Dividend Payments as a Response to Peer Influence

Jillian A. Popadak*
The Wharton School, University of Pennsylvania

ABSTRACT

I show peer firms play an important role in determining the timing and magnitude of U.S. corporate dividends. In particular, dividend changes by peer firms accelerate the time to a dividend change by 132 days. Peer firm dividend changes lead to increases in dividend payments of 15% – an effect that is larger than many previously identified dividend determinants. At the industry level, peer effects alter dividend yields; if expected yields are 3%, peer effects inflate (deflate) yields to 3.4% (2.6%). Cross-sectional heterogeneity suggests elements of strategic behavior and behavioral biases are producing the estimated peer effects. Excess-variance, instrumental variable and partial identification strategies are used to address the difficult challenge of establishing peer effects, and because each strategy uses different identifying assumptions, the conclusions are not fragile to any single identifying assumption.

JEL classification: C31, D22, G14, G35
Keywords: Dividend Policy, Peer Effects, Excess Variance, Partial Identification

*Popadak: The Wharton School, University of Pennsylvania, 3620 Locust Walk, Suite 3000, Philadelphia, PA 19104 (e-mail: jpopadak@wharton.upenn.edu). I thank Christine Dobridge, Jesse Edgerton, Cesare Fracassi, Todd Gormley, Roni Michaely, David Musto, Krishna Ramaswamy, Michael Roberts and Luke Taylor for very helpful discussions and suggestions. The remaining errors are my own.

1. Introduction

Equity markets react strongly to dividend announcements and dividend paying firms generate the bulk of industrial earnings (Fama and French (2001); DeAngelo, DeAngelo, and Skinner (2004)), yet the economic determinants of dividend policy are not well understood (Allen and Michaely (2003); Michaely and Roberts (2012)). Existing explanations, which focus on factors such as tax advantages, stockholder preferences, signaling motives, and agency problems, can only explain a small fraction of the observed variation in dividend policy (Coles and Li (2012)). I hypothesize and empirically test an important yet previously unaccounted for component of dividend policy – that managers make dividend decisions by responding to the dividend decisions of their peer groups. Prior research in economics and finance refers to such a response as a "peer effect" (Manski (1993)).

As a recent example of peer effects in dividend policy, consider the health insurance industry. In late 2010, UnitedHealth's CEO announced a *meaningful* dividend increase from 3 cents per share to 12.5 cents per share. Shortly thereafter, Aetna raised its dividend to 15 cents per share, up from 4 cents per share. In an interview one week later, WellPoint's CEO stated his firm would only pay a dividend if it is a meaningful one. Two weeks after the interview, WellPoint's CEO, likely influenced by his peer firms' meaningful dividend changes, announced a new dividend of 25 cents per share. Historical examples of peer effects also abound. Consider GE and Westinghouse. O'Sullivan (2006) demonstrates that GE was consistently more profitable for much of the 20th century, but the two companies' average dividend levels were much more similar. O'Sullivan attributes the similarity to peer pressure to pay a higher dividend. Finally, Lintner's interviews with 28 chief executives led him to suggest that peer effects were among the more important factors determining the different target payout ratios and adjustment rates in the interviewed firms (Lintner (1956)).

This paper measures the extent to which peer effects explain dividend policy, and importantly, the mechanisms underlying them. Understanding the mechanisms is critical, because peer effects can stem from from both rational and behavioral-based responses in managers' decision-making processes. Each of these origins have different policy implications. An irrational, behavioral-based response occurs when the dividend decisions of peer managers overwhelm the internal decision-making process and cause a manager to ignore the validity of internal analysis (Benabou and Tirole (2003)). In contrast, if the observable information from peers' decisions lead managers to learn what policy is best for their firm (DeMarzo, Vayanos, and Zwiebel (2003); Bursztyn et al. (2012)), peer effects are a rational determinant of dividend policy.

To empirically explore the relationship between peer effects and dividend policy requires a rigorous identification strategy. Yet it is very difficult to identify peer effects without the random assignment of firms to peer groups. One of the difficulties in establishing that causal peer effects exist is the reflection problem (Manski (1993)), which refers to the idea that peers simultaneously influence one another. Unobservable influences common to firms within an industry make the reflection-induced endogeneity even more difficult to overcome. I use a variety of complimentary methodologies to analyze the possibility of peer effects and deal with the many identification threats posed in analyzing peer effects. While I lack the ideal random assignment of firms to peer groups, the evidence from three different empirical tests are remarkably robust across specifications and suggest peer effects exist. The joint appeal of many tests is that they use different identifying assumptions to overcome the endogeneity problem; this suggests any conclusions are less fragile to a single assumption.

The first approach used to identify peer effects draws from the excess-variance and network identification literature (Graham (2008); Shue (2013)). The excess-variance approach exploits the mathematical identity that variance does not increase proportionately with sample size. Specifically, the identification capitalizes on natural variation in industry size. Because some industries are larger or smaller than others, the mathematical identity implies that peer influence, if it exists, will inflate or deflate the observed variance in dividend payments more in industries with fewer firms. The observed variance in dividend payments differs across industries for both firm and industry-specific reasons, but these factors do not lead to a systematic inflation or deflation between industries defined as large or small based on the number of firms.

Intuitively, the excess-variance approach is akin to a difference-in-difference design used to identify mean effects, but is more accurately described as a ratio-in-differences design used to identify variance effects. The ratio compares observed to expected conditional variance; this step removes all of the variance attributable to observable firm and industry-specific factors. The variance that remains is a composition of unobservable factors, which include peer effects, self-selection, and sorting. The difference across small and large industries separates the variance attributable to peer effects from that attributable to self-selection and sorting. The reason this second difference isolates the variance attributable to peer effects is that only peer effects display disproportionate variance when the number of firms decreases; this is attributable to the mathematically identity first established by deMoivre (1730). A limitation of this approach is that the results would be biased if self-selection also displays disproportionate variance when the number of firms changes.

The excess variance approach suggests that peer effects are statistically significant and economically meaningful in the context of dividend policy. The economic magnitude of the peer influence accounts for 12% of the clustering in dividend payments at the industry level. Put another way, if the expected dividend yield for an industry is 3% ignoring peer effects, then accounting for peer effects leads to an increase (or decrease) in the yield of 0.36%. Because it is a ratio-of-differences, only the magnitude not the sign is identified. These results remain robust across refinements such as only examining highly competitive industries. This type of refinement is relevant because industry competitiveness is one of the leading determinants of self-selection into industry.

The second identification approach follows closely the logic of Leary and Roberts (2013), in which idiosyncratic equity returns are used as an instrument for identifying peer effects with respect to leverage. However, the approach used in the paper differs in two important ways. First, idiosyncratic equity returns are not known to be relevant determinants of dividend changes, so I focus on *idiosyncratic equity risk*, which is a known determinant of dividend policy (Hoberg and Prabhala (2009)). The second difference is to highlight the use of an alternative sufficient condition for identification in an instrumental variables context proposed by Kolesar, Chetty, Friedman, Glaeser, and Imbens (2012) that achieves identification without the need for the exclusion restriction to hold in the strictest sense. A potential limitation of the instrumental variable approach is if the assumptions of both methodologies are violated; however, a proof by contradiction shows this is impossible.

Using the instrumental variable strategy, I find peer effects are statistically significant and economically meaningful in the context of dividend policy. Peer effects are associated with managers reducing the time between dividend changes and with increasing dividend levels more than is predicted by a baseline model, which takes into consideration firm-specific financial constraints, agency and signaling considerations, and business cycle explanations. These results remain robust to the inclusion of contextual effects and alternative definitions of the peer group. In addition, the results are robust to a placebo test, which re-estimates each instrumental variable specification, but replaces the actual peer influence variable with a variable representing a forward-looking peer influence variable. If common, yet unobserved factors are creating spurious results, then the newly constructed placebo variable would have had a statistically significant coefficient estimate, but it does not.

A third approach employs partial identification (Conley, Hansen, and Rossi (2012); Imbens and Manski (2004)) and finds a statistically significant and economically meaningful effect attributable to peer influence, even with substantial departures from a perfect instrument. The partial identification approach assumes the instrument, idiosyncratic equity risk, does not fulfill the exclusion restriction, and instead employs an alternative framework to understand how large the deviation from the exclusion restriction would need to be to make the peer effect coefficient indistinguishable from 0. The results suggest the deviation would need to be a more important determinant of corporate dividend payments than factors such as firm risk, institutional ownership, and repurchases; such a scenario is unlikely.

Having shown multiple complimentary strategies that all suggest peer effects are economically meaningful in the context of dividend policy, the final part of this paper investigates the channel through which peer effects operate. To distinguish between the various theoretical explanations, which originate from learning, reputation, strategy, and psychology, the instrumental variable analyses is extended. Peer influence is interacted with firm and managerial characteristics. The interaction term, which captures the joint effect of peer influence and the characteristic, is endogenous, so it is instrumented for with the average peer idiosyncratic equity risk interacted with the characteristic. This exercise provides mostly suggestive evidence about the origins of peer effects as the characteristic is likely endogenous as well. To proxy for career or reputational concerns, I consider the age and tenure of the CEO. Overconfidence is proxied for using the definition outlined by Malmendier and Tate (2005). Strategic motives are proxied for by examining peer firms' financial capacities to pay dividends. Finally, learning is proxied for using firm size.

The tests suggest strategic and behaviorally-based explanations of peer effects are economically important while learning and reputation is not. For example, a strategically-motivated manager may increase his dividend payment when he knows his peer managers will follow suit; he utilizes this strategy to exploit the peer firms' financial vulnerability. Supporting this intuition, I find financially vulnerable firms are 2.1% more likely to increase dividend payments when peer influence is high, all else equal. The statistical evidence supporting the behavioral explanation indicates that overconfident CEOs are 2.8% more likely to increase dividend payments when peer influence is high, all else equal.

This study is related to several strands of literature and makes contributions to each. First, I highlight a previously unaccounted for dynamic effect of peer influence: that firms may be changing the timing and the size of their dividend payments in response to the external influence of peer firms. These dynamics have important implications for theoretical and empirical work in corporate finance and asset pricing. For example, the dynamic finding suggests that an external factor would complement the theoretical models of dividend smoothing, which primarily focus on internal factors such as earnings and agency explanations (Leary and Michaely (2011); Lambrecht and Myers (2012)). Similarly, because there is scant empirical evidence to support dividend signaling models (Benartzi, Michaely, and Thaler (1997)), a theoretical model that incorporates a peer-influence component into the signal may reconcile the differences between the empirical evidence and the survey evidence from executives who believe dividends are signals. The dynamic finding is not part of the asset pricing literature that exploits properties of dividend and payout yields to understand the fundamentals of price movements. Because asset prices are essential for many important decisions, understanding the extent to which peer influence distorts or is reflected in fundamental values is critical.

Second, I introduce a new way in which industry composition induces managers to return excess cash to shareholders. It complements previous studies, which emphasize the importance of the competitive structure of industries (Grullon and Michaely (2008); Hoberg, Phillips, and Prabhala (2013)), by showing that industrial peer influence is a meaningful determinant of corporate dividend payments. Third, I extend previous work demonstrating the importance of peer interdependencies for firm financial policy (Shue (2013); Leary and Roberts (2013); Lerner and Malmendier (2013); Matvos and Ostrovsky (2010)). Fourth, I illustrate the importance of moving beyond the search for the perfect instrument and provide an application of the usefulness of partial identification for tackling endogeneity.

The remainder of this paper is organized as follows: Section 2 motivates the study by conceptually distinguishing peer effects from other determinants of dividend policy; Section 3 summarizes the data; Section 4 explains the statistical tests for identifying peer effects; Section 5 presents the empirical evidence for peer effects; and Section 6 concludes. In addition, Appendix A derives the excess-variance identification; Appendix B defines all variables; and Appendix C includes robustness checks.

2. Conceptually distinguishing peer effects

Similarities in dividend policies among firms within the same peer group can be caused by multiple economic factors. Because the goal of this paper is to study the importance of peer effects, which capture the interdependence of managers' dividend decisions, it is important to highlight conceptually what does and does not constitute a peer effect. Specifically, this section defines peer effects, provides examples, and discusses the theoretical basis for them.

Before peer effects can be fully examined, they must be distinguished from other influencing factors. The economic forces that induce firms to behave like their peer firms can be categorized into three mutually exclusive definitions. First, *peer effects* are the propensity of a manager to alter dividend policy in some way that varies with the prevalence of the same behavior in some reference group containing that manager. Second, *contextual effects* are the propensity of a manager to alter dividend policy in some way that varies with the exogenous characteristics of the group. Third, *common effects* refer to the idea that managers in the same reference group may behave similarly, because they face common institutional settings or their firms have correlated firm-specific characteristics.

To illuminate the distinction between peer effects, contextual effects, and common effects, consider the example of a firm's dividend policy. There is a peer effect if, all else equal, the peers' dividend decision enters into a manager's calculation when determining his own firm's dividend policy. When peer effects are not present, a manager's dividend decision is independent of the dividend decisions of the peer firms. Although independent decisions by all managers are equivalent to no peer effects, independent choices do not preclude managers' dividend decisions from being correlated for other reasons. Observed dividend decisions will be similar if there are contextual effects or common effects. If dividend policy tends to vary with the average profitability or productivity of the other firms in the reference group, this is a contextual effect. If dividend policy does not vary with the group characteristics such as average profitability then there is no contextual effect. In contrast to peer effects and contextual effects, which involve either the peers' dividend decision or peer characteristics entering directly into a manager's dividend decision, common effects do not involve peer firms. For example, a common effect occurs if individual firms' dividend policies tend to vary together when tax rates on dividends change for all firms in the peer group. In addition, a common effect arises if two firms in the same peer group are both suffering from agency problems, and each independently alters its dividend policies in a similar manner.

Peer effects are generated by many theoretical models, which encompass both rational and irrational frameworks. Existent theoretical models use different terms to connote peer effects, such as social interactions, social norms, bandwagon effects, conformity, mimicking, contagion, herd behavior, informational cascades, and interdependent preferences. As to what drives the peer effects, the theoretical models typically appeal to reputational concerns, observational learning, strategic motives, or behavioral biases.

Reputation-based models of peer effects involve rational but inefficient decisions by managers. When there are many managers and market participants rationally update their beliefs about managerial type, there are conditions under which it is rational for a manager, who is concerned about his reputations in the labor market, to ignore his own private information and mimic the behavior of his peers (Scharfstein and Stein (1990)).

Observational or social learning models that produce peer effects involve rational processing of information. For example, although each manager could decide by direct analysis the optimal dividend policy for his firm, it is rational for the manager to rely on the information content of his peers' decisions since direct analysis is costly and time-consuming (Bikhchandani, Hirshleifer, and Welch (1992)). In extreme cases, an informational cascade can occur, in which a manager's optimal dividend policy does not depend at all on his private information when he observes his peers' decisions (Banerjee (1992)). Persuasion bias, an idea developed in DeMarzo, Vayanos, and Zwiebel (2003), adds an additional layer of complexity to how a manager processes the information from his peers' decisions. In their model a manager's decision is subject to persuasion bias, which means he may fail to adjust properly for possible repetition in the information received from observing peers' decisions. A manager, who fails to adjust for this repetition by not discounting appropriately that some of his peers' decisions may also be influenced by the same peers' decisions, would be predictably swayed toward the persuasive or concordant viewpoint.

Strategic interaction models generate peer effects by assuming that firms within the same peer group are either attempting to collude with or force out a competitor (Rajan (1994); Chevalier and Scharfstein (1996)). For example, in a peer group where firms are colluding, a dividend announcement may be interpreted by the peer firms as aggressive behavior and signal against further collusion. It is plausible that if product demand is high and investors want greater cash distributions, then a colluding manager may increase his dividend with the plan to cut prices and steal market share to pay for the dividend increase. In such a scenario, once a manager breaks from the coalition, this would increase the incentives for his peer managers to also break from the coalition and spur further dividend increases. Alternatively, a peer group may be attempting to force a competitor into bankruptcy. For example, if a manager recognizes that his peer competitors will follow his dividend policy, he may exploit this fact in an attempt to drain the cash reserves of his rivals and drive them into insolvency.

The behavioral explanations, which produce peer effects, involve irrational expectations on the part of the managers. For example, when the dividend decisions of peer managers overwhelm the manager's internal decision-making process and cause him to ignore the validity of internal analysis (Benabou and Tirole (2003)), peer effects are produced. The distinction from the observational learning model is that in the learning model, a manager rationally decides not to conduct his own analysis. Although not explicitly modeled in the context of dividend policy, prominent behavioral biases such as optimism and overconfidence can also produce peer effects (Malmendier and Tate (2005)). Such a model would be similar to the observational learning model but distinct, because the manager would irrationally overweight the mean (optimism) or variance (overconfidence) of his firm's performance relative to the peer firms. For example, an overconfident manager believes that he has more precise knowledge about future events than he actually has; if a manager is overconfident his firm will outperform his peers, peer dividend increases induce him to increase dividends as well.

Some of the theoretical models which produce peer effects interpret the peers' dividend decisions as signals. It is important to note that the potential role of peer effects in dividend policy is distinct from the theoretical literature on information asymmetry and dividend signaling (Bhattacharya (1979); John and Williams (1985); Miller and Rock (1985)). The traditional dividend signaling literature conjectures that dividend payments are an information transmission device between a firm's leadership and investors, causing managers to bear the cost of a dividend payment to signal the true value of the firm. The key distinction from the peer effects signaling models is that in the traditional signaling models, managers calculate their optimal dividend policies based on private information. In contrast, in the peer effects signaling models, managers calculate their dividend policies based on the information or signal provided by the peer. In conclusion, the intuition for peer effects presented in this section provide the foundation for what follows – an empirical analysis of the importance of peer effects in determining dividend policy.

3. Summary Statistics

I analyze the dividend payments of U.S. firms publicly traded on the New York Stock Exchange, the American Stock Exchange, and the Nasdaq. For each firm, comprehensive dividend and share price data is obtained from the Center for Research in Security Prices (CRSP) tapes. Accounting data comes from the CRSP-Compustat merged database. The years selected for analysis are 1975 through 2011, which reflects sample selection concerns associated with the accounting data for periods before 1970 as well as a desire to exclude the period surrounding President Nixon's 1971 dividend freeze. Financial firms, utilities, and REITs are excluded from the sample, because their payout decisions are affected by regulation. Supplementary sources of data include: equity ownership data from Thomson Reuters, mergers and acquisition data from SDC, securities fraud litigation data from Stanford Law School, and industry data from IBISWorld.

Peer influence is measured by calculating the fraction of peer firms within the same 3-digit SIC that increased dividend payments in the 180 days prior to an individual firms' announcement. When no dividend announcement is made, the fraction of peer firms that increased dividend payments in the 180 days prior to the last day of the quarter is used. Since dividend changes require the approval of the board of directors, the 180 day period ensures that at least one board meeting occurs following the peer dividend change. A shorter window of 90 days is considered as a robustness check in the empirical section.

An important component of this empirical definition of peer effects is the designation of the peer or reference group. Example reference groups include those defined by common industrial classifications, product markets, firms disclosed in financial reports, analysts or bankers, or even business school alma maters. The first defining characteristic of the peer definition is that it is exogenous to the group. Some of the reference groups listed above may not literally be exogenous, but if the determination of membership is predetermined, then it is valid. The second defining characteristics of the peer definition is that the group setting facilitates salient interactions that may, in turn, affect the acquisition of knowledge or influence a managers thinking and preferences. The 3-digit SIC meets the criteria; further, firm disclosures, in which the board of directors self-identifies its' peer firms often reflect 3-digit SIC classifications (Faulkender and Yang (2010)). An alternative peer group, which is defined by similar product market characteristics (Hoberg and Phillips (2010)), is considered as a robustness check in the empirical section.

Table 1 summarizes the distribution of covariates for (1) all firms, (2) dividend paying firms, and (3) non-dividend paying firms. Panel A displays the firm-specific covariates, which corresponds to quarterly observations for firm j. I focus on quarterly observations, because 97% of managers, who choose to pay a dividend, pay a quarterly dividend. Panel B displays the peer firm averages, which average all firms within a 3-digit SIC industry-quarter combination excluding the j_{th} firm's value. Congruent with previous studies, the distributions of covariates across dividend paying and non-dividend paying firms are quite different. Dividend paying firms are larger, at a later stage in their lifecycle, have higher cash flows, lower idiosyncratic risk, and greater ownership by institutional investors. In contrast to the differences in firm-specific covariates across dividend and non-dividend paying firms, the peer firm average covariates are similar across the groups.

When examining the firm-specific covariates considered in Panel A of Table 1, it is important to emphasize that the explanation of peer effects serves as an additional reason for why firms change their dividend payments and is distinct from all the covariates listed. Furthermore, the explanation of peer effects is also distinct from the contextual effects, which the peer firm averages for all the covariates comprise.

Figure 1 depicts how dividend changes cluster or clump together across time by industry for 12 different industries; the figures also provide examples illustrating that dividend clumps often occur independent of traditional factors. For example, if you look at battery manufacturers, during an obvious uptrend in industry profitability, a clustering of dividend decreases occurs; then, during a period of no growth in industry profitability, several firms simultaneously increase their dividends. Similar patterns are evident for restaurants, computer software, telephone, industrial gases, and toy manufacturers. Figure 1 also reveals that dividend initiations and omissions exhibit much greater variation at the industry level than the traditional economic factors.

In order to examine the hypothesis that 3-digit SIC industry peer firms influence managers' dividend decisions, Table 2 presents summary statistics characterizing the managers' dividend decisions and their peers' dividend choices. Panel A of Table 2 reveals that managers are more likely to increase their dividend payment when a peer firm increases its dividend payment in the previous 180 days. Similarly, managers are more likely to decrease their dividend payment when a peer firm decreases its dividend payment in the previous 180 days. The likelihood of a manager announcing a dividend change continues to increase when more peer firms change their dividend payments in the 180 days prior to the dividend announcement. For example, when no peer firms increase their dividend payments in the 180 days prior to the dividend announcement, the likelihood of increasing dividend payments is 9%. Yet when one peer firm increases in the previous 180 days, the likelihood rises to 14%, and when more than two peer firms increase in the previous 180 days, the likelihood rises to 16%. Of course, this analysis does not separate peer effects from contextual or common effects, but it does provide evidence that there are similarities in dividend policies among firms within the same peer group.

Panel B of Table 2 formalizes the intuition presented in Panel A through a univariate analysis of dividend changes as a function of peer influence. To test the relationship between peer influence and dividend changes, the firms in the sample are divided into peer influence quintiles and the likelihood of a dividend change for the firms in that quintile is calculated. The results are presented in Panel B. The difference between the top and the bottom quintiles are statistically and economically significant. For example, the quintile of firms subject to high peer influence increases their dividend 17% of the time whereas the quintile of firms subject to low peer influence only increases their dividend 9% of the time. This 8% difference is highly statistically significant with a t-statistic of 25.6.

The peer influence measure is also correlated with how quickly managers change a dividend following a change by peers and with how much they change the dividend. Table 3 summarizes this relationship between peer firm dividend changes and characteristics of the individual manager's dividend change. Table 3 reports statistics for four categories: firms that change their dividend prior to one year, annually, after one year, and that do not change their dividend payment. When peer influence is highest, the time elapsed between changes in dividend payment is lowest. Similarly, when peer influence is higher, the size of the dividend change is greater. Statistical tests for differences in the degree of peer influence across the categories, reveals that peer influence is significantly higher when managers' are changing their dividends.

4. Empirical approaches

Estimating the importance of peer influence is difficult because of the reflection problem (Manski (1993)) and omitted variable bias. The reflection problem is the violation of an identifying assumption of regression analysis the matrix of explanatory variables is full-rank. Since all managers in the peer group simultaneously influence one other, each decision cannot be observed in isolation. By including the decisions of each manager in a regression analysis, a researcher introduces the equivalent of a full set of dummy variables and a constant. This multicollinearity means the matrix is not full rank and an infinite number of solutions are possible.

I use multiple complimentary identification strategies to address the identification challenges. The first strategy is an excess-variance approach (Graham (2008); Shue (2013)). It stems from research focused on identifying the aggregate effect a policy change given individual-level responses and the spillover effects via peer influence to such responses (e.g., Becker and Murphy (2010); Glaeser, Sacerdote, and Scheinkman (1996)). The appeal of the excess-variance approach is that it allows statements analogous in spirit to general equilibrium effects; it provides an estimate of how much higher or lower dividend payments are in equilibrium at the industry level as a result of peer effects. The second identification strategy extends the instrumental variable framework introduced in Leary and Roberts (2013). The appeal of the instrumental variable approach is that it allows for statements about the firm response. The third approach is partial identification strategy, which models uncertainty about the validity of the exclusion restriction as being the same order of magnitude as sampling uncertainty (Conley, Hansen, and Rossi (2012)). This approach can provide valid confidence interval for the endogenous peer effect even when the exclusion restriction is not perfect. The joint appeal of multiple approaches is that they use different identifying assumptions to overcome the endogeneity problem; this suggests any conclusions are less fragile to a single assumption.

4.1. Excess-variance approach

To understand the excess-variance approach, recall that the law of total variance establishes that an observable variance can be broken up into the variance attributable to that within an industry and between industries. The main intuition for the excess variance method is that the observed variance within an industry provides information about the expected conditional variance between industries when there is no peer influence. Specifically, information about the variation between and within small industries compared to the variation between and within large industries is used to identify the peer effects.

With no peer effects, one would expect less clustering of dividend payments or in selected yields than with peer influence, all else equal. To ensure that all else is equal, the variation attributable to firm-specific and peer firm average covariates listed in Table 1 is removed. Other unobservable firm-level and industry-level factors may impact the variance, but the key is that they do not have systematic impact on the variance in small and large industries.

The additional variance induced by peer effects has a larger effect within small industries than within large industries. Because the variance examines the spread in observations from the mean, if there is a cluster of firms with a particular dividend yield within a given industry, then observing repeated values around that dividend yield, when that dividend yield differs from the mean, increases the variance, all else equal. This intuition follows from the mathematical identity that variance does not change proportional to sample size (deMoivre (1730)). Because firms sort themselves into smaller clusters within an industry, a cluster of firms above the mean in an industry might be offset by a cluster of firms below the mean in an industry that is large simply because there are more firms in that industry. Thus, the variance within an industry is more sensitive to the importance of peer influence if an industry is small.

Example: Figure 2 illustrates the intuition of the excess-variance approach. The figure shows simulations of the distribution of dividend yields in small and large industries with and without peer influence. The small industry has 7 firms and the large industry has 35 firms. All industries have the same mean dividend yields of 2.75%; however, as the figures illustrate, peer influence amplifies the variance. What is of importance is that the variance for the small industry with peer effects is 31% higher than that of the large industry with peer effects. Although both have pockets of firms that cluster at a higher dividend yield of 4%, the large industry has enough additional firms to offset the impact of this cluster on the observed variance.

The exact details on the simulated distributions are as follows. The non-peer-influenced dividend yields are simulated using a random draw from a normal distribution with a mean dividend yield of 2.75% and a standard deviation of 2%. The simulation of the peer-influenced dividend yields assumes that every fifth dividend yield is part of a new cluster. The first draw in the new cluster is always the random draw. The subsequent random draws in the cluster are inflated or deflated by 15% in the direction of the previous member(s) of the cluster. Alternative constructions with differing assumptions yield similar results, and in each case the variance for the small industry is higher than that of the large industry.

To think about this mathematically, consider the typical linear-in-means model (Manski (1993)) for dividend payments, D_{ji}, for firm j in industry i, which is given by:

$$D_{ji} = \alpha_i + (\gamma - 1)\,\bar{\varepsilon}_i + \varepsilon_{ji} \tag{1}$$

where α_i represents industry-level heterogeneity and ε_{ji} represents firm-level heterogeneity and $\bar{\varepsilon}_i$ is the industry mean of the firm-level heterogeneity. Let γ represent the peer influence parameter. The peer influence parameter is dependent on $\bar{\varepsilon}_i$ which encompasses the decisions of the peer managers and moreover the quality of the peers. In the presence of peer influence ($\gamma > 1$), dividend payments are amplified by the decisions of the peer managers, $\bar{\varepsilon}_i$. Therefore, the greater the peer influence, the greater will be. As mentioned above, this model is not identified because the presence of $\bar{\varepsilon}_i$ leads to a matrix that is not of full rank. What is identified is the total variance.

A mathematical derivation in Appendix A shows that by breaking up the total variance into the variance attributable to variations within an industry and variance between industries, one can use the variance observed in the data to back out the effect of peer influence when one conditions on industry size. Again the intuition is that industry size is correlated with the effect peer influence has on the variance. As illustrated in the figures, peer influence will have a greater effect on the observed variance in small industries. By comparing the ratio of the difference in the variance between industries across small and large industries to the corresponding difference in expected between industry variance based on the within industry information, the square of the peer influence can be identified as follows:

$$\frac{E\left[V_i^b|S_i=1\right]-E\left[V_i^b|S_i=0\right]}{E\left[V_i^w|S_i=1\right]-E\left[V_i^w|S_i=0\right]}=\gamma^2 \tag{2}$$

where S_i is an indicator for the type (small or large) of industry i in the conditional variance expressions. This key to understanding this method is that the between industry differences in peer quality, which is contained in $\bar{\varepsilon}_i$ is informative about how much peer influence affects the observed distribution of dividend yields. Intuitively, this estimator is akin to a difference-in-difference estimator. By taking the difference across small and large industry types, one isolates the component of variance attributable to peer influence. Then, by taking the ratio of the remaining variance that is observed over the expected variance without peer effects, one isolates the peer influence.

There are two assumptions facilitating identification. The first identifying assumption is that the unconditional dividend payment within an industry and across industries is statistically exchangeable. Exchangeability is a term from statistics and is closely related to the notion that a variable used in regression analysis is an independent and identically-distributed random variable; the key difference is exchangeability does not require prior knowledge of the underlying distribution. The second restriction facilitating identification is that the correlation of the components of the unobservable error in expected dividend payments within an industry is restricted to be random across small and large industries. This second identifying assumption is weaker than the traditional exogeneity restrictions from regression analysis, because it does not require that the unaccounted for heterogeneity across industry types cannot contain common factors that are correlated with peer influence.

The main concern with the identifying assumptions is that there may be systematic unobservable variance other than peer influence across small and large industry types that inflate or deflate the conditional variance. To ensure that all else is equal, the variation attributable to firm-specific and peer firm average covariates listed in Table 1 is removed in the first step. Recall that this comes from the intuition that the excess-variance approach is akin to a difference-in-difference design. The ratio compares observed to expected conditional variance; this first step removes all of the variance attributable to observable firm and industry-specific factors. Other unobservable firm-level and industry-level factors may impact the variance, but the key is that they do not have systematic impact on the variance in small and large industries.

The remaining unobservable variance includes peer effects, sorting, and self-selection. For sorting or self-selection to have systematic impact on the conditional variance across small and large industries, it would have to be a meaningful determinant of dividend policy that does not vary over time and exhibits persistently greater variance in either small or large industries throughout the sample. Fortunately, it is hard to imagine that firms within an industry sort themselves into peer groups in a manner that is different in small industry than in large industries after accounting for factors like industry competitiveness. Similarly, firms likely self-select into a small or large industry at entry based on reasons other than desired dividend payment (Chen, Cohen and Lou (2013)). Given the two primary sources of unobservable variation – self-selection and sorting – are not likely to vary systematically across small or large industry types, the assumptions for identification are plausibly satisfied.

When the identifying assumptions hold, the square of the peer influence parameter, γ^2, is uniquely identified. In the absence of peer influence, this parameter will be one. But in the presence of peer influence, γ is greater than one. Therefore, peer influence will amplify this ratio, which implies that traditional hypothesis tests can be used to determine if γ^2 is significantly different from one and conclusions can be drawn about the significance of the underlying peer influence parameter.

This variance-based approach identifies overall peer influence, but it is not informative about how peer effects operate. The summary statistics suggest that peer influence has a positive correlation with an individual manager's dividend decision; however, the variance-based approach cannot distinguish between conformers (a positive correlation) and dissenters (a negative correlation). For example, it could be argued that if a manager observes multiple firms decreasing their dividend, he may increase his firms' dividend payment to signal he is better than his peers. Thus, although the variance-based approach casually identifies whether peer influence can significantly explain overall variation in observed dividend levels across industries, it cannot distinguish the expected direction or composition of individual firm changes attributable to peer influence. Therefore, a second set of statistical tests help to resolve the ambiguity of the variance-based approach, but they require a new set of assumptions.

4.2. Instrumental variable approach

The second identification approach follows closely the logic behind Leary and Roberts (2013), which uses idiosyncratic equity returns as an instrument for identifying peer effects with respect to leverage; however, the approach in this paper differs in two significant ways. First, idiosyncratic equity returns are not known to be relevant determinants of dividend changes, so I focus on idiosyncratic equity risk, which is a known determinant of dividend policy (Fama and French (2001); Hoberg and Prabhala (2009)). Intuitively, when a firm's idiosyncratic risk decreases, the reduced uncertainty implies the firm needs less precautionary savings and can distribute more cash to shareholders. The intuition for the relevance condition for a single firm extends to the peer effects framework; when the average peer firms' idiosyncratic risk decreases, the number of peer firms' increasing their dividend increases.

Idiosyncratic equity risk, which is calculated as the second moment of the idiosyncratic returns distribution, negates one of the virtues of Leary and Roberts' approach; namely that the correlation between firms' idiosyncratic returns and those of their peers is virtually zero. That is to say there is potentially reason to believe the instrument of idiosyncratic equity risk violates the exclusion restriction. Intuitively, the reason is the correlation between a firm's idiosyncratic equity risk and the average of his peer firms' idiosyncratic risks is often positive. Because of this, an alternative methodology that allows for identification even if the exclusion restricted is violated is needed. An alternative sufficient condition for point identification proposed by Kolesar, Chetty, Friedman, Glaeser, and Imbens (2012) is considered.

In their methodological paper, Kolesar, Chetty, Friedman, Glaeser, and Imbens (2012) show that the exclusion restriction can be replaced by an alternative sufficient condition, and point identification can be recovered when using a bias-corrected two-stage-least-squares estimator. The alternative sufficient condition enabling point identification requires that the direct effects of the invalid instruments are uncorrelated with the effects of the instruments on the endogenous regressor. In my context, that means that the effect of the peers' idiosyncratic equity risk on the peers' dividend decision is independent of the effect of the hidden fundamental on the manager's dividend decision. This alternative condition combined with the relevance condition is the identifying assumptions. Although this alternative condition is not innocuous, it is likely to hold in my setting as illustrated below.

Example: Consider a case where the peer firms' production processes rely on oil, and suppose oil prices unexpectedly increase. The subsequent impact on firms' equity prices does not occur in isolation, so the risk is not idiosyncratic. This risk is common to the industry and the market, so co-movements in equity prices at the industry and market levels stemming from this common yet hidden fundamental are separated out in the calculation of idiosyncratic risk (see Campbell et al. (2001) methodological paper for details on calculating separate risks). In the case of an oil shock, identification holds via the traditional exclusion restriction because there is no omitted common factor that is not being picked up by the industry risk or market risk, which are control variables in each analysis. However not all common factors are as salient as oil price shocks, so it is possible some will be captured in idiosyncratic rather than industry or market risks. The next example provides intuition for a proof by contradiction in order to facilitate understanding of why identification likely holds even when an omitted factor is less salient.

Example: Suppose two managers in the same industry simultaneously yet independently implement policies of frugality. Assume that equity market prices reflect how this new information affects the discounted value of future cash flows. In contrast to the previous case, suppose the co-movements in their equity prices are not separated out as a change in industry risk. Rather both of the firms' idiosyncratic equity risks decrease, so there will be an induced correlation between the firm's idiosyncratic equity risk and the peer firms' idiosyncratic equity risk. Further, suppose the frugality led both of the firms to change their dividend policies and that traditional observables cannot account for this omitted frugality factor. Since the peers' idiosyncratic risk is correlated with the unobserved fundamental, there is a direct effect on the outcome, which violates the exclusion restriction. Similarly, the reduction in the peers' idiosyncratic risk also affects the peers' dividend policies. If these two effects are independent, as in our example of two firms independently implementing policies of frugality, then the alternative condition for identification is maintained. If these two effects are dependent, the dependence of these two effects implies a common dependent change in fundamentals occurred at the industry level, because each firms' equity price would reflect this joint information revelation. But this directly *contradicts* the supposition of no change in industry risk. Therefore, an unobserved common factor affecting idiosyncratic risk should always have independent effects on idiosyncratic risk and peer dividend policies, which means point estimates can be identified via an instrumental variable approach.

The instrumental variable specification of the average managers' reactions to the observed dividend decisions of his peer managers is as follows:

$$Div_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit} \tag{3}$$

where Div_{jit} represents a manager's dividend decision for firm j in industry i in time period t where Δt is one quarter. In the main specifications, Div_{jit} is a dummy variable indicating a dividend increase. The peer influence is captured by $Peer_{(-j)it'}$ which is the share of peer firms within the same industry i in the 180 days prior to the manager of firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable prior to the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous two quarters. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Concerns about time-varying heterogeneity across industries warrant the addition of industry-by-time fixed effects to a specification that already includes firm fixed effects.

An extension of the instrumental variables strategy clarifies the channel through which peer effects operate. To distinguish between the various theoretical explanations for peer effects, the instrumental variable strategy is extended to include interactions with various firm and managerial characteristics. The specification is as follows:

$$Div_{jit} = \beta_P Peer_{(-j)it'} + \beta_C Char_{jit} + \beta_{C\times P} Char_{jit} \times Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit} \quad (4)$$

where the specification is the same as Equation 3 except for the inclusion of $Char_{jit}$, which is a dummy variable indicating a that firm or manager displays the characteristic, and its associated interaction terms. When present, the controls and fixed effects are interacted with the $Char_{jit}$ as well. Furthermore, since $Char_{jit} \times Peer_{(-j)it'}$ is endogenous, it is instrumented for with the average peer idiosyncratic equity risk interacted with the $Char_{jit}$.

Because of the interaction terms, the regression coefficients no longer indicate the change in mean response with a unit increase in the covariates, all else equal. Instead, the mean response is dependent on the given level of the characteristic under study. For example, if the interaction term of interest is CEO overconfidence and the interaction term, $\beta_{C\times P}$ is positive, this indicates that the likelihood of a dividend change increase with a unit increase in peer influence is greater when CEOs are overconfident.

4.3. Partial identification approach

The third approach, which is a partial identification approach, extends the instrumental variable framework. The partial identification specification of the manager's reaction to the observed dividend decisions of his peer managers is as follows:

$$Div_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + \zeta Z_{(-j)it} + f_j + \delta_{it} + \epsilon_{jit} \tag{5}$$

where ζ is a parameter measuring the plausibility of the exclusion restriction and $Z_{(-j)it}$ is the instrument, the peer firms' average idiosyncratic risk. The difference between the model defined in Equation 3 and the equation above is the presence of the term $\zeta Z_{(-j)it}$ in specification. Typically, $\zeta Z_{(-j)it}$ is removed from the specification, because it is assumed the exclusion restriction holds and $\zeta = 0$. Since $\zeta Z_{(-j)it}$ represents the violation of the exclusion restriction or more generally an exogeneity error, it is known to not be part of the actual data generating process for dividend payments.

Another example of something that is not part of the data generating process for dividend payments but plays a role in inference is the sampling error. By assuming that the sampling error and the exogeneity error are of the same magnitude, it can be shown that traditional inference based on confidence intervals is still feasible for the model defined above (see Conley, Hansen, and Rossi (2012) for a proof). Whereas in Equation 3, a 95% confidence interval is interpreted as containing only sampling error, the confidence interval from the partial identification approach takes into consideration sampling and exogeneity error. If the exogeneity error is 0, which is the same as saying the exclusion restriction holds, then the partial identification method produces the same confidence interval as a traditional instrumental variable regression. Intuitively, what the partial identification approach does is inflate the standard errors of the estimate by the size of the violation of the exclusion restriction. For an empiricist the partial identification approach presents a tractable method for conducting inference even if the instrument is not perfect.

Mathematically, let the distribution for β_P be approximated as follows:

$$\hat{\beta}_P \sim N\left(\beta_{P,} Var_{2SLS}\right) + A\zeta$$

$$Prior = \zeta \sim N\left(0, \Omega_\zeta\right) \tag{6}$$

$$\hat{\beta}_P \sim N\left(\beta_{P,} Var_{2SLS} + A\Omega_\zeta A'\right)$$

where Var_{2SLS} is the variance-covariance matrix and A is the projection matrix from estimating the two-stage least-squares estimator from Equation 3 and it is assumed that ζ is normally distributed with mean 0. The assumption implies that the posterior distribution β_P is also normal (Gelman et al. (2004)). The intuition behind the math is that the exogeneity error is accounted for statistically by adjusting the variance. Hence, using the adjusted estimate of the standard error for the peer influence parameter allows for valid inferences even if the instrument is not perfect.

5. Empirical results

5.1. Excess-variance approach

Table 4 reports estimates from the variance-based approach used to identify the peer influence for dividend yields and payout ratios. The estimates of the peer influence multiplier, γ^2, for dividend yields equals 1.93, suggesting a peer influence multiplier of 1.39. The estimate is significantly different than 1, which is the expected value if the null hypothesis of no peer effects were true. The χ^2 test statistic is 4.72, which indicates a rejection of the null hypothesis of no peer effects at the 95th percentile. These results provide strong support for the hypothesis that within-industry peer effects substantively alter dividend yields in an industry.

To interpret the economic importance of the peer influence multiplier, I estimate an average overall effect for small and large industries. These calculations show that peer influence leads managers to inflate or deflate dividend yields across industry in a meaningful way. For small industries, peer effects lead managers to inflate or deflate yields by 17%; for large industries, peer effects lead managers to inflate or deflate yields by 6%. If the expected dividend yield in a small industry is 3% under the assumption of no peer influence, these excess-variance results suggest that the observed yield will be either 2.49% or 3.51%. In comparison, the results for payout ratios are statistically similar but economically less meaningful. One interpretation, which is consistent with survey evidence from Brav et al. (2005), is that managers focus on yields rather than ratios, so peer influence primarily operates through dividend yields.

The results of the variance-based test for peer effects support the hypothesis that industry peer firms' actions influence managers' decisions about dividend policy and are consistent with recent empirical findings about corporate dividends. John, Knyazeva, and Knyazeva (2011) and Becker, Ivkovic and Weisbenner (2011) find that firms headquartered in geographically distinct areas have statistically different dividend payments. The fact that payout policy varies by geography and industrial firms cluster geographically suggests that peer effects may explain part of the mechanism behind those findings.

5.2. *Instrumental variable approach*

Although the variance-based approach identifies whether peer influence can significantly explain overall variation in observed dividend levels across industries, it cannot distinguish the expected direction or composition of individual firm changes attributable to peer influence. To shed light on this ambiguity, I examine specific managerial choices as a function of peer influence using an instrumental variable approach. Two primary findings emerge: (1) managers' decisions to increase dividend payments are influenced by their peers whereas decisions to decrease dividend payments are not, and (2) peer influence leads managers to reduce the time between dividend changes and to increase dividend levels more than they would in the absence of peer effects. This dynamic time effect has important implications for dividend policy.

Panel A in Table 5 presents estimates for several different specifications of dividend increases and Panel B presents estimates for dividend decreases. The table reports estimated coefficients scaled by the corresponding standard deviation with t-statistics in parentheses. The 17% reported in column (1) is interpreted as follows: a standard deviation increase in the fraction of peer firms increasing dividend payments increases the probability that a manager will increase dividend payment by 17%, all else equal. This result is significant at the 99th percentile and the F-statistic from the first-stage is 32.4, which exceeds the requisite 10 to ensure minimal bias of the instrumental variable estimate (Stock and Yogo (2005)). More formal statistical tests for weak instruments such as those suggested by Kleibergen and Paap (2006) are also satisfied. The specifications include the firm-specific, industry-specific, and peer average covariates listed in Table 1 as well as firm fixed effects, industry-by-time fixed effects where all variables are winsorized at the 1 percentile. The reported t-statistics use robust standard errors clustered by firm (Peterson (2009)).

One important finding from Table 5 is that managers' decisions to increase dividend payments are influenced by their peers whereas decisions to decrease dividend payments are not. All specifications in Panel A (dividend increases) are statistically significant whereas none of the specifications in Panel B (dividend decreases) are statistically significant. This finding implies that the peer influence estimates from the excess variance approach likely lead to average dividend yield inflation across industries rather than deflation. Another important finding in Table 5 is that managers appear to engage in strategic dividend changes. Column (3) and (4) of Panel A reveal that managers are more likely to increase their dividend payments when a greater fraction of peer firms are decreasing dividend payments. This result supports the theoretical models for peer effects based on strategic interactions (Rajan (1994); Chevalier and Scharfstein (1996)).

The final important finding is the peer influence is economically important. In comparison to the 17% increase induced by a standard deviation increase in peer influence, a standard deviation increase in leverage only reduces the likelihood of a dividend increase by 5%. Table 6 presents the details of the coefficients estimates from Table 5 for dividend increases. Again all estimated coefficients are scaled by their corresponding standard deviation to ease comparison. What is evident is that peer influence is very important as are firm-specific covariates, but the peer firm average characteristics are much less important and are often indistinguishable from 0. Since peer firm characteristics represent their own distinct method through which peer effects may be transmitted and they are rarely significant, this suggests dividend peer effects operate through salient events such as dividend announcements and the subsequent pressure applied by equity analysts and other stakeholders.

Table 7 examines the timing and size of the individual firm's response to peer actions using the same instrumental variable approach. Panel A focuses on the elapsed time between dividend changes. Table 7 reveals statistically significant evidence to indicate that a standard deviation increase in peer influence shortens the expected time to dividend change by approximately one quarter. When firms that always change their dividend annually are excluded, the point estimate remains qualitatively similar and statistically significant. This suggests that on average one channel through which peer effects operate is to accelerate a firm's typical dividend change. Panel B of Table 7 reports evidence for the size of the dividend change prompted by peer influence. The main finding is statistically significant evidence that a standard deviation increase in peer influence causes a manager to increase his dividend by 15%, all else equal. This result is significant at the 99th percentile and economically meaningful.

5.3. Partial identification approach

Figure 3 presents the results from the partial identification approach and suggest that there is still a significant effect of peer influence on the probability of a dividend increase, even with substantial departures from perfect instruments. Along the x-axis of Figure 3 is the value of the parameter measuring the potential deviation from exclusion restriction, where higher values indicate greater deviation or greater exogeneity error. Hypothetically, if the exogeneity error is equivalent in magnitude to that of share repurchases in determining corporate payout policy, then the implied interval based on this amount of exogeneity error leads to a corresponding 95% confidence interval for the peer influence coefficient of [8.2%, 26.3%]. While certainly different from the 95% confidence interval of [12.2%, 22.4%] under perfect instruments, it still indicates that peer influence is of an economically meaningful size.

5.4. Robustness checks and discussion

To ensure that the estimated peer effects are not spurious, the sensitivity of the estimates for both the excess-variance and the instrumental variable approach are checked. For the excess-variance approach, the whole exercise is repeated for three different levels of industry concentration as outlined by the U.S. Department of Justice. The results of this effort are reported in Table C1 of Appendix C. Peer influence remains statistically significant and economically important in the industry concentration subsamples. This exercise implies that the overall estimate of peer influence is not being driven by industrial organization confounds.

To test the sensitivity of the instrumental variable approach, placebo tests are implemented, which suggest that the peer effect findings are not spurious. The placebo tests re-estimate each instrumental variable specification, but replace the peer influence variable with a dummy variable representing a forward-looking peer influence variable. The constructed placebo variable captures the fraction of peer firms that will change their dividend in the 180 days after a dividend increase is announced. If common, yet unobserved economic constraints are creating spurious results, then the newly constructed placebo variable will have a coefficient estimate similar to the coefficient estimated in the model measuring peer influence. If not, then the new explanatory variable should not be significant.

The intuition for the placebo test is that the common yet unobserved economic shock caused firms to react, but firms reacted at different speeds. The dummy explanatory variable is capturing the response of early reactors in the same manner that the original peer influence variable could have "erroneously" captured the common but unobserved economic shocks for the late reactors rather than a "true" peer influence. The results of the counterfactual analyses, which are included in Table C2 of Appendix C, validate that the instrumental variable approach detects causal peer influence. The coefficient estimates for the dummy variable representing common shocks is statistically insignificant and close to zero. This exercise implies that unobserved industry-level factors are not generating spurious results.

Table C3 and Table C4 of Appendix C tests the sensitivity of the definition of peer influence by shortening the time period of influence and finds no discernible difference. Instead of defining peer influence as the fraction of peer firms within the same 3-digit SIC that increased dividend payments in the 180 days prior to an individual firms' announcement; it is defined over a 90 day period. The results are qualitatively similar. Managers respond to peer firm dividend changes by accelerating the time to a dividend change by 100 days and increasing dividend payments of 18%. The results are statistically significant and the instrumental variable passes weak instrument tests.

The previous statistical tests for peer influence rely on the fact that peer firms can be meaningfully defined by the 3-digit SIC code. If the true set of peer firms is a subset of firms within a 3-digit SIC code, the excess-variance approach still provides consistent causal estimates. However, if the true peer group spans multiple industries, this would be a limitation of the excess-variance estimates. Since most dividend-paying firms are the established leader in their industry whereas non-dividend paying firms are better characterized as satisfying niche markets that straddles multiple industries, this caveat is less troublesome.

To probe the sensitivity of the definition of the peer group, Table C5 and Table C6 of Appendix C considers an alternative definition of the peer group and finds similar results. The alternative definition of peer group comes from Hoberg and Phillips (2010); they use text-based analyses of business descriptions reported in annual SEC filings to define dynamic peer groups. These peer groups are firm-specific, change annually, and are available from 1996 through 2008. To perform the sensitivity tests, the fraction of peer firms changing their dividend in the prior 180 days, the average idiosyncratic risk of the peer firms, the peer firm covariate averages, and the industry concentration measure were all recalculated based on the firm-specific textual industrial classifications (TNICs). The alternative text-based industry definitions produce results similar to the 3-digit SIC definition. For example, a standard deviation increase in the text-based peer influence raises the probability of a manager increasing his dividend by 17%, which is the same as in Table 5 despite the much shorter sample period. In addition, the results suggest managers respond to peer firm dividend changes by accelerating the time to a dividend change by 175 days and increasing dividend payments of 20%. The results remain statistically significant, are qualitatively similar to prior estimates, and are economically meaningful.

Table C7 of Appendix C tests the sensitivity of the economic magnitude of the peer influence estimates from the instrumental variable approach and finds no meaningful variation. Table C7 reveals that peer influence remains statistically significant and economically meaningful across various samples, but the point estimate is sensitive to how the sample is defined. Since there are many small industries, if only two firms in an industry increase their dividend, the fraction of peer firms increasing their dividend is very large, which increases the standard deviation of the peer influence measure. In order to ensure that the estimates are economically meaningful, the sensitivity of the main specification is reported in Table 5. Changes in the minimum number of firms an industry must have in order to be included in the sample as well as to changes in the percentile of observations that are subject to winsorization are varied to test the sensitivity. In comparison to the 17% reported in Table 5 removing all industries with fewer than five firms and winsorizing at the fifth percentile generates a point estimate of 11%, which is statistically significant at the 95th percentile. This confirms that the estimates are not sensitive to sample definition.

5.5. *Assessing the theoretical channels for peer effects*

Several existent theories produce peer effects; they include models based on reputational concerns, observational learning, strategic motives, and behavioral biases. While each theory has its conceptual merits, I empirically test which of the theories provides a better description of how peer effects originate in the context of dividend policy. The primary finding to emerge is that peer effects originate from behavioral biases and strategic interactions rather than through observational learning or reputational concerns.

Table 8 assesses reputational and behavioral theories for peer influence. The similarity in these two theories is that peer effects are the result of a latent characteristic of the manager. Table 8 uses CEO characteristics as proxies to evaluate the importance of these two theories. It presents estimates for instrumental variable regression results applied to dividend changes made by regular dividend payers, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk and the interaction between peer influence and CEO characteristics is instrumented for with the average peer idiosyncratic equity risk interacted with the CEO characteristics.

All the of the results in Table 8 exhibit a strong first stage instrumental variable estimate, but only the behavioral explanation of CEO overconfidence leads to a statistically significant second stage estimate. On average, overconfident managers are 3.4% less likely to increase dividend payments, all else equal. However, the statistically significant 6.2% interaction term tells us that the combination of high peer influence and overconfidence makes overconfident managers 2.8% more likely to increase dividend payments, all else equal. This is an economically important finding in terms of the magnitude, but it also has interesting implications for future research. For example, one could examine if these peer-influenced, behaviorally biased decisions lead to sub-optimal dividend policies.

Table 9 presents estimates that test the importance of observational learning and strategic interactions as the theoretical channel for peer effects. In the first test, the peer group is redefined; rather than letting the peer group encompass all firms within industry, the peer group is restricted to only those firms within industry that have a larger market capitalization. By conditioning the peer group on industry and size, this test assumes that peer influence operates through managers learning from the decisions of managers in larger firms within their industry. The statistically insignificant 7% reported in column (1) is the first piece of evidence to suggest that peer effects do not operate through an observational learning channel.

To further test the veracity of the initial results that observational learning is not driving the peer effects, a second test is implemented. The second test applies an instrumental variable regression framework to dividend changes made by regular dividend payers, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk and the interaction between peer influence and learning characteristics is instrumented for with the average peer idiosyncratic equity risk interacted with the learning characteristics. This test assumes that the managers engaging in observational learning are those in the bottom quartile of market capitalization within their industry.

Column (2) of Table 9 echoes the results of the first test; it too finds that observational learning is not driving the peer effects. The statistically significant -11.8% coefficient on the interaction between peer influence and learning reveals that on average, the learning managers are 11.8% less likely to increase their dividend payments when peer influence is high, all else equal. The magnitude is economically important, but moreover, the finding points in a different direction. It suggests that the importance of peer effects likely comes from strategic motivations, because the managers of the largest firms are the ones responding the most to their peers. This finding that the larger firms are the ones responding to their peer firms provides suggestive evidence to support the theory of dividends as signals of aggressive behavior and against collusion (Chevalier and Scharfstein (1996)).

Column (3) of Table 9 provides additional evidence that strategic motivations lead to peer effects. The third test applies an instrumental variable regression framework to dividend changes made by regular dividend payers, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk and the interaction between peer influence and strategic vulnerability is instrumented for with the average peer idiosyncratic equity risk interacted with the strategic vulnerability characteristic. If a manager recognizes that his peer competitors will follow his dividend policy, he may exploit this fact to try and drain the cash reserves of his rival for strategic reasons. I proxy for this strategic vulnerability by examining both the firms cash holdings and their cash flow volatility to find the most sensitive firms.

On average, strategically vulnerable managers are 2.1% less likely to increase dividend payments, all else equal. However, the statistically significant 4.2% interaction term tells us that the combination of high peer influence and strategic vulnerability makes these managers 2.1% more likely to increase dividend payments, all else equal. The inference that strategic motivations are likely more important is also supported by previous empirical findings. For example, the evidence that managers respond asymmetrically to peer increases and decreases suggests that strategic motivations help to generate peer effects.

6. Conclusion

Managers do not set dividend policy independently from their industry peer firms. These interdependencies among selected dividend payments contribute to the clustering of dividend payments over time at the industry level. On average, peer effects account for 12% of the clustering of dividend yields in industry. This implies that if the expected dividend yield for an industry is 3% based on existent fundamentals such as firms' financial constraints, shareholders' preferences, agency problems, or lifecycle considerations, then peer interdependencies drive the observed yield to either 3.4% or 2.6%. Considering that dividend paying firms generate the bulk of industrial earnings and have large market capitalizations, the implied change in cash distributions is economically meaningful.

For example, consider the auto industry and the potential for meaningful economic distortions engendered by peer effects. The average market capitalization is approximately $25 billion and the observed dividend yield is 2%. If the true dividend yield based on existent fundamentals should be 2.3%, this translates to a non-trivial $1.7 billion in cash annually that could have been allocated and invested more efficiently.

Peer effects also have important dynamic implications for both corporate finance and asset pricing. I find dividend changes by peer firms accelerate the time to a dividend change by 132 days and increase yields by 15%. These finding suggests that external industry factors rather than internal factors such as agency and earnings based explanations for dividend smoothing and signaling are necessary. In addition, the dynamic finding also has implications for the considerable asset pricing literature that exploits properties of dividends and payout yield to better understand the fundamentals of price movements.

Finally, I analyze the channels through which peer effects operate and finds evidence to support strategic motives and behavioral biases. On average, the combination of high peer influence and overconfidence makes overconfident managers 3% more likely to increase dividend payments. This behavioral-based explanation, which contrasts with the rational strategic explanation of exploiting financially constrained firms' weaknesses, suggests a potentially fruitful area for future research to examine whether the two channels for peer influence differentially affect firm value. Similarly, the combination of high peer influence and strategic exploitability makes financial vulnerable managers 2% more likely to increase dividend payments. This example of strategic interactions affecting dividend decisions also indicates that an important area for future research is testing if peer-influenced managerial decisions predict future firm performance.

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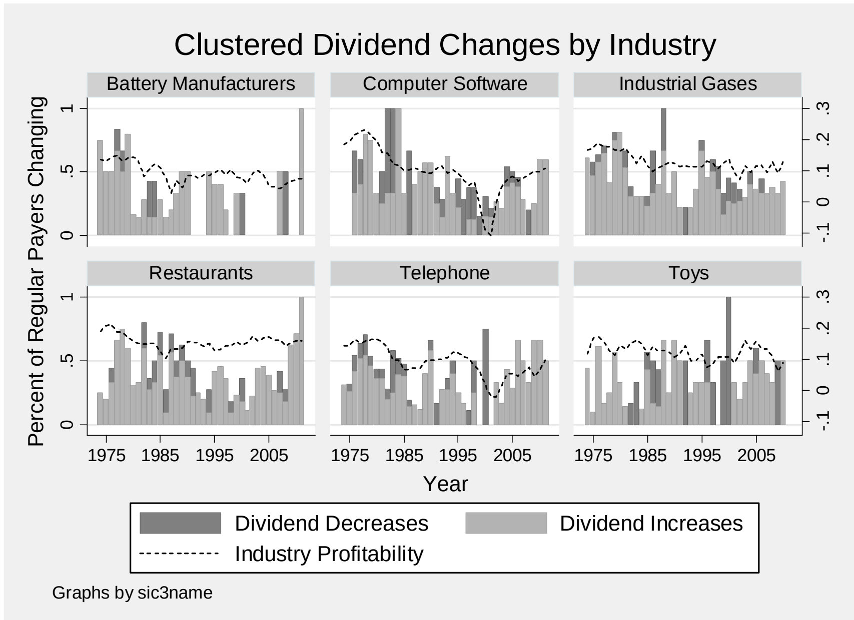
Figures and Tables



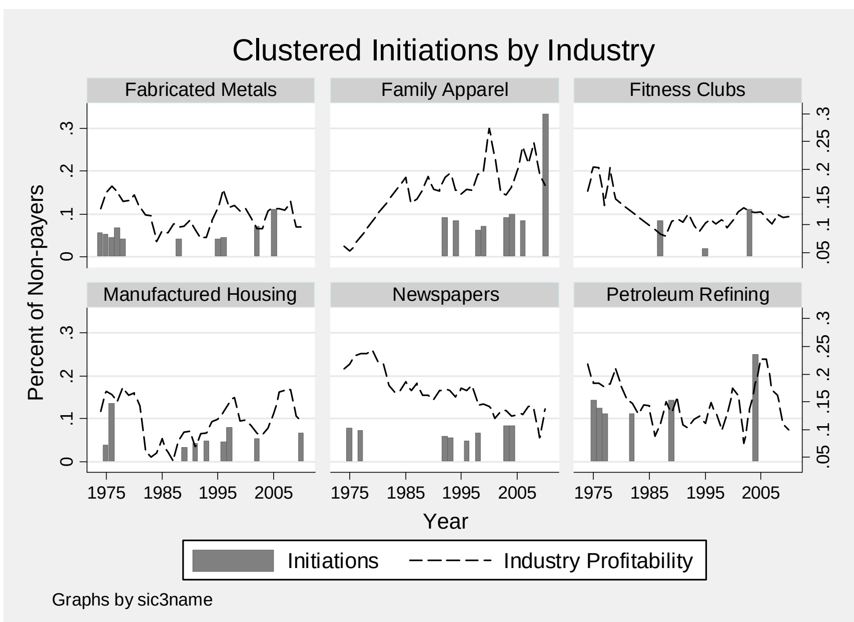


Fig. 1. Dividend changes and initiations for a sample of industries. This figure shows dividend changes and initiations for firms from 12 representative industries (battery manufacturers, computer software, industrial gases, restaurants, telephone, toys, fabricated metals, family apparel, fitness clubs, manufactured housing, newspapers, and petroleum refining). Dividend changes are calculated from CRSP data and industry profitability is calculated from COMPUSTAT data. Industries are defined by the 3-digit SIC.

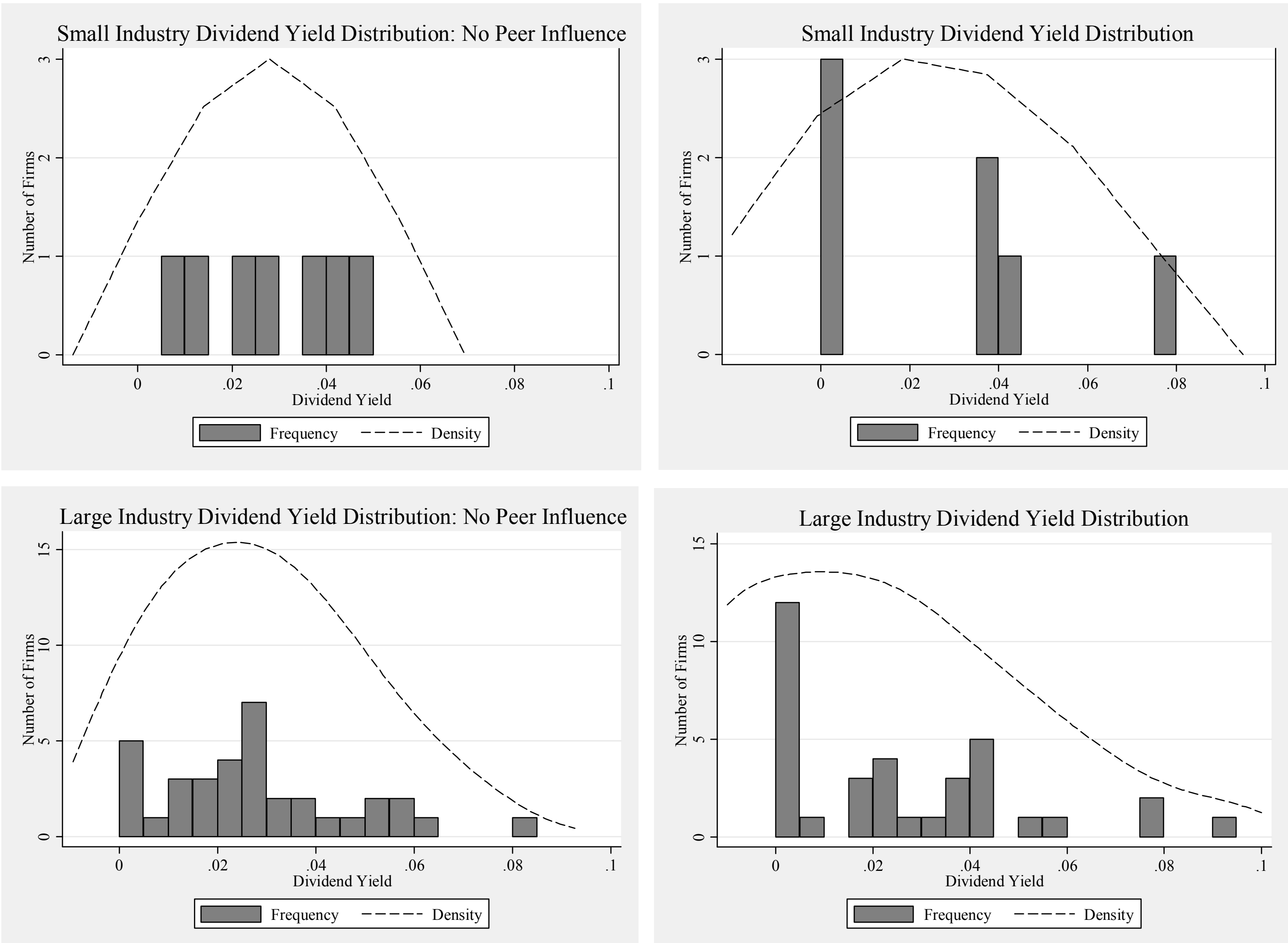


Fig. 2. Simulated excess-variance in small and large industries. The figures show a simulated small industry with 7 firms and a large industry with 35 firms. All figures have the same mean dividend yields of 2.75%; however, as the figures illustrate, peer influence amplifies the variance.

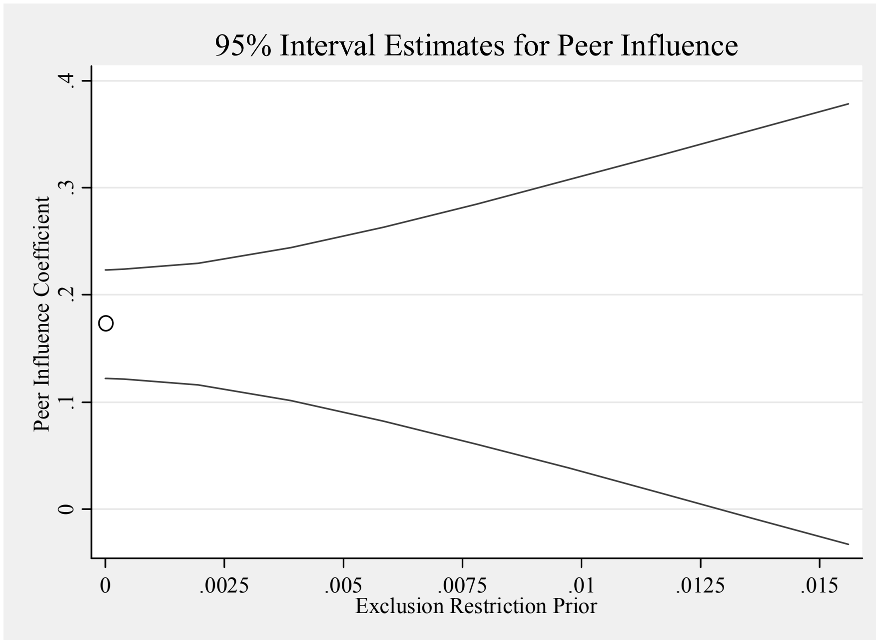


Fig. 3. Partial identification, relaxation of the exclusion retriction, and the economic importance of peer influence. This figure presents 95% confidence intervals for the effect of peer influence on dividend increases using the partial identification approach that produces confidence intervals by imposing a prior that the exogeneity error is distributed as follows: $\zeta \sim N\left(0, \Omega_{\zeta}\right)$. The dot represents the instrumental variable regression results for dividend changes made by regular dividend payers, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The point estimate of 17.3% assumes $\Omega_{\zeta} = 0$

Table 1
Summary Statistics.

The sample includes quarterly firm observations covering 1975 through 2011 for all firms in the CRSP and Compustat databases. The statistics are calculated using observations for all non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Appendix B provides precise definitions for all covariates. The table presents means, standard deviations (SD) and medians for all covariates. Firm-specific covariates correspond to firm j's value whereas peer firm averages denote the average of all firms within an industry-quarter combination, excluding the j_{th} firm's value. Industry is defined by the 3-digit SIC.

	All Firms			Dividend Paying Firms			Non-Dividend Paying Firms		
Panel A. Firm-Specific Covariates	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Dividend Yield	0.7%	0.0%	1.7%	3.0%	2.6%	2.2%	0.0%	0.0%	0.7%
Repurchases Yield	1.5%	0.0%	4.6%	1.6%	0.0%	4.6%	1.4%	0.0%	4.6%
Special Dividend Yield	0.0%	0.0%	1.3%	0.0%	0.0%	0.9%	0.0%	0.0%	1.5%
Profitability	0.02	0.02	0.05	0.03	0.03	0.03	0.01	0.02	0.06
Lifecycle Stage	-0.15	0.16	1.40	0.35	0.35	0.22	-0.30	0.08	1.56
Market-to-Book	1.60	1.08	1.88	1.15	0.92	0.81	1.74	1.15	2.08
Book Leverage	0.23	0.20	0.22	0.23	0.22	0.16	0.23	0.18	0.24
Tangibility	0.28	0.23	0.22	0.34	0.30	0.20	0.27	0.20	0.22
Investment-to-Capital	0.06	0.02	0.44	0.02	0.00	0.07	0.07	0.03	0.50
Cash flow-to-Capital	-0.05	0.07	4.19	0.12	0.08	0.45	-0.10	0.06	4.77
Firm Risk	5.4%	2.6%	7.3%	1.2%	0.8%	1.5%	6.6%	3.7%	7.9%
Market Equity	1,119	175	3,916	2,606	787	5,395	674	120	3,218
Institutional Ownership	32.4%	25.1%	29.2%	34.3%	32.7%	31.0%	31.8%	23.7%	28.6%
Panel B. Peer Firm Average Covariates	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Dividend Yield	0.7%	0.3%	1.1%	1.5%	1.1%	1.5%	0.5%	0.2%	0.8%
Repurchases Yield	1.5%	1.2%	1.6%	1.3%	0.8%	1.8%	1.5%	1.2%	1.6%
Special Dividend Yield	0.0%	0.0%	0.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.3%
Profitability	0.14	0.14	0.05	0.15	0.15	0.05	0.14	0.14	0.05
Lifecycle Stage	0.21	0.24	0.25	0.29	0.31	0.19	0.18	0.21	0.26
Market-to-Book	1.52	1.27	0.93	1.15	1.00	0.61	1.64	1.38	0.98
Book Leverage	0.25	0.23	0.12	0.26	0.24	0.11	0.25	0.22	0.12
Tangibility	0.31	0.27	0.18	0.35	0.32	0.17	0.29	0.25	0.18
Investment-to-Capital	0.06	0.05	0.14	0.03	0.02	0.08	0.06	0.06	0.15
Cash flow-to-Capital	-0.05	0.05	0.77	0.06	0.07	0.46	-0.08	0.05	0.84
Firm Risk	6.2%	4.7%	7.6%	4.2%	2.7%	6.9%	6.8%	5.5%	7.6%
Industry Risk	1.7%	0.9%	3.2%	1.4%	0.8%	2.2%	1.8%	0.9%	3.4%
Market Risk	1.3%	0.7%	1.9%	1.1%	0.7%	1.7%	1.3%	0.7%	2.0%
Market Equity	2,051	1,029	3,515	2,147	898	4,697	2,022	1,075	3,073
Institutional Ownership	32.7%	31.0%	18.5%	25.8%	23.7%	20.9%	34.8%	32.2%	17.2%
HHI	2,288	1,835	1,801	2,605	2,166	1,770	2,193	1,748	1,799
Industry IBIS Lifecycle Stage	2.90	3.00	1.54	2.79	3.00	1.49	2.94	3.00	1.55
Industry LBO	0.68	1.00	0.47	0.45	0.00	0.50	0.74	1.00	0.44
Industry M&A	0.78	1.00	0.41	0.59	1.00	0.49	0.84	1.00	0.37
Industry Rumor Major Deal	0.12	0.00	0.33	0.05	0.00	0.22	0.15	0.00	0.35
Industry Fraud Accusations	0.30	0.00	0.46	0.11	0.00	0.32	0.36	0.00	0.48
Observations		439,327			101,161			338,166	
Unique Firms		12,215			2,587			11,418	

Table 2

Univariate analyses of manager's dividend decisions and their peers' dividend choices.

This table presents the distribution of dividend increases and decreases by regular dividend payers. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Industry is defined by the 3-digit SIC. Peer influence, which is the primary variable of interest, is defined as the fraction of peer firms within an industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. For the univariate analysis, the sample is divided into quintiles based on peer influence and then calculate mean percentage of firms increasing (decreasing) their dividend payment in a given quarter across each peer influence quartile. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dividend Payment Changes Conditional on Peer Activity	
Likelihood of a Regular Dividend Payer Increasing Dividend Payments	12.6%
Likelihood of a Regular Dividend Payer Increasing When No Peers Increased in Previous 180 Days	9.3%
Likelihood of a Regular Dividend Payer Increasing When At Least 1 Peer Increased in Previous 180 Days	14.1%
Likelihood of a Regular Dividend Payer Increasing When More Than 1 Peer Increased in Previous 180 Days	14.9%
Likelihood of a Regular Dividend Payer Increasing When More Than 2 Peers Increased in Previous 180 Days	15.8%
Likelihood of a Regular Dividend Payer Decreasing Dividend Payments	3.5%
Likelihood of a Regular Dividend Payer Decreasing When No Peers Decreased in Previous 180 Days	2.8%
Likelihood of a Regular Dividend Payer Decreasing When At Least 1 Peer Decreased in Previous 180 Days	4.5%
Likelihood of a Regular Dividend Payer Decreasing When More Than 1 Peer Decreased in Previous 180 Days	5.1%
Likelihood of a Regular Dividend Payer Decreasing When More Than 2 Peers Decreased in Previous 180 Days	6.1%
Observations	101,161

Panel B. Univariate Analysis Across Quintiles	Likelihood of Regular Dividend Payer Increasing Dividend Payments	Likelihood of Regular Dividend Payer Decreasing Dividend Payments
Low Peer Influence	9.3%	2.9%
2	10.5%	3.8%
3	12.6%	4.1%
4	14.6%	4.1%
High Peer Influence	17.0%	5.6%
High Minus Low	7.6%	2.7%
T-stat	25.60***	14.22***

Table 3
Summary statistics on dividend change characteristics by time to dividend change.

This table presents characteristics of the dividend changes made by regular dividend payers. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. Industry is defined by the 3-digit SIC. Peer influence, which is the primary variable of interest, is defined as the fraction of peer firms within an industry that increase their dividend in the 180 days prior to firm j's dividend announcement. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively for a test of differences in mean peer influence across the three categories: less than 1 year to dividend change, annual changer, and more than 1 year to dividend change.

Panel A. Dividend Change Characteristics	Less than 1 year	Annual Change	More than 1 year	No Change	All Dividend
Years to Dividend Change	0.6	1.0	2.6	N.A.	1.4
Percent Change in Dividend	10.6%	11.8%	4.7%	N.A.	1.5%
Dividend Yield	3.1%	3.0%	3.1%	3.0%	3.0%
Number of Peers Increasing in Previous 90 Days	1.6	1.3	1.3	1.1	1.1
Peer Influence	21.4%	15.1%	14.3%	13.8%	14.3%
T-stat (No change minus category)	22.97***	12.75***	9.97***		
Panel B. Firm Characteristics					
Repurchases Yield	1.5%	1.9%	1.5%	1.6%	1.6%
Special Dividend Yield	0.01%	0.00%	0.03%	0.05%	0.04%
Profitability	0.04	0.04	0.03	0.03	0.03
Lifecycle Stage	0.38	0.41	0.36	0.35	0.35
Market-to-Book	1.36	1.36	1.14	1.12	1.15
Book Leverage	0.21	0.21	0.23	0.23	0.23
Tangibility	0.34	0.33	0.34	0.34	0.34
Investment-to-Capital	0.02	0.02	0.02	0.02	0.02
Cash flow-to-Capital	0.14	0.14	0.12	0.11	0.12
Firm Risk	1.23	0.91	1.34	1.26	1.24
Market Equity	3046.1	3953.1	2490.5	2495.6	2606.0
Institutional Ownership	26.2%	36.6%	31.6%	34.8%	34.3%
Observations	5,667	5,537	5,026	84,931	101,161

Table 4
Influence of industry peers: variance-based approach.

This table presents estimates from the variance-based approach described in Section 4.1. The sample includes quarterly observations from 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. When the estimate of the peer influence multiplier, γ^2, is significantly different than 1, then peer effects are present. Column (1) conditions for observable firm-level and industry-level heterogeneity including all firm-specific and industry-specific covariates listed in Table 1. Column (2) conditions for observable firm-level and industry-level heterogeneity including all firm-specific, industry-specific, and peer firm average covariates listed in Table 1. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dividend Yields	(1)	(2)
Estimate of γ^2	1.93	2.37
Implied Peer Influence Multiplier	1.39	1.54
Chi-Squared Test of No Peer Influence	(4.72)**	(4.05)**
Implied Effect of Multiplier Small Industry	17%	24%
Implied Effect of Multiplier Large Industry	6%	9%
Firm-specific Covariates	Yes	Yes
Industry-specific Covariates	Yes	Yes
Peer Firm Average Covariates	No	Yes
Observations	439,327	

Panel B. Payout Ratios	(1)	(2)
Estimate of γ^2	1.30	1.48
Implied Peer Influence Multiplier	1.14	1.22
Chi-Squared Test of No Peer Influence	(3.08)*	(5.37)**
Implied Effect of Multiplier Small Industry	6%	10%
Implied Effect of Multiplier Large Industry	2%	4%
Firm-specific Covariates	Yes	Yes
Industry-specific Covariates	Yes	Yes
Peer Firm Average Covariates	No	Yes
Observations	439,327	

Table 5
Influence of industry peers and asymmetric managerial responses: IV approach.

This table presents estimates from the instrumental variable approach described in Section 4.2. The exact specification is: $Div_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. Peer influence is captured by $Peer_{(-j)it'}$ which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable prior to the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. The endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Dividend Increase	Peer Increases (1)	Peer Increases (2)	Peer Decreases (3)	Peer Decreases (4)
Peer Influence Coefficient	17%	28%	35%	46%
Test-statistic	(3.10)***	(2.16)**	(2.68)***	(1.86)*
First-stage F-stat	32.4	34.1	15.0	14.3
T-stat on Instrument	(12.82)***	(6.32)***	(5.93)***	(3.53)***
Adjusted R^2	6.26%	6.28%	6.27%	6.28%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Panel B. Dependent Variable = Dividend Decrease	Peer Increases (1)	Peer Increases (2)	Peer Decreases (3)	Peer Decreases (4)
Peer Influence Coefficient	-2%	-19%	-5%	-30%
Test-statistic	(0.35)	(1.24)	(0.35)	(1.10)
First-stage F-stat	32.4	34.1	15.0	14.3
T-stat on Instrument	(12.82)***	(6.32)***	(5.93)***	(3.53)***
Adjusted R^2	2.11%	2.12%	2.13%	2.14%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Table 6
Peer influence and dividend increases in detail: IV approach.

This table presents details of the coefficients estimates from Table 5 for dividend increase instrumental variable regressions, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate *p*-values of 1%, 5%, and 10%, respectively.

Dependent Variable = Dividend Increase	Peer Increases (1)	(2)	Peer Decreases (3)	(4)
Peer Influence	0.173	0.284	0.346	0.455
	(3.10)***	(2.16)**	(2.68)***	(1.86)*
Repurchases	0.006	0.006	0.007	0.006
	(2.21)**	(2.20)**	(2.01)**	(1.83)*
Profitability	0.016	0.016	0.018	0.017
	(2.89)***	(2.82)***	(2.87)***	(2.70)***
Lifecycle Stage	0.016	0.014	0.023	0.021
	(1.86)*	(1.59)	(2.36)**	(2.02)**
Market-to-Book	0.052	0.051	0.035	0.037
	(7.31)***	(6.82)***	(3.28)***	(2.77)***
Book Leverage	-0.047	-0.046	-0.051	-0.048
	(7.14)***	(6.83)***	(7.17)***	(6.33)***
Tangibility	-0.019	-0.021	-0.015	-0.015
	(2.22)**	(2.32)**	(1.47)	(1.36)
Investment-to-Capital	0.014	0.014	0.015	0.015
	(3.46)***	(3.38)***	(3.45)***	(3.27)***
Cash flow-to-Capital	0.027	0.027	0.031	0.032
	(3.90)***	(3.76)***	(3.71)***	(3.60)***
Firm Risk	-0.009	-0.008	-0.017	-0.018
	(2.50)**	(2.16)**	(3.36)***	(2.88)***
Industry Risk	-0.008	-0.006	-0.032	-0.037
	(1.71)*	(1.23)	(3.69)***	(2.52)**
Institutional Ownership	0.006	0.008	0.005	0.006
	(0.70)	(0.91)	(0.47)	(0.52)
Firm Size	0.034	0.036	0.026	0.028
	(4.58)***	(4.55)***	(3.24)***	(3.32)***
HHI	-0.009	-0.018	-0.003	-0.004
	(1.06)	(1.34)	(0.37)	(0.36)
Peer Average Repurchases		-0.003		-0.006
		(0.89)		(1.14)
Peer Average Profitability		-0.007		0.001
		(0.64)		(0.15)
Peer Average Lifecycle Stage		-0.004		0.006
		(0.36)		(0.70)
Peer Average Market-to-Book		-0.003		-0.029
		(0.53)		(1.86)*
Peer Average Book Leverage		0.006		-0.015
		(0.62)		(2.00)**
Peer Average Tangibility		0.012		0.017
		(1.20)		(1.25)
Peer Average Investment-to-Capital		0.002		0.002
		(0.46)		(0.32)
Peer Average Cash flow-to-Capital		-0.002		0.001
		(0.48)		(0.26)
Peer Average Firm Size		-0.016		-0.009

		(1.32)		(0.74)
Peer Average Institutional Ownership		-0.032		-0.031
		(1.80)*		(1.47)
Industry IBIS Lifecycle Stage		0.001		-0.002
		(0.55)		(0.51)
Industry LBO		0.009		0.024
		(2.13)**		(2.32)**
Industry M&A		-0.004		0.006
		(0.84)		(0.87)
Industry Rumored Major Deal		0.001		0.000
		(0.53)		(0.13)
Industry Fraud		-0.002		0.003
		(0.45)		(0.66)
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
First-stage F-stat	32.4	34.1	15.0	14.3
T-stat on Instrument	(12.82)***	(6.32)***	(5.93)***	(3.53)***
Adjusted R^2	6.26%	6.28%	6.27%	6.28%
Observations	101,161	101,161	101,161	101,161

Table 7
Peer influence and dividend change characteristics: IV approach.

This table presents estimates from the instrumental variable approach described in Section 4.2. The exact specification is: $DivChar_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. The sample in Panel A is limited to firms that announce a dividend increase in a given quarter. $DivChar_{jit}$ is a continuous variable measuring the timing of the dividend change in Panel A and the size of the dividend change in Panel B for firm j in industry i in quarter t. Peer influence is captured by $Peer_{(-j)it'}$ which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable prior to the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. The endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Time between Dividend to Changes (Days)	Peer Influence (1)	Peer Influence (2)
Peer Influence Coefficient	-132	-83
Test-statistic	(1.81)*	(1.68)*
First-stage F-stat	12.6	13.1
T-stat on Instrument	(7.96)***	(10.19)***
Adjusted R^2	26.89%	24.77%
Firm-specific Covariates	Yes	Yes
Annual Changers Included	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	8,571	12,162

Panel B. Dependent Variable = Percentage Change in Dividend Yield	Peer Influence (1)	Peer Influence (2)
Peer Influence Coefficient	15%	25%
Test-statistic	(2.70)***	(2.24)**
First-stage F-stat	32.2	35.4
T-stat on Instrument	(14.84)***	(8.05)***
Adjusted R^2	2.64%	2.66%
Firm-specific Covariates	Yes	Yes
Peer Firm Averages	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	101,161	101,161

Table 8
Assessing theoretical channels for peer influence with CEO characteristics.

This table presents estimates that test the importance of reputational and behavioral explanations as the theoretical channel for peer effects. The exact specification is: $Div_{jit} = \beta_P Peer_{(-j)it'} + \beta_C Char_{jit} + \beta_{C\times P} Char_{jit} \times Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The estimates come from instrumental variable regressions, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk and the interaction between peer influence and CEO characteristics is instrumented for with the average peer idiosyncratic equity risk interacted with the CEO characteristics. The sample includes all regular dividend announcements between 1992 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. The sample is further restricted to firms with non-missing CEO data available in Execucomp and Thomson Reuters. Peer influence is captured by $Peer_{(-j)it'}$ which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable prior to the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change, CEO characteristics, and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively. The table presents the heteroskedasticity corrected Cragg-Donald statistic testing for weak instruments (First Stage Multivariate F-stat), each F-stat has statistical significance implying less than 10% distortion, which is denoted by ***.

Dependent Variable = Dividend Increase	(1)	(2)	(3)	(4)
Peer Influence	19.4%	19.8%	19.1%	17.9%
	(2.21)**	(2.22)**	(2.13)**	(2.03)**
Overconfident CEO		-3.4%		
		(2.04)**		
Peer Influence x Overconfident CEO		6.2%		
		(2.21)**		
Young CEO			-0.7%	
			(0.45)	
Peer Influence x Young CEO			0.3%	
			(0.09)	
Early Tenure CEO				-2.0%
				(1.34)
Peer Influence x Early Tenure CEO				2.1%
				(0.73)
First Stage Multivariate F-stat	51.8***	26.2***	24.9***	26.4***
T-stat on Instrument 1	(7.20)***	(5.15)***	(9.92)***	(8.45)***
T-stat on Instrument 2	N.A.	(3.30)***	(2.55)***	(4.55)***
Adjusted R^2	6.44%	6.45%	6.44%	6.46%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	31,193			

Table 9

Assessing theoretical channels for peer influence: learning and strategy.

This table presents estimates from observational learning and strategic interaction tests of the theoretical channel for peer effects. For test 1, the table presents instrumental variable regression results for dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $Div_{jit} = \beta_P PeerObsLearn_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$, where Div_{jit} indicates a dividend increase for firm j in industry i in quarter t. Peer influence is captured by $PeerObsLearn_{(-j)it'}$. It differs from previous measures of peer influence, because it conditions not only on industry but on market capitalization within an industry. $PeerObsLearn_{(-j)it'}$ represents the fraction of peer firms within the 3-digit SIC industry that have a market capitalization greater than the individual firm and that increase their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable prior to the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. For test 2 and test 3, the exact specification is: $Div_{jit} = \beta_P Peer_{(-j)it'} + \beta_C Char_{jit} + \beta_{C\times P} Char_{jit} \times Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. Peer influence is not redefined in these specifications. For each test, the sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Dependent Variable = Dividend Increase	Test 1 (1)	Test 2 (2)	Test 3 (3)
Peer Influence (Observational Learning)	7.0%		
	(1.09)		
Peer Influence		23.7%	15.9%
		(3.53)***	(2.87)***
Learning Firm		2.1%	
		(0.70)	
Peer Influence x Learning Firm		-11.8%	
		(2.07)**	
Strategically Vulnerable Firm			-2.1%
			(2.11)**
Peer Influence x Strategically Vulnerable Firm			4.2%
			(2.71)***
First Stage Multivariate F-stat	240.1***	9.0***	81.9***
T-stat on Instrument 1	(15.49)***	(11.18)***	(12.73)***
T-stat on Instrument 2	N.A.	(2.83)***	(2.52)**
Adjusted R^2	6.33%	6.28%	6.26%
Firm-specific Covariates	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes
Observations	101,161		

Appendix A. Excess-Variance Derivation

This appendix formally derives the identification of γ^2, which is the square of the peer influence parameter, using the excess-variance framework. Let there be a sufficient sample of industries. Each industry i consists of M_i firms. Dividend payments, D_{ji}, for firm j in industry i are given by:

$$D_{ji} = \alpha_i + (\gamma - 1)\,\bar{\varepsilon}_i + \varepsilon_{ji} \tag{A.1}$$

Where α_i represents industry-level heterogeneity and ε_{ji} represents firm-level heterogeneity. $\bar{\varepsilon}_i = \underline{\varepsilon}_i^{'}\underline{1}_m/M_i$ is the industry mean of the firm-level heterogeneity, where $\underline{1}_m$ is a $M_i \times 1$ vector of ones, $\underline{\varepsilon}_i^{'}$ is a $1 \times M_i$ vector of the ε_{ji} for each firm j in industry i, and M_i is the number of firms in that industry. Let γ represent the peer influence parameter. The peer influence parameter is dependent on $\bar{\varepsilon}_i$ which encompasses the decisions of the peer managers. Although it may be more intuitive to think of γ as depending on the industry mean of the dividend payments, $\bar{D}_i$, since $\bar{D}_i$ is a combination of all the ε_{ji}, the two are reparameterizations of each other. In the presence of peer influence ($\gamma > 1$), dividend payments are inflated or deflated by the decisions of the peer managers, $\bar{\varepsilon}_i$. Therefore, the greater the peer influence, the greater γ will be. In the absence of peer influence ($\gamma = 1$), the model for dividend payments reverts to the traditional model, where dividend payments only depend on the firm's own heterogeneity (ε_{ji}) and industry-level heterogeneity (α_i). Under the above specification, the peer influence parameter is not identified, because of the reflection problem (Manski (1993)). However, the peer influence parameter can be identified by conditioning on industry type.

To see how the peer influence parameter is identified, additional notation is useful. Define $\underline{D}_i$ as a $M_i \times 1$ vector of individual firm's dividend payments in industry i. In vector notation, $\underline{D}_i = A\underline{X}_i$, where $\underline{X}_i = \begin{bmatrix} \alpha_i \\ \varepsilon_{1i} \\ \varepsilon_{2i} \\ \vdots \\ \varepsilon_{mi} \end{bmatrix}$ is a $(M_i + 1) \times 1$ vector and A is a $M_i \times (M_i + 1)$ matrix.

$$A=\begin{bmatrix} 1 & \left[\frac{(\gamma-1)}{m}+1\right] & \frac{(\gamma-1)}{m} & \cdots & \frac{(\gamma-1)}{m} \\ 1 & \frac{(\gamma-1)}{m} & \left[\frac{(\gamma-1)}{m}+1\right] & & \vdots \\ \vdots & \vdots & & \ddots & \vdots \\ \vdots & \vdots & & & \frac{(\gamma-1)}{m} \\ 1 & \frac{(\gamma-1)}{m} & \cdots & \frac{(\gamma-1)}{m} & \left[\frac{(\gamma-1)}{m}+1\right] \end{bmatrix} \tag{A.2}$$

Recall that if X is a random vector and A is a matrix that operates on X, then, $Var(AX) = AVar(X)A'$. Define the $Var(\underline{X}_i) = E\left[\underline{X}_i\underline{X}_i'\right] - E[\underline{X}_i]E\left[\underline{X}_i'\right]$. Since the goal is to define the conditional variance of $\underline{D}_i$, let S_i be an indicator for the type (small or large) of industry i. Assume that the conditional expectation of $\underline{X}_i$ is $E[\underline{X}_i|s_i,m_i] = \begin{bmatrix} \mu_i & 0 & \cdots & 0 \end{bmatrix}'$. Next, define the conditional variance-covariance matrix of $\underline{X}_i$, which relates the industry-level heterogeneity (α_i) and the vector of firm-level heterogeneity $\left(\underline{\varepsilon}_i'\right)$ as follows:

$$Var(\underline{X}_i|s_i,m_i) = \begin{bmatrix} \sigma^2_{\alpha|s,m} & \sigma_{\alpha\varepsilon|s,m} & \cdots & \cdots & \sigma_{\alpha\varepsilon|s,m} \\ \sigma_{\alpha\varepsilon|s,m} & \sigma^2_{\varepsilon|s,m} & \sigma_{\varepsilon\varepsilon|s,m} & \cdots & \sigma_{\varepsilon\varepsilon|s,m} \\ \vdots & \sigma_{\varepsilon\varepsilon|s,m} & \ddots & & \vdots \\ \vdots & \vdots & & & \sigma_{\varepsilon\varepsilon|s,m} \\ \sigma_{\alpha\varepsilon|s,m} & \sigma_{\varepsilon\varepsilon|s,m} & \cdots & \sigma_{\varepsilon\varepsilon|s,m} & \sigma^2_{\varepsilon|s,m} \end{bmatrix}$$

Or more compactly,

$$Var(\underline{X}_i|s_i,m_i) = \begin{bmatrix} \sigma^2_{\alpha|s,m} & \sigma_{\alpha\varepsilon|s,m}\underline{1}_m' \\ \sigma_{\alpha\varepsilon|s,m}\underline{1}_m & \left(\sigma^2_{\alpha|s,m} - \sigma_{\varepsilon\varepsilon|s,m}\right)I_m + \sigma_{\varepsilon\varepsilon|s,m}\underline{1}_m\underline{1}_m' \end{bmatrix} \tag{A.3}$$

where $\sigma^2_{\alpha|s,m}$ captures the variance of industry-level heterogeneity conditioned on industry size and type, $\sigma_{\alpha\varepsilon|s,m}$ captures the covariance between industry-level and firm-level heterogeneity conditioned on industry size and type, $\sigma^2_{\varepsilon|s,m}$ captures the variance of heterogeneity at the firm-level conditioned on industry size and type, I_m is an $m \times m$ identity matrix, and $\sigma_{\varepsilon\varepsilon|s,m} = Cov(\varepsilon_{ji}, \varepsilon_{ki}|s_i,m_i)$, which captures the within-industry covariance in firm quality.

Matrix multiplication using the conditional variance matrix from A.3 and the operator matrix from A.2 produces the desired $M_i \times M_i$ conditional variance-covariance matrix of $\underline{D}_i$ as follows:

$$Var(\underline{D}_i|s_i,m_i) = \lambda^2_{|s,m}I_m + \left[\tau^2_{|s,m} + \left(\gamma^2-1\right)\frac{\lambda^2}{m}\right]\underline{1}_m\underline{1}_m'$$

Where $\lambda^2_{|s,m} = \sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}$ and $\tau^2_{|s,m} = \sigma^2_{\alpha|s,m} + 2\gamma\sigma_{\alpha\varepsilon|s,m} + \gamma^2\sigma_{\varepsilon\varepsilon|s,m}$. Notice that $\tau^2_{|s,m} > 0$ represents the combination of unobserved industry-level heterogeneity and within-industry sorting by firms that contribute to additional excess variation observed across managers in the same industry. The bracketed term, $\left[\tau^2_{|s,m} + (\gamma^2 - 1)\frac{\lambda^2}{m}\right]$, captures all the excess dividend payment variance across managers in the same industry, but without further restrictions the portion attributable to peer influence, γ^2, is not identified. However, when $\tau^2_{|s,m}$ is equivalent across small and large industries, then the portion attributable to peer influence is identified.

To understand the next step, recall that the conditional variance can be rewritten in terms of the within-industry and between-industry sum of squares according to the law of total variance. This identity makes it possible to use within-industry and between-industry transforms of $\underline{D}_i$ as opposed to the entire $M_i \times M_i$ matrix. Define $V_i^b = [\bar{D}_{i.} - \bar{\bar{D}}_{|s}]^2$ as the between-industry sum of squares for the vector of dividend payments $\underline{D}_i$, where $\bar{D}_{i.}$ is the mean dividend payment in industry i, $\bar{\bar{D}}_{|s}$ is the grand mean dividend payment in industries of type small or large. Next, define $V_i^w = \frac{1}{M_i}\frac{1}{M_i-1}\sum_{i=1}^{M_i}\left[D_{ij} - \bar{D}_{i.}\right]^2$ as the within-industry sum of squares where D_{ij} is the dividend payment for firm j in industry i and M_i is the number of firms in industry i. The conditional expectation of V_i^b given the industry type (small or large) is:

$$E\left[V_i^b|s_i\right] = \tau^2_{|s} + \gamma^2 E\left[\frac{\lambda^2_{|s_i m_i}}{m_i}|s_i\right] = \sigma^2_{\alpha|s} + 2\gamma\sigma_{\alpha\varepsilon|s} + \gamma^2\sigma_{\varepsilon\varepsilon|s} + \gamma^2 E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]$$

The conditional expectation of V_i^w given the industry type (small or large) is:

$$E\left[V_i^w|s_i\right] = E\left[\frac{\lambda^2_{|s_i m_i}}{m_i}|s_i\right] = E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]$$

The ratio of the difference in between-industry squares across small and large industries to the corresponding difference in within-industry squares is:

$$\frac{E\left[V_i^b|S_i = 1\right] - E\left[V_i^b|S_i = 0\right]}{E\left[V_i^w|S_i = 1\right] - E\left[V_i^w|S_i = 0\right]} =$$

$$\frac{\left\{\sigma^2_{\alpha|s} + 2\gamma\sigma_{\alpha\varepsilon|s} + \gamma^2\sigma_{\varepsilon\varepsilon|s} + \gamma^2 E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]\right\} - \left\{\sigma^2_{\alpha|s} + 2\gamma\sigma_{\alpha\varepsilon|s} + \gamma^2\sigma_{\varepsilon\varepsilon|s} + \gamma^2 E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]\right\}}{E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right] - E\left[\frac{\sigma^2_{\varepsilon|s,m} - \sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]}$$

Combining terms and simplifying the expressions shows the ratio of differences in conditional expectations identifies the square of the peer influence parameter:

$$\frac{E\left[V_i^b|S_i=1\right]-E\left[V_i^b|S_i=0\right]}{E\left[V_i^w|S_i=1\right]-E\left[V_i^w|S_i=0\right]}=\gamma^2\left\{\frac{E\left[\frac{\sigma^2_{\varepsilon|s,m}-\sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]-E\left[\frac{\sigma^2_{\varepsilon|s,m}-\sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]}{E\left[\frac{\sigma^2_{\varepsilon|s,m}-\sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]-E\left[\frac{\sigma^2_{\varepsilon|s,m}-\sigma_{\varepsilon\varepsilon|s,m}}{m_i}|s_i\right]}\right\}=\gamma^2$$

Appendix B. Variable definitions

Dividend payments are calculated using CRSP, where only ordinary shares incorporated in the U. S. ($SHRCD$ equal to 10 or 11, cash dividends distributed in U.S. dollars (first two digits of $DISTCD$ equal to 12 or 13) for firms listed on major exchanges ($EXCHCD$ equal to 1, 2, or 3) are included. The sample is further restricted to financials (SIC codes between 6000 and 6999), utilities (SIC codes between and 4900 to 4999), and REITs ($SHRCD$ equal to 18).

A **regular dividend** is the first cash dividend payment reported on the CRSP Master File that is followed by another dividend in less than 13 months. This ensures dividends which are first reported as other frequency ($DISTCD$ beginning with 120, 121, 130, 131, 126, 128, 136, or 138) that followed a regular dividend pattern are not excluded. All other frequency dividends are designated **special dividends** ($DISTCD$ beginning with 127, 129, 137, or 139). A dividend change occurs when the regular cash dividends per share are at least 1% changed.

Gross share repurchases are defined by converting Compustat's repurchases fiscal year to date variable, $PRSTKCY$, into quarterly amounts and adjusts to account for changes in preferred stock, $PSTKQ$. If Compustat has data available on both the number of shares repurchased and the average price per share of shares repurchased, this is taken to be the quarterly gross repurchase ($CSHOPQ \times PRCRAQ$). **Net repurchases** equal gross repurchases less the value of issuances of new stock ($CSHIQ \times PRCC$). If a firm uses the treasury stock method to account for repurchases, net repurchases equal the dollar amount of the increase in common treasury stock ($TSTKQ$). The **payout ratio** is defined using net repurchases, regular dividends, and special dividends.

Peer influence is measured by calculating the fraction of peer firms within the same 3-digit SIC that increased dividend payments in the 180 days prior to an individual firms' announcement. When no dividend announcement is made, the fraction of peer firms that increased dividend payments in the 180 days prior to the last day of the quarter is used. Since dividend changes require the approval of the board of directors, the 180 day period ensures that at least one board meeting occurs following the peer dividend change.

To calculate **firm risk** and **industry risk**, the method to disaggregate risk for an individual industry outlined by Campbell et al. (2001) is applied to daily equity return data. This method separates market-level, industry-level, and idiosyncratic firm-level shocks. The procedure generates risk measures for individual industries and the market. Since the procedure only generates an estimate of the average firm risk in an industry, firm-specific equity risk is estimated using an augmented market model. For consistency, the same value-weighted market and industry returns used in the Campbell et al. (2001) procedure are used in the augmented market model. In addition returns on the value, size, and momentum factors are included. The model is estimated for each firm using daily returns for the quarter and requires at least 20 daily return observations per firm. The standard deviations of the residuals from these firm-specific models are the firm-specific risk measures.

Other covariates from Compustat/Thomson Reuters include:

Profitability $= OIBDPQ/ATQ$.

Lifecycle Stage $= RETQ/ATQ$

Market-to-Book $= (MEQ + DLCQ + DLTTQ + PSTKQ - TXDITCQ)/ATQ$

Book Leverage $= (DLCQ + DLTTQ)/(DLCQ + DLTTQ + MEQ)$

Tangibility $= PPENTQ/ATQ$

Investment-to-Capital $= ((CAPXY - SPPEY) - (CAPXY_{t-1} - SPPEY_{t-1}))/PPENTQ_{t-1}$

Cash flow-to-Capital $= (IBQ + DP)/PPENTQ_{t-1}$

Market Equity $= MEQ$

Institutional Ownership $= INSTOWN_PERC$

Debt Issuance $= I\left[(TDQ - TDQ_{t-1})/ATQ > .025\right]$

Equity Issuance$= I\left[(SSTKY - PRSTKCY_{t-1})/ATQ > .025\right]$

R&D Investment $= XRD$

Overhead Costs $= XSGA$

Young CEO $= I\left[Percentile(Age) < 25\right] \approx I\left[Age < 52\right]$

Early Tenure CEO $= I\left[Percentile(Qtr - Qtr_{BecameCEO}) < 25\right] \approx I\left[CEOTenure < 8Qtr\right]$

Overconfident CEO is an indicator variable to capture overconfidence (Malmendier and Tate (2005)). CEOs can be overconfident based on 3 different criteria. First, if a CEO persistently exercises options later than suggested by the benchmark, he is overcondent. Second, if a CEO is optimistic enough about his rm's future performance that he holds options all the way to expiration), he is overcondent. Third, since underdiversied CEOs should also avoid acquiring additional equity, CEOs who habitually increase their holdings of company stock are overcondent.

Learning Firm $= I[Percentile(MEQ) < 25]$

Strategically Vulnerable Firm $=$

$$I[Percentile(CHEQ/ATQ) > 75] \bigcap I\left[Percentile(Var(CFQ_t, \ldots, CFQ_{t-4}) > 75\right]$$

Appendix C. Additional Tables

Table C1
Robustness check: variance-based approach by industry concentration.

This table presents estimates from the variance-based approach described in Section 4.2 for three levels of industry concentration as defined by the U.S. Department of Justice. The sample includes quarterly observations from 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. When the estimate of the peer influence multiplier, γ^2, is significantly different than 1, then peer effects are present. Column (1) conditions for observable firm-level and industry-level heterogeneity including all firm-specific and industry-specific covariates listed in Table 1. Column (2) conditions for observable firm-level and industry-level heterogeneity including all firm-specific, industry-specific, and peer firm average covariates listed in Table 1. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Least Concentrated Industries	(1)	(2)
Estimate of γ^2	1.67	1.68
Implied Peer Influence Multiplier	1.29	1.30
Chi-Squared Test of No Peer Influence	(10.07)***	(7.40)***
Implied Effect of Multiplier Small Industry	13%	13%
Implied Effect of Multiplier Large Industry	5%	5%
Firm-specific Covariates	Yes	Yes
Industry-specific Covariates	Yes	Yes
Peer Firm Average Covariates	No	Yes
Observations	229,277	
Panel B. Moderately Concentrated Industries	**(1)**	**(2)**
Estimate of γ^2	1.47	1.91
Implied Peer Influence Multiplier	1.21	1.38
Chi-Squared Test of No Peer Influence	(3.16)*	(4.11)**
Implied Effect of Multiplier Small Industry	10%	17%
Implied Effect of Multiplier Large Industry	3%	6%
Firm-specific Covariates	Yes	Yes
Industry-specific Covariates	Yes	Yes
Peer Firm Average Covariates	No	Yes
Observations	65,562	
Panel C. Highly Concentrated Industries	**(1)**	**(2)**
Estimate of γ^2	1.80	3.55
Implied Peer Influence Multiplier	1.34	1.88
Chi-Squared Test of No Peer Influence	(0.98)	(2.28)
Implied Effect of Multiplier Small Industry	15%	40%
Implied Effect of Multiplier Large Industry	6%	14%
Firm-specific Covariates	Yes	Yes
Industry-specific Covariates	Yes	Yes
Peer Firm Average Covariates	No	Yes
Observations	144,488	

Table C2
Robustness check: placebo tests for instrumental variable approach.

The table presents placebo tests, which re-estimate each instrumental variable specification from Table 5, but replace the peer influence variable with a placebo variable representing a forward-looking peer influence variable. The exact specification is: $Div_{jit} = \beta_P PeerPlacebo_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. The constructed placebo variable, $PeerPlacebo_{(-j)it'}$, captures the fraction of peer firms that will change their dividend in the 180 days after a dividend increase is announced. If common, yet unobserved economic constraints are creating spurious results, then the newly constructed placebo variable will have a coefficient estimate similar to the coefficient estimated in the model measuring peer influence. If not, then the new explanatory variable should not be significant. The $t^{'}$ as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Dividend Increase	Peer Increases (1)	Peer Increases (2)	Peer Decreases (3)	Peer Decreases (4)
Peer Influence Placebo	-3%	-18%	-35%	105%
Test-statistic	(0.14)	(0.34)	(0.13)	(0.32)
First-stage F-stat	28.5	31.7	24.2	21.6
T-stat on Instrument	(3.74)***	(3.07)***	(0.76)	(0.65)
Adjusted R^2	6.02%	6.02%	5.94%	5.95%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Panel B. Dependent Variable = Dividend Decrease	Peer Increases (1)	Peer Increases (2)	Peer Decreases (3)	Peer Decreases (4)
Peer Influence Placebo	12%	14%	69%	-50%
Test-statistic	(1.04)	(0.52)	(0.86)	(0.42)
First-stage F-stat	28.5	31.7	24.2	21.6
T-stat on Instrument	(3.74)***	(3.07)***	(0.76)	(0.65)
Adjusted R^2	2.01%	2.02%	2.13%	2.14%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Table C3
Robustness check: an alternative definition of peer influence.

This table presents instrumental variable regression results for dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $Div_{jit} = \beta_P Peer90_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. Peer influence is captured by $Peer90_{(-j)it'}$, which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 90 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 90 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Dividend Increase	Peer Increases (1)	(2)	Peer Decreases (3)	(4)
Peer Influence (90-days)	21%	32%	47%	78%
Test-statistic	(3.06)***	(2.12)**	(2.66)***	(1.61)
First-stage F-stat	29.4	41.0	14.0	13.9
T-stat on Instrument	(11.49)***	(6.00)***	(5.29)***	(2.38)***
Adjusted R^2	6.30%	6.31%	6.26%	6.28%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Panel B. Dependent Variable = Dividend Decrease	Peer Increases (1)	(2)	Peer Decreases (3)	(4)
Peer Influence (90-days)	3%	22%	6%	52%
Test-statistic	(1.04)	(0.52)	(0.86)	(0.42)
First-stage F-stat	29.4	41.0	14.0	13.9
T-stat on Instrument	(11.49)***	(6.00)***	(5.29)***	(2.38)***
Adjusted R^2	2.11%	2.12%	2.18%	2.20%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	101,161			

Table C4
Robustness check: an alternative definition of peer influence.

This table presents instrumental variable regression results for characteristics of the dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $DivChar_{jit} = \beta_P Peer90_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. $DivChar_{jit}$ is a continuous variable measuring the timing of the dividend change in Panel A and the size of the dividend change in Panel B for firm i in industry j in quarter t. Peer influence is captured by $Peer90_{(-j)it'}$, which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 90 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 90 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Time between Dividend to Changes (Days)	Peer Influence (1)	Peer Influence (2)
Peer Influence (90-days)	-162	-100
Test-statistic	(1.80)*	(1.67)*
First-stage F-stat	7.5	8.7
T-stat on Instrument	(5.74)***	(7.74)***
Adjusted R^2	26.38%	24.42%
Firm-specific Covariates	Yes	Yes
Annual Changers Included	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	8,571	12,162

Panel B. Dependent Variable = Percentage Change in Dividend Yield	Peer Influence (1)	Peer Influence (2)
Peer Influence (90-days)	18%	30%
Test-statistic	(2.66)***	(2.20)**
First-stage F-stat	27.0	29.4
T-stat on Instrument	(12.47)***	(7.12)***
Adjusted R^2	2.64%	2.67%
Firm-specific Covariates	Yes	Yes
Peer Firm Averages	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	101,161	101,161

Table C5
Robustness check: an alternative definition of industry group.

This table presents instrumental variable regression results for dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $Div_{jit} = \beta_P PeerTNIC_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1996 through 2008 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP, Compustat, and TNIC industry databases (Hoberg and Phillips (2010)). Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. Peer influence is captured by $PeerTNIC_{(-j)it'}$, which is defined as the fraction of peer firms within the TNIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Dividend Increase	Peer Increases (1)	(2)	Peer Decreases (3)	(4)
Peer Influence (TNIC)	17%	34%	19%	29%
Test-statistic	(2.64)***	(1.87)*	(2.42)**	(1.69)*
First-stage F-stat	16.3	18.4	3.5	3.1
T-stat on Instrument	(13.03)***	(5.82)***	(6.92)***	(3.95)***
Adjusted R^2	7.26%	7.26%	7.11%	7.12%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	28,403			

Panel B. Dependent Variable = Dividend Decrease	Peer Increases (1)	(2)	Peer Decreases (3)	(4)
Peer Influence (TNIC)	-8%	-34%	-9%	-30%
Test-statistic	(0.92)	(1.53)	(0.90)	(1.42)
First-stage F-stat	16.3	18.4	3.5	3.1
T-stat on Instrument	(13.03)***	(5.82)***	(6.92)***	(3.95)***
Adjusted R^2	2.39%	2.43%	2.71%	2.75%
Firm-specific Covariates	Yes	Yes	Yes	Yes
Peer Firm Averages	No	Yes	No	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes	Yes	Yes
Observations	28,403			

Table C6
Robustness check: an alternative definition of industry group.

This table presents instrumental variable regression results for dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $DivChar_{jit} = \beta_P PeerTNIC_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1996 through 2008 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP, Compustat, and TNIC industry databases (Hoberg and Phillips (2010)). $DivChar_{jit}$ is a continuous variable measuring the timing of the dividend change in Panel A and the size of the dividend change in Panel B for firm i in industry j in quarter t. Peer influence is captured by $PeerTNIC_{(-j)it'}$, which is defined as the fraction of peer firms within the TNIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A. Dependent Variable = Time between Dividend to Changes (Days)	Peer Influence (1)	(2)
Peer Influence (TNIC)	-272	-175
Test-statistic	(1.56)	(1.65)*
First-stage F-stat	4.6	13.7
T-stat on Instrument	(4.51)***	(5.57)***
Adjusted R^2	39.20%	40.13%
Firm-specific Covariates	Yes	Yes
Annual Changers Included	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	1,705	2,630

Panel B. Dependent Variable = Percentage Change in Dividend Yield	Peer Influence (1)	(2)
Peer Influence (TNIC)	20%	47%
Test-statistic	(2.82)***	(2.48)**
First-stage F-stat	18.8	22.0
T-stat on Instrument	(14.09)***	(6.49)***
Adjusted R^2	2.09%	2.11%
Firm-specific Covariates	Yes	Yes
Peer Firm Averages	No	Yes
Firm Fixed Effect	Yes	Yes
Industry-by-Time Fixed Effect	Yes	Yes
Observations	28,403	28,403

Table C7
Sensitivity analysis of the economic magnitude of the peer influence estimate.

This table presents instrumental variable regression results for dividend changes made by regular dividend payers, in which the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. The exact specification is: $Div_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_{it} + \epsilon_{jit}$. The sample includes all regular dividend announcements between 1975 through 2011 for non-financial, non-utility, non-REIT firms traded on a major exchange (NYSE, AMEX, Nasdaq) with non-missing data available in the CRSP and Compustat databases. Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. Peer influence is captured by $Peer_{(-j)it'}$, which is defined as the fraction of peer firms within the 3-digit SIC industry that increase (decrease) their dividend in the 180 days prior to firm j's dividend announcement. The t' as opposed t reflects the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the individual manager's decision. If no announcement is made by a manager in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates as listed in Table 1, f_j is a firm fixed effect, δ_{it} is an industry-by-time fixed effect, and ϵ_{jit} is the unobservable error component. Appendix B provides precise definitions of the dividend change and firm-specific characteristics. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively. Panel A shows the sensitivity of the estimates to changes in the minimum number of firms an industry must have in order to be included in the sample as well as to changes in the percentile of observations that are subject to winsorization. Panel B reports the mean and standard deviation in parentheses for the peer influence covariate under the various sample restrictions.

Panel A. Sensitivity of Peer Influence Estimate

		Data Winsorization				
		0%	1%	2%	3%	5%
Ind. Size Cut-off	No cut-off	0.377	0.173	0.140	0.117	0.093
		(3.41)***	(3.10)***	(2.66)***	(2.30)**	(1.89)*
	3 firms	0.429	0.194	0.161	0.136	0.109
		(3.58)***	(3.34)***	(2.93)***	(2.58)***	(2.19)**
	4 firms	0.578	0.203	0.164	0.136	0.104
		(3.04)***	(3.22)***	(2.78)***	(2.39)**	(1.95)*
	5 firms	0.523	0.212	0.171	0.143	0.113
		(3.90)***	(3.31)***	(2.84)***	(2.49)**	(2.09)**

Panel B. Mean and Standard Deviation of Peer Influence

		Data Winsorization				
		0%	1%	2%	3%	5%
Ind. Size Cut-off	No cut-off	0.143	0.143	0.143	0.140	0.138
		(0.185)	(0.185)	(0.185)	(0.174)	(0.165)
	3 firms	0.139	0.139	0.138	0.137	0.135
		(0.169)	(0.169)	(0.163)	(0.159)	(0.154)
	4 firms	0.137	0.136	0.135	0.135	0.134
		(0.162)	(0.159)	(0.155)	(0.155)	(0.149)
	5 firms	0.135	0.134	0.134	0.133	0.132
		(0.156)	(0.153)	(0.150)	(0.147)	(0.144)