 6. The reaction of corporate payout to income changes under different innovation orders. The figure describes the response of corporate profitability, denoted by EARNINGS, to a one-standard-deviation increase in firms' total payout – dividends plus share repurchase, denoted by PAYOUT. The sample consists of 156 firms that are included in any of the COMPUSTAT tapes in every year from 1950 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response functions are derived from a fully recursive VAR model of investments (CAPX), profitability (EARNINGS), total payout (PAYOUT), and the fraction of dividends in payout (SPLIT) using aggregate data for the sample firms.

Panel A contains the estimated response functions when the order of variables in the VAR model is EARNINGS, CAPX, PAYOUT, and SPLIT. In Panel A, the solid lines depict the estimated response functions and the dashed lines depict ± 2 standard errors. Panel B contains the estimated response functions both under the original order of variables in the VAR model (i.e., CAPX, EARNINGS, SPLIT, and PAYOUT) and under a modified order (i.e., EARNINGS, CAPX, SPLIT, and PAYOUT). In Panel B, the solid line depicts the function estimated under the original order and the dashed line the estimate under the modified order.

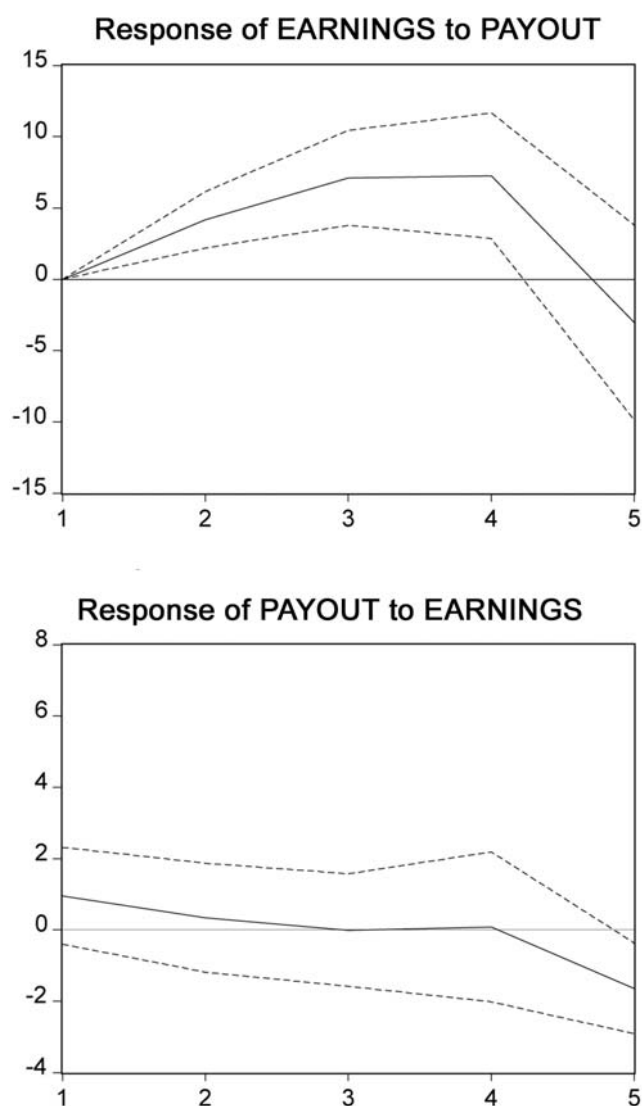


Figure 7. The reaction of corporate payout to income changes and the reaction of income to payout changes in a short sample period. The figure describes the response of firms' total payout – dividends plus share repurchase, denoted by PAYOUT, to a one-standard-deviation increase in corporate profitability, denoted by EARNINGS, and the change in EARNINGS to a one-standard-deviation increase in PAYOUT. The sample consists of 559 firms that are included in any of the COMPUSTAT tapes in every year from 1968 to 1997, that are not a financial or otherwise regulated company, and whose fiscal year-end is December 31. The estimated response functions are derived from a fully recursive VAR model of investments (CAPX), profitability (EARNINGS), total payout (PAYOUT), and the fraction of dividends in payout (SPLIT) using aggregate data for the sample firms. The solid lines depict the estimated response functions and the dashed lines depict ± 2 standard errors.

that the information content of payout policies in the firms that pass the more restrictive survivorship requirement is not different from the information content of firms that do not survive throughout the whole sample period. Additionally, the reaction of PAYOUT to EARNINGS innovations is similar to the reaction observed in the longer sample period, although it is not statistically significant because of the shorter sample period and the resulting larger standard errors.

Lastly, I examine three modifications of the model to check whether the measurement of investments and profits in the model affects the conclusions. First, I re-estimate the model with *net* investment – CAPX less depreciation charges (COMPUSTAT data item # 14) – instead of gross investment, CAPX. Second, I add to CAPX the annual expenses on advertising (CUMPUTAT data item # 45) and net acquisitions (CUMPUTAT data item # 129).⁹ Third, I replace EARNINGS with a proxy for cash flows: EARNINGS plus depreciation charges.¹⁰ The estimated response functions under all three modifications, which are not presented, are not qualitatively different from the reported response function: changes in PAYOUT imply long-run changes in profitability in the modified model and changes in profits entail payout changes in the same direction. Thus, it appears that the reported results are not an artifact of the specific manner in which investments and profitability are measured.

5. Concluding Remarks

Prior studies of corporate payout policies yield mixed results about the information content of these policies and their dependency on taxes, investment opportunities, and profitability. I argue that at least part of the blame for the inconclusive results is due to the fact that prior studies ignored the dynamic nature of corporate decisions. In this paper, I conduct a time-series analysis of corporate payout policies that explicitly accounts for the dynamic nature of these decisions and for the interaction among investment decisions and payout policies. Moreover, unlike most of the studies of corporate payout policies, which focused on the price effects of these policies, the focus here is on quantities – the level of payout and its split between dividends and share repurchase.

The estimation is done with a VAR model of investments, profitability, total payout (i.e., dividends plus share repurchases), and the split of the payout between dividends and share repurchases. The model also controls for changes in the legal

⁹ These variables are available only since 1970. Hence, when these variables are included in the estimated equations, I use a shorter sample period than the one I use elsewhere.

¹⁰ I use this proxy for cash flows because the accounting definitions and reports have changed over the years so that it is not possible to use any single accounting measure in a time-consistent fashion. The result is a noisy proxy for cash flows that does not include changes in operating working capital (e.g., changes in Accounts Receivable, COMPUSTAT item # 302, which is available only since 1987).

treatment of share repurchase in 1982 and for the many changes in the relative taxation of dividends and capital gains during the sample period.

As far as the exogenous determinants of corporate payout policies are concerned, I find that an increase in the taxation of capital gains relative to the taxation of dividends causes a shift in the split of the total payout of corporations away from share repurchases and towards dividends. I cannot document such an impact of the change in the legal treatment of repurchases at the end of 1982, probably because this change coincided with tax rate changes so that the impact of the two changes cannot be separated. In terms of the model's endogenous variables, I find that corporate investment decisions lead payout policies and not the other way around. I also find that increases in corporate payout are associated with long-term subsequent increases in profitability. Moreover, I find that the information content of a change in dividends is stronger than an equal-size change in share repurchases. Lastly, I find that an increase in profitability leads first to an increase in share repurchases and only later to an increase in dividends.

Several diagnostic checks suggest that the main conclusions of the paper are quite robust. In particular, the selection of firms with continuous data throughout the sample period does not appear to affect the main conclusions, as the re-estimation of the same model with a shorter sample period and more firms yields similar response functions. The conclusions are also robust to modifications of the order of the shocks in the VAR model and the measurement of profitability and investments.

Appendix: Data Construction

The data set is comprised of data taken from several sources, since firm's financial statements often report items in more than one place. The order of preference for extracting information from financial statements is the Cash Flow Statement (or the Statement of Sources and Funds in the earlier part of the sample period) first, footnote information second, and balance sheet information last. This order is applied to the computation of capital expenditures, share repurchases, and dividends. Specifically, to compute capital expenditures (CAPX), I look first at the capital expenditures on Plant, Property, and Equipment (PP&E) as reported in the firm's cash flow statement (COMPUSTAT item # 30). If none is available, I look for the investment information reported in the footnotes to the financial statements about the firm's investment activity (COMPUSTAT item # 128). If neither item is reported, I use the annual change in PP&E (COMPUSTAT item # 7) as the implicit capital expenditures on PP&E in the year. I add the annual expenditures on R&D (COMPUSTAT item # 46) to the annual expenditures on PP&E to get the annual capital expenditures (CAPX). Since firms report only material items, I assume that R&D expenses are zero whenever specific R&D expenses are not reported.

A similar procedure applies to share repurchases where the preferred source of information is the cash flow statement (COMPUSTAT item # 88). Absent this

information, I use footnote information on treasury stock (COMPUSTAT item # 226). The least preferred alternative is to impute the share repurchases from the decline in the number of shares outstanding (COMPUSTAT item # 25), adjusted for stock splits and stock dividends, times the closing price of the stock (COMPUSTAT item # 24). Note, however, that since the vast majority of repurchases occurred after 1982 when cash flow statements replaced the old sources and uses statement, I hardly use balance sheet data to compute the value of shares repurchased.¹¹

Lastly, since the theories of firm and investor behavior being tested are based on real decisions while the data are measured in current dollars, I restate all series to dollars of December 1997 using the GDP deflator.

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¹¹ Recently, Fama and French (2001) argue that shares that are repurchased and subsequently given to executives who exercise options should not be included in measures of share repurchases. In my view, however, since firms can use new stock certificates but opt not to, such repurchases can be viewed as deliberate repurchases independent of the eventual use of the specific stock certificates. Thus, I include all repurchases independent of how the repurchased stock certificates are eventually used.

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