How do dividend policies influence firm risks?

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Abstract

We study the impact of firm dividend policies on firm risks in the United States, from 1987 to 2011. The impact of a comprehensive set of dividend policies (cash dividend initiations, omissions, the duration of the policies, the amounts of payout) is assessed on a set of important firm risks (total, idiosyncratic and systematic market risks, as well as the Fama-French, 1993, size and distressed earnings risk factors). Unlike previous work, we account for dividend policy path dependencies and self-selection bias. We find that dividend omissions increase idiosyncratic risk more than dividend initiations reduce this risk. The asymmetry of effects is accentuated by the duration of the policy and the pay-out amount. Unlike findings from previous work, we show that the impact of dividend initiations and omissions on systematic market risks is relatively small.

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1 Introduction

Dividend policy and firm risk are two major concepts in the field of corporate finance, but the impact of dividend payment on firm risk has received scant attention in the literature. This may partly be due to the fact that the irrelevance theorem of Miller and Modigliani (1961) focuses on firm value, but not on firm risk. In fact, a consistent incorporation of risk in the value literature was established only three years later (Sharpe, 1964). Notwithstanding, risk has now become an important factor in explaining the well-known value effects of payout policies (Grullon, Michaely, and Swaminathan, 2002; Grullon and Michaely, 2004).

Two sets of theories of dividend policy determination have been devised, arising from relaxing the assumptions underpinning the Miller-Modigliani (1961) theorem, which are of especial importance within the field of corporate finance.[1] The first is signalling theory (Bhattacharya, 1979, John and Williams, 1985, and Miller and Rock, 1985) which emphasizes the importance of utilizing dividend policy, to diminish information asymmetries which may arise between the management of the firm and the firm's investors. The second is the agency cost-based life cycle theory (Grullon et al. 2005, DeAngelo, DeAngelo and Stulz, 2006). This theory implies that the decision to distribute or retain free cash flows varies according to the evolution of the phases of the firm's financial life cycle, thereby reconciling Jensen's agency theory (Jensen, 1986 and LaPorta et al., 2000) with life-cycle theory. Hence, firm dividend policies may impart value effects, either as an inadvertent manifestation and/or as a deliberate signal on the part of management with respect to the phase of maturity of the financial life-cycle of the firm.

Positive value effects after unanticipated initiations and increases of dividends are well-documented (Charest, 1978; Healy and Palepu, 1988; Benartzi, Michaely, and Thaler, 1997; Grullon and Michaely, 2004; Charitou et al., 2011). Authors also report relatively large negative value effects after unanticipated omissions of dividends or reductions in the amount of dividends (Charest, 1978; Healy and Palepu, 1988; Michaely, Thaler, and Womack, 1995; Chen, Shevlin, and Tong, 2007). The value effects after dividend policy changes are unlikely to be solely caused by an associated adjustment in a firm's expected profitability, as research findings indicate that dividend changes are not reliable signals of subsequent changes in profitability (Watts, 1973; DeAngelo, DeAngelo and Skinner, 1996; Benartzi, Michaely and Thaler, 1997; Grullon, Michaely and Swaminathan, 2002; Grullon et al., 2005).

The explanation of altered risk levels may thus constitute a major (or at least a reinforcing) channel via which dividend policies influence firm value. The risk based explanation is corroborated by empirical observations that dividend pay outs are correlated with lower risk (Pastor and Veronesi, 2003; Bartram, Brown and Waller, 2012) and that payout policies may impact firm systematic risks (Grullon, Michaely, and Swaminathan, 2002; Grullon and Michaely, 2004). Furthermore, Brav et al. (2005) conduct a survey article and find that managers tend to believe that there is a causal relation between higher dividends and

[1] Following Allen and Michaely, 2003, we do not focus here on the possible influence of personal taxes and clientele effects (Miller and Modigliani, 1961) or behavioral finance effects (Baker and Wurgler, 2004).

risk reductions. For these reasons, we analyse in this paper the impact of dividend policies on firm risk.

Firm risk is a multi-faceted concept. A firm's stock return sensitivity to overall market returns (beta) should be complemented by its sensitivity to the small minus big 'size' factor and the high minus low book to market 'distressed earnings growth' factor (Fama and French, 1993). As the firm progresses through its financial life-cycle it will become more mature and larger. Hence, the firm will exhibit a greater likelihood of distressed earnings growth and a smaller size risk factor effect. In addition, there is also substantive evidence that idiosyncratic risk is integral in giving price signals to the market (Goyal and Santa Clara, 2003) and that, moreover, this risk is increasingly important over time (Campbell et al., 2001 and Wei and Zhang, 2006). Finally, firms have become increasingly likely to default (Fama and French, 2004; Brown and Kapadia, 2007), and this underpins the importance of total risk (as a combination of systematic risk and idiosyncratic risk). For the management of firms, it is thus relevant to know which risk measures, if any, are influenced by dividend policies, and if so, by how much. For science, it is relevant to learn whether or not value enhancing (or value reducing) effects can be caused by dividend policies, and whether this mechanism operates via changes in systematic risk or primarily via changes in idiosyncratic and/or total risk. It is therefore appropriate to study the impact of dividend policies on all these risk measures.

In order to motivate the range of payout policies examined, it is important to state that it is expected that there is a different impact on firm risks according to the payout channel or combination of payout channels adopted. This follows due to the stylized contexts in which cash dividends and/or share repurchases payout policies tend to be realized. As young firms tend to have relatively rich investment opportunity sets (Fama and French 1993; Grullon and Michaelly 2004), and limited earnings, retention tends to dominate distribution; while mature firms accumulate earnings and face a deteriorating investment opportunity set, such that distribution dominates retention to mitigate associated agency costs. Indeed, as a firm progresses in its financial life cycle, with progression from a transitory income to predominantly permanent income (Jagannathan, Stephens and Weisbach, 2000; Guay and Harford, 2000), a firm tends to commence pay out using share repurchases or share repurchases and dividends[2], and with the maturation of the firm's income stream, it may decide to pay dividends exclusively.[3] This makes it likely that the perceived reduction of risk, on the part of the market, will be larger when firm managers decide to pay cash dividends instead of conducting share repurchases or when it is decided to conduct a combination of the two payout types. Hence, it is likely that risk effects of dividend pay out changes will differ for firms with different previous payout policies - channels of pay out, payout amount and

[2] Twu (2010) finds that prior payout channels are strongly predictive of decisions of future payouts. Moreover, Bhargava (2010) shows that path dependency also exists with respect to amounts paid. Repurchases do not significantly influence dividend amounts, while higher dividend amounts do reduce repurchases.

[3] The group of payers distributing a combination of cash dividends and share repurchases has become increasingly important in comparison to the firms that distribute solely through dividends (Skinner, 2008 and Renneboog and Trojanowsky, 2011).

payout duration.

Even after correction for the previous payout channel, payout amount and payout duration, an analysis of the impact of pay outs on firm risk is not straightforward, because firm risk itself may impact the decision to pay. In his seminal paper, Lintner (1956) indicates that managers consider earnings stability as a major determinant of dividend policy (Lambrecht and Myers, 2012). They show that dividend paying firms gradually increase dividends in the direction of the desired payout of net earnings with a view to avoiding reductions in dividends in the future. This means that dividend policies of firms are influenced by the risk perceptions of their managers. In this vein, Hoberg and Prabhala (2008) find that systematic and idiosyncratic risks are both significant determinants of the propensity to pay dividends, and Chay and Suh (2009) find that the standard deviation of the monthly stock market returns (during the previous two years) is a major factor in setting payout policies. In addition, Charitou et al. (2011) find that there is a significant reduction in default risk in the year prior to a dividend increase or initiation. These findings imply that measurements of the impact of payout policies on risk should take into account the fact that the risk position of the firm may also influence such policies. In this paper we correct for self-selection in payout policies based on previous risk.

We study firms listed in the United States and we perform propensity score matching hypotheses tests (Rosenbaum and Rubin, 1983 and Li and Zhao, 2006) and conduct tests using the system GMM estimator on dynamic panels (Arellano and Bover, 1995 and Blundell and Bond, 1998) to measure the impact of a comprehensive set of dividend policies on firm risks. This allows verification of whether there are indeed risk reductions after initiating dividends, whether the effects differ for dividend payments or a combination of the dividends and repurchases, whether these effects occur only at the initiation of a policy or whether risk reductions also arise from a longer duration of payouts and/or higher dividend amounts paid and whether firm risks vary inversely in respect to dividend omissions.

Using up to 59,091 fiscal year observations together with the Fama and French (1993) risk factors to disaggregate firm risk, we identify four main findings for the relation between dividend policies and firm risk. First, cash dividend payers are associated with the lowest total risk, while not paying or conducting share repurchases is associated with higher total risk. Second, the longevity of the dividend policy is inversely associated with total risk although not to systematic risk. Third, the propensity score matching (on previous payout policy, total risk, industry and year) methodology added to the difference-in-differences approach shows causality between dividend initiations and omissions and firm risks. Dividend initiations and omissions are shown not to impact systematic risk measures significantly or consistently. Initiations do slightly reduce total and idiosyncratic risks while omissions markedly increase these latter risks. Fourth, we account for the latter asymmetry of initiating and omitting dividends which may be indicative of a gradual change in investors' perceptions during the time that a dividend policy is in effect. We show, using dynamic GMM panel data estimates, that pay out amounts do not impact systematic risks while cash dividend payout durations exhibit relatively small negative effects. Total and idiosyncratic risk exhibit pronounced negative effects from exclusive cash dividend payment durations and there is a negative effect on idiosyncratic risk from the cash dividend amount paid. As a result, we conclude that any prolonged value effects (value drift) are not really attributable to systematic market risk reductions, but that such effects are more likely to be caused by idiosyncratic or total risk reductions.

The outline of the article is as follows. Section 2 states the hypotheses tested and explains why the difference-in-differences propensity score matching (PSM) tests and dynamic panel generalized method of moments (GMM) system estimator approaches are appropriate. Section 3 presents information about the dataset. Section 4 presents associative descriptive statistics. Section 5 and 6 present the main results concerning causal relations between payout policies and firm risk. Section 7 reports the main conclusions.

2 Hypotheses tests and methodologies

We focus on extending the previous literature by conducting two sets of hypotheses tests, using difference-in-differences propensity score matching (PSM) tests (Rosenbaum and Rubin, 1983 and Li and Zhao, 2006) and generalised method of moment (GMM) dynamic panel system estimators (Blundell and Bond, 1998), to examine the impact of cash dividend payout policies on firm risks. The first set of hypotheses is based on the influence of dividend initiations and omissions on firm risks (Fama and French, 1993). The second and third sets of hypotheses tests examine the related influence of the duration of payout and the payout amounts. Contrary to previous adopted approaches (Grullon, Michaely and Swaminathan, 2002, and Grullon and Michaely, 2004), our combination of methods accounts for path dependencies in payout policies, dynamic effects of total risk and the self-selection bias in respect to dividend policies and previous firm risks.

2.1 Hypotheses tests

As dividend initiations indicate a maturation of the financial life-cycle of the firm, we expect that its influence will be negative on the risk measures, like total, systematic market, and idiosyncratic risks. For example, this is expected to be the case for the beta of the small minus big risk factor. Firms that initiate dividends are generally larger than firms that do not (yet) do so. Turning to the high minus low risk factor, dividend paying firms are expected to become more sensitive to the high minus low book to market factor due to an increase in the level of distress of earnings growth, with the maturation of the firm. We expect opposite sign effects from dividend omissions. When a firm follows a policy of paying dividends, investors might reasonably interpret an omission in dividend pay out as providing information concerning increases in future firm risks. This leads to our first set of hypotheses tests:

Hypotheses 1: Dividend initiations (omissions) will negatively (positively) impact firm risks.

In respect to dividend initiations and dividend omissions, we study whether there is an asymmetry of effects. Value reductions through omissions are generally larger than the value increases concomitant with initiations. If the value effects originate from risk shifts, the effect of omitting should be larger in absolute terms. This leads to our second set of hypotheses:

Hypotheses 2: Dividend initiations will have a relatively smaller impact on firm risks than dividend omissions.

There may be a larger impact on firm risks from dividend omissions due to a gradual reduction of risk since dividend initiation with a longer duration increasing dividend amounts over time. This leads to our third set of hypotheses:

Hypotheses 3: Firm risks will reduce with the payout duration and/or the payout amount.

2.2 Methods

2.2.1 A propensity score matching algorithm

We test the first and second sets of non-experimental hypotheses, hypotheses 1 and 2, using a modified difference-in-differences approach with a propensity score matching 'nearest match' algorithm (see, Rosenbaum and Rubin, 1983 and Li and Zhao, 2006). The difference-in-differences approach alone does not account for self-selection bias in relation to previous firm risks. The matching algorithm improves the difference-in-differences approach by mitigating self-selection bias due to observable systematic differences across treated (*i.e.* dividend initiating or omitting firms) and comparison control groups. We also control for path dependencies. In particular, the control group has the same previous period payout channel as the treated group of firms.

The propensity score is a conditional probability from a probit function, using a sample that contains the treated and control firms. Each treated firm is then matched to a control firm with the closest propensity score.[4] In this paper, propensity score matching is adopted on the criterion of total risk which includes the range of risk measures which we study. We use year dummies as well as industry dummies as additional matching criteria, and apply the propensity score matching algorithm to the full period. It would be preferable to conduct this method for each year, while accounting for the fact that firms in different industries may show different reactions. However, this approach is not feasible due to

[4]The propensity score matching method allows a large number of matching variables without imposing constraints on these variables.

matching difficulties. In addition, we conduct robustness tests conditioning on a relatively large number of explanatory variables.[5]

2.2.2 Dynamic Panel GMM estimation

We test the third set of non-experimental hypotheses, hypotheses 3, using a dynamic panel generalized method of moments (GMM) system estimator (Blundell and Bond, 1998). Consistent with a substantial body of literature (Allen and Michaely, 2003; Chay and Suh, 2009), we identify a dynamic model for the choice variable, dividend policy, that is $D_{it} = f(y_{it-1}, Z_{it-1})$ [1], where D_{it}, y_{it-1} and Z_{it-1} represent dividend policy, firm risk and a set of firm characteristics which determine dividend policy. If firm risk and this set of firm characteristics (and hence also dividend policy) are a feature, in part, of the maturity of the phase of the financial life-cycle of the firm, then the choice variable, dividend policy, may reveal information to the market and determine firm risk, y_{it}. In equation [2], we state:

$$y_{it} = \alpha + \Sigma\kappa_s y_{it-s} + \beta D_{it-1} + \gamma Z'_{it-1} + \eta_i + \epsilon_{it}, \tag{2}$$

where $s = 1$, ϵ_{it} is a random error term, η_i, is time-invariant unobserved heterogeneity, Z' is a subset of variables in Z which is expected to determine firm risk and β is the effect of dividend policy on firm risk. We simultaneously account for the effects of path dependencies in total risk (*i.e.*, previous total risk on current firm total risk). The economic rationale of the impact of dividend policy on firm risks may stem from this policy being an inadvertent manifestation and/or a deliberate signal on the part of management.

In this setting, a weak assumption is that current shocks are independent of past realizations of dividend policies and explanatory variables. This assumption can be stated in orthogonality form, $E(\epsilon_{it}/y_{it-s}, D_{it-1}) = 0$. The statement relies on the assumption that we have specified all endogenous and time-varying variables that effect dividend policies and firm risks. Despite accounting for a broad set of variables, which may influence firm risk, equation [2] presents a random error, ϵ_{it}, which is at best an imperfect proxy for the pure expectational error. Hence, the orthogonality conditions above may not be satisfied. In addition, fixed-effects estimates are biased if lagged dependent variables, *e.g.* y_{t-s}, influence independent variables, *e.g.* D_{it-1}, (see, Wooldridge 2002).[6] As a result, in equation [2], the fixed-effects panel regression estimation does not mitigate bias from endogeneity.

We use the dynamic panel GMM estimator to obtain efficient, consistent and unbiased estimates, of the impact of dividend policies (the durations of pay out and amounts of pay out) on firm risks. To mitigate bias from time invariant heterogeneity we write the dynamic model of [2] in first difference form $\Delta y_{it} = \kappa_p \Sigma \Delta y_{it-p} + \beta \Delta D_{it} + \gamma \Delta Z_{it} + \Delta \epsilon_{it}, \forall p > 0$ [3]. To mitigate endogeneity bias, lagged values of the level variables are adopted as instruments . The instruments must provide a source of exogenous variation for the firm

[5]The results are available from the authors on request.

[6]In this setting, the consistency of the static panel fixed effect estimator depends on T (the number of periods) being large, which is not true in our dataset.

dividend policy. They must be uncorrelated with the error in the risk equation [2]. To ensure the latter property is satisfied, equation [2] must be well specified and dynamically complete. Associated with this exogeneity assumption are orthogonality conditions, $E(D_{it-s}\epsilon_{it}) = E(Z_{it-s}\epsilon_{it}) = E(y_{it-s}\epsilon_{it}) = 0$, ∀ s>p [4]. However, equation [3] contains potential mis-specifications, including econometric issues stemming from differences. Specifically, differencing may reduce the variation of the explanatory variables (Beck, Levine and Loayaza, 2000). Variables in levels may be weak instruments for first-differenced equations (Arellano and Bover, 1995) and first differencing may exacerbate the impact of measurement error on the dependent variable (Griliches and Hausman, 1986). Hence, we mitigate these shortcomings by estimating a stacked 'system' estimator, equation [5]:

$$\begin{bmatrix} y_{it} \\ \Delta y_{it} \end{bmatrix} = \alpha + \kappa \begin{bmatrix} y_{it-p} \\ \Delta y_{it-p} \end{bmatrix} + \beta \begin{bmatrix} D_{it} \\ \Delta D_{it} \end{bmatrix} + \gamma \begin{bmatrix} Z_{it} \\ \Delta Z_{it} \end{bmatrix} + \epsilon_{it}. \qquad ([5])$$

To deal with the unobserved heterogeneity in levels we assume that the correlation between the explanatory variables and the unobserved effects is constant over time, which leads to an additional set of orthogonality conditions $E(\Delta D_{it-s}(\eta_i + \epsilon_{it})) = E(\Delta Z_{it-s}(\eta_i + \epsilon_{it})) = E(\Delta y_{it-s}(\eta_i + \epsilon_{it})) = 0, \forall\ s > p$ [6]. Taking the orthogonality conditions, [4] and [6], together we estimate the stacked 'system' of equations [5]. The orthogonality conditions imply that we can use lagged levels as instruments for our differenced equations and lagged differences as instruments for the level equations, respectively.

3 Data description

Our dataset comprises the payout decisions of United States firms,[7] reporting in United States dollars and listed on the NYSE or the NASDAQ from 28 December 1979 to 30 December 2011.[8] Notwithstanding, we start our analysis in 1987 as there is a relatively small number of observations available in the preceding years. We include observations prior to 1987, where available, to permit lagged variables in our model specifications.

Our data is sourced primarily from Datastream, Worldscope and CRSP. To correct for survivorship bias, our dataset comprises active, dead and suspended firms. Firms in the Financial and Utilities sectors (Industry Classification Benchmark codes 7000 and 8000) and firms with evident cash dividend record errors are excluded from this study. For the

[7]We focus on firms in the United States (ISIN codes commencing with the prefix 'US') as there is high quality accounting and stock return data available for United States firms and there is a wealth of extant findings in respect to dividend policy in the United States. In addition, we prefer not to combine an analysis from several countries, as country differences might confound the firm effects that we want to analyze. Finally, recent research indicates that the United States is the country with the largest firm level risk (Bartram *et al.*, 2012). This implies that the impact of dividend policies on risk may be most relevant in the United States.

[8]These dates match the exact dates from the website of Kenneth French for the relevant period (`http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`), which is a requirement in order to estimate the Fame and French (1993) factor loadings.

remaining firms, we download return indices with dividends reinvested (RI) on a weekly basis. We calculate the arithmetic returns from the dividends reinvested return index (RI), taking into account varying fiscal year end dates.[9]

In order to study a dataset of firms which trade relatively regularly, we require that there are at least 25 return observations per fiscal year and subsequent to fiscal year. We discontinue the variable in the dataset, if the fiscal year observation shows an arithmetic return observation of -1. Moreover, following Bartram, Brown and Stulz (2012) we ultimately retain firms with relatively liquid trading by requiring that less than 30% of the remaining fiscal year observations have zero weekly returns. We also delete the fiscal year observations where the standard deviation of the arithmetic returns is equal to zero. Finally, as we do not want our findings to be influenced by different investors' perceptions associated with infrequent reporting (von Eije and Megginson 2008), we require that the firms report 4 times per year.

Our principal payout variables are cash dividends and net share repurchases. We require that cash dividend and share repurchase observations are available, though they may be zero. We follow Fama and French (2001) and Skinner (2008) to calculate net share repurchases.[10] We winsorize the variables, except where they are constrained at zero. Hence, as our database extends until 2011, we have 25 years of observations. After these filters, 59,091 firm year observations of 4,678 unique firms remain.

[Please insert table 1 about here.]

Table 1 presents a disaggregation of total risk (TRISKW) from the standard deviation of excess weekly returns, for our United States firms, in each fiscal year, into its constitutent components of systematic risk (SRIKW) and residual idiosyncratic risk (IRISKW), consistent with Fama and French (1993). The related decomposition of systematic risk into market beta (BEXMRW), the beta for the small minus big factor (BSMBW) and the beta of the high minus low factor (BHMLW) is also reported in the table. The descriptive statistics of the disaggregated risk variables match those reported in prior studies (e.g. Hoberg and Prabhala, 2008).

[9] As some firms have changed their fiscal year end date, the number of return observations may become smaller or larger than the normal 52 (or 53) weeks in a calendar year. In order to retain only weekly returns for normal fiscal year durations and to allocate pay out decisions to appropriate reference fiscal years, we exclude observations if the fiscal year was shorter than 360 days or longer than 372 days.

[10] In particular, we adjust the share repurchases for employee stock options, acquisitions and/or price manipulation to obtain a net measurement of share repurchases. This approach approximates share repurchases activity by monitoring the value of treasury stock. However, if there are no contemporaneous observations on treasury stock (indicated by either missing values or zero values in the current and prior year), Fama and French (2001) assume that the retirement method is applied by the firm. In that case we use net proceeds of the sale/issue of common and preferred stock as representing net share repurchases. If the net share repurchases approximated by the treasury stock monitoring method is unavailable and the retirement method indicates a negative value, we set the net share repurchases at zero.

The mean weekly total risk is 7.4%. It represents an annual risk of 53.4% (7.4%*sqrt(52)).[11] The reported summary risk measurements show that the majority of total risk (7.4%) is idiosyncratic risk (6.4%). Turning to the components of systematic risk, the mean of the systematic component (SRIKW) of total risk (3.2%) comprises the market risk factor (BEMRW with a mean of 1.028) which is larger than sensitivity to the small minus big factor (BSMBW with a mean of .808) and considerably larger than the sensitivity to the book to market effect (BHMLW with a mean of .109).[12]

4 Empirical findings - associative descriptive statistics

Table 2 reports the distribution of firms which adopt specific payout channels, across quintiles of firms, with respect to the criterion of total risk. The distinction between payout channels is motivated principally by Renneboog and Trojanowsky (2011), who distinguish three payout channels (solely repurchases, solely dividends, and both types of payout) besides non-payment. The main observation is that firms which do not pay out or exclusively adopt the share repurchases channel exhibit greater total risk (8.7% and 8.6%, respectively) than firms which combine share repurchase and cash dividend pay outs or exclusively adopt the cash dividend payout channel (5.3%). Furthermore, in each payout channel, the proportion of firms in each total risk quintile varies monotonically. It rises across total risk quintiles for non-paying firms and for exclusive share repurchasers. It declines, across total risk quintiles, for those firms that include cash dividends in their payout policies.

[Please insert table 2 about here.]

Turning to table 3, it presents descriptive statistics indicative of an intriguing association between the payout channel, its duration, and the magnitude of total risk and disaggregated risks.[13] Table 3 shows, in Panel A, that not only total risk declines markedly in association with payout policy alteration from non-payment and exclusive share repurchases to a payout

[11] In order to provide an indication of the economic impact of weekly total equity risk, we set the long term debt ratio of a firm to its median value of 15.7%. We assume that the long-term debt has no coupons, has a duration of 4 years and is uncorrelated with the equity. Furthermore, we set the annual risk free interest rate at 3% and apply the Black and Scholes (1974) formula (in which weekly asset risk equals 84.3% of weekly total equity risk) in order to find the percentage of the implied put option of long term debt in relation to the risk free present value of long term debt, with respect to an exercise price of 100% of face value. At the median of weekly total equity risk (6.4%) that percentage is relatively small, namely 0.36%. When total equity risk increases to 7.4% (the mean value), the implied put option, is 1.14% of the present value of the risk free zero coupon bond. The put option relation is non-linear and for the full range of total equity risk (between 2.0% and 26.7%), the implied put option percentages lie between 0.0% and 75.5%.

[12] A year-by-year disaggregation of these winsorized measures of risk, winsorized concomitant total risk and the frequency distributions of the payout channels used over time are available on request.

[13] We calculate the duration of a payout policy, by setting the first possible pay out year at 1980 and increasing the duration by one year if the firm continues a specific payout type. Firms that discontinue a payout policy are set at zero during the period of payout policy discontinuation and if they recommence payout the pay out duration counter starts again at zero.

channel comprising cash dividends, but also systematic market risk (BEXMRW), overall systematic risk (SRISKW) and idiosyncratic risk (IRISKW) reduce in association with this alteration of payout channels. This finding also applies to the sensitivity to the small minus big factor (BSMBW) and it means that firms that pay dividends are generally larger.

[Please insert table 3 about here.]

Table 3 shows in Panels B and C the risk measures for different durations of dividend payout policies. A longer use of a payout channel results in smaller total risk, smaller sensitivity to the small minus big factor and smaller idiosyncratic risk. Interestingly, the longevity of dividend payout policy has not a negative association with the systematic market risk measure (BEXMRW) or the overall systematic risk (SRISKW). Firms that use the combined channel of dividends and share repurchases for an extended period (Panel B) are becoming less sensitive to the high minus low factor, which implies that a long duration of using this payout channel is associated with relatively low book to market firms.

5 Empirical findings - propensity score matching

While the associations reported in section 4 are intriguing, they do not show whether initiating (omitting) dividends generates a reduction (an increase) in total risk, because low risk is also a determinant of the likelihood to pay. In order to address the question of causality, we adopt a difference-in-differences methodology, while mitigating for self-selection based on low total risk. Table 4 presents the difference-in-differences, and associated significance levels, in respect of Fama and French (1993) measurements of firm risk for firms that *de facto* change the payout channel and matched benchmark firms that retain the same payout channel. The matching is based on the nearest neighbor propensity score, calculated for year, industry and total risk.

[Please insert table 4 about here.]

There are several findings in this table. First, initiation of a dividend pay out reduces total (and idiosyncratic) firm risk and omitting to pay dividends increases total (and idiosyncratic) firm risks. Second, while the difference in weekly total risk between firms that do not pay and firms that do pay dividends is 3.3% (8.6% - 5.3% = 3.3%, see table 2), the causal effect of initiating dividend payouts when no previous payouts took place is only -0.5 %. Therefore, the impact is only 15% (-0.5%/-3.3%) of the difference between firms that pay dividends and non-payers and it is only marginally significant. Omitting paying dividends has a larger absolute effect on a firm's idiosyncratic and total risks than initiating to pay dividends. When a firm that only paid dividends omits its dividends, weekly total risk increases by 1.5%, which in absolute terms is three times as large as the effect of the initiation of dividend pay out.[14] Hence, we observe a marked asymmetry in effects. This suggests that there is an impact on the risk measures during the period of pay out, which may arise due to the longevity of pay outs and/or the pay out amounts.

We do not find consistent reductions in the beta for systematic market risk (BEXMRW) due to initiations, nor consistent increases in that risk factor loading due to omitting dividends. The absence of consistent effects on systematic market risk is in line with Bulan, Subramanian and Tanlu (2007), but is in contradiction to earlier measurements of changes in systematic risk due to pay out changes (Grullon, Michaely, and Swaminathan, 2002; Grullon and Michaely, 2004). Turning to the small minus big systematic risk factor (BSMBW), initiating dividends reduces this factor loading (not consistently) and omitting dividends increases it relatively markedly. In contrast, in respect to the beta of the high minus low factor, we do not find significant effects. Finally, the aggregate systematic risk effects are relatively small and, in addition, not consistent across dividend policy alterations.

The relatively small magnitudes and inconsistent reactions of the aggregate systematic risk factor and the three systematic risk factor loadings, to dividend initiations and dividend omissions, suggests that we cannot conclude that there are consistent and meaningful unidirectional effects of dividend policy on systematic risks. Hence, our findings suggest that it is unlikely that value losses after omissions are caused by increases in systematic market risk, although they may be caused by increases in idiosyncratic risk. These findings, together with the relatively straightforward effects found for total and idiosyncratic risks, reveal the direct impact of payout initiations and omissions on firm risks.[15],[16]

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[14] It is noteworthy that the impact of dividend initiations and omissions is smaller if at the same time repurchases are made.

[15] Robustness checks show no major differences between the average treatment effects measured in table 4 and the Hodges-Lehman estimates of the effects. Rosenbaum Gamma values indicate that most measurements are robust to omitted variable bias. There are also no major differences between the estimates found when using the method of five nearest neighbors instead of when one nearest neighbor is used in the propensity score matching. Excluding lagged total risk, however, increases the absolute value of most value effects, indicating that the use of lagged total risk in the propensity score matching procedure is relevant in order to control for self-selection related to total risk. As a final robustness test we add eight new independent variables that may influence risk or payout. In this robustness test, the signs of the impacts measured are in most cases similar to those of our major estimates in table 4, though the coefficients are generally somewhat smaller in absolute terms. We prefer the propensity scores when only total risk is included in the equation (as in table 4) because with eight additional variables, insignificant explanatory variables with relatively large coefficients may have biased the selection of the matched untreated firms, thereby reducing the quality of the estimates of the dividend payout effects on risk. Results are available on request.

[16] It may be noted that we give a comprehensive overview of the impacts of dividend initiations and dividend omissions, but that we only measure the effects of initiating and omitting a certain type of payout and not the impact the amounts involved in such policy changes. Ordinary least squares regressions of the impact of the payout amounts involved, however, do not indicate systematic effects. Results are available on request.

6 Empirical findings - dynamic GMM panel regressions

The asymmetry of effects on idiosyncratic risk of initiating and omitting pay out of cash dividends may be indicative of a gradual change in investors' perceptions during the time that a dividend policy is in effect. Using system GMM estimates (Blundell and Bond, 1998) on our panel dataset, we test if this asymmetry of effects is related to aspects of the payout policies of paying firms, like relative payout amounts and payout durations, while simultaneously accounting for other possibly relevant variables.

Table 5 presents the findings of the impact of payout durations and relative amounts on total firm risk for two of our payout channels, exclusive cash dividend pay out and a combination of dividends and share repurchases. We use the lagged natural logarithms of the duration of the payout policy in our estimates (LNDDURATIONL for the dividend channel and LNDRDURATIONL for the combined channel). We also account for the effects of the relative amounts paid (CDTAWL for the dividend channel, and TOTPTAWL for the combined channel).[17] We include six lagged variables that are assumed to influence firm risk, namely size (LNTAWL), the long term debt ratio (LTDTAWL), the cash ratio (CATAWL), accounting risk (SDNITAWL), market to book value of equity (MCEWL), and company age (AGE). We assume a dynamic relation and therefore include lagged total risk (TRISKWL) as an explanatory variable, because it is likely that there is also path dependency in the risk levels of paying firms.

[Please insert table 5 about here.]

Table 5 shows that the effects of the control variables on total risk have the expected signs and that payout amounts have no significant effects on total risk measures. In contrast, the duration of cash dividends payouts influences total risk negatively and significantly. Quite unexpectedly, however, a longer duration of payouts through both repurchases and dividends marginally increases total firm risk. This finding implies that firms that want to increase firm value by reducing risk should not indefinitely extend the period of paying through a combination of dividends and repurchases.

In a similar manner, we measure the impact of the durations of payout channel use, and the payout amounts, on our set of Fama and French (1993) risk measures in table 6. The table shows that firms with a longer payout duration of solely paying cash dividends have significantly smaller idiosyncratic risk (IRISKW) and overall systematic risk (SRISKW), and thereby also smaller total risk. However, the individual betas calculated for the Fama and French (1993) factors are not significantly influenced by a protracted duration of this payout channel. We find opposite, albeit small results, on both idiosyncratic (IRISKW), total (TRISKW) and overall systematic (SRISKW) risks, for firms that adopt the combined payout channel over a protracted period of time. This corroborates our earlier finding that

[17] Summary statistics for the winsorized duration and the winsorized relative amounts paid are available on request.

firms which use both types of payout should refrain from doing so for a protracted period if they intend to increase value by diminishing firm risks. Turning to payout amounts, paying larger relative amounts (CDTAWL, TOTPTAWL) does reduce the idiosyncratic risk of the firm, though there is no effect on systematic market risks. Taking tables 5 and 6 together, we conclude that any prolonged value effects (value drift) after dividend initiations (Grullon, Michaely and Swaminathan, 2002) are not really attributable to systematic market risk reductions.

[Please insert table 6 about here.]

7 Conclusion

Firm market risk and payout policies are two major topics of corporate finance, and we study the direct impact of payout policies on the most important measures of firm risk. We correct explicitly for selection and omitted variables bias. Recently, it is shown that the total market risk of the firm is a major determinant of payout policies (Chay and Suh, 2009) and researchers should therefore control for selection bias related to the previous total market risk before concluding about any effect caused by payout changes. Omitted variables bias results when the effects of payouts *per se* are measured without distinguishing between payout channels, initiations, payout durations and payout amounts. We take care of selection bias by applying the propensity score matching technique to payout policy changes. The impact of payout durations and payout amounts, across payout channels, are measured by system GMM estimates that control for important other determinants of firm risk.

The propensity score matching procedure gives, first, the expected negative effects of payout initiations on total and idiosyncratic risk. Moreover, the effects are larger for initiating dividends than for initiating repurchases. However, second, the effects of payout initiations on firm risk measures are not significant. Third, when applying the propensity score matching technique to firms that omit payouts, the effects are larger than the absolute effects found after payout initiations. Fourth, the direct effects of omitting dividends do not result in significant increases in systematic market risk.

The asymmetric effect of initiating and omitting payouts on total and idiosyncratic risk suggests that there are unveiled developments during the payout period. Fifth, when controlling for other factors, we find through system GMM estimates that the payout duration influences total risk and its two main constituents (overall systematic risk and idiosyncratic risk). However, a protracted period of paying out both types simultaneously increases these risks. Finally, we find that higher relative payout amounts reduce idiosyncratic risk.

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Table 1 Characteristics of the risk measures, NYSE and NASDAQ, 1987-2011

Total risk (TRISKW) is defined as the sample estimate of the standard deviation of the excess arithmetic weekly returns over the risk free rate for a fiscal year. The betas (mnemonic starting with a B) are the coefficients of an ordinary least squares estimation of the Fama and French (1993) equation applied to weekly returns for each fiscal year, where BEXMR is the beta of excess market return, BSMB the beta of small minus big, and BHML the beta of high minus low. IRISK is a measure of idiosyncratic risk, which is the sample estimate of the residuals derived from the root mean squared errors from the Fama and French beta estimates. SRISK is a measure of systematic risk calculated as the square root of the difference of the squared total risk minus the squared idiosyncratic risk. All variables are transformed by a 0.5% winsorization at both sides (indicated by the letter W at the end of the mnemonic).

	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
Mean	0.074	1.028	0.808	0.109	0.032	0.064
St. Dev.	0.041	0.832	1.172	1.442	0.022	0.038
Median	0.064	0.984	0.696	0.130	0.027	0.055
Min	0.020	-1.699	-2.572	-5.057	0.004	0.017
Max	0.267	3.961	5.074	4.925	0.135	0.251

Table 2 Total risk quintiles and payout channel, NYSE and NASDAQ, 1987-2011

The table presents the number of firms and the means of winsorized total risk by total risk quintiles and payout channel. Total risk (TRISK) is defined as the standard deviation of the excess arithmetic weekly returns over the risk free rate for a fiscal year. Winsorized total risk (TRISKW) is the value of total risk winsorized at 0.5% at both sides. Firms that do not pay through either dividends or repurchases are indicated by payout channel zero (POC=0). Firms that pay out through repurchases only are indicated by the first payout channel (POC=1), firms that pay only dividends are indicated by the second payout channel (POC=2). Finally, firms that distribute through both repurchases and dividends are represented by the third payout channel (POC=3).

TRISK quintile	POC=0	POC=1	POC=2	POC=3	Total
			Number of observations		
1	696	2100	3033	5990	11819
2	1458	4304	1992	4064	11818
3	2021	5828	1323	2646	11818
4	2319	7150	780	1569	11818
5	2739	7794	455	830	11818
Total	9233	27176	7583	15099	59091
			Means of TRISKW		
1	0.035	0.035	0.032	0.032	0.033
2	0.049	0.049	0.048	0.048	0.049
3	0.064	0.064	0.063	0.063	0.064
4	0.085	0.084	0.083	0.082	0.084
5	0.141	0.138	0.133	0.133	0.138
Total	0.087	0.086	0.053	0.053	0.074

Table 3 Risk measures of firms by payout channel and duration of the payout channel, NYSE and NASDAQ, 1987-2011

The table presents the risk measures of firms for firms that do not pay out (POC=0) as well as for firms that use one of the three payout channels (Panel A). Panels B and C present the magnitude of the risk measures for the duration of the three payout channels. Firms that do not pay through either dividends or repurchases are indicated by payout channel zero (POC=0). Firms that pay out through repurchases only are indicated by the first payout channel (POC=1), firms that pay only dividends are indicated by the second payout channel (POC=2). Finally, firms that distribute through both repurchases and dividends are represented by the third payout channel (POC=3). Total risk (TRISKW) is defined as the standard deviation of the excess arithmetic weekly returns over the risk free rate for a fiscal year. The betas (mnemonics starting with a B) are the factor loadings of an ordinary least squares estimation of the Fama and French (1993) equation applied to weekly returns for each fiscal year, where BEXMR is the beta of the excess market return factor, BSMB the beta of small minus big risk factor, and BHML is the beta of high minus low risk factor. IRISK is a measure of idiosyncratic risk, which the the root mean squared errors of the residuals from the Fama and French (1993) regression equation. SRISK is a measure of systematic risk calculated as the square root of the difference of the squared total risk minus the squared idiosyncratic risk. All variables are transformed by a 0.5% winsorization at both sides (indicated by the letter W at the end of the mnemonics). Obs. is the number of observations.

Panel A: Risk measures by payout channel

POC	Obs.	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
0	9233	0.087	0.986	0.917	0.236	0.034	0.079
1	27176	0.086	1.095	0.992	-0.062	0.037	0.076
2	7583	0.053	0.947	0.565	0.345	0.025	0.045
3	15099	0.053	0.973	0.533	0.219	0.026	0.045
Total	59091	0.074	1.028	0.808	0.109	0.032	0.064

Panel B: Risk measures by duration of the second payout channel (POC=2: only dividends)

Duration in years	Obs.	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
1	591	0.064	0.890	0.703	0.368	0.026	0.057
2	485	0.061	0.929	0.764	0.259	0.025	0.055
3	409	0.061	0.906	0.725	0.255	0.026	0.054
4	395	0.062	0.910	0.754	0.303	0.027	0.054
5	351	0.062	0.869	0.738	0.356	0.027	0.054
6	308	0.063	0.934	0.603	0.434	0.029	0.054
7	297	0.057	0.862	0.631	0.317	0.026	0.05
8	346	0.054	0.942	0.593	0.296	0.026	0.045
9	325	0.049	0.922	0.591	0.323	0.022	0.043
10	308	0.044	0.974	0.624	0.368	0.019	0.039
> 10	3768	0.048	0.983	0.446	0.366	0.025	0.04

Table 3 *continued...*

Duration in years	Panel C: Risk measures by duration of the third payout channel (POC=3: both dividends and repurchases)						
	Obs.	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
1	3830	0.059	0.994	0.634	0.267	0.027	0.051
2	2383	0.055	0.971	0.611	0.242	0.026	0.047
3	1672	0.053	0.979	0.572	0.270	0.025	0.046
4	1215	0.051	0.939	0.512	0.181	0.025	0.043
5	972	0.052	0.949	0.490	0.237	0.026	0.043
6	735	0.052	0.955	0.509	0.222	0.026	0.043
7	605	0.050	0.958	0.482	0.233	0.025	0.042
8	586	0.052	1.012	0.470	0.231	0.028	0.042
9	504	0.048	1.004	0.489	0.050	0.025	0.039
10	426	0.044	1.001	0.435	0.166	0.022	0.037
> 10	2171	0.044	0.948	0.339	0.127	0.024	0.036

Table 4 The effect of a change in payout policies on risk measures, NYSE and NASDAQ, 1987-2011

The table presents the propensity score matched difference in risk measures when changing from the benchmark policy (and the t-values of that difference below the coefficients) with matching at one nearest neighbor. In the propensity score estimates time dummies, 1-digit industry dummies, year dummies, and lagged winsored total risk are used as independent variables. D represents dividend payments and R repurchases. The Letter L before D or R represents the last year's policy. D, R, LD or LR equal to 1 implies that a payout has taken place, and if it is equal to 0, there is no payout in the relevant year. Total risk is defined as the sample estimate of the standard deviation of the excess arithmetic weekly returns over the risk free rate for a fiscal year. The betas are the coefficients of an ordinary least squares estimation of the Fama and French (1993) equation for each fiscal year. Idiosyncratic risk is sample estimate of the residuals derived from the root mean squared errors from such equations. All variables are winsored at 0.5%. The benchmark policy in each panel is to continue the payout channel choice of last year. The 5% critical value of the t-test (two-sided) at the minimum level of matched treated firms (110) is 1.98.

	Treated	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
Benchmark is no payout in the previous year and continuing that policy							
LD=0,LR=0,D=1,R=0	211	-0.005	0.048	-0.041	-0.190	0.000	-0.006
P-values		(0.065)	(0.268)	(0.356)	(0.068)	(0.460)	(0.036)
Benchmark is only repurchases in the previous year and continuing that policy							
LD=0,LR=1,D=1,R=1	794	-0.004	-0.072	-0.157	-0.004	-0.003	-0.003
P-values		(0.020)	(0.044)	(0.003)	(0.480)	(0.003)	(0.052)
Benchmark is only dividends in the previous year and continuing that policy							
LD=1,LR=0,D=0,R=0	242	0.015	0.107	0.296	0.094	0.003	0.015
P-values		(0.000)	(0.086)	(0.005)	(0.245)	(0.116)	(0.000)
Benchmark is both dividends and repurchases in the previous year and continuing that policy							
LD=1,LR=1,D=0,R=1	586	0.009	-0.006	0.218	-0.046	0.002	0.010
P-values		(0.000)	(0.448)	(0.002)	(0.309)	(0.042)	(0.000)

Table 5 System GMM analysis of the impact of the duration of payment and the amount of payment on total risk, NYSE and NASDAQ, 1987-2011

Dynamic system panel regressions with winsorized total risk (TRISKW) as the dependent variable. All equations have 357 instruments, namely generalized methods of moments for all the lags of the dependent variable (starting at lag 2) for the dependent of the differenced equation, generalized methods of moments for lagged difference of the dependent variable, standard differences of the other exogenous variables in the difference equation where appropriate. TRISKWL is lagged winsorized total risk. LNRDURATIONL is the lagged natural log of the duration of repurchase payments if firms only repurchase (POC=1). NREPTALWL is the lagged winsorized value of the ratio of net repurchase amounts divided by total assets. LNDDURATIONL is the lagged natural log of the duration of dividend payments if firms only pay dividends (POC=2). CDTAWL is the lagged winsorized value of the ratio of cash dividends divided by total assets. LNDRDURATIONL is the lagged natural log of the duration of repurchase and dividend payments if firms payout through both repurchases and dividends (POC=3). TOTPTAWL is the lagged winsorized value of the ratio of total payout divided by total assets. LNTA is the natural log of total assets, LTDTA is long term debt divided by total assets, CATA is cash divided by total assets, SDNITA is the 3 year standard deviation of the net income to asset ratio of the current and two previous years, and MCE is the Market capitalization divided by the book value of equity (all these variables are winsorized from below and above at 0.5% and lagged as indicated by the last two letters of the mnemonic). AGE is company age. Coef. is the value of the coefficient and P>z the p-value of the z-statistic. The level equation contains industry and time dummies (not reported).

	POC=2		POC=3	
	Coef.	P>z	Coef.	P>z
TRISKWL	0.275	(0.000)	0.256	(0.000)
LNDDURATIONL	-0.007	(0.000)		
CDTAWL	-0.019	(0.328)		
LNDRDURATIONL			0.001	(0.032)
TOTPTAWL			-0.005	(0.167)
LNTAWL	0.002	(0.155)	-0.001	(0.290)
LTDTAWL	0.005	(0.364)	0.006	(0.096)
CATAWL	-0.019	(0.002)	-0.010	(0.018)
SDNITAWL	-0.000	(1.000)	0.014	(0.030)
MCEWL	-0.000	(0.602)	-0.000	(0.923)
AGE	-0.000	(0.106)	-0.000	(0.434)
CONSTANT	0.039	(0.035)	0.053	(0.000)
Observations	3,479		8,873	
Groups	785		1,302	
Wald-Chi^2	2764		6214	
Probability Wald-Chi^2	0.000		0.000	

Table 6 System GMM analysis of the impact of the duration of payment and the amount of payment on firm risk measures by payout channel of paying firms, NYSE and NASDAQ, 1987-2011

The table reports the focal coefficients and P-values for dynamic system panel regressions with winsorized variables. The dependent variables are total risk (TRISK), the beta of excess market return (BEXMR), the beta of small minus big (BSMB), the beta of high minus low (BHML), idiosyncratic risk (IRISK), and systematic risk (SRISK) as the square root of the difference of the squared total risk minus the squared idiosyncratic risk. All risk measures are winsorized at 0.5%, indicated by the letter W at the end of the mnemonic. LNRDURATIONL is the lagged natural log of the duration of repurchase payments if firms only repurchase (POC=1). NREPTALWL is the lagged winsorized value of the ratio of net repurchase amounts divided by total assets. LNDDURATIONL is the lagged natural log of the duration of dividend payments if firms only pay dividends (POC=2). CDTAWL is the lagged winsorized value of the ratio of cash dividends divided by total assets. LNDRDURATIONL is the lagged natural log of the duration of repurchase and dividend payments if firms payout through both repurchases and dividends (POC=3). TOTPTAWL is the lagged winsorized value of the ratio of total payout divided by total assets. The regression equations also contained additional independent variables and industry and year dummies (identical to the variables of Table 6) for which the coefficients and P-values are not reported.

	TRISKW	BEXMRW	BSMBW	BHMLW	SRISKW	IRISKW
	Only cash dividend payers (POC=2)					
Lagged dependent	0.275	-0.027	0.023	0.047	0.109	0.248
P-value	(0.000)	(0.134)	(0.205)	(0.007)	(0.000)	(0.000)
LNDDURATIONL	-0.007	-0.070	-0.143	-0.171	-0.003	-0.006
P-value	(0.000)	(0.288)	(0.168)	(0.187)	(0.011)	(0.000)
CDTAWL	-0.019	0.118	0.064	-2.287	0.014	-0.034
P-value	(0.328)	(0.856)	(0.946)	(0.051)	(0.313)	(0.035)
	Paying through repurchases and dividends (POC=3)					
Lagged dependent	0.256	0.037	0.031	0.063	0.115	0.267
P-value	(0.000)	(0.001)	(0.010)	(0.000)	(0.000)	(0.000)
LNDRDURATIONL	0.001	0.017	-0.009	0.006	0.001	0.002
P-value	(0.032)	(0.539)	(0.809)	(0.894)	(0.007)	(0.004)
TOTPTAWL	-0.005	0.256	-0.072	0.030	0.004	-0.010
P-value	(0.167)	(0.070)	(0.712)	(0.904)	(0.153)	(0.004)

Table A1 Characteristics of the explanatory variables, NYSE and NASDAQ, 1987-2011

CDTA is the cash dividends divided by total assets, NREPTA are the net repurchases based on Fama and French (2001) divided by total assets, TOTPTA is the sum of CDTA and NREPTA. RDURATION is the duration of repurchase payments in years if firms only repurchase (POC=1). DDURATION is the duration in years of dividend payments if firms only pay dividends (POC=2). DRDURATION is the duration in years of repurchase and dividend payments if firms payout through both repurchases and dividends (POC=3). LNTA is the value of natural log of total assets, CATA is cash divided by total assets, SDNITA is the standard deviation of the ratios of net income divided by total assets for a period of three years including the current year, LTDTA is long term debt to total assets, MCE is the market to book ratio of equity, NITA is net income to total assets, DATA is the relative change in total assets. All these variables are winsorized at 0.5% at the top and 0.5% at the bottom, which is indicated by the letter W at the end of the mnemonic. AGE is the firms age calculated by taking the relevant year of observation minus the year of incorporation and minimized at zero.

	Obs.	Mean	St. dev.	Median	Min	Max
CDTAW	59089	0.010	0.027	0.000	0.000	0.255
TOTPTAW	59089	0.065	0.155	0.014	0.000	1.072
DDURATION 1)	7615	11.435	8.038	10.000	1.000	32.000
DRDURATION 2)	15099	5.300	5.307	3.000	1.000	32.000
LNTAW	59089	12.726	1.887	12.621	8.375	17.945
CATAW	59084	0.199	0.226	0.105	0.000	0.946
SDNITAW	49910	0.080	0.149	0.031	0.001	1.257
LTDTAW 3)	58650	0.166	0.183	0.114	0.000	0.998
MCEW 4)	56964	3.584	5.448	2.180	0.011	53.313
NITAW	59065	-0.012	0.231	0.042	-1.648	0.399
DATAW	54414	0.059	0.260	0.064	-1.444	0.781
AGE	48833	26.219	25.656	17.000	0.000	181.000

1. For firms with dividend payments only.
2. For firms with both dividend and repurchase payments.
3. The maximum of the winsorized value for the long term debt ratio (LTDTAW) is required to be smaller than or equal to 1.
4. The minimum of the winsorized value of the market to book ratio of equity (MCEW) is required to be larger than or equal to 0.

Table R1 Risk characteristics by year, NYSE and NASDAQ, 1987-2011

Total risk is defined as the sample estimate of the standard deviation of the excess arithmetic weekly returns over the risk free rate for a fiscal year. The betas are the coefficients of an ordinary least squares estimation of the Fama and French (1993) equation for each fiscal year. Idiosyncratic risk is the sample estimate of the residuals derived from the root mean squared errors from such estimates. Systematic risk is the square root of the difference of the squared total risk minus the squared idiosyncratic risk. All variables are winsorized at 0.5%.

	1	2	3	4	5	6	7
Year	Obs.	Total risk	Beta excess market returns	Beta small minus big	Beta high minus low	Systematic risk	Idiosyncratic risk
1987	733	0.065	1.124	0.858	-0.005	0.037	0.051
1988	973	0.057	1.145	0.851	-0.057	0.029	0.048
1989	1078	0.048	1.117	0.810	0.012	0.018	0.044
1990	1258	0.056	1.079	0.719	0.006	0.025	0.049
1991	1429	0.065	1.119	0.801	0.122	0.028	0.057
1992	1548	0.058	1.117	0.884	0.171	0.023	0.053
1993	1659	0.056	1.031	0.797	-0.009	0.019	0.052
1994	2219	0.058	1.030	0.780	0.014	0.021	0.054
1995	2415	0.060	1.023	0.801	0.071	0.019	0.056
1996	2708	0.066	1.049	0.938	-0.090	0.023	0.061
1997	2915	0.067	1.080	1.016	0.045	0.024	0.062
1998	3120	0.082	1.039	0.934	0.183	0.035	0.072
1999	3030	0.091	1.111	0.976	0.581	0.033	0.084
2000	3043	0.110	0.910	0.683	0.251	0.047	0.097
2001	3008	0.103	1.019	0.940	-0.034	0.047	0.089
2002	2950	0.087	1.084	0.848	0.235	0.036	0.078
2003	2911	0.076	1.066	0.808	0.301	0.031	0.068
2004	2895	0.063	1.015	0.830	0.112	0.027	0.056
2005	2887	0.058	0.969	0.734	0.023	0.024	0.052
2006	2870	0.056	0.850	0.844	-0.032	0.024	0.050
2007	2799	0.057	0.985	0.591	-0.055	0.025	0.050
2008	2792	0.095	1.075	0.574	0.155	0.055	0.075
2009	2663	0.100	1.051	0.666	0.184	0.055	0.081
2010	2657	0.065	0.939	0.739	0.104	0.034	0.053
2011	2531	0.066	0.985	0.768	0.014	0.038	0.052
Total	59091	0.074	1.028	0.808	0.109	0.032	0.064

Table R2 Incidence and total risk per payout channel by year, NYSE and NASDAQ, 1987-2011

The first part of this table distinguishes between the various payout channels per year for the total number of observations in column 1 of table A1. Four payout channels are defined. POC0 represents the firms that do not pay at all, POC1 represents payout through repurchases only, POC2 represents payout through dividends only and POC3 represents payout through both dividends and repurchases. The relative frequency indicates the choice of payout channel by year, implying that the relative frequencies of the four payout channels sum to 1. The second part of the table shows the total risk for each payout channel by year, as presented in column 2 of table A1. Total risk is the winsorized value of total risk.

	Panel A				Panel B			
	Relative frequency				Total risk			
1987	0.059	0.307	0.184	0.450	0.071	0.079	0.054	0.058
1988	0.085	0.281	0.202	0.432	0.074	0.074	0.046	0.048
1989	0.099	0.243	0.224	0.434	0.062	0.061	0.040	0.041
1990	0.106	0.245	0.233	0.417	0.077	0.071	0.048	0.046
1991	0.131	0.253	0.284	0.332	0.090	0.084	0.050	0.052
1992	0.132	0.283	0.267	0.317	0.073	0.076	0.045	0.047
1993	0.133	0.310	0.233	0.324	0.072	0.070	0.043	0.045
1994	0.132	0.410	0.172	0.286	0.069	0.071	0.043	0.045
1995	0.157	0.418	0.154	0.271	0.069	0.074	0.041	0.043
1996	0.147	0.472	0.127	0.253	0.076	0.079	0.045	0.046
1997	0.126	0.524	0.106	0.244	0.076	0.080	0.044	0.046
1998	0.139	0.533	0.087	0.241	0.093	0.093	0.057	0.058
1999	0.159	0.517	0.089	0.235	0.105	0.104	0.066	0.064
2000	0.159	0.545	0.083	0.214	0.118	0.128	0.070	0.073
2001	0.184	0.534	0.103	0.179	0.113	0.120	0.064	0.065
2002	0.196	0.528	0.107	0.169	0.098	0.099	0.057	0.057
2003	0.203	0.491	0.108	0.198	0.086	0.087	0.049	0.052
2004	0.183	0.482	0.115	0.220	0.076	0.072	0.046	0.044
2005	0.157	0.492	0.107	0.245	0.070	0.065	0.047	0.043
2006	0.162	0.483	0.092	0.263	0.067	0.063	0.044	0.042
2007	0.147	0.492	0.090	0.272	0.068	0.063	0.049	0.044
2008	0.138	0.506	0.096	0.259	0.112	0.099	0.094	0.081
2009	0.207	0.451	0.134	0.209	0.123	0.104	0.087	0.080
2010	0.185	0.466	0.115	0.234	0.077	0.070	0.055	0.049
2011	0.162	0.456	0.113	0.268	0.079	0.073	0.058	0.052
Total	0.156	0.460	0.128	0.256	0.087	0.086	0.053	0.053

Table R3 Propensity score quality checks for estimates of the effect of payout channel changes on total risk, NYSE and NASDAQ, 1987-2011

The table provides quality checks for the impact of payout policy changes on total risk, measured for estimates with one nearest neighbor (as applied in Table 5). Column 1 gives the regression coefficients for the impact of lagged total risk (TRISKWL) in the propensity score and in column 2 its P-value. In column 3 the minimum of the common support region of lagged total risk is provided and in column 4 its maximum. Column 5 provides the averages of the lagged total risk for untreated firms and column 6 the mean of lagged total risk for treated firms. Column 6 provides the Gamma value proposed by Rosenbaum for which the upper and lower values of Hodges-Lehmann point estimates have the same sign as the estimated coefficient of the average treatment effects (tested between Gamma=1 and Gamma=1.5 at intervals of 0.1).

	Propensity score estimate		Outcome characteristics				
	1	2	3	4	5	6	7
	TRISKWL	P-value	Common support TRISKWL minimum	maximum	Mean TRISKWL untreated	Mean TRISKWL treated	Gamma
	Benchmark is no payout in the previous year and continuing that policy						
LD=0,LR=0,D=0,R=1	-1.443	0.000	0.020	0.267	0.089	0.085	1.1
LD=0,LR=0,D=1,R=0	-4.852	0.000	0.024	0.267	0.089	0.073	1.3
LD=0,LR=0,D=1,R=1	-3.041	0.002	0.020	0.267	0.089	0.077	1.3
	Benchmark is only repurchases in the previous year and continuing that policy						
LD=0,LR=1,D=0,R=0	0.297	0.297	0.020	0.267	0.087	0.088	1.1
LD=0,LR=1,D=1,R=0	-2.183	0.025	0.021	0.267	0.087	0.075	1.5
LD=0,LR=1,D=1,R=1	-2.805	0.000	0.020	0.267	0.087	0.075	1.4
	Benchmark is only dividends in the previous year and continuing that policy						
LD=1,LR=0,D=0,R=0	13.905	0.000	0.022	0.244	0.051	0.088	1.5
LD=1,LR=0,D=0,R=1	10.425	0.000	0.028	0.267	0.051	0.053	1.5
LD=1,LR=0,D=1,R=1	-0.856	0.241	0.020	0.267	0.051	0.050	1.0
	Benchmark is both dividends and repurchases in the previous year and continuing that policy						
LD=1,LR=1,D=0,R=0	12.918	0.000	0.024	0.267	0.050	0.086	1.5
LD=1,LR=1,D=0,R=1	15.941	0.000	0.026	0.267	0.050	0.087	1.5
LD=1,LR=1,D=1,R=0	3.930	0.000	0.020	0.267	0.050	0.054	1.0

Table R4 Robustness checks of the change in payout channel, NYSE and NASDAQ, 1987-2011

The table provides the average treatment effects (ATT) that show the impact of a change in payout channel and the concomitant t-values. In all cases industry dummies and year dummies are used in estimating the propensity scores of the treated firms that change their payout channel and the concomitant scores of the untreated firms that do not change from the benchmark payout channel. Columns 1 and 2 represent the results when adding lagged winsorized total risk (TRISKWL) as an independent variable and applying 1 nearest neighbor (results provided in the main text). Column 3 shows the Hodges-Lehmann estimates at a Gamma value of 1. Column 4 shows the highest Gamma value proposed by Rosenbaum for which the upper and lower values of Hodges-Lehmann have the same sign as the estimated coefficient of the average treatment effects (tested between Gamma=1 and Gamma=1.5 at intervals of 0.1). Columns 5 and 6 give the results when adding lagged winsorized total risk and applying 5 nearest neighbors. The results of propensity scores based only on the industry and time dummies is provided in columns 7 and 8.Columns 9-12 show the results when besides lagged winsorized total risk also eight other variables that influence risk and payouts are included. These are the lagged winsorized logarithm of total assets (LNTAWL), the lagged winsorized long term debt debt ratio (LTDTAWL), the lagged winsorized cash ratio (CATAWL), the lagged winsorized 3 year standard deviation of the net income to asset ratio of the current and two previous years (SDNITAWL), the lagged winsorized market capitalization divided by the book value of equity (MCEWL), and company age (AGE). Besides these variables that may influence risk, we also add two variables that may influence payouts, namely lagged winsorized net income divided by total assets (NITAWL) and the lagged winsorized relative change in total assets (DATAWL). Column 11 indicates how many of the nine variables are significant in the equation (irrespective of the correct sign). Column 12 gives the highest Gamma values for which the upper and lower values of Hodges-Lehmann have the same sign as the estimated coefficient of the average treatment effects (again tested between Gamma=1 and Gamma=1.5 at intervals of 0.1).

Table R4 *continued...*

	TRISKWL included						TRISKWL excluded		8 additional variables besides TRISKWL			
	1 nearest neighbor (Similar to table 5)				5 nearest neighbors		1 nearest neighbors		1 nearest neighbors			
	1	2	3	4	5	6	7	8	9	10	11	12
	ATT	t-value	Hodges-Lehman	Gamma	ATT	t-value	ATT	t-value	ATT	t-value	# sign.	Gamma
	Benchmark is no payout in the previous year and continuing that policy											
LD=0,LR=0,D=0,R=1	-0.002	-1.78	-0.003	1.1	-0.002	-1.86	-0.011	-2.47	0.001	0.75	4	1.0
LD=0,LR=0,D=1,R=0	-0.005	-1.52	-0.004	1.3	-0.006	-2.35	-0.014	-2.58	-0.006	-1.43	2	1.1
LD=0,LR=0,D=1,R=1	-0.004	-1.02	-0.005	1.3	-0.005	-1.62	-0.022	-4.06	-0.003	-0.57	6	1.1
	Benchmark is only repurchases in the previous year and continuing that policy											
LD=0,LR=1,D=0,R=0	0.003	2.94	0.003	1.1	0.003	2.87	0.003	0.92	0.001	0.73	6	1.0
LD=0,LR=1,D=1,R=0	-0.005	-1.24	-0.008	1.5	-0.004	-1.12	-0.002	-0.37	-0.001	-0.18	3	1.0
LD=0,LR=1,D=1,R=1	-0.004	-2.06	-0.006	1.4	-0.002	-1.39	-0.002	-0.61	-0.001	-0.41	3	1.1
	Benchmark is only dividends in the previous year and continuing that policy											
LD=1,LR=0,D=0,R=0	0.015	3.52	0.012	1.5	0.015	4.25	0.031	7.18	0.013	2.38	5	1.5
LD=1,LR=0,D=0,R=1	0.014	2.47	0.011	1.5	0.015	3.12	0.025	4.31	0.004	0.49	6	1.5
LD=1,LR=0,D=1,R=1	-0.001	-0.91	0.000	1.0	0.000	0.03	0.000	-0.17	-0.001	-0.75	3	1.0
	Benchmark is both dividends and repurchases in the previous year and continuing that policy											
LD=1,LR=1,D=0,R=0	0.014	3.08	0.012	1.5	0.015	4.17	0.036	8.14	0.017	2.80	6	1.5
LD=1,LR=1,D=0,R=1	0.009	3.59	0.009	1.5	0.010	5.06	0.032	10.65	0.010	3.03	6	1.5
LD=1,LR=1,D=1,R=0	0.001	0.58	0.000	1.0	0.001	1.45	0.004	1.46	0.001	0.66	5	1.0

Table R5 The impact of previous and current payout amounts for firms that change their payout policy, NYSE and NASDAQ, 1987-2011.

The table presents the coefficients (and robust p-values) for an ordinary least squares regression of the impact of amounts on the change in risk measures for treated firms for the four benchmark policies (panels A-D). All variables are wisorized (indicated with the letter W at the end of the mnemonic). The dependent variables are change variables (indicated by the letter D before the mnemonic). The core mnemonics of the dependent variables are total risk (TRISK), market beta (BEXMR), the beta of small minus big (BSMB), the beta of high minus low (BHML), overall systematic risk (SRISK), and idiosyncratic risk(IRISK). The independent variables are current and lagged (indicated with the letter L at the end of the mnemonic) net repurchases to total assets (NREPTA), and current and lagged cash dividends to total assets. The mnemonics below the risk measures refer to dividend payments (D), lagged dividends payments (LD), net repurchases (R), or lagged repurchases (LR) and whether the payouts took place (=1) or not (=1).

Panel A: Benchmark is no payout in the previous year and continuing that policy

	DTRISKW	DBEXMRW	DBSMBW	DBHMLW	DSRISKW	DIRISKW
			LD=0,LR=0,D=1,R=0			
NREPTAWL						
CDTAW	0.041	-3.595**	1.740	-0.869	-0.017	0.054**
	(0.153)	(0.003)	(0.336)	(0.743)	(0.359)	(0.049)
CDTAWL						
NREPTAW						

Table R5 *contd...*

Panel B: Benchmark is only dividends in the previous year and continuing that policy						
	DTRISKW	DBEXMRW	DBSMBW	DBHMLW	DSRISKW	DIRISKW
			LD=1,LR=0,D=0,R=0			
NREPTAWL						
CDTAW	-0.024	-0.979	1.974	1.241	-0.041	-0.003
	(0.470)	(0.373)	(0.191)	(0.589)	(0.094)	(0.933)
CDTAWL	0.014	0.144	-1.365	-1.990	0.017	0.008
	(0.642)	(0.889)	(0.312)	(0.317)	(0.449)	(0.781)
NREPTAW	0.006	0.079	-0.312	0.085	0.005	0.007
	(0.659)	(0.839)	(0.575)	(0.881)	(0.593)	(0.544)
			LD=1,LR=0,D=0,R=1			
NREPTAWL						
CDTAW						
CDTAWL	-0.014	-0.126	0.209	2.621	-0.001	-0.021
	(0.811)	(0.919)	(0.942)	(0.207)	(0.962)	(0.691)
NREPTAW	0.189	2.831**	1.269	3.766	0.112**	0.145
	(0.076)	(0.040)	(0.739)	(0.300)	(0.004)	(0.148)
			LD=1,LR=0,D=1,R=1			
NREPTAWL						
CDTAW						
CDTAWL	-0.034	0.787	-1.937	2.667	0.020	-0.055
	(0.364)	(0.510)	(0.237)	(0.165)	(0.371)	(0.172)
NREPTAW						

Table R5 *contd...*

Panel C: Benchmark is both dividends and repurchases in the previous year and continuing that policy						
	DTRISKW	DBEXMRW	DBSMBW	DBHMLW	DSRISKW	DIRISKW
			LD=1,LR=1,D=0,R=0			
NREPTAWL	-0.009	-1.018	2.043**	1.641	-0.008	-0.004
	(0.560)	(0.128)	(0.009)	(0.152)	(0.510)	(0.738)
CDTAW						
CDTAWL	-0.001	-1.129	0.412	4.554	-0.008	-0.002
	(0.984)	(0.548)	(0.874)	(0.156)	(0.806)	(0.957)
NREPTAW						
			LD=1,LR=1,D=0,R=1			
NREPTAWL	-0.009	-0.050	-1.039**	-0.782	-0.005	-0.008
	(0.243)	(0.877)	(0.031)	(0.093)	(0.321)	(0.311)
CDTAW						
CDTAWL	-0.036	-0.093	0.091	0.673	-0.019	-0.034
	(0.085)	(0.920)	(0.955)	(0.627)	(0.160)	(0.082)
NREPTAW	0.008	-0.184	0.681	-0.700	0.003	0.005
	(0.623)	(0.706)	(0.371)	(0.331)	(0.724)	(0.760)
			LD=1,LR=1,D=1,R=0			
NREPTAWL	0.009	0.265	-0.030	-0.373	0.003	0.008
	(0.169)	(0.328)	(0.919)	(0.310)	(0.524)	(0.188)
CDTAW	0.009	-1.693**	0.291	-0.073	-0.012	0.016
	(0.671)	(0.015)	(0.816)	(0.968)	(0.438)	(0.445)
CDTAWL	-0.006	2.387**	-0.751	1.990	0.010	-0.008
	(0.793)	(0.001)	(0.542)	(0.277)	(0.511)	(0.695)
NREPTAW						