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Dividend payments as a response to peer influence☆

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ABSTRACT

I show dividend policies have peer effects. My estimates indicate that firms speed up the time taken to make a dividend change by about 1.5 quarters and increase payments by 16% in response to peer changes. The peer effects matter in increases but not decreases. In contrast to dividends, repurchases show no peer effects. In addition, announcement returns indicate that investors partially anticipate the consequences of peer effects. Overall, peer interdependencies account for 12% of total dividend payments.

1. Introduction

Firms' decisions to change their dividend payments tend to occur at similar times. Whether these correlations in dividend choices across firms are consistent with traditional theories of dividend policy or with other theories in which peer firm behavior plays a central role remains unclear. In this paper, I find that firms' dividend policies are responsive to peer influence. This relation entails firms accelerating dividend changes and increasing payments to a greater extent than they would otherwise. Further, I examine the economic forces that could explain why, and through what channels, dividend peer effects operate.

I start with a real-life example based on two US firms, General Electric (GE) and Westinghouse (WHS). The example illustrates dividend peer effects and motivates my tests. O'Sullivan (2006) shows that although GE was more profitable than WHS for decades, the two companies' dividends often moved in lockstep. Between 1970 and 1990, WHS increased its dividend ten times, with 70% of those increases occurring within a few months of GE's announcement of a dividend increase. In these cases, both firms increased their dividend by the same amount (e.g., five cents). For GE the increases amounted to small percentage changes in yield, and for WHS the increases were much more pronounced. In fact, to maintain a dividend competitive with GE, WHS had to finance its dividends with debt and the popular press subsequently blamed "the recklessness in the declaration of dividends" for WHS's financial distress in the 1990s.

Consistent with this example, dividend peer effects are formally defined as the propensity of a firm to alter its

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dividend policy in a way that varies with the prevalence of the same action in some reference group containing the firm. The WHS policy is a stylized example that indicates but does not definitively establish that peer effects exist. For instance, WHS and GE could be responding to common shocks. I try to separate the peer effects from such common effects using an instrumental variable (IV) approach. I then investigate the heterogeneity in the peer effects to identify plausible channels that give rise to the peer effects.

My econometric models are motivated by the Lintner (1956) partial adjustment model for dividend payments. Three key inputs in Lintner's model are earnings, the target payout ratio, and the adjustment period. I hypothesize that dividend peer effects manifest in the choice of a target payout ratio or adjustment period. A firm belonging to an industry in which many peer firms are increasing their dividend payments will either shorten the adjustment period or increase the target payout ratio, if it wants to increase its dividend as well. Lintner's model does not distinguish between dividend increases or decreases, yet subsequent research has shown that they are not motivated by the same factors (Michaely et al., 1995) and not symmetric (Leary and Michaely, 2011). To allow for this, I separately analyze dividend increases and decreases when testing for peer effects.

I measure peer influence using peer firms' dividend announcements, and I define the peer reference groups based on industry, using the three-digit Standard Industrial Classification (SIC) code. Firms have significant economic links at the industry level, as they compete for the same customers, capital, and executive talent. The definition is also supported by the theoretical models offering explanations for the existence of peer effects. For example, models rooted in industrial organization generate peer effects from strategic actions taken to create or maintain market power, and learning models generate peer effects when firms rely on peer-based information such as industry peers' payout ratios.

The challenge to empirically identifying peer effects derives from the reflection problem (Manski, 1993), which refers to a specific form of endogeneity arising in the attempt to infer whether the average behavior in a group influences the behavior of the individuals who compose the group. In the dividend context, three hypotheses exist that can explain why firms belonging to the same industry tend to behave similarly: (1) peer effects, wherein the propensity of a firm to behave in a certain way varies with the behavior of the industry, (2) contextual effects, wherein the propensity of a firm to behave in a certain way varies with the characteristics of the industry, (3) correlated effects, wherein firms in the same industry tend to behave similarly due to similar firm characteristics or institutional environments.

To identify dividend peer effects, I use an IV strategy in which peer influence is instrumented for using the peer firms' idiosyncratic equity risk. This strategy is an extension of the research design pioneered by Leary and Roberts (2014), who use peer firms' idiosyncratic returns as an instrument for leverage peer effects. The relevance of idiosyncratic risk for dividend policy is shown by Hoberg and Prabhala (2009). When a firm's idiosyncratic risk decreases, the firm requires less cash and instead opts to distribute more. Idiosyncratic risk, distinct from industry risk, is both unpredictable and unique to an individual firm. Consequently, other firms' idiosyncratic risk cannot be directly linked to a firm's own dividend decision. Instead, other firms' idiosyncratic risk works via the impact on peers' dividend decisions. This indirect relationship makes idiosyncratic risk an ideal candidate for an IV because this type of risk likely meets the exclusion restriction, in which a change in a firm's idiosyncratic equity risk affects only a peer firm's dividend policy through its own dividend policy.

By investigating the odds of a dividend increase, the time taken to increase dividends, and the size of dividend increases, I find that peer effects are statistically significant and economically meaningful for dividend policy. The estimated marginal effect is larger than many previously identified dividend determinants such as profitability and investment. Peer effects are evident for increases but not decreases. This asymmetric effect is consistent with survey evidence showing such an effect (Brav et al., 2005). Further, peer influence leads firms to reduce the time between dividend changes by 1.5 quarters and to increase payout ratios by 16%. These findings are consistent with dividend peer effects working through the adjustment period and target payout ratio in Lintner's partial adjustment model of dividend payments.

I conduct several robustness tests. Given that dividend payments affect a firm's other uses of cash such as repurchases, peer effects could work indirectly through one of these channels instead of through dividends directly, yet no evidence emerges for a repurchase peer effect. To address if latent common factors attributable to the peer group definition are behind the finding, a placebo test is conducted that uses randomly assigned peer groups and it reveals insignificant peer effects for these random peer groups. A second placebo test is administered that uses changes in earnings scaled by pre-announcement returns as the dependent variable, and it reveals insignificant peer effects for earnings, suggesting that simultaneous changes in firm fundamentals within an industry are not driving the result. Finally, I verify that the results are robust to alternative explanations such as taxes and catering (Baker and Wurgler, 2004).

I also examine four economic channels for why peer effects exist, viz., a learning channel in which firms mimic better rated firms, a behavioral channel in which overconfident chief executive officers (CEOs) excessively extrapolate from peer firm actions, an industrial organization channel in which weak firms respond to dividend actions by stronger peers, and a reputation channel in which young CEOs follow peers to build reputation. The evidence supports a behavioral channel and an industrial organization channel.

My final tests examine whether dividend announcement returns anticipate peer effects. Evidence from abnormal stock returns around the announcement of a dividend increase suggests that firms convey valuable private information to the market through a dividend increase, but some of the private information is anticipated via peers'

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dividend announcements. An analysis of the aggregate importance of peer effects suggests that they account for about 12% of total dividend payments.

This paper contributes to work on peer effects in corporate finance (Shue, 2013; Leary and Roberts, 2014; Fracassi, 2017) and to work on dividends (Allen and Michaely, 2003; DeAngelo et al., 2009). This study further complements papers examining the ways repurchase announcements cluster by industry (Oded, 2005; Massa et al., 2007) and how industry determines payout (Grullon and Michaely, 2008; Hoberg et al., 2014). By linking dividend changes to executive overconfidence, this study supplements research providing behavioral explanations for dividends (Ben-David, 2011; Baker and Wurgler, 2013). By exploring announcement effects, this study contributes to work examining contagion and competitive pricing effects at the industry level (Laux et al., 1998; Slovin et al., 1999) and the information content of dividend changes (Benartzi et al., 1997; Nayak and Prabhala, 2001).

2. Data

In this section, I present the data, the construction of the main variables, and I compare the characteristics of firms in the sample that change and do not change their dividend in the presence of peer influence.

2.1. Data sources

I use comprehensive dividend and share price data from the Center for Research in Security Prices (CRSP). Accounting data come from the CRSP-Compustat merged database. I analyze the dividend payments of US firms publicly traded on the New York Stock Exchange (NYSE), the American Stock Exchange, and the Nasdaq from 1975 through 2011 (CRSP share code of 10 or 11 and CRSP exchange code of 1, 2, or 3). The sample starts in 1975 due to concerns about the accounting data for periods before 1970 and to avoid the period surrounding President Rihcard M. Nixon's 1971 dividend freeze (Baker and Wurgler, 2004). Financial firms, utilities, and Real Estate Investment Trusts (REITs) are excluded from the sample (SIC 6000–6999, SIC 4900–4949), because their payout decisions are affected by regulation. Supplementary sources of data include equity ownership data from ThomsonReuters, merger and acquisition (M&A) data from Securities Data Company (SDC), securities fraud litigation data from Stanford Law School, industry data from IBISWorld, and Treasury rates from the Federal Reserve Board. I winsorize all variables at the 0.5 and 99.5 percentile levels to minimize the influence of outliers. The formulas for the variables derived from these databases are in Appendix A.

2.2. Peer influence

The key explanatory variable in this study is dividend peer influence. Designating the peer group is central to defining the variable. Prior research defines peer groups in various ways, including common industrial classifications (Leary and Roberts, 2014), product markets (Hoberg et al., 2014), compensation contract disclosures (Bizjak et al., 2008), analyst coverage (Kaustia and Rantala, 2015), or even executives' business school alma maters (Shue, 2013). I use the 3-digit SIC to define peer groups based on industry. Peer firms compete for the same customers, capital, and executive talent, thus creating economic links. In addition, compensation contracts use peer firms from the same industry as the peer group for legal purposes (Faulkender and Yang, 2010), which is a practice also popular in the investment community. Given that peer comparison is one of the most practiced methods of equity analysis used by the investment community, and executives spend significant time with investors, the peer firms' outcomes are likely to be salient, even if peer interaction is infrequent.

I quantify peer influence by constructing a time series of firm-specific peer dividend decisions and calculate the fraction of peer firms increasing dividend payments in the 180 days before an individual firm's declaration date. When no dividend declaration is made by a firm, the fraction of peer firms increasing dividend payments in the 180 days before the last day of the reference period is used. Given that dividend changes must be approved by the board of directors, the 180-day period ensures that at least one board meeting occurs following any peer dividend change. Own-firm dividend changes are excluded from the peer group to ensure that no mechanical relation exists between dividend payments and peer influence. In the rare case that a firm increases its dividend many times in the period (1.8% of observations), the first dividend declaration date is used to construct the peer influence variable.

2.3. Risk variables

The key IV in this study is peer idiosyncratic risk. To construct a quarterly idiosyncratic risk time series, I follow the decomposition framework developed in Campbell et al. (2001). This method separates market-level, industry-level, and idiosyncratic firm-level shocks. I use daily split-adjusted stock return data and Treasury bill rates to calculate the simple excess return over the Treasury bill rate for each stock j on day s in quarter t, which I denote as R_{ijst}. Then, for each stock j belonging to three-digit SIC i in quarter t, I compute the daily firm-specific residual return by subtracting the daily industry-specific stock return:

$$\varepsilon_{ijst} = R_{ijst} - R_{ist}, \tag{1}$$

where R_{ijst} is the excess return on day s in quarter t for stock j that belongs to industry i. R_{ist} is the value-weighted excess return of industry i on day s in quarter t. Market capitalizations at the end of the previous quarter $(t-1)$ are used to calculate the value weighting.

The idiosyncratic risk of stock j that belongs to industry i in quarter t is calculated as follows. To reduce noise, stocks with fewer than 20 daily observations in a given quarter are excluded.

$$IR_{ijt} = \sum_{s \epsilon t} \varepsilon_{ijst}^2 \tag{2}$$

To obtain peer idiosyncratic risk, I take the average idiosyncratic risk of the peer firms. Own-firm idiosyncratic risk is excluded from the peer group to avoid mechanical correlations.

Industry risk is used as an additional explanatory variable throughout this study. The idiosyncratic risk of industry i in quarter t is calculated using the quarterly idiosyncratic risk estimates for all stocks and their market capitalizations at the end of the previous quarter $(t-1)$. The quarter t weight of stock j that belongs to industry i is denoted as w_{ijt-1}.

$$IR_{it} = \sum_{j\epsilon i} w_{ijt-1} IV_{ijt} \quad (3)$$

2.4. Other explanatory variables

Dividend payments are often motivated by three major market frictions, namely, asymmetric information, agency costs, and taxes. In asymmetric information models, dividends typically signal firms' private information about current or future cash flows. Firms with negative retained earnings, and, consequently, limited cash available to return to shareholders, are poor candidates to signal with dividends (DeAngelo et al., 2006). Increasing investment limits the ability to signal with dividends (Guttman et al., 2010). Firm size is a determinant of dividend policy as larger and older firms are known to face lower information asymmetry (Brav et al., 2005). Tangible assets are easier for investors to value than intangible assets reducing information asymmetry about the firm's true value (Harris and Raviv, 1991). In agency cost models, highly profitable firms with low market-to-book ratios are likely to have excess cash relative to net present value (NPV)-positive investment opportunities (Fama and French, 2002). Leverage and dividend payments are alternative ways to reduce free cash flow (Myers, 1984). Given that many institutions are tax exempt, the level of institutional holdings has been used as a proxy for investors' tax clientele (Grinstein and Michaley, 2005). I also control for industry dynamics that could lead to industry-wide dividend changes such as competitiveness (Grullon and Michaely, 2008), changes in the market for corporate control (Billett and Xue, 2007), and exposure to fraud (La Porta et al., 2000).

2.5. Summary statistics

Table 1 summarizes the distribution of firm-specific covariates, which correspond to quarterly observations, for all firms, dividend-paying firms, and non-dividend-paying firms. I focus on quarterly observations, because 97% of dividend-paying firms choose to pay a quarterly dividend. Congruent with previous studies, the distributions of covariates across dividend-paying and non-dividend-paying firms are different. Dividend-paying firms are larger and at a later stage in their life-cycle. They also have higher cash flows, have lower idiosyncratic risk, and are more likely to be owned by institutional investors. Appendix Table C.1 displays the peer firm averages, which average all firms within a three-digit SIC industry-quarter combination, excluding the jth firm's value and industry-specific covariates. In contrast to the differences in firm-specific covariates across dividend-paying and non-dividend-paying firms, the peer firm average covariates are similar across the groups.

Table 2 presents firms' dividend decisions and their peers' dividend choices. Panel A reveals that firms are more likely to increase their dividend payment when a peer firm increases its dividend payment. The likelihood of a firm announcing a dividend change continues to increase when more peer firms change their dividend payments. For example, when no peer firm increases its 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 its dividend payment in the previous 180 days, the likelihood rises to 14%. When more than two peer firms increase their dividend payments in the previous 180 days, the likelihood rises to 16%. Although this analysis does not separate peer effects from contextual or common effects, it demonstrates 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 relation 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 a given quintile is calculated. The quintile of firms subject to high peer influence (i.e., many peer firms changing their dividend in the last 180 days) increases their dividend 17% of the time, and the quintile of firms subject to low peer influence (i.e., none or few peer firms changing their dividend in the last 180 days) increases their dividend only 9% of the time. This 8% difference is economically and statistically significant with a t-statistic of 25.6.

Table 3 summarizes this relation between peers' dividend changes and characteristics of an individual firm's dividend change using quarterly firm observations. The table reports statistics for four categories: (1) firms that change their dividend prior to one year, (2) annually, and (3) after one year and (4) those that do not change their dividend payment. The time elapsed between changes in dividend payment is less than one year when peer influence is the highest (21.4% of peer firms changing their dividend). In comparison, only 13.8% of peer firms change their dividend when no change is made. In the bottom row of Panel A, t-statistics are reported that assess whether the means of peer influence are statistically different when a dividend change occurs versus when it does not. In each case, peer influence is significantly higher when dividend changes are made. The t-statistics are 23.0, 12.8, and 10.0 for firms that change their dividend prior to one year, annually, and after one year, respectively.

3. Dividend peer effects

In this section, I outline the dividend peer effects hypothesis and the identification strategy. Then, I present the results for dividend peer effects and robustness.

3.1. Hypothesis development

Because my central hypothesis is that dividend peer effects exist, a change should be observed in dividend payments when peer firms change their dividend payments. I

Table 1
Summary statistics.
The sample contains quarterly firm observations from 1975 through 2011 for all for all nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data in the Center for Research in Security Prices and Compustat databases. Summary statistics for all variables are presented after winsorizing 1% of the data.

	All firms			Dividend payers			Non-dividend payers		
Firm variable	Mean	Median	Standard deviation	Mean	Median	Standard deviation	Mean	Median	Standard deviation
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
Life-cycle 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
Idiosyncratic Risk	5.4%	2.6%	7.3%	1.2%	0.8%	1.5%	6.6%	3.7%	7.9%
Market Equity (millions of 2010 dollars)	1119	175	3,916	2,527	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%
Number of observations		439,327			101,161			338,166	
Number of unique firms		12,215			2587			11,418	

Table 2
Univariate analyses of dividend changes.
This table presents the distribution of dividend increases and decreases by payers of regular cash dividends. The sample includes all regular dividend announcements between 1975 and 2011 for nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data available in the Center for Research in Security Prices and Compustat databases. Industry is defined by the three-digit Standard Industrial Classification. Peer influence is defined as the fraction of peer firms within an industry that increase or decrease their dividend prior to firm *j*'s dividend announcement. For the univariate analysis, the sample is divided into quintiles based on peer influence and then the mean percentage of firms increasing or decreasing their dividend payment in a given quarter across each peer influence quintile is reported. ***, **, and * indicate *p*-values of 1%, 5%, and 10%, respectively.

Panel A: Dividend payment changes conditional on peer activity

Condition	Likelihood of regular dividend payer meeting condition (%)
Increasing dividend payments	12.6
Increasing dividend payments when no peers increased in previous 180 days	9.3
Increasing dividend payments when at least one peer increased in previous 180 days	14.1
Increasing dividend payments when more than one peer increased in previous 180 days	14.9
Increasing dividend payments when more than two peers increased in previous 180 days	15.8
Decreasing dividend payments	3.5
Decreasing dividend payments when no peers decreased in previous 180 days	2.8
Decreasing dividend payments when at least one peer decreased in previous 180 days	4.5
Decreasing dividend payments when more than one peer decreased in previous 180 days	5.1
Decreasing dividend payments when more than two peers decreased in previous 180 days	6.1
Number of observations	101,161

Panel B. Univariate analysis across quintiles

Peer influence quintile	Likelihood of regular dividend payer increasing dividend payments	Likelihood of regular dividend payer decreasing dividend payments
1 (low peer influence)	9.3%	2.9%
2	10.5%	3.8%
3	12.6%	4.1%
4	14.6%	4.1%
5 (high peer influence)	17.0%	5.6%
High minus low	7.6%	2.7%
t-statistic	25.60***	14.22***

borrow from the Lintner (1956) partial adjustment model of dividend payments to develop additional hypotheses related to the existence of dividend peer effects. Lintner interviewed executives from a diverse group of 28 firms and found that "among the more important factors which had more or less consciously and rationally entered into interviewees' standards for target payout ratios and adjustment period were: the normal pay-outs and speeds of adjustment of competitive companies or those whose securities were close substitutes investment-wise" (p. 104). This finding indicates that if peer effects exist in dividends, they must manifest in the choice of a target payout ratio or in the adjustment period. For example, when multiple peer firms increase their dividend payments resulting in a given

Table 3
Summary statistics by time to dividend change.
This table presents characteristics of the dividend changes made by payers of regular cash dividends. The sample contains all regular dividend announcements between 1975 and 2011 for nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data available in the Center for Research in Securities Prices and Compustat databases. Industry is defined by the three-digit Standard Industrial Classification. 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 four categories: less than one year to dividend change, annual change, more than one year to dividend change, and no change. N.A. = Not Applicable

Panel A: Dividend change characteristics	Less than one year	Annual change	More than 1 Year	No change	All dividends
Years to dividend change	0.6	1.0	2.6	N.A.	1.4
Percent change in dividend	10.6%	11.8%	4.7%	0%	1.5%
Dividend yield	3.1%	3.0%	3.1%	3.0%	3.0%
Peer influence	21.4%	15.1%	14.3%	13.8%	14.3%
T-statistic (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%
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
Idiosyncratic Risk	1.2%	0.9%	1.3%	1.3%	1.2%
Market Equity (millions of 2010 dollars)	3046.1	3953.1	2490.5	2495.6	2606.0
Institutional Ownership	26.2%	36.6%	31.6%	34.8%	34.3%
Number of observations	5,667	5,537	5,026	84,931	101,161

firm wanting to increase its dividend, the firm will either need to shorten the adjustment period or increase the target payout ratio. Implicit in this view is the assumption that the change in earnings does not fully motivate a dividend increase.

Although I do not test Lintner's model explicitly, it motivates two hypotheses tested here. I posit that peer-influenced dividend changes are attributable to either a change in the adjustment period or a change in the target payout ratio. Lintner does not distinguish between dividend increases or decreases, yet subsequent research has established that dividend increases and decreases are not motivated by the same factors. Empirical evidence shows that dividend cuts are more pronounced than increases (Michaely et al., 1995) and that smoothing behavior is not symmetric (Leary and Michaely, 2011). Survey evidence from financial executives also indicates that they perceive a large asymmetry between dividend increases and decreases (Brav et al., 2005). To allow for the asymmetry suggested by the literature, I separate changes in dividend payments into increases and decreases when testing hypotheses.

3.2. Identification strategy

To test whether peer effects exist in dividend decisions, I analyze the response of firms to peer influence in an IV setting. Peer influence is instrumented for using the peer firms' idiosyncratic equity risk. The use of an IV strategy helps to prevent what Manski (1993) deemed the reflection problem from biasing the estimation. Peer group characteristics are also controlled for to further reduce potential estimation bias. The exact IV specification is:

$$Div_{jit} = \beta Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}, \tag{4}$$

where Div_{jit} represents the dividend decision for firm j in industry i in time t and Δt is one quarter. In the main specifications, Div_{jit} is a dummy variable indicating a dividend increase or decrease. Peer influence, $Peer_{(-j)it'}$, is the fraction of peer firms increasing or decreasing dividend payments. I use t' instead of t because this specification uses the exact dividend declaration date to calculate which peer choices were observable before the individual firm's decision. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates (i.e., common and contextual effects), f_j is a firm fixed effect, δ_t is a time fixed effect, and ϵ_{jit} is the unobservable error component.

Given that idiosyncratic equity risk is a known determinant of dividend policy (Fama and French, 2001; Hoberg and Prabhala, 2009), it satisfies the relevance condition for IV identification. When a firm's idiosyncratic risk decreases, the reduced uncertainty implies that the firm, needing less precautionary savings, can distribute more cash to shareholders. Similarly, when the average of the peer firms' idiosyncratic risk decreases, the number of peer firms' increasing their dividends should increase.

The exclusion restriction for IV identification requires that the peer firms' average idiosyncratic risk alter a firm's dividend only via its effect on peers' dividends. Several

Table 4
Instrumental Variable (IV) test of dividend peer effects.
The exact specification is: $Div_{jit} = \beta Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. The sample contains all regular dividend announcements between 1975 and 2011 for nonfinancial, nonutility, non-REIT firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data available in the Center for Research in Security Prices and Compustat databases. All variables are subject to a 1% winsorization. Div_{jit} is a dummy variable indicating a dividend increase (decrease) for firm j in industry i in quarter t. Peer influence is $Peer_{(-j)it'}$, which represents the fraction of peer firms within the three-digit SIC industry that increase or decrease their dividend in the 180 days before firm j's dividend announcement. I use t' rather than t to reflect the fact that this specification uses the exact dividend declaration date to calculate which peer choices were observable before the firm's decision. Own-firm dividend changes are not included in peer averages to ensure that no mechanical relation exists between the dependent and independent variable. Average peer idiosyncratic equity risk instruments for peer influence. In column (1), X_{jit} includes the firm-specific covariates listed in Table 1 as well as industry concentration and industry risk. In column (2), X_{jit} also adds peer averages of the firm-specific covariates and more industry-specific covariates (IBIS lifecycle stage, leveraged buyout (LBO) activity, M&A activity, rumored major deals, and fraud). f_j is a firm fixed effect, δ_t is a time fixed effect, and ϵ_{jit} is the unobservable error component. Below the coefficient estimates are test statistics from robust standard errors clustered by firm. ***, ** and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Dividend increase

	Peer increases	
	(1)	(2)
Peer influence coefficient	18%	29%
t-statistic	(3.22)***	(2.21)**
First-stage F-statistic	167.2	40.5
t-statistic on instrument	(12.93)***	(6.37)***
Adjusted R^2	6.3%	6.3%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

Panel B. Dependent variable = Dividend decrease

	Peer decreases	
	(1)	(2)
Peer influence coefficient	−4%	−31%
t-statistic	(0.31)	(1.12)
First-stage F-statistic	36.9	12.4
t-statistic on instrument	(6.07)***	(3.52)***
Adjusted R^2	2.1%	2.1%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

arguments exist to plausibly satisfy the restriction. The instrument's construction isolates a risk that is orthogonal to market risk and industry risk and thereby idiosyncratic to a peer firm. I use the procedure outlined in Campbell et al. (2001) to calculate idiosyncratic risk in a manner consistent with such orthogonality. Further, I condition on industry risk in the first-stage estimation of peer influence. Given that the exclusion restriction applies after conditioning on observables, this approach mitigates concerns that peer idiosyncratic risk affects dividend decisions through correlation with common industry risk.

To test whether dividend peer effects manifest themselves in changes in the adjustment period, or in the target payout ratio of Lintner's model, observed payout ratios are examined as a proxy for target payout ratios, as well as the time between dividend changes as a proxy for the adjustment period. I use the same IV strategy outlined in Eq. (4).

3.3. Results

This subsection describes the empirical evidence for dividend peer effects, beginning with findings on the existence of peer effects and followed by a description of the results related to the components of Lintner's partial adjustment model for dividend payments. The combined test findings establish whether peer firm behavior plays a central role in firms' decisions to change their dividend payments at similar times.

Table 4 presents the results of testing firms' responses to peer firms' dividend changes, separating changes into increases (Panel A) and decreases (Panel B). The findings show that dividend peer effects exist and are more pronounced for dividend increases. To ease interpretation of magnitudes, all coefficients are scaled by the corresponding variable's standard deviation, and t-statistics are reported in parentheses. Columns 1 and 2 show estimated coefficients when firm and time fixed effects are included. The 18% reported in Column 1 of Panel A is interpreted as follows: A standard deviation increase in the fraction of peer firms increasing dividend payments increases the probability that a firm will increase dividend payments by 18% on average, ceteris paribus. A standard deviation increase in peer influence is equivalent to an additional 18% of peer firms in the industry increasing their dividend relative to an average of 14%.

Statistical evidence for dividend peer effects indicates significance at the 99th percentile. The *F*-statistic from the first stage of the IV regression is 167.2, which exceeds the requisite 10 to ensure minimal bias of the point estimate. The IV specification includes firm-specific, industry-specific, and peer average covariates as well as firm fixed effects and time fixed effects. The firm-specific covariates in the Table 4 test are firm size, profitability, market-to-book, leverage, investment, cash holdings, repurchases, tangibility, life-cycle stage, idiosyncratic risk, and institutional ownership. These help to control for other market frictions that could drive dividend changes. The industry-specific covariates are competitiveness, industry risk, IBIS life-cycle stage, leveraged buyout (LBO) activity, M&A activity, rumored major deals, and fraud. These help to control for other industry dynamics that could cause dividend payment changes to cluster.

The peer influence point estimate for dividend increases (Table 4, Panel A) is larger than that for dividend decreases (Panel B), indicating that peer influence has a more pronounced effect on dividend increases than on decreases. In comparison with the 18% estimated for dividend increases, the point estimate is -4% and statistically insignificant for dividend decreases. This finding of asymmetry is consistent with prior survey evidence showing that increases and decreases are not motivated by the same factors (Brav et al., 2005).

Table 5 presents the details of additional firm-specific coefficient estimates from Table 4 for dividend increases. Table 5 conveys a couple of important messages. First, peer influence does not displace other known dividend determinants as evidenced by the statistical significance of several firm-specific covariates. Repurchases, profitability, market-to-book, leverage, tangibility, investment, cash holdings, firm risk, and firm size are all significant at the 95th percentile. This is the case for both the regression that includes the firm-specific covariates in Column 1 and the regression that includes the firm-specific, industry-specific and peer firm average covariates in Column 2. Second, Table 5 indicates where peer influence ranks relative to other firm-specific covariates. Peer influence has a coefficient of 17%, market-to-book has a coefficient of 5%, and leverage has a coefficient of -5%. In terms of economic magnitude, these are the three most significant, positing peer influence as one of the most important determinants of dividend policy.

Unreported coefficient estimates for the peer firm average covariates and the industry-specific covariates further convey where peer influence ranks relative to them. In contrast to the dividend peer effect, no other peer-firm-average characteristics are statistically distinguishable from 0 at the 95th percentile. This suggests that dividend peer effects work through dividend policy and are not simply a repackaging of a peer effect associated with another corporate policy and that contextual effects are not responsible for the propensity of a firm to behave like peer firms. If contextual effects were, the regression would show significant peer firm average characteristics, but it does not. Further, industry-specific coefficients are almost always statistically indistinguishable from zero. Only industry-level LBO activity is significant at the 95th percentile. However, its economic magnitude is only 1%. Taken together, this evidence suggests that dividend peer effects operate through salient events, such as peer dividend announcements in which a decisive action is taken.

Table 6 presents evidence testing the hypotheses that stem from Lintner's partial adjustment model for dividend payments. Panel A focuses on the adjustment period as proxied for by time to dividend change and reveals dividend peer effects manifest in the adjustment period. Column 1 presents the coefficient estimates for the regression specification with peer influence and firm-specific covariates for non-annual dividend changers, and Column 2 presents the coefficient estimates for annual and non-annual dividend changers combined. As reported in Column 1, a standard deviation increase in peer influence shortens the expected time to dividend change by approximately 1.5 quarters. The result is statistically significant and economically meaningful. As expected, when annual changers who do not accelerate their timing are included, the average effect is diluted while remaining statistically significant.

Panel B of Table 6 focuses on the target payout ratio as proxied for by the size of the dividend change. Column 1 presents the coefficient estimates for the regression specification with peer influence and firm-specific covariates for all dividend changers, and Column 2 presents the coefficient estimates when the regression is augmented with industry-specific covariates and peer-firm averages. The regression coefficients reveal that dividend peer effects occur through the target payout ratio of Lintner's partial adjustment model as well. As reported in Column 1, a standard deviation increase in peer influence leads firms to increase dividend payments by 16% more than they would if peer influence were low. This result is significant at the 99th percentile. When the regression is augmented with industry-specific covariates and peer firm averages, the coefficient estimate is 33% and is statistically significant at the 95th percentile. Overall, these results support the existence of dividend peer effects, the effect of peer influence on time between dividend changes, and the effect of peer influence on dividend levels.

3.4. Robustness checks

As a first robustness check, I administer a placebo test that is designed to ensure that the peer influence result is not caused by latent common factors attributable to the peer group definition. The test investigates whether peer groups composed of randomly selected firms generate peer effects. The intuition for the placebo test is that if peer influence results are caused by a common but unobserved factor, then the definition of peer group should not mat-

Table 5
Peer influence and dividend increases in detail.
This table presents additional details of the coefficient estimates from Table 4 for dividend increase instrumental variable regressions, where the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

	Dependent variable = Dividend Increase	
	Peer increases	
	(1)	(2)
Peer Influence	0.175	0.288
	(3.22)***	(2.21)**
Repurchases Yield	0.006	0.006
	(2.19)**	(2.16)**
Profitability	0.016	0.016
	(2.88)***	(2.82)***
Life-cycle Stage	0.016	0.014
	(1.84)*	(1.61)
Market-to-Book	0.052	0.051
	(7.33)***	(6.83)***
Book Leverage	−0.047	−0.046
	(7.04)***	(6.76)***
Tangibility	−0.019	−0.021
	(2.22)**	(2.34)**
Investment-to-Capital	0.014	0.013
	(3.42)***	(3.34)***
Cash Flow-to-Capital	0.027	0.026
	(3.81)***	(3.63)***
Idiosyncratic Risk	−0.009	−0.008
	(2.51)**	(2.16)**
Institutional Ownership	0.007	0.009
	(0.78)	(0.95)
Firm Size	0.034	0.036
	(4.60)***	(4.57)***
Other robustness variables	Yes	Yes
Peer firm averages	No	Yes
Firm and time fixed effects	Yes	Yes
First-stage F-statistic	167.2	40.5
t-statistic on the instrument	(12.93)***	(6.37)***
Adjusted R^2	6.3%	6.3%
Number of observations	101,161	

ter. I find insignificant peer effects for these random peer groups, which suggests that peer firms defined by industry are an appropriate reference group for evaluating peer effects, and that such a group matters for dividend policy. The tests assume that a firm stays in the same random peer group during the time it is a publicly traded firm. To match the number of peer groups in the main analysis, 463 random peer groups are defined. Idiosyncratic risk and peer influence measures are recalculated based on the new peer group definitions. The placebo test results for the random peer group are shown in Panel A of Table 7.

As a second robustness check, I examine changes in earnings. Lintner's investigation of dividend policy stresses that firms increase dividends only when executives believe that earnings have permanently increased. This implies that a dividend increase should be associated with a rightward shift in the distribution of earnings (Benartzi et al., 1997; Nissim and Ziv, 2001). Peer effects can occur at any time absent permanent shifts in earnings. Therefore, as a placebo test, I evaluate whether dividend peer effects lead to changes in earnings. My measure of earnings is the quarterly change in earnings scaled by the pre-announcement market capitalization. The estimates are consistent with the null hypothesis of no peer effects for earnings. Further, this test supports the claim that the target payout ratio and the adjustment period are the margins upon which firms, when influenced by their peers, adjust their dividend policy. The placebo test results for earnings are shown in Panel B of Table 7.

I address remaining concerns about the robustness of my findings through additional tests. An excess variance approach to identification shows that, in aggregate, peer effects account for 12% of total dividend payments. These findings are reported in Appendix B. Other highlights include robustness to other known dividend determinants such as dividend taxes and catering (Baker and Wurgler, 2004); an alternative construction of peer influence examining a product market industrial classification (Hoberg and Phillips, 2016); an alternative time period for peer influence that assumes pressure is salient only for short periods of time; and an alternative sample construction reducing the influence of outliers by changing how all the variables are winsorized. In all data permutations, dividend peer effects remain economically meaningful. Appendix C presents these tests and results in detail.

Table 6
Peer influence and key inputs into Lintner's partial adjustment model for dividend payments.
This table presents estimates from evaluating two key inputs into Lintner's partial adjustment model for dividend payments. I use the same instrumental variable strategy to estimate the coefficient on peer influence as in Table 4. The instrument is average peer idiosyncratic equity risk. I include all the same controls as in Table 4. Panel A presents coefficient estimates for peer influence when the time to dividend change, my proxy for Lintner's adjustment period, is the dependent variable. Panel B presents coefficient estimates for peer influence when dividend yield change, my proxy for the target payout ratio, is the dependent variable. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Time to Change (Quarter)	(1)	(2)
Peer influence coefficient	-1.48	-0.98
t-statistic	(2.06)**	(1.82)*
First-stage F-statistic	39.0	61.5
t-statistic on instrument	(6.25)***	(7.84)***
Adjusted R^2	23.0%	20.4%
Firm-specific covariates	Yes	Yes
Annual changers included	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	8,571	12,162
Panel B: Dependent variable = Dividend Payout Change		
Peer influence coefficient	16%	33%
t-statistic	(2.75)***	(2.31)**
First-stage F-statistic	167.2	40.5
t-statistic on instrument	(12.93)***	(6.37)***
Adjusted R^2	2.6%	2.6%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

Table 7
Placebo tests for instrumental variable (IV) approach.
The table presents placebo tests of the IV specification for dividend increases. Panel A changes the peer group definition from the three-digit Standard Industrial Classification group to a group of randomly selected peer firms. The exact specification is $Div_{jit} = \beta_P PeerPlacebo_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. $PeerPlacebo_{(-j)it'}$ captures the fraction of randomly selected peer firms that increase their dividend before firm j's dividend announcement. I include all the same controls as in Table 4, except I replace peer firm averages with random peer firm averages. Panel B presents coefficient estimates for peer influence when changes in earnings per share (EPS) scaled by pre-announcement market capitalization, my proxy for earnings, is the dependent variable. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable =	Peer Increases	
Dividend Increase	(1)	(2)
Random group peer influence coefficient	0%	4%
t-statistic	(0.03)	(0.15)
First-stage F-statistic	71.0	19.3
t-statistic on instrument	(8.42)***	(4.40)***
Adjusted R^2	6.5%	6.5%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	
Panel B: Dependent variable = ΔEPS/Pre-announcement Market Capitalization		
Peer influence coefficient	-11%	-30%
t-statistic	(0.88)	(1.06)
First-stage F-statistic	167.2	40.5
t-statistic on instrument	(12.93)***	(6.37)***
Adjusted R^2	5.7%	5.8%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

4. Heterogeneity in peer effects

In this section, I present the results from examining four economic channels for why peer effects exist.

4.1. Hypothesis development and empirical proxies

With the existence of dividend peer effects established, the economic reasons behind dividend peer effects are explored. Based on economic theory, I propose four reasons for the occurrence of dividend peer effects: learning, overconfidence, industrial organization with predatory behavior, and reputation-building actions. I investigate each reason for its strength as a mechanism underlying dividend peer effects, with the premise that no single mechanism is more prominent than another.

The first mechanism is learning. This set of models generates peer effects when firms rely on peer-based information (Bikhchandani et al., 1992; Bursztyn et al., 2014; Foucault and Fresard, 2014). Firms can learn fundamental information associated with the ways that peer firms set their dividend policy (e.g., the sustainability of their cash flows). The firms in question could then use this information to choose a dividend policy similar to that of their peers'. Alternatively, firms can learn about their industry peers' dividend policy from metrics used for benchmarking, such as payout ratios, and consequently mimic the behavior without directly interacting with their peers. In each case, the firm is learning information and rationally updating its decision-making process.

The second mechanism stems from behavioral models of executive overconfidence (Malmendier and Tate, 2005; Ben-David, 2011; Malmendier and Tate, 2015). Similar to learning models, peer effects occur when firms rely on peer-based information. In the behavioral models of overconfidence, peer-based information is not rationally incorporated. For example, an overconfident executive irrationally weights the variance of his firm's performance relative to his peers by underestimating the chance of random events negatively affecting his firm's performance. As a result, the executive alters his firm's dividend policy differently from the prevalence of the same action in the peer group. Thus, the behavioral model is one in which overconfident CEOs rely excessively or insufficiently on peer actions. This reliance on relative position produces the peer effects. One example of this phenomenon is that overconfident CEOs misread peers' successes as signals that their own successes are coming.

Third, models rooted in industrial organization generate peer effects when weak firms feel compelled to respond to peers (Bolton and Scharfstein, 1990; Fudenberg and Tirole, 1986). Dividend peer effects are a by-product of models in which firms' industrial strategies involve predation, and they follow the deep-pocket theory of predation, whereby cash-rich firms drive their financially constrained competitors out of business by reducing their rivals' cash flow (Telser, 1966). For example, an industry leader can use dividend policy to force a competitor into financial hardship. If the peer group leader recognizes that his peer competitors will imitate his or her firm's dividend policy, the leader could exploit this tendency, and spur his or her rivals to drain the cash reserves and drive them into insolvency. However, dividend payments could also be lower than fundamentals imply. For example, in a noncompetitive product market, firms could all choose not to pay a dividend and opt instead to accumulate cash to deter future predation. When, despite fundamentals suggesting otherwise, all firms cluster on no dividend payment, this decision generates peer effects.

Fourth, models with executive reputation-building actions can generate peer effects. In these models, executive reputation is an asset providing future rents to the executive (Scharfstein and Stein, 1990). An executive who attains a reputation for reliability can improve future employment prospects and rents. Thus, the executive has an incentive to invest in reputation building by taking actions that make him or her appear more reliable. Regarding dividends, an executive can adopt a policy reflecting reliability, as a reputation-building measure. If peer firms regularly increase dividends, and those actions are viewed favorably as signs of reliability by talent seekers, then an executive could choose to also increase his or her firms dividend even if firm fundamentals suggest otherwise. Such an action results in all firms changing their dividend payments at similar times.

To analyze the heterogeneity in peer effects and shed light on the economic channels that motivate peer effects, I create four proxies for the four proposed economic mechanisms. First, I proxy for learning by defining a learning firm as one without a credit rating. While determining which peers a firm will try to learn from is difficult, (Lintner, 1956) finds that firms often look to those with desirable credit ratings when establishing their own dividend policy. Surveys of executives have also found that credit ratings matter (Brav et al., 2005), indicating they are a sensible proxy. Second, I proxy for executive overconfidence using the late option exercise measure developed by (Malmendier and Tate, 2005). This approach focuses on the timing of CEOs' decision to exercise their executive stock options. Overconfident executives overestimate the future performance of their firms and are therefore likely to hold options in expectation of future stock price appreciation.[1]

Third, I proxy for the industrial organization channel by identifying strategically vulnerable firms such as those in the bottom quartile of cash holdings (i.e., *CHEQ*/*ATQ* in Compustat) but in the top quartile of cash flow volatility (i.e., variance of *CFQ* in Compustat). This proxy captures the theory of industrial predatory behavior driving one firm to exploit the tendency of other peer firms to match its dividend policy, thereby draining the cash reserves of its rivals to create a competitive advantage for itself. Fourth, I proxy for reputation-building actions using the age and tenure of the CEO (Gibbons and Murphy, 1992). Younger CEOs and those earlier in their tenure have greater incentives to invest in reputation building. Specifically, I create an indicator equal to one for CEOs younger than 52, which represents the bottom quartile of CEOs, and for CEOs with fewer than eight quarters of experience, which again represents the bottom quartile.

These four proxies are used in an IV setting augmented with an interaction term between peer influence and the characteristic. The specification is:

$$Div_{jit} = \beta_P Peer_{(-j)it'} + \beta_C Char_{jit} + \beta_{C\times P} Char_{jit} \times Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}. \quad (5)$$

This specification resembles Eq. (4) but differs in two ways. First, I include $Char_{jit}$, which is a dummy variable indicating the firm has the characteristic that proxies for the economic models and its associated interaction term, $Char_{jit} \times Peer_{(-j)it'}$. These include a second instrument: the interaction between the primary instrument, peer idiosyncratic risk, and $Char_{jit}$. This second instrument satisfies the relevance and exclusion restriction through the same logic as the first instrument.

4.2. Results

I find evidence that dividend peer effects stem primarily from executive overconfidence and models in which dividends are used for strategic purposes. Table 8 presents the results for each of the four potential explanations for dividend peer effects. Column 1 shows that the dividend payments of overconfident CEOs increase strongly when peer influence is high. These CEOs are 6 percentage points more likely to increase dividend payments because of dividend peer effects. This represents a 38% increase with respect to the likelihood of increasing dividend payments when peer influence is high. The inference that executive overconfidence is an important determinant of dividend peer effects complements previous research suggesting dividend payments are in part behaviorally driven (Ben-David, 2011).

Column 2 shows an increase in dividend payments for strategically vulnerable firms when peer influence is high. When a firm's cash flows make it strategically vulnerable and peer influence is high, the firm is 4.3 percentage points more likely to increase dividend payments because of dividend peer effects. Although the point estimate is smaller than the CEO overconfidence estimate, the economic implications are meaningful. Despite having cash flow issues rendering the firm vulnerable to industry competitors, the firm chooses not to retain cash. Rather, it is twice as likely to payout additional cash when peer influence is high. The inference that strategic motivations are an important determinant of dividend peer effects also complements previous research establishing industry as a payout determinant (Grullon and Michaely, 2008; Hoberg et al., 2014).

Columns 3 and 4 reveal no statistically significant change in dividend payments for firms motivated by

[1] Several recent finance studies use this measure, including Malmendier and Tate (2008), Malmendier et al. (2011), Hirshleifer et al. (2012) and Banerjee et al. (2015).

Table 8
Heterogeneity in peer effects.
This table examines heterogeneity in peer effects by evaluating four mechanisms that can generate peer effects. The exact instrumental variable (IV) specification is $Div_{jit} = \beta_P Peer_{(-j)it'} + \beta_C Char_{jit} + \beta_{C\times P} Char_{jit} \times Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. $Char_{jit}$ is a dummy variable indicating that the firm displays that characteristic. Column 1 shows the coefficient estimates when chief executive officer overconfidence proxies for behavioral models as a potential mechanism. Column 2 shows the coefficient estimates for strategic interactions between competing firms within an industry as a potential mechanism. Column 3 shows the coefficient estimates for a reputation-building mechanism. Column 4 shows the coefficient estimates for firms that lack a credit rating as a proxy for a learning mechanism. As in Table 4, the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. I also use a second instrument: average peer idiosyncratic equity risk interacted with the characteristic indicator. The second instrument mitigates the same endogeneity concerns as in Table 4 regarding peer influence. ***, ** 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-statistic). Each F-statistic has statistical significance implying less than 10% distortion, which is denoted by ***.

	Dependent variable = Dividend increase			
	Executive overconfidence (1)	Strategic interactions (2)	Reputation-building (3)	Learning (4)
Peer influence	19.1%	16.1%	18.7%	23.7%
	(2.25)**	(2.97)***	(2.20)**	(3.77)***
Potential mechanism	−3.2%	−2.1%	−0.8%	1.5%
	(1.98)**	(2.14)**	(0.49)	(0.48)
Peer influence × potential mechanism	6.0%	4.3%	0.2%	−10.7%
	(2.19)**	(2.74)***	(0.07)	(1.26)
First-stage multivariate F-statistic	27.5***	83.2***	26.4***	8.0***
t-statistic on instrument 1	(7.26)***	(12.84)***	(9.82)***	(11.41)***
t-statistic on instrument 2	(5.24)***	(2.52)**	(7.04)***	(2.80)***
Adjusted R^2	6.5%	6.3%	6.4%	6.3%
Firm-specific covariates	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Number of observations	31,193	101,161	31,193	101,161

reputation-building concerns or learning. The reputation-building point estimate is close to zero. While these explanations for peer influence are not mutually exclusive and dividend peer effects could stem from multiple mechanisms, evidence indicates a more prominent role for executive overconfidence and an industrial organization that includes predatory behavior. This conclusion challenges the premise that no single mechanism is more prominent than another.

5. Repurchases

In this section, I present the results from examining a repurchases channel as an alternative explanation for dividend peer effects.

5.1. Hypothesis development

In corporate finance, sources and uses of cash must match. As such, any test of dividend policy being a relevant decision indirectly tests for another corporate variable as the residual shock absorber. Dividend policy most closely relates to other uses of cash. Therefore, if dividends are fixed, then something else should be the residual, thus prompting a test for peer effects on other uses of cash. Repurchases, which are another common use of cash, serve as an ideal test. Dividends and repurchases are seen as close but imperfect substitutes (e.g., Guay and Harford, 2000; Grullon and Michaely, 2002). Therefore, testing for repurchase peer effects helps to determine if dividend peer effects work through dividends directly or indirectly via a firm's sources and uses of cash.

5.2. Identification strategy

To test whether dividend peer effects work through a dividend channel alone or through an alternative peer effect channel induced by repurchases, repurchases replace dividends on both the left-hand and right-hand side of the IV specification:

$$Repurchases_{jit} = \beta PeerRepurchases_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}. \quad (6)$$

$Repurchases_{jit}$ represents the actual repurchases made for firm j in industry i in time t and Δt is one quarter. In the main specifications, $Repurchases_{jit}$ is a dummy variable indicating a repurchase increase or decrease. Peer influence is $PeerRepurchases_{(-j)it-1}$, which is the share of peer firms within the same industry i that made repurchases before firm j's repurchases were made. X_{jit} is a vector of the observable firm-specific covariates and peer averages of those covariates (i.e., common and contextual effects), f_j is a firm fixed effect, δ_{it} is a time fixed effect, and ϵ_{jit} is the unobservable error component.

5.3. Results

Table 9 examines whether a repurchase peer effect is driving identification of a dividend peer effect. The point

Table 9
Repurchases.
This table reports instrumental variable (IV) regressions that evaluate whether dividend peer effects work through a dividend channel or through interconnections with repurchases. The exact specification is: $Repurchases_{jit} = \beta_P Peer_{(-j)it} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. The sample includes actual repurchases made by firms between 1975 and 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. $Repurchases_{jit}$ is a dummy variable indicating a repurchase increases or decreases for firm j in industry i in quarter t. Peer influence is $Peer_{(-j)it}$ which represents the fraction of peer firms within the three-digit Standard Industrial Classification industry that increase or decrease their repurchases in the quarter before firm j makes its repurchases. As in Table 4, the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. I include all the same controls as in Table 4 except dividend yield is a control and repurchases yield is not a control. Below the coefficient estimates are t-statistics from robust standard errors clustered by firm. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable =	Peer increases	
Repurchases Increase	(1)	(2)
Peer influence coefficient	6%	-1%
t-statistic	(0.68)	(0.09)
First-stage F-statistic	126.7	58.4
t-statistic on instrument	(11.26)***	(7.64)***
Adjusted R^2	16.3%	16.3%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	
Panel B: Dependent variable =	Peer decreases	
Repurchases Decrease	(1)	(2)
Peer influence coefficient	10%	11%
t-statistic	(1.39)	(0.72)
First-stage F-statistic	141.7	34.4
t-statistic on instrument	(11.90)***	(5.87)***
Adjusted R^2	16.6%	16.6%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

estimate is insignificant and close to zero on the repurchase peer effect in all specifications. Dividend policy also relates to two other fundamental firm policies: leverage and investment. Given that operating cash flows and changes in leverage must equal investments plus payout, only two of the three firm policies represent decisions. The other firm policy must capture the residual difference. Theories of leverage such as pecking order (Myers and Majluf, 1984) and trade-off (Myers, 1984) assume that investment and leverage represent decisions in which payout is the residual. Lambrecht and Myers (2012) and Lambrecht and Myers (2017) derive the Lintner (1956) partial adjustment model for dividends by assuming that investment and payout represent decisions and leverage is the residual. In theory, all three could be the residual, but, in practice, survey evidence suggests that dividends are not the residual. Brav et al. (2005) find that dividends rank higher than asset sales, heavy borrowing, and NPV-positive investments. However, there is no way to definitively conclude whether dividends affect these other endogenous variables or vice versa, or their peer effects, without a more elaborate model. Hence, while a number of other potentially endogenous corporate policies interact and can have their own peer effects, this is a complex issue calling for a richer model that is beyond the scope of this paper.

6. Announcement effects

In this section, I present and discuss the results for whether dividend announcement returns anticipate peer effects.

6.1. Hypotheses development

Investors react positively to announcements of dividend increases (Michaely et al., 1995). The positive reaction is consistent with theoretical models in which investors rationally respond to the surprise revelation of private information conveyed by the dividend increase. Given that peer influence helps predict when a firm will increase its dividend, it follows that investors who enhance their dividend expectations model with peer influence will be less surprised by the announcement of a dividend increase. To evaluate whether investors account for peer influence, I integrate my peer effects model for predicting a dividend increase with a model of dividend announcement effects.

Announcement effect models are premised on executives having private information about their firms that the market does not have, combined with executives' potential incentive to reveal this information to the market. For example, executives internalize that some shareholders want to sell their holdings at fair prices, and this factor enters into the dividend announcement. Undervalued firms increase dividends to signal their prospects. Thus, this revelation of private information by the firm helps explain the market's positive reaction to announcements of unexpected dividend increases.

6.2. Identification strategy

To determine which dividend announcements are a surprise and thereby reveal private information to the market, a model of the unexpected component of a dividend announcement is necessary. A good proxy for the unexpected is the error term, ϵ_{jit}, from the peer effects regressions predicting when a dividend increase will occur [i.e., Eq. (4)]. A large error term is associated with an unexpected increase, while a small error term suggests a comparatively greater expected increase. To determine the role that peer influence can have in changing which dividend announcements are a surprise, I isolate the change in what is unexpected when peer-based information is part of an investors' model for predicting dividend increases. Calculating simple differences in error terms across regression models isolates how much the unexpected component of the dividend increase changes with the inclusion of peer-based information.

Two models that investors could use for predicting when a dividend increase will occur are considered. Each model follows the regression specification outlined in Eq. (4). The first regression is a baseline model with no peer influence, so the model contains all of the traditional,

Table 10
Peer influence and announcement effects.
This table presents estimates of announcement-induced abnormal returns (Panel A). Abnormal returns are in excess of benchmark portfolios matched on size, book-to-market, and momentum. Panel B presents cross-sectional estimates in which the cumulative abnormal returns (CARs) from the dividend announcements are a function of firms' private information. The error terms, ϵ_{jit}, from the regression analyzed in Table 4 proxy for private information. The baseline model does not include peer covariates, and the augmented model includes peer influence, peer firm averages of the firm-specific covariates, and the aggregate peers' CARs from the -1 to +1 event window surrounding their announcements. The first row of Panel B reports the estimates of β_ϵ from the regression $CAR_{ijt} = \alpha_{ijt} + \beta_\epsilon \epsilon_{jit} + e_{jit}$. The final row of Panel B reports the estimates of β_Δ from the regression $CAR_{ijt} = \alpha_{ijt} + \beta_\epsilon \epsilon_{Mk} + \beta_\Delta \Delta_\epsilon + e_{jit}$. Below the coefficient estimates are test-statistics from robust standard errors clustered by firm. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Announcement-induced abnormal returns	Estimated Average CAR [−1, +1]
All dividend increases	0.70%
	(19.70)***
Panel B: Cross-sectional estimates of surprise upon announcement of a dividend increase	
Error term from baseline model (firm-specific covariates, firm fixed effects, time fixed effects)	0.39%
	(4.85)***
Change in error term when peer influence, peer firm averages, and peer firms' CARs are included	−0.15%
	(2.99)***
Number of observations	12,122

firm-specific covariates used to predict dividend increases. Given that investors can also learn about an impending dividend increase via peer firms' dividend announcements, the abnormal returns associated with the peer firms' dividend announcements are added to the baseline regression model along with peer influence and peer-firm averages. To operationalize the anticipation from peers' announcements, I calculate the abnormal returns for the peer firms in the -1 to +1 event window surrounding their announcement. If multiple peer firms make dividend changes in the period prior to the individual firm's announcement, I aggregate the cumulative abnormal returns (CARs) across peer firms.

With these measures of the unexpected component of dividend increases, the private information contained in announcement returns can be evaluated. This two-step approach of first calculating the unexpected, and then using that result to evaluate the announcement returns, reflects methods developed by other researchers to examine the private information revealed in corporate announcements (e.g., Eckbo et al. (1990); Nayak and Prabhala (2001); Kai and Prabhala (2007)).

In the first step, I estimate the CARs from the announcement of a dividend increase. I use daily data to estimate the parameters of a Carhart four-factor model in which the four factors are (1) the market return, which is the CRSP value-weighted index, (2) SMB (small minus big), which is a mimicking portfolio to capture risk related to size, (3) HML (high minus low), which is a mimicking portfolio to capture risk associated with book-to-market characteristics, and (4) UMD (up minus down), which is a mimicking portfolio designed to address risk associated with prior returns by subtracting a portfolio of low prior return firms from a portfolio of high prior return firms. The event period is days -1 to +1, and I measure it relative to the dividend announcement at day 0.

In the second step, I use the ordinary least squares (OLS) estimates of the CARs along with the error term, ϵ_{jit}, estimated from the models predicting dividend increases to investigate the degree of investors' surprise at the dividend announcement. The regression specification is:

$$CAR_{ijt} = \alpha_{ijt} + \beta_\epsilon \epsilon_{Mk} + e_{ijt}, \tag{7}$$

where ϵ_{Mk} are the error terms from the $k = 1, \ldots, 2$ regression models that investors could use to predict dividend increases. β_ϵ is the coefficient of interest, and it represents the investors' surprise from dividend announcements.

To understand the incremental change in what is revealed by the announcement of a dividend increase when investors include peer-based information in their prediction model, I use the OLS estimates of the CARs along with the error terms from the baseline prediction model, ϵ_{jit}, and the difference in error terms, Δ_ϵ, from including peer-based information in the prediction model. The regression specification is:

$$CAR_{ijt} = \alpha_{ijt} + \beta_\epsilon \epsilon_{M1} + \beta_\Delta \Delta_\epsilon + e_{ijt}, \tag{8}$$

where β_Δ is the coefficient of interest, and it represents the change in investors' surprise from dividend announcements when they add peer-based information to their prediction models for when dividend increases will occur.

Panel A of Table 10 shows the average excess returns for the -1 to +1 event window for announcing dividend increases are 0.81%. Panel B shows that the announcement returns are higher when dividend announcements are more unexpected and that investors anticipate the consequences of peer effects. This suggests that the model with peer announcement effects (i.e., a model with rumors of a dividend increase) better fits the data and improves investors' ability to predict dividend increases.

7. Conclusion

This study helps to explain the phenomenon of firms deciding to change their dividends at similar times. I demonstrate that dividend decisions of peer firms are important determinants of dividend policy. Peer firm behavior has a robust and significant impact on dividend increases but not on decreases. Overall, peer influence leads firms to reduce the time between dividend changes by about 1.5 quarters and to increase payout ratios by 16%.

These findings are consistent with dividend peer effects working through the adjustment period and target payout ratio in Lintner's partial adjustment model of dividend payments instead of through earnings. In contrast to dividends, repurchases show no peer effects.

One further empirical question this study invites is whether peer-induced dividend decisions are optimal for firm value. Although announcement returns indicate that investors anticipate the consequences of peer effects, dividend policy is a decision firms rarely reverse. Therefore, peer-induced changes to cash distribution could have long-term implications for firm value. In addition, an interesting implication of these findings will be found in examining the interaction of corporate peer effects. Because peer effects are likely to exist among numerous corporate policies, a richer model allowing researchers to evaluate the complexity intrinsic to multiple peer effects will be valuable.

Appendix A. Variable definitions

A.1. Payout variables

Regular Cash Dividends (RCD) = $DIVAMT \times SHROUT$ when *DISTCD* begins with 122, 123, 124, 125, 132, 133, 134, or 135 as well as when *DISTCD* begins with 120, 121, 130, 131, 126, 128, 136, or 138 but follows a regular dividend pattern.

Dividend Payout Change = $\frac{RCD_t - RCD_{t-1}}{RCD_{t-1}}$.

Dividend Increase = an indicator variable equal to one if $\frac{RCD_t - RCD_{t-1}}{RCD_{t-1}} \geq 1\%$.

Dividend Decrease = an indicator variable equal to one if $\frac{RCD_t - RCD_{t-1}}{RCD_{t-1}} \leq 1\%$.

Time to Change = $\frac{DCLRDT_{change2} - DCLRDT_{change1}}{90}$.

Dividend Yield (DY) = $\frac{RCD_t \times 4}{CSHO_{t-4} * PRCC\_F_{t-4}}$.

Special Dividends (SD) = $DIVAMT \times SHROUT$ when *DISTCD* begins with 127, 129, 137, or 139.

Special Dividend Yield (SDY) = $\frac{SD_t}{CSHO_{t-4} * PRCC\_F_{t-4}}$.

Gross Repurchases (GR) = $CSHOPQ \times PRCRAQ$ when *PRCRAQ* is non-missing or $\Delta PRSTKCY - \Delta PSTKQ$.

Net Repurchases (NR) = GR - $(CSHIQ \times PRCCQ)$. If a firm uses the Treasury stock method to account for repurchases, NR = $(TSTKQ)$.

Repurchases Yield (RY) = $\frac{NR_t + NR_{t-1} + NR_{t-2} + NR_{t-3}}{CSHO_{t-4} * PRCC\_F_{t-4}}$.

Payout Yield (PY) = $DY + SDY + RY$.

Payout Ratio = $\frac{PY \times CSHO_{t-4} * PRCC\_F_{t-4}}{IBCOM}$.

Δ *EPS/Pre-announcement Market Capitalization* = $\frac{EPSPXQ_t - EPSPXQ_{t-1}}{CSHO_{t-1} * PRCC\_F_{t-1}}$.

A.2. Other explanatory variables

Profitability = $\frac{OIBDPQ}{ATQ}$.

Life-cycle Stage = $\frac{RETQ}{ATQ}$.

Market-to-Book = $\frac{CSHO \times PRCC\_F + DLCQ + DLTTQ + PSTKQ - TXDITCQ}{ATQ}$.

Book Leverage = $\frac{DLCQ + DLTTQ}{DLCQ + DLTTQ + CSHO \times PRCC\_F}$.

Tangibility = $\frac{PPENTQ}{ATQ}$.

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

Cash Flow-to-Capital = $\frac{IBQ + DPQ}{PPENTQ_{t-1}}$.

Market Equity (millions of 2010 dollars) = $CSHO \times PRCC\_F$, adjusted to 2010 dollars using quarterly US Consumer Price Index data.

Firm Size = $log(MarketEquity)$.

Institutional Ownership = $INSTOWN\_PERC$ from Thomson Reuters.

Herfindahl-Hirschman index (HHI) = $\sum_{j=1}^{N_i} SALE_{jit}^2$ for firm's j in three-digit SIC industry i in quarter t.

Industry IBIS Life-cycle Stage takes on values ranging from 1 = future industry to 5 = declining industry for a three-digit SIC industry i in quarter t as reported by IBISWorld.

Industry Leveraged Buyouts (LBO) = count of LBO deals for three-digit SIC industry i in quarter t from SDC.

Industry M&A = count of completed M&A deals for three-digit SIC industry i in quarter t from SDC.

Industry Rumor Major Deal = count of rumored M&A deals for 3-digit SIC industry i in quarter t from SDC.

Industry Fraud Accusations = count of lawsuits for three-digit SIC industry i in quarter t from Stanford Law School's securities fraud database.

Appendix B. Excess variance identification

As a different approach to identifying peer effects, I use an excess variance identification strategy. The technique, pioneered by Graham (2008), begins with the traditional linear-in-means model of peer effects (Manski, 1993). I begin by summarizing the logic of the identification approach for dividends. Then, I present my findings from using this approach.

From the law of total variance, it follows that the observed variance of firms' dividend decisions at the peer group level is the sum of three terms: (1) the variance of any individual-level heterogeneity between peer groups (e.g., the variance of the average firm's profitability across industries), (2) the variance of any peer group level heterogeneity (e.g., variance of industry life-cycle stage), and (3) variance from peer effects. When no peer effects exist, the first two variance terms can be estimated by defining excess variance as the residual between peer group sample variance that remains after accounting for the contribution of individual-level heterogeneity. The variance of any individual-level heterogeneity is estimated using the within peer group sample variance. When peer effects exist, difficulties arise because excess variance (when defined as the residual) includes the variance from both the second and the third term of the total variance of firms' decisions at the peer group level.

To determine whether any of the excess variance is coming from peer effects, I compare the excess variances across different types of peer groups defined by the number of firms in the industry. Small industries are defined as having fewer than the median number of firms across all industries,and large industries have more than the median number of firms across all industries. Given the numerous small and large industries, I can separately calculate the sample distribution of excess variance for all small and all large industries. When the sample distributions of excess variance are statistically indistinguishable, peer effects likely do not exist. When the sample distributions of excess variance are statistically distinguishable, peer effects likely exist.

The variance attributable to peer effects changes when the number of firms in the group changes because of offsetting clusters of firms. For example, in large industries, clusters of firms that mimic their peers likely are offset by a corresponding cluster of firms that do not mimic their peers. These two competing clusters result in lower variance in average dividend payments across large industries. In small industries, peer groups composed of firms that mostly mimic or do not mimic their peers are more frequently observed. With only a single cluster of firms, the result will be higher variance in average dividend payments across small industries. Consequently, the variance attributable to peer effects should be greater across the set of small industries than across the set of large industries. Given that the total expected variance will be greater in small industries, I can condition the expected variance on industry type (small or large) to produce a well-identified estimate of peer effects. The equation I estimate is:

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

where S_i is an indicator for the type (small or large) of industry i, V_i^b is the conditional variance between industries, and V_i^w is the observed variance within industry.

As an example, assume the car industry is small with only the seven major carmakers: Chrysler, Ferrari, Ford, General Motors, Honda, Tesla, and Toyota. If peer effects exist in this industry, then the US carmakers Chrysler, Ford, General Motors, and Tesla cluster at a high dividend yield of 5%, and the remaining three carmakers choose not to pay dividends (i.e., a yield of 0%). The standard deviation in dividend yields in this small industry is 2.7%. Now assume that the car industry is large, consisting of all the major and minor carmakers (approximately 25 firms). If peer effects exist in this industry, then the major carmakers still cluster near yields of 5% and 0%, but some of the minor carmakers create their own clusters near a low dividend yield of 1% and others near 3%. The standard deviation in dividend yields in this large industry is 1.8%. Assume that the average dividend yield across all industries is 3%. In the large car industry, the cluster of carmakers above the 3% yield is offset by clusters of carmakers below the 3% yield. However, when the industry was small, with only seven firms, not enough carmakers exist to offset the dominant cluster of carmakers near the 5% yield. As a result, the variance in the large car industry is smaller than the variance in the small car industry. Other industries could have no peer effects, so their yields would exhibit no clustering regardless of whether they were a small or large industry. However, by evaluating all the three-digit SIC industries over many quarters, it is possible to statistically detect if the variance conditioned on small and large industries are different. When they are, this is evidence of peer effects.

The key identifying assumption for the excess variance method is that after controlling for observables, being in a small or large industry affects the variance in dividend payments only via peer effects. There is no need to assume that unobservables are uncorrelated with peer influence as is common in standard regression models. This implies that even if some variable cannot be observed, it can be correlated with both industry size and dividend payments and the excess variance identification will hold.

Table B.1
Total economic impact of peer influence on industry dividend yields.
This table presents estimates for the total impact of peer influence on dividend yields at the industry level. Estimates stem from the variance-based test. The test estimates γ^2. When γ^2 is significantly different from one, peer effects alter yields relative to fundamentals. Chi-squared tests determine if γ^2 is significantly different than one. Column (1) conditions on the observable firm-specific and industry-specific covariates listed in Table 1. Column (2) also includes peer firm averages of the covariates listed in Table 1. ***, **, and * indicate *p*-values of 1%, 5%, and 10%, respectively, associated with the chi-square test statistic.

	Dependent variable = Dividend Yield	
	(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 small industry	6%	9%
Firm-specific covariates	Yes	Yes
Industry-specific covariates	Yes	Yes
Peer firm average covariates	No	Yes
Number of observations	439,327	

Given that the excess variance identification is coming from comparing different types of peer groups, any inferences based on it can demonstrate only the total incidence of peer effects at the group level. In the dividend context, this means that point estimates represent the aggregate impact of peer interactions for small or large industries. Comparing point estimates can inform only how mean dividend payments would change if a firm were to switch from a small to large industry or vice versa.

Based on the excess variance approach, I estimate a substantial aggregate peer effect at the industry level. The results presented in Table B.1 show that peer effects induce firms to alter dividend yields by 17% in small industries and 6% in large industries. The results are statistically significant at the 95th percentile as evidenced by chi-squared test statistics of 4.72 and 4.05. The specification in Column 1 includes firm-specific covariates and Column 2 augments that specification with industry-specific and peer-firm average covariates. To put the finding into economic perspective, if the expected dividend yield in a small industry is 3% under the assumption of no peer influence, the results suggest that observed yields will be between 2.5% and 3.5%. Given that the average dividend-paying firm's market capitalization is in the billions, a 0.5% change is a substantial transfer of cash to shareholders. These results strongly support the hypothesis that within-industry peer effects substantively alter dividend yields in an industry.

Appendix C. Robustness checks

C.1. Other known dividend determinants

Contextual and correlated effects can influence firms' dividend decisions in a manner that is distinct from div-

Table C.1
Additional summary statistics.
This table provides additional summary statistics for peer firm averages (Panel A) and industry-specific covariates (Panel B). The sample contains quarterly firm observations from 1975 through 2011 for all nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data in the Center for Research in Security Prices and Compustat databases. 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 three-digit Standard Industrial Classification. Summary statistics for all variables are presented after winsorizing 1% of the data.

	All firms			Dividend payers			Non-dividend payers		
Panel A: Peer firm averages	Mean	Median	Standard deviation	Mean	Median	Standard deviation	Mean	Median	Standard deviation
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
Life-cycle 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
Idiosyncratic risk	6.2%	4.7%	7.6%	4.2%	2.7%	6.9%	6.8%	5.5%	7.6%
Market equity (millions of 2010 dollars)	2051	1029	3515	2147	898	4697	2022	1075	3073
Institutional ownership	32.7%	31.0%	18.5%	25.8%	23.7%	20.9%	34.8%	32.2%	17.2%
Panel B: Industry variables									
Industry risk	1.7%	0.9%	3.2%	1.4%	0.8%	2.2%	1.8%	0.9%	3.4%
HHI	2288	1835	1801	2605	2166	1770	2193	1748	1799
Industry IBIS life-cycle 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
Number of observations		439,327			101,161			338,166	
Number of unique firms		12,215			2587			11,418	

idend peer effects. To mitigate the influence of contextual and correlated effects, I control for peer firm averages and industry-specific covariates when estimating peer influence. Table C.1 summarizes the distribution of the peer firm averages, which average all firms within a three-digit SIC industry-quarter combination, excluding the *j*th firm's value and industry-specific covariates.

Is the 2003 dividend tax cut or catering to investor demand for dividends masquerading as a dividend peer effects? Table C.2 evaluates known determinants of dividend payments that only vary over time and that can be inducing all firms to change their dividend payments in a similar manner around the same time. The main IV specifications include time fixed effects to capture such variation. Nevertheless, as an alternative, I remove the time fixed effects and include these known dividend determinants. First, I include the dividend tax rate. Then, I remove the years when the dividend tax rate changed to ensure that taxes are not driving the result. Second, I look at dividend catering (Baker and Wurgler, 2004), which is meant to capture prevailing investor demand for dividend payments to which firms could cater. In all of these specifications, peer influence remains statistically significant and economically meaningful.

C.2. Sensitivity to peer influence definition

Two potential concerns stemming from the choice of peer influence are overlapping data issues and the saliency of the peer dividend decisions. Peer influence is defined as the fraction of peer firms that changed dividend payments in the 180 days prior to an individual firm announcement, yet the unit of observation in the regressions is 90 days. Because the same 90-day period is used in two different observations, this has the potential to create a moving average error term if ordinary least squares (OLS) were used to generate the point estimate. OLS, however, is not used and the IV design overcomes this potential source of bias. Nevertheless, as a robustness check, I repeat the analysis but bootstrap the standard errors to correct for any bias from overlapping data. I use five hundred replications of the data and find no meaningful difference in my statistical inferences. These findings are in Table C.2. As a second check, I change the definition of peer influence from 180 days to 90 days. This second alternative has the added benefit of focusing on events that are more recent and perhaps more memorable. Again, the results are qualitatively similar. Firms respond to peer firms' dividend changes by accelerating the time to a dividend change by 1.6 quarters and increasing dividend payments by 20%. These findings are in Tables C.3 and C.4.

Table C.2
Robustness check: sensitivity to other known dividend determinants.
This table presents coefficient estimates when additional robustness checks of the instrumental variable regression are performed. As in Table 4, the endogenous peer influence is instrumented for with the average peer idiosyncratic equity risk. When the robustness check includes additional control variables that only vary over time (i.e., dividend tax rate and Baker-Wurgler's catering measure), time fixed effects are excluded so as not to be collinear with the variable of interest. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable = Dividend Increase		
	Peer increases	
Check	(1)	(2)
Check #1: Bootstrap standard errors (replications = 500)	18%	29%
	(2.89)***	(1.91)*
Check #2: Control for dividend tax rate	19%	27%
	(5.78)***	(4.74)***
Dividend tax rate	1%	−3%
	(0.88)	(2.52)**
Check #3: Exclude years when dividend taxes changed	17%	23%
	(2.96)***	(2.02)**
Check #4: Include Baker-Wurgler catering measure	17%	22%
	(5.03)***	(4.02)***
Baker-Wurgler catering measure	4%	3%
	(4.09)***	(2.47)**
Panel B: Dependent variable = Dividend Decrease		
	Peer decreases	
Check	(1)	(2)
Check #1: Bootstrap standard errors (replications = 500)	−4%	−31%
	(0.30)	(0.97)
Check #2: Control for dividend tax rate	14%	14%
	(2.04)**	(1.67)*
Dividend tax rate	0%	0%
	(0.10)	(0.24)
Check #3: Exclude years when dividend taxes changed	−5%	−21%
	(0.39)	(1.06)
Check #4: Include Baker–Wurgler catering measure	16%	15%
	(2.46)**	(1.93)*
Baker-Wurgler catering measure	-2%	-2%
	(4.13)***	(3.13)**

Table C.3
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 specification is $Div_{jit} = \beta_P Peer90_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. This alternative proxy for peer influence is captured by $Peer90_{(-j)it'}$, which is defined as the fraction of peer firms within the three-digit Standard Industrial Classification industry that increase or decrease their dividends in the 90 days prior to firm j's dividend announcement. I use t' instead of t to reflect the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the firm's decision. If no announcement is made by a firm in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 90 days. I include all the same controls as in Table 4. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Dividend Increase		
	Peer increases	
	(1)	(2)
Peer influence (90 days)	22%	33%
t-statistic	(3.18)***	(2.18)**
First-stage F-statistic	135.5	36.2
t-statistic on instrument	(11.64)***	(6.02)***
Adjusted R^2	6.3%	6.3%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	
Panel B. Dependent variable = Dividend Decrease		
	Peer decreases	
	(1)	(2)
Peer influence (90 days)	−6%	−13%
t-statistic	(0.31)	(1.05)
First-stage F-statistic	29.2	5.5
t-statistic on instrument	(5.40)***	(2.36)**
Adjusted R^2	2.2%	2.2%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

C.3. Sensitivity to peer group definition

In the main statistical tests for peer influence, I define peer firms by three-digit SIC code. If the true set of peer firms is a subset of firms within a three-digit SIC code, the excess variance approach described in Appendix B still provides consistent causal estimates. However, if the true peer group spans multiple industries, this would be a limitation of the excess variance estimates. Given that most dividend-paying firms are the established leaders in their industry, and non-dividend-paying firms are better characterized as satisfying niche markets that straddle multiple industries, the caveat about multiple industries is less troublesome. To probe the sensitivity of the definition of the peer group, Tables C.5 and C.6 consider an alternative definition of the peer group and find similar results. The alternative definition of peer group comes from Hoberg and Phillips (2016); which uses text-based analyses of business descriptions reported in annual Securities and Exchange Commission 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 in-

Table C.4
Robustness check: an alternative definition of peer influence (Lintner's model).
This table extends the instrumental variable analysis of the 90-day definition of peer influence to evaluate the inputs into Lintner's partial adjustment model for dividend payments. Panel A presents coefficient estimates for peer influence when the time to dividend change, my proxy for Lintner's adjustment period, is the dependent variable. Panel B presents coefficient estimates for peer influence when dividend yield change, my proxy for the target payout ratio, is the dependent variable. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Time to Change (Quarter)	(1)	(2)
Peer influence (90 day)	−1.60	−1.05
t-statistic	(2.06)**	(2.02)**
First-stage F-statistic	21.7	43.9
t-statistic on instrument	(4.66)***	(6.63)***
Adjusted R^2	22.7%	20.2%
Firm-specific covariates	Yes	Yes
Annual changers included	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	8,571	12,162
Panel B: Dependent variable = Dividend Payout Change		
Peer influence (90 day)	20%	38%
t-statistic	(2.72)***	(2.27)**
First-stage F-statistic	135.5	36.2
t-statistic on instrument	(11.64)***	(6.02)***
Adjusted R^2	2.6%	2.7%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	101,161	

Table C.5
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 specification is $Div_{jit} = \beta_P PeerTNIC_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. The sample contains all regular dividend announcements between 1996 and 2008 for nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data available in the Center for Research in Security Prices, Compustat, and Text-based Network Industry Classifications (TNIC) databases (Hoberg and Phillips, 2016). Div_{jit} is a dummy variable indicating a dividend increase or 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 or decrease their dividend in the 180 days prior to firm j's dividend announcement. I use t' instead of t to reflect the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the firm's decision. If no announcement is made by a firm in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. I include all the same controls as in Table 4. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Dividend Increase	Peer increases	
	(1)	(2)
Peer influence (TNIC)	18%	36%
t-statistic	(2.35)**	(1.98)**
First-stage F-statistic	99.3	24.0
t-statistic on instrument	(9.96)***	(2.95)***
Adjusted R^2	7.3%	7.3%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	28,403	
Panel B. Dependent variable = Dividend Decrease	Peer decreases	
	(1)	(2)
Peer influence (TNIC)	−20%	−30%
t-statistic	(1.03)	(1.20)
First-stage F-statistic	36.4	10.8
t-statistic on instrument	(6.03)***	(3.28)***
Adjusted R^2	2.7%	2.8%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	28,403	

dustry concentration measure were all recalculated based on the firm-specific Text-based Network Industrial Classification (TNICs). The alternative text-based industry definitions produce results similar to the three-digit SIC definitions. For example, a standard deviation increase in the text-based peer influence raises the probability of a firm increasing its dividend by 18%, which is the same as in the main IV specification despite the much shorter sample period. In addition, the results suggest that firms respond to their peers' dividend changes by accelerating the time to a dividend change by 2.1 quarters and increasing dividend payments by 27%. The results remain statistically significant, are qualitatively similar to prior estimates, and are economically meaningful.

C.4. Sample restrictions

Table C.7 presents results for the economic magnitude of the peer influence estimate when restrictions on the selected sample change. I find that peer influence remains statistically significant and economically meaningful across various samples, but the point estimate varies with how the sample is defined and the extent to which the data are winsorized. In the main IV specification, 1% of the data are winsorized, which removes outliers at the 0.5 and 99.5 percentile levels for each ratio in the regression. No restrictions are placed on the minimum number of firms in an industry. This results in a point estimate of 18% that is statistically significant at the 99th percentile. When I take the extreme action of removing all industries with fewer than five firms and winsorizing 5% of the data for ratios in the regression, the point estimate is 11% and statistically significant at the 95th percentile. This confirms that the peer influence estimates are not sensitive to sample restrictions.

Table C.6
Robustness check: an alternative definition of industry group (Lintner's model).
This table extends the instrumental variable analysis of the Text-based Network Industrial Classification (TNIC) industry definition (Hoberg and Phillips, 2016) to evaluate the inputs into Lintner's partial adjustment model for dividend payments. Panel A presents coefficient estimates for peer influence when the time to dividend change, my proxy for Lintner's adjustment period, is the dependent variable. Panel B presents coefficient estimates for peer influence when dividend yield change, my proxy for the target payout ratio, is the dependent variable. ***, **, and * indicate p-values of 1%, 5%, and 10%, respectively.

Panel A: Dependent variable= Time to Change (Quarter)	(1)	(2)
Peer influence (TNIC)	−2.09	−2.57
t-statistic	(1.76)*	(1.90)*
First-stage F-statistic	4.6	19.6
t-statistic on instrument	(4.51)***	(1.91)*
Adjusted R^2	39.2%	39.7%
Firm-specific covariates	Yes	Yes
Annual changers included	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	1705	2630
Panel B: Dependent variable = Dividend Payout Change		
Peer influence (TNIC)	27%	48%
t-statistic	(2.70)***	(2.22)**
First-stage F-statistic	99.3	24.0
t-statistic on instrument	(9.96)***	(2.95)***
Adjusted R^2	2.3%	2.3%
Firm-specific covariates	Yes	Yes
Peer firm averages	No	Yes
Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Number of observations	28,403	

Table C.7
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 specification is $Div_{jit} = \beta_P Peer_{(-j)it'} + \theta X_{jit} + f_j + \delta_t + \epsilon_{jit}$. The sample contains all regular dividend announcements between 1975 and 2011 for nonfinancial, nonutility, non Real Estate Investment Trust firms traded on a major exchange (NYSE, Amex, Nasdaq) with non-missing data available in the Center for Research in Security Prices and Compustat databases. Div_{jit} is a dummy variable indicating a dividend increase or 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 three-digit Standard Industrial Classification industry that increase or decrease their dividend in the 180 days prior to firm j's dividend announcement. I use t' instead of t to reflect the fact that this specification uses the exact dividend declaration date to calculate which peer choices occurred after the firm's decision. If no announcement is made by a firm in a given quarter, the last day of the quarter is used to calculate the number of peer changes in the previous 180 days. I include the same controls as in Table 4 Column 1. ***, **, 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 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					
Industry	Data winsorization				
size cutoff	0%	1%	2%	3%	5%
No cutoff	0.372	0.175	0.143	0.121	0.098
	(3.51)***	(3.22)***	(2.79)***	(2.44)**	(2.04)**
Three firms	0.416	0.194	0.161	0.137	0.112
	(3.69)***	(3.44)***	(3.04)***	(2.69)**	(2.31)**
Four firms	0.552	0.202	0.164	0.137	0.107
	(3.16)***	(3.35)***	(2.91)***	(2.53)**	(2.11)**
Five firms	0.500	0.206	0.167	0.140	0.112
	(3.99)***	(3.37)***	(2.91)***	(2.56)**	(2.18)**
Panel B: Mean and standard deviation of peer influence					
No cutoff	0.143	0.143	0.143	0.140	0.138
	(0.185)	(0.185)	(0.185)	(0.174)	(0.165)
Three firms	0.139	0.139	0.138	0.137	0.135
	(0.169)	(0.169)	(0.163)	(0.159)	(0.154)
Four firms	0.137	0.136	0.135	0.135	0.134
	(0.162)	(0.159)	(0.155)	(0.155)	(0.149)
Five firms	0.135	0.134	0.134	0.133	0.132
	(0.156)	(0.153)	(0.150)	(0.147)	(0.144)

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