Vanishing Stock Dividends*

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Abstract

We document that stock dividends are vanishing: the probability that a firm distributes stock dividends to shareholders decreases by the factor of 75 over the six decades from the 1950s to the 2010s. In 2017, only five industrial firms distribute stock dividends, representing less than 0.2% of the industrial firms listed in the United States. Why are stock dividends vanishing? We find that the vanishing of stock dividends is not attributable to changing firm characteristics over the six decades. Our review of the history of stock dividends indicates that people-including shareholders and the judicial, tax, and accounting authorities—commonly misunderstand the economic substance of stock dividends and mistakenly equate them to cash dividends in the early American commercial history. The investors gradually learn and correct the misunderstanding; during the process, their demand for stock dividends dwindles. In addition, institutional investors, who are more professional than retail investors and are less likely to misunderstand the economic substance of stock dividends, own more and more corporate equities in recent years and thus help correct the misunderstanding. Consistent with the misunderstanding-learning hypothesis, both the Granger causality tests and the instrumental variable regressions suggest that institutional investors have causal and negative effects on the firm's propensity to distribute stock dividends.

Keywords: vanishing stock dividends, investor learning, signaling

JEL classification: G35

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"When asked to pass judgement upon the use of small annual stock dividends as a means of conserving cash for business expansion, 19 per cent of the stockholders advocated a normal cash dividend with no stock, 44 per cent favored a cash-plus-stock procedure, and 19 per cent preferred all stock. The responses of very small stockholders were almost evenly divided among these three options. These results are reasonably consistent with those obtained by Merrill Lynch, Pierce, Fenner & Smith in a 1958 mail survey of customers who had recently received stock dividends; these customers voted 56 per cent in favor of the cash-plus-stock policy and 21 per cent each for an all-cash or an all-stock policy." -- Clendenin (1958, p. 50).

1. Introduction

Corporate distribution policies have significantly changed in the past several decades. Whereas the aggregate amount of cash dividends paid to shareholders increases (DeAngeloo, DeAngelo, and Skinner, 2004), the fraction of firms that pay cash dividends significantly decreases from the 1940s to the 1990s (Fama and French, 2001). In addition, more and more firms distribute earnings to shareholder through share repurchases rather than cash dividends (Kalay and Lemmon, 2008). The dynamics of corporate distribution policies suggest that firms adjust their distribution policies in response to changes in investor preference and business environment. As an important form of corporate distribution, stock dividends are more controversial than other forms of corporate distributions (e.g., cash dividends and share repurchases) and have received considerable academic attention (see Sections 2.1 and 3.2.1 for detailed discussions). But there are no studies of the dynamics of stock dividends. In this paper, we fill the gap and examine the time-series variation in firms' use of stock dividends.

Stock dividends used to be widely used: in the 1950s, about 15% of the industrial firms listed in the United States distribute stock dividends. In 2017, the fraction of stock dividend paying firms decreases to less than 0.2%; merely five firms distribute stock dividends to shareholders in 2017. The probability that the firm distributes stock dividends in a year decreases by a factor of 75 over the six decades from the 1950s to the 2010s. That is, stock

dividends are vanishing and essentially close to extinction. An obvious, yet important, question is: why are stock dividends vanishing?

To answer the question, it is necessary to answer a related question: why are stock dividends widely used in the history? Stock dividends are controversial since their birth in the 1680s. The controversy centers on whether stock dividends are income to shareholders. One view is that stock dividends are income to shareholders because they are similar to cash dividends; the supporters of this view believe that the shareholder's wealth increases after receiving additional shares distributed by the firm via stock dividends. The opposing view argues that stock dividends are not income to shareholders because they do not sever any assets from the firm; nor are any assets transferred from the control of the firm's management to the shareholders for their disposal; in addition, the shareholder's proportional ownership in the firm is not changed by the stock dividend.

Both views have numerous supporters, who actively debate over the economic substance of stock dividends for almost a century in the United States (Section 2.1 provides details of the debate). In the 1950s, the judicial, tax and accounting authorities finally seem to reach the consensus that stock dividends are analogous to stock splits; they are not income to shareholders and thus are not taxable. Although the authorities reach the consensus in the 1950s, the shareholders remain largely indifferent between cash dividends versus stock dividends, according to the findings of the mail survey quoted at the beginning of the paper and more surveys discussed in Section 2.1. Given shareholders' preference for stock dividends, it is unsurprising that many firms distribute stock dividends in the history. In short, stock dividends are widely used in the past because investors misunderstand the economic substance of stock dividends and mistakenly equate them to cash dividends.

The misunderstanding seems obvious in today's standard. Nevertheless, it could take a long time to correct it because the misunderstanding is widespread in the early history of the American commercial history and is deep-rooted in some supporters' mind. At least three factors will help to correct the misunderstanding. First, it is reasonable to expect that the supporters of the stock-dividend-is-income view will gradually learn from the long-lasting and ubiquitous debate over the economic substance of stock dividends, no matter how slow the learning is. Second, these supporters will gradually pass away, and will be replaced by younger generations of investors who are more likely to accept the orthodox view of stock dividends held by the judicial, tax and accounting authorities. The third factor is the increasing presence of institutional investors over time. Institutional investors own a trivial fraction of United States corporate equities in the 1950s, but own almost a half of them in recent years (see Figure 1). Compared to retail investors, institutional investors are more professional and less likely to misunderstand the economic substance of stock dividends.

The first two factors—the speed of investor learning and the replacement of older investors who misunderstand stock dividends—are difficulty to measure using existing databases. On the other hand, we have data on institutional investor ownership of corporate equities; we therefore test the misunderstanding-learning hypothesis mainly by examining the third factor, i.e., the effects of institutional investors on the firm's stock dividend decision. In doing so, we employ two methods to identify the effects of institutional investors on the firm's stock dividend decision, one at the aggregate level and the other at the firm level. At the aggregate level, we find that the aggregate ownership of institutional investors in corporate equities is negatively associated with the fraction of firms that pay stock dividends; the Granger causality tests in vector auto-regressions (VARs) suggest that the direction of causation runs

from institutional ownership to stock dividend decision but not the other way round. At the firm level, we run instrumental variable (IV) regressions and find evidence suggesting causal and negative effects of institutional ownership on the firm's propensity to distribute stock dividends. Taken together, the aggregate- and firm-level results all indicate that institutional ownership has negative and causal effects on the likelihood that the firm distributes stock dividends, consistent with the misunderstanding-learning hypothesis.

The instrumental variable regression exploits the difference in institutional ownership between the stocks at the top of the Russell 2000 index and the stocks at the bottom of the Russell 1000 index, following Appel, Gormley, and Keim (2016). FTSE Russell assigns the largest 1000 stocks into the Russell 1000 index and the next largest 2000 stocks into the Russell 2000 index. Each stock's portfolio weight within the index is proportional to its market capitalization. As a result, the stocks at the top of the Russell 2000 index have much greater portfolio weights than those at the bottom of the Russell 1000 index and thus have significantly greater ownership by passive institutional investors who track the Russell indices. We analyze the 100 stocks at the top of the Russell 2000 index and the 100 stocks at the bottom of the Russell 1000 index, which have similar market capitalizations, and use the Russell 2000 index as an instrumental variable for the stock's ownership held by passive institutional investors. Consistent with the results of Appel et al., we find that the Russell 2000 stocks are associated with significant greater institutional ownership. In the second stage, we regress the firm's stock dividend decision on the fitted institutional ownership and other controls, and find a negative and significant coefficient on the fitted institutional ownership. The results are qualitatively unchanged when we expand the bandwidth to 200, 300, 400, or 500 stocks; they suggest that

institutional investors reduce the likelihood that the firm distributes stock dividends to shareholders.

Our finding of vanishing stock dividends sheds new light on the hypothesis that stock dividends are a credible signal of positive information. Under the signaling hypothesis, stock dividends bring the nominal stock price to the optimal range and thus reduce the trading cost and enhance firm value; firms without positive private information find it costly to reduce the nominal stock price using stock dividends because the price could drop below the optimal range in the future without positive information (Brennan and Copeland, 1988). That stock dividends are vanishing imposes a challenge to the signaling hypothesis: to explain the phenomenon, the signaling hypothesis must answer (1) why firms use stock dividends as a credible signal of positive information in the earlier years, and (2) why firms stop doing so in recent years. It is hard to argue that stock dividends are a credible signal in the earlier years but not anymore in recent years: stock dividends reduce the nominal stock price in the 2010s as well as in the 1950s. In addition, we find that firm profitability significantly deteriorates rather than improves after stock dividends. Furthermore, we find that stock returns around the announcement of the stock dividend decrease as the firm announces more and more follow-on stock dividends, and become economically small and marginally significant after the firm announces more than twenty stock dividends. Taken together, these results impose a challenge to the signaling hypothesis.

Our study contributes to the literature from three aspects. First, we are the first to document the phenomenon of vanishing stock dividends. As a major form of corporate distribution, stock dividends are widely used in the past. Documenting the vanishing (actually close to extinction) of stock dividends helps researchers understand the dynamics of corporate distribution policies. Second, we not only document the phenomenon but also explain why stock

dividends are vanishing. In doing so, we show that investor misunderstanding could have significant effects on management's corporate distribution decisions, and that how long it could take to correct an obvious investor misunderstanding. Third, we provide new evidence on the signaling hypothesis of stock dividends; the additional evidence imposes additional challenge to the signaling hypothesis.

Our study builds on two strands of literature. Fama and French (2001) show that the fraction of firms that pay cash dividends significantly decreases from about 90% in the 1940s to just above 20% in the late 1990s. DeAngelo, DeAngelo, and Skinner (2004) adds that, while the fraction of cash dividend payers decreases, the aggregate amount of cash dividends has been increasing: the firms that stop paying cash dividends used to pay small amounts of cash dividends, while the firms that continue to pay tend to pay more. In other words, cash dividends are not vanishing. We add to the two studies and show that stock dividends are indeed vanishing. Both studies and ours highlight that corporate distribution policies are changing over time. The paper also relates to the studies on stock dividends (we discuss these studies in more detail in Section 3.2.1). We add to this literature with new findings on the dynamics of the announcement return and on the declining profitability after stock dividends.

2. The birth and vanishing of stock dividends

2.1. The birth and economic substance of stock dividends

Stock dividends originate in the late seventeenth century in British companies, dating back to at least 1682 in the East India Company and several years later (1690) in the Hudson's Bay Company (Cobleigh, 1951). Stock dividends are controversial since their commencement: people disagree about their economic substance, in particular, whether stock dividends are income to shareholders. Some argue that they are income because of their similarity to cash dividends, but others contend that a stock dividend simply splits the firm's existing stocks without influencing the firm's assets or the shareholders' economic interests in the firm. The question on the economic substance of stock dividends is first raised and debated in the Britain because stock dividends are largely a British phenomenon in their early life. At the beginning of the nineteenth century—more than a century after the commencement of stock dividends—the British Court of Chancery and the House of Lords determine that stock dividends are analogous to stock splits and are not income to shareholders (Chartfield and Vangermeersch, 1996).

Stock dividends are also controversial in the United States of America. The early American corporate history is plagued by security fraud including stock watering, especially in the railroad industry. From the 1860s to the beginning of the twentieth century, many railroad companies water their stocks by issuing stock dividends (Ripley, 1911; p. 98):

"Stock watering—a much abused term—may be defined as an increase of nominal capitalization of a corporation without a commensurate additional investment of funds. The baldest and simplest form—probably the one primarily responsible for the odium attached to the term by the general public—is the outright declaration of a stock or bond dividend. In this case no new capital whatever is put into the company."

Many states outlaw the use of stock dividends because of the concern of their usage for the purpose of stock watering; even in the early twentieth century, most states still prohibit firms from distributing stock dividends unless the full stated par value of the newly issued stocks are paid into the corporation (Hovenkamp, 2014).

Whether stock dividends are income to shareholders is especially important for personal trust management when the trust principal, or corpus, consists of stocks and when the trust has

dual beneficiaries, the life tenant and the remainderman. The life tenant is supposed to receive the income from the corpus, while the remainderman receives the corpus upon the termination of the trust. When the trustor is not specific about who will receive the stock dividends paid to the corpus stocks, the court must decide whether the stock dividends are income (and thus go to the life tenant rather than the remainderman). The judicial decisions on this issue result in three rules about the allocation of stock dividends between the life tenant and the remainderman: the Massachusetts Rule, the Pennsylvania Rule, and the Kentucky Rule (Buellesbach, 1952).

The Massachusetts Rule, established in 1868 in *Minot v. Paine*, distinguishes between the corporation and its owners. The corporation's assets are under the control of the managers; the owners cannot access the assets unless the managers distribute the assets to the owners (for example through cash dividends). The Massachusetts Rule implies that stock dividends are not income to the owners because stock dividends do not sever any assets from the corporation and do not allocate any tangible assets to the owners for their disposal. In contrast, in 1927 in *Robinson v. Robinson's Executor*, the Kentucky Rule determines that stock dividends are income to shareholders and should be allocated to the life tenant. The Massachusetts Rule and the Kentucky Rule are simple to follow in practice because they are clear about whether stock dividends are income.

The Pennsylvania Rule considers that the trustor intends to bequeath a certain amount of value, the intact value, to the remainderman (*Earp's Appeal* in 1857). The stock dividends are part of the intact value and belong to the remainderman when the earnings behind the stock dividends are accumulated before the life tenancy commences and the stock dividends are declared after the commencement of the trust. They belong to the life tenant if the earnings are accumulated after the commencement of the life tenancy. They shall be divided between the life

tenant and the remainderman so that the intact value is not impaired if the earnings are accumulated partly before and partly during the life tenancy. In practice, it is difficult to determine the intact value of the trust. The court tries to address the difficulty in 1932 in *Waterhouse's Estate*, but the rule remains "unworkable."

The Massachusetts Rule is approved by the Supreme Court in 1890 in *Gibbons v. Mahon*; it is accepted in the Uniform Principal and Income Act issued by the National Conference of Commissioners on Uniform State Laws. Many states approve the Massachusetts Rule and accept the Uniform Principal and Income Act: for instance, Pennsylvania adopts the act in 1945; Kentucky adopts it in 1956.

Whether stock dividends are income to shareholders also matters for taxation purposes. The Revenue Act of 1916 determines that stock dividends are taxable income based on their similarity to cash dividends. The act is challenged by the Supreme Court in 1918 in *Towne v*. *Eisner* and two years later in *Eisner v*. *Macomber*; the Supreme Court refers to *Gibbons v*. *Mahon* and determines that stock dividends are not income and thus are not subject to taxation. The Internal Revenue Code of 1954 excludes stock dividends from taxation, unless the stock dividends are to discharge preferred dividend obligations for the current or preceding taxable year. The stock dividends are also taxable if the firm allows the shareholder to choose between receiving stock dividends and receiving cash dividends or stock rights.

Instead of declaring a stock dividend, the firm can distribute a cash dividend to the shareholders and at the same time offer them rights to purchase additional stocks. If the shareholders choose to purchase additional stocks using the received cash dividend, the firm's cash balance remains unchanged, retained earnings decrease, and paid-in capital and the number of shares outstanding increase—these are the same as the effects of the stock dividend on the

firm's balance sheet. Some people therefore argue that the stock dividend is equivalent to the combination of the cash dividend and stock rights; it should be taxed because the cash dividend is taxed. The Supreme Court questions the equivalence: the shareholder could choose not to purchase additional stocks using the received cash dividend but instead sell the received stock rights in the market; in the case of the stock dividend, however, the firm does not offer the shareholder with this choice.

Consistent with the view of the judicial and tax authorities, the accounting authority—the American Institute of Accountants—issues the *Accounting Research Bulletin No. 11* in 1941, which refers to *Eisner v. Macomber* and states that stock dividends do not change the firm's assets or the economic interests of the shareholders. The bulletin requires that the firm reduces retained earnings by the amount of the market value of the stocks issued through stock dividends; the par value of the stocks goes to the capital account and the rest goes to capital surplus. In 1952, the American Institute of Accountants revises the *Accounting Research Bulletin No. 11* with minor changes. The revised bulletin suggests that stock dividends below 25% should follow the accounting treatment delineated in the original bulletin, but a large stock dividend that materially influences the share price should be treated as a stock split. The bulletin has not been revised since 1952 and remains the accounting principle of stock dividends.

In summary, stock dividends are controversial in the early United States commercial history. The controversy centers on whether stock dividends are income to shareholders; it lasts for at least nine decades in the United States from the 1860s (the stock watering of railroad companies) to the 1950s. The view that stock dividends are not income to shareholders seems to win out: it is widely accepted by the judicial, tax, and accounting authorities in the United States; it becomes orthodox in the 1950s and remains so today.

Although it is orthodox since the 1950s that stock dividends are not income to shareholders, about 15% of the public firms in the United States distribute stock dividends in the 1950s (see Figure 1). The prevalence of stock dividends seems inconsistent with the orthodox view of stock dividends. Why stock dividends are appealing to the investors although no assets are severed from the firm and no assets are distributed to the shareholders? Will stock dividends continue to be widely used in recent years? We proceed to examine the questions.

2.2. Vanishing stock dividends

To examine the temporal variation in the prevalence of stock dividends, we assemble a sample of stock dividends over the 1954-2017 period; stock dividends before 1954 are excluded from the sample because the official requirements of the size and accounting treatment of stock dividends are not in place until the early 1950s (as discussed above). We identify stock dividends declared to common stocks (share code 10 or 11) from the CRSP event file with the distribution code of 5533 or 5538, excluding those distributed by utility firms (SIC code 4900-4949), financial firms (SIC code 6000-6999), firms that are not listed on the NYSE, Amex or Nasdaq exchange, and firms that lack stock returns in CRSP. There are 8,888 such stock dividends. We retrieve stock prices and returns from the CRSP, accounting data from the Compustat, and institutional ownership data from the Thomson Reuters 13f database.

Table 1, Panel A, shows that stock dividends used to be prevalent in the 1950s but are vanishing in the 2010s. In the 1950s, about 15% of listed industrial firms distribute stock dividends every year; in the 1960s, more than 10% of listed industrial firms do so; the fraction of stock dividend paying firms steadily decreases to less than 10% in the 1970s, further decreases to below 5% since 1982 and below 1% since 1998, and finally drops to merely 0.16% in 2017. During the six decades from the 1950s to the 2010s, the likelihood that a firm pays stock

dividends drastically decreases by a factor of 75 (15% in the 1950s versus 0.2% in the 2010s). In 2017, merely five out of the 3000+ list industrial firms pay stock dividends to shareholders. The small number of stock dividend payers seems not to be temporary: fewer than ten firms pay stock dividends every year in the 2010s and the fraction of stock dividend payers is always below a quarter of one percent. Given the clear downward trend in the fraction of stock dividend paying firms (see Figure 1), it is reasonable to expect that stock dividends will be vanishing in the near future; we will not be surprised if they completely disappear.

Table 1, Panel B, presents the average fraction of stock dividend paying firms during the six sub-periods. The fraction of stock dividend paying firms decreases from about 13.66% over the 1954-1962 period to 0.22% over the 2007-2017 period. Not only seasoned public firms stop paying stock dividends, newly listed firms are also not paying: 8.67% of new lists pay stock dividends in the 1954-1962 period; the fraction declines to 6.80% in the 1963-1973 period and to merely 0.02% in the 1996-2006 period before slightly increasing to 0.29% in the 2007-2017 period.

Stock dividends are vanishing either because current stock dividend payers stop paying them or because current non-payers do not initiate them. Which factor plays a more important role? To answer the question, in Table 2 we examine the firm's stock dividend decision conditional on its stock dividend status in the preceding year. Start with the decision of the current stock dividend payers. About 55.9% of the stock dividend payers continue to pay in the next year over the 1954-1962 period. The propensity to continue to pay slightly increases to 57.0% over the 1963-1973 period and then decreases to 36.1% over the 1996-2006 period before increasing again to 52.4% in the 2007-2017 period. The numbers indicate that the propensity to continue to pay stock dividends does not decrease by much over time.

On the other hand, non-payers' propensity to initiate stock dividends significantly decreases over time. Over the 1954-1962 period, 7.2% of the non-payers start paying stock dividends in the next year; the fraction steadily decreases to 5.5% in the 1963-1973 period and is only 0.1% over the 2007-2017 period: the likelihood of stock dividend initiation drastically decreases by a factor of 70 (7.2% versus 0.1%) during the six decades. We further divide the non-payers into former payers and never-paid firms depending on whether the firm had ever paid stock dividends before the year, and find that both former payers and never-paid firms are less likely to initiate stock dividends in recent years. For the firms that have never paid stock dividends as of year *t*-1, the probability of stock dividend initiation in year *t* decreases from 5.6% over the 1954-1962 period to less than 0.1% over the 2007-2017 period. For the firms that do not pay in year *t*-1 but paid before, the probability of stock dividend initiation in year *t* decreases from 8.9% to 0.2% during the six decades.

Taken together, Tables 1-2 show that stock dividends, once prevalent in the 1950s, are vanishing recently: only about 0.2% of listed firms pay stock dividends in the 2010s. Whereas current stock dividend payers often continue to pay, merely 0.1% of non-payers and 0.3% of newly listed firms pay stock dividends in the 2007-2017 period. Since non-payers greatly outnumber payers, the net effect is the declining popularity of stock dividends: the fraction of firms that pay stock dividends decreases by a factor of 75 over the six decades from the 1950s to the 2010s. In the rest of this section, we examine whether the vanishing of stock dividends is attributable to the changing firm characteristics over the six decades.

2.3. Changing firm characteristics and the vanishing of stock dividends

Characteristics of the listed firms have experienced significant changes over the past six decades (Fama and French, 2001; Kahle and Stulz, 2017). For instance, almost all firms already

make profits at the time of the initial public offering (IPO) back in the 1950s, but much more firms go public when they are still losing money in recent years, especially during the "Internet Bubble" period. The summary statistics provided by Professor Jay Ritter on his website show that in the 1980s more than three quarters of firms make profits at the time of IPO; the fraction of money-losing IPO firms is astonishingly 80% in 2000, the peak of the "Internet Bubble" period, and remains as high as 71% in 2015.¹ If firm characteristics determine the stock dividend decision, the vanishing of stock dividends could be attributable to the changing firm characteristics. Following Fama and French (2001), we examine whether temporal variations in several important firm characteristics help explain the vanishing of stock dividends. The characteristics, whose definitions are provided in the Appendix, include firm profitability proxied by return on assets (ROA), asset growth, Tobin's Q, firm size, leverage ratio, distributions of cash dividends, and share repurchases.

Table 3, Panel A, presents the characteristics of the stock dividend payers and nonpayers. Stock dividend payers are smaller and less profitable than non-payers, and have greater asset growth rate and Tobin's Q; the differences in these characteristics could help explain their stock dividend decisions. On the other hand, stock dividend payers and non-payers have similar debt leverage ratios, similar amounts of cash dividends, and similar magnitudes of share repurchases.

We then investigate the associations between the firm characteristics and the stock dividend decision in multivariate regressions. Specifically, we estimate logit regressions where the dependent variable takes the value of one if the firm pays stock dividends in the year and zero otherwise and the explanatory variables are the contemporaneous firm characteristics. We

¹ <u>https://site.warrington.ufl.edu/ritter/files/2016/03/Initial-Public-Offerings-Updated-Statistics-2016-03-08.pdf</u>

cluster the regression residuals by firm and year following the suggestions of Petersen (2009). Our multivariate regressions are constrained to the 1963-2017 period because accounting data in the Compustat database are unavailable until 1963.

The first column of Table 3 Panel B presents the estimation results of the logit regression over the whole sample period: 1963-2017. During the whole period, small and fast-growing firms and more profitable and more indebted firms are more likely to pay stock dividends, while firms with high Tobin's Q are less likely to do so. Cash dividend payers are more likely to pay stock dividends over the whole sample period, indicating that cash and stock dividends are complementary distributions to shareholder. On the other hand, firms that repurchase stocks are less likely to pay stock dividends, suggesting that share repurchase and stock dividends are substitutes: this is unsurprising because stock dividends increase the firm's number of shares outstanding while share repurchases reduce it.

The associations between firm characteristics and the stock dividend decision could vary over time. We therefore estimate the logit regression for each of the five subperiods—1963-1973, 1974-1984, 1985-1995, 1996-2006, and 2007-2017—and present the estimation results in columns (2)-(6) of Panel B of Table 3. The coefficients on ROA, log assets, Tobin's Q, and share repurchases are largely in line with those in column (1) based on the whole sample period: more profitable firms are more likely to pay stock dividends in four of the five subperiods and in the whole period; small firms, firms with high Tobin's Q, and firms that repurchase less stocks are more likely to pay stock dividends in the whole period (column 1) seems to be driven by the first two subperiods: since 1985, the coefficient on asset growth has been statistically insignificant, albeit still positive. The coefficient on leverage ratio is positive and

significant during the 1974-1984 and 1985-1995 periods, but are insignificant in the other three subperiods, suggesting that the significantly positive coefficient on leverage ratio in the whole period shown in column (1) is driven by the periods of 1974-1984 and 1985-1995.

While cash dividends are positively associated with stock dividends over the whole sample period and in the last three subperiods since 1985, the association is significantly negative in the 1963-1973 period. The negative association in the 1963-1973 period is consistent with the finding of Lakonishok and Lev (1987) that firms use stock dividends to substitute for cash dividends in their sample period of 1963-1982. The positive association between cash dividends and stock dividends since 1985, however, suggest that they have become complements in recent years.

In summary, Table 3 shows that small and more profitable firms, firms with high Tobin's Q, and firms that repurchase less stocks are more likely to pay stock dividends during the whole sample period and in most subperiods. On the other hand, asset growth and leverage ratio are significantly associated with the stock dividend decision only in the early half of the sample period. In addition, cash dividends substitute for stock dividends in the 1963-1973 period but complement them after 1985. On balance, the results indicate that the firm characteristics are significantly associated with the firm's stock dividend decision, although the associations are often sensitive to the sample period.

Since firm characteristics change over time, the significant associations between the firm characteristics and the stock dividend decision lead to a natural question: are stock dividends vanishing because the firm characteristics are changing? Fama and French (2001) ask a similar question: are cash dividends disappearing because of changing firm characteristics. Because of the similarity of the two questions, we test our hypothesis using the method of Fama and French.

The method has three steps. In the first step, we estimate the aforementioned logit regression using the data in the 1963-1973 period; the regression results are presented in column (2) of Table 3 Panel B. We then estimate the probability that a firm will pay stock dividends in each year after 1973 using the firm's characteristics in the year and the estimated coefficients on the firm characteristics over the 1963-1973 period. The predicted probability is the likelihood that a firm will pay stock dividends in the year given its contemporaneous characteristics. If changing firm characteristics cause the declining probability of stock dividend payment, the predicted probability of stock dividend payment will be close to the observed probability. Therefore, in the third step we compare the observed probability versus the predicted probability of stock dividend payment.

Table 4, Panel A, presents the observed versus the predicted probabilities of stock dividends for public industrial firms with available stock returns and accounting data. The observed probability is much smaller than the predicted probability during each of the four subperiods after 1973. For example, the model predicts that 10.0% of the firms will pay stock dividends during the 1974-1984 period, but only 7.0% of the firms actually paid stock dividends: there is a gap of 3.1 percentage points between the observed and the predicted probabilities. The gap widens to 8.0 percentage points in the 1985-1995 period and reaches 8.9 percentage points in both the 1996-2006 period and the 2007-2017 period. The gap arises because of the declining observed probability of stock dividends; the characteristic-based predicted probability of stock dividends that changing firm characteristics barely contribute to the vanishing of stock dividends.

In addition to predicting the probability of stock dividend payment for the pool of all public firms, we also predict the probability separately for the firms that pay stock dividends in the preceding year, for the former stock dividend payers, and for the firms that never paid stock dividends before the year. For each of the three categories of firms, we estimate the aforementioned logit regression using only the firms in the same category in the 1963-1973 period. We then predict the probability that the firms in the same category will pay stock dividends in each year year after 1973 using its contemporaneous firm characteristics and the coefficient estimates based on the 1963-1973 data.

Panels B-D of Table 4 compare the observed probability versus the predicted probability of paying stock dividends for each of the three categories of firms. Start with the current payers, the results for which are reported in Panel B. Recall that the current payers' propensity to continue to pay does not significantly decrease in the past six decades: the likelihood of continuing to pay stock dividends is 55.9% in the 1954-1962 period versus 52.4% in the 2007-2017 period (see Table 2). Consistent with the results, Panel B of Table 4 shows that the predicted probability of stock dividend continuation is very close to the observed probability with a gap of merely -0.5 percentage points (55.5% versus 56.0%) in the 1974-1984 period. While the predicted probability is lower than the observed probability in the next two subperiods with gaps of 8.3 percentage points and 21 percentage points, the gap turns negative (-3.4 percentage points) again in the 2007-2017 period. On balance, current stock dividend payers are as likely to continue to pay in recent years as before; they are not responsible for the vanishing of stock dividends.

On the other hand, the predicted probability of stock dividend payment greatly exceeds the observed probability for each of the other two categories of firms and over each of the four

subperiods after 1973. For the former stock dividend payers (Panel C), the gap between the observed probability and the predicted probability is 1.3 percentage points in the 1974-1984 period; it increases to 2.8 percentage points in the 1985-1995 period and further increases to about 3.2 percentage points in both the 1996-2006 period and the 2007-2017 period. For the firms that never paid stock dividends before (Panel D), the gap is positive throughout the four subperiods, ranging between 2.3 percentage points in the 1974-1984 period and 3.5 percentage points in the 1985-1995 period. The results in Panels C-D are consistent with those in Table 2, and both suggest that stock dividends are vanishing because non-payers are less likely to initiate stock dividends in recent years than before.

Taken together, Table 4 shows that changing firm characteristics cannot explain the vanishing of stock dividends. The predicted probability of stock dividend payment only slightly decreases over time; this is true not only for the whole sample of firms but also for the current payers and the non-payers separately. Whereas the results suggest that the vanishing of stock dividends is not attributable to changing firm characteristics, they do not answer why stock dividends are vanishing. In the next section, we answer the question with a specific focus on investors learning and the roles of institutional investors.

3. Why are stock dividends vanishing?

The results in Section 2 beget the question: why are stock dividends vanishing? A legitimate answer to the question must explain both the prevalence of stock dividends in the earlier years and the vanishing of stock dividends in recent years. In the rest of the section, we formulate and test an answer based on investor learning. We also present new evidence on the

signaling hypothesis of stock dividends and discuss the implications of the vanishing of stock dividends for the signaling hypothesis.

3.1. Investor learning and the vanishing of stock dividends

We hypothesize that stock dividends are widely used in the earlier years because numerous investors misunderstand the economic substance of stock dividends: they mistakenly equate stock dividends with cash dividends and believe that a stock dividend distributes corporate earnings to them. The investors gradually realize the misunderstanding and correct it. In addition, institutional investors hold more and more corporate equities in recent years; they are less likely to prefer stock dividends to cash dividends because they are professional and are unlikely to misunderstand the economic substance of stock dividends. As investors gradually correct the misunderstanding, their demand for stock dividends dwindles and consequently stock dividends are vanishing in recent years. In the rest of this subsection, we formulate and test the misunderstanding-learning hypothesis.

3.1.1. Investor misunderstanding and the prevalence of stock dividends in the earlier years

As noted above, stock dividends are controversial in the early American commercial history; the controversy centers on whether stock dividends are income to shareholders. The controversy arises because numerous shareholders mistakenly equate stock dividends with cash dividends. The misunderstanding of stock dividends is so prevalent that many state courts, following the Pennsylvania Rule and the Kentucky Rule, determine that stock dividends are income to the life tenant of the trust fund. Even the judicial authority could misunderstand the economic substance of stock dividends, it is unsurprising that the investors, predominantly retail ones in the 1950s, also misunderstand it.

Mail surveys of retail investors suggest that the investors indeed misunderstand the economic substance of stock dividends in the 1950s. In two surveys of thousands of retail investors in 1951 and 1958, Clendenin (1958, p. 50) finds that most stockholders prefer stock dividends being at least a part of the firm's distribution to stockholders; these investors are largely indifferent between cash dividends and stock dividends (see the quotes at the beginning of the paper).

Mail surveys of corporate managers also suggest that investors misunderstand the economic substance of stock dividends in the earlier years. In the survey of 120 executives of the firms that have distributed stock dividends to stockholders, Sussman (1962) finds that one third of the firms distribute stock dividends because investors want them. For example, two executives reply to the questionnaire as follows:

"In recent times, such [stock] dividends seem to have been the style and for some reason, they are of interest to shareholders as is witnessed by the fact that our omission of a stock dividend so far this year has caused a number of inquiries as to the reason for the lack of action."

"When we discontinued the stock dividend ... we received several letters from stockholders who felt that we had deprived them of a substantial part of their regular return."

In the same survey of corporate executives, seventy-eight percent of the firms indicate that they distribute stock dividends to conserve cash; that is, stock dividends substitute for cash dividends. For instance, the reply of one executive reads:

"An alternative to stock dividends might be the increasing of the regular cash dividend. Many companies, however, in my opinion are reluctant to do this, being unwilling to assume the payment of a regular increased dividend. They prefer rather to pay from time to time extra dividends in the nature of cash or stock."

The findings of the mail surveys suggest that investors are largely indifferent between cash dividends and stock dividends, likely because they misunderstand the economic substance of stock dividends. In the thorough study of stock dividends in the 1950s, Sussman (1962) concludes that "in public statements concerning stock dividends and in replies to this study's questionnaire, information was presented which was theoretically and practically incorrect or misleading."

Taken together, the extant studies all suggest that the investors misunderstand the economic substance of stock dividends in the earlier years; the misunderstanding, together with managers' incentive to conserve cash, leads to the prevalence of stock dividends in the 1950s and a couple of decades after that.

3.1.2. Institutional investors and the vanishing of stock dividends

Whereas stockholders misunderstand the economic substance of stock dividends in the earlier years, it is reasonable to expect them to gradually learn and correct their misunderstanding. As noted above, the federal court and most state courts accept that stock dividends are not income to stockholders in the 1950s after decades of discussions and debates; the tax and accounting authorities also accept the view by the 1950s. It would be surprising if stockholders do not learn from the long-lasting and ubiquitous debate on stock dividends. In addition, since the view that stock dividends are not income to investors becomes orthodox in the 1950s, younger generations of investors are expected to be influenced by the view. As younger investors gradually replace older ones, the demand for stock dividends will likely dwindle. Of

course, the learning process could be slow: some stockholders could still prefer stock dividends in the few decades after the 1950s.

Institutional investors are professional and more experienced than retail investors; they are less likely to equate stock dividends with cash dividends. In addition, distributing stock dividends is costly and inconvenient because the firm must distribute the newly created stocks to the stockholders and must file with the Securities and Exchange Commission (Sussman, 1962). Therefore, institutional investors are unlikely to prefer stock dividends, which are costly but do not bring material changes to their economic interests in the firm. This implies that the ownership of institutional stockholders will reduce the likelihood that the firm pays stock dividends. We test the prediction in the remainder of this subsection.

3.1.2.1. Aggregate institutional ownership and the fraction of stock dividend paying firms

In Figure 2, we plot the fraction of firms that pay stock dividends in each year from 1954 to 2017 against the aggregate ownership of institutional investors in corporate equities in the United States. The aggregate institutional ownership is retrieved from the Flow of Funds table of the Federal Reserve Board of Governors; it is the percent of corporate equities owned by insurance companies, private pension funds, state and local government retirement funds, federal government retirement funds, mutual funds, closed-end funds, and brokers and dealers.² The fraction of stock dividend paying firms is based on our stock dividend sample described in Section 2. The fraction of stock dividend payers decreases from about 15% in the 1950s to merely 0.16% in 2017; during the same period, the aggregate institutional ownership of

² Our vector auto-regression results remain qualitatively unchanged if we compute institutional ownership as one minus the equity ownership of the household sector. The Flow of Funds table of the Federal Reserve Board of Governors can be downloaded from this website: https://www.federalreserve.gov/releases/z1/

corporate equities drastically increases from less than 10% to more than 40%. That is, the fraction of stock dividend paying firms is negatively associated with the corporate equity ownership of institutional investors.

The negative association, however, does not speak of any causal effects of institutional investors on the firm's stock dividend decision. We examine whether the effect is causal using the vector auto-regression (VAR), which takes advantage of the temporal variations in the aggregate institutional ownership and the fraction of stock dividend payers. Assuming that there are multiple endogenous variables, a VAR regression tests which variable causes which by regressing the vector of the endogenous variables on the lagged values of these variables. On the left hand side (LHS) of our VAR regression are the aggregate institutional ownership and the fraction of stock dividend payers in each year from 1955 to 2017; on the right hand side (RHS) are the one-year lagged values of the two variables.

Table 5 presents the VAR estimation results. In column (1) of Table 5, where the LHS variable is the fraction of stock dividend payers, the coefficient on the lagged fraction of stock dividend payers is positive and that on the lagged institutional ownership is negative; both coefficients are statistically significant at the one percent level. The Granger causality test indicates that the lagged institutional ownership has a negative causal effect on the fraction of firms that pay stock dividends. In column (2), where the LHS variable is the aggregate institutional ownership, the coefficient on the lagged fraction of stock dividend payers is negative but insignificant, while that on the lagged institutional ownership is positive and significant at the one percent level. The Granger causality test fails to reject the null hypothesis that the lagged fraction of stock dividend payers does not have any causal effects on institutional

ownership. Taken together, these results indicate that institutional ownership has causal effects on the stock dividend decision, but not the other way round.

3.1.2.2. Institutional ownership and the firm's propensity to paying stock dividends

In addition to the analysis at the aggregate level, we also investigate the effects of institutional ownership on the stock dividend decision at the firm level in logit regressions. The dependent variable of the logit regression is an indicator of whether the firm pays stock dividends in the year; the independent variables are the firm's contemporaneous institutional ownership and the contemporaneous firm characteristics discussed in Section 2. The regression is confined to the 1980-2017 period in which the firm-level institutional ownership data are available in the Thomson-Reuters 13f database. Reported in column (7) of Table 3 Panel B, the logit regression results show a negative coefficient on institutional ownership; it is highly statistically significant with an associated t-statistics of -14.5. Consistent with the negative association at the aggregate level, the results suggest that institutional ownership is also negatively associated with the likelihood of stock dividend payment at the firm level.

We further investigate whether institutional investors causally influence the firm's stock dividend payment using an instrumental variable (IV) regression. An appropriate IV shall affect the firm's stock dividend payment only through its effects on the firm's institutional ownership—finding such an IV is not easy. We borrow the IV of Appel, Gormley, and Keim (2016), who show that the portfolio weights that FTSE Russell assigns to the stocks in the Russell 1000 and 2000 indices lead to variations in the firm's institutional ownership that are exogenous to corporate decisions. The Russell 1000 index includes the largest 1000 stocks in terms of the free float market capitalization at the end of May every year; the Russell 2000 index includes the next largest 2000 stocks. Both indices assign portfolio weights to their constituent

stocks based on the stock's float-adjusted market capitalization. Consequently, the stocks at the bottom of the Russell 1000 index receive significantly smaller portfolio weights than the stocks at the top of the Russell 2000 index, although these stocks have similar market capitalizations. For example, the largest stock in the Russell 2000 index receives a much larger portfolio weight than the smallest stock in the Russell 1000 index although they have very close market capitalizations.

Because of the difference in their portfolio weights, the stocks at the top of the Russell 2000 index receive a greater amount of investment from passive investors who invest in market indices than the stocks at the bottom of the Russell 1000 index do. That is, the stocks at the top of the Russell 2000 index tend to have higher institutional ownership than those at the bottom of the Russell 1000 index. Consistent with the reasoning, Appel, Gormley, and Keim (2016) find that the stocks at the top of the Russell 2000 index have significantly higher ownership by passive mutual funds than the stocks at the bottom of the Russell 1000 index.

We use the difference in the ownership of passive institutional investors between the stocks at the cutoff point of the Russell 1000 and 2000 indices to examine whether institutional ownership has causal effects on the firm's stock dividend decision in an IV regression. The IV regression is essentially a fuzzy regression discontinuity (RD) analysis of a certain number of stocks that are just around the cutoff point between the Russell 1000 index and the Russell 2000 index (Angrist and Pischke, 2009). Researchers usually choose N firms from the group below the cutoff point and N firms from the group above the cutoff point. A narrower bandwidth (i.e., a smaller N) makes the selected stocks from the two indices more similar to each other, but likely reduces the test power because of the smaller number of observations. We use five

bandwidths—100, 200, 300, 400, and 500—to balance between the test power and the similarity of the selected stocks, and to check the robustness of our results.

For each year from 1997 to 2006, we retrieve the largest N stocks in the Russell 2000 index and the smallest N stocks in the Russell 1000 index, and retrieve the ownership of passive institutional investors (classified by Bushee (1998)) as of September that year from the Thomson Reuters 13f database. We only include the ownership of passive institutional investors in the analysis because active investors usually do not invest on passive indices like the Russell 1000 index or the Russell 2000 index, and Appel, Gormley, and Keim (2016) show that passive institutional investors also have significant impacts on firm decisions. As in Appel et al., the RD analysis is restricted to the 1997-2006 period because FTSE Russell provides the constituent stocks' free float starting from 1997 and it changes the weighting schemes of the Russell 1000 and 2000 indices after 2006.

Given the similarity between our analysis and that of Appel et al., we use their first-stage regression:

$$IO_{it} = \mu + \theta_0 R2000_{it} + \sum_{k=1}^{3} \theta_k Ln(MV_{it})^k + \sigma Ln(Float_{it}) + F_t + u_{it},$$
(1)

in which the dependent variable is the ownership of passive investors in firm *i* in year *t*; $R2000_{it}$ is an indicator that takes the value of one if firm *i* is in the Russell 2000 index in year *t*, and zero if it is in the Russell 1000 index; MV_{it} is firm *i*'s market capitalization in CRSP at the end of May year *t*; $Float_{it}$ is firm *i*'s float-adjusted market capitalization computed by Russell; and F_t is the year fix effects. The regression controls for the third-order polynomials of market capitalization and the float-adjusted market capitalization because market capitalization is the key variable that affects whether the stock will be included in the Russell 2000 index or the Russell 1000 index (Angrist and Pischke, 2009).

In the second stage, we estimate the logit regression for the firm's stock dividend decision:

$$Prob(SD_{it} = 1) = \frac{\exp\{X'_{it}\vartheta\}}{1 + \exp\{X'_{it}\vartheta\}}$$
$$X'_{it}\vartheta \equiv \alpha + \beta \widehat{IO}_{it} + \sum_{k=1}^{3} \gamma_k Ln(MV_{it})^k + \delta Ln(Float_{it}) + F_t,$$
(2)

where SD_{it} is an indicator for firm *i*'s stock dividend decision in year *t*; \widehat{IO}_{it} is the predicted ownership of passive investors based on the first-stage estimation results, and the other variables are the same as in Equation (1).

Table 6, Panel A, presents the first-stage regression results for the five bandwidths ranging from 100 firms to 500 firms. The coefficient on the instrument variable, the Russell 2000 indicator, is positive and statistically significant throughout the five bandwidths with associated *t*-statistics of at least 5 and as large as 11, consistent with the findings of Appel, Gormley, and Keim (2016). In terms of the economic magnitude, the ownership of passive institutional investors is about 6 percentage points greater for the largest stocks in the Russell 2000 index than for the smallest stocks in the Russell 1000 index. The results indicate that the Russell 2000 stocks just below the cutoff point have greater ownership of passive institutional investors than the Russell 1000 stocks just above the cutoff point do.

Table 6, Panel B, presents the second-stage regression results, in which the key explanatory variable is the fitted value of the passive institutional ownership based on the first-stage regression results. The coefficient on the fitted passive institutional ownership is negative and statistically significant throughout the five bandwidths. Both the economic magnitude of the coefficient and the associated *t*-statistic tend to decrease as the bandwidth enlarges: the coefficient is -47.0 with an associated *t*-statistic of -3.0 in column (1), where the bandwidth is 100, to -14.4 with a *t*-statistic of -2.0 in column (5), where the bandwidth is 500. The economic

magnitude is greater with a narrower bandwidth because, with a narrower bandwidth, the firms from the two indices are more similar to each other and thus the effects of institutional ownership on the stock dividend decision are more likely to be identified by the coefficient (Angrist and Pischke, 2009). The results suggest that the firms at the top of the Russell 2000 index—who have higher institutional ownership because of the way FTSE Russell assigns portfolio weights to the constituent stocks in the two indices—are less likely to pay stock dividends than the firms at the bottom of the Russell 1000 index. Because the portfolio weights are out of the control of the passive institutional investors or the firm's managers, the results of the regression discontinuity analysis suggest negative and causal effects of institutional ownership on the likelihood that the firm pays stock dividends.

Based on two identification strategies, the results in Tables 4 and 5 suggest that institutional investors have causal effects on the firm's stock dividend decision. The Granger causality tests indicate that the aggregate institutional ownership in the United States causally affects the fraction of stock dividend paying firms, but not vice versa; the IV regression provides firm-level evidence that institutional investors have causal effects on the firm's stock dividend decision. The results are consistent with our hypothesis: as institutional ownership drastically increases from the 1950s to the 2010s, investors better understand the economic substance of stock dividends and thus are less likely to request firm managers to distribute stock dividends, causing stock dividends to vanish.

3.2. Signaling and the vanishing of stock dividends

3.2.1. Signaling firm prospects using stock dividends: Extant evidence

In the mail surveys of retail investors, Clendenin (1958, p. 48) finds that the investors prefer the stock price being between \$20 and \$50: "prices within the \$20 to \$50 range conform

to the tastes of nearly all individual investors, while those above and below these figures discourage a portion of the total potential market." Stock dividends could bring the stock price to the preferred range and thus attract more investors. Consistent with the reasoning, some corporate executives state that they use stock dividends to increase the number of shareholders by bringing the stock price to the preferred range (Sussman, 1962; p. 80). For example, one executive replies to Sussman's questionnaire as follows:

"The company feels that an increased number of ... stockholders helps the company to sell more of its services, since more people become interested in the company and if they did not patronize the company heretofore, they will do so after becoming stockholders if only to promote their own interests."

By bringing the stock price to the preferred range, stock dividends could serve as a credible signal for managers' positive private information about the firm's prospects. In the model of Brennan and Copeland (1988), for instance, the trading cost of a stock is the lowest when the nominal stock price is within a certain range; nominal prices outside the range raise the trading cost and thus impair shareholder value. The model shows that stock dividends could serve as a costly signal for managers' positive private information because stock dividends could reduce the nominal stock price to the optimal range, which in turn reduces the trading cost of the stock and enhances firm value. Without positive private information, however, the nominal stock price could drop below the optimal price range after the stock dividend. Hence, firms without positive private information find it costly to imitate the firms with positive information, who use stock dividends to reduce the nominal stock price.

The accounting principles require the firm to reduce retained earnings when it distributes stock dividends. The effect on retained earnings could also make stock dividends a credible

signal for managers' positive private information about firm prospectus (Grinblatt, Masulis, and Titman, 1984). Stock dividends reduce the amount of retained earnings by the market price of the stock dividends and increase paid-in capital by the same amount. Legal restrictions and debt covenants commonly restrict the distribution of cash dividends out of paid-in capital. Consequently, stock dividends weaken a firm's ability to pay cash dividends in the future if its future earnings are expected to be low. In other words, stock dividends could serve as a costly signal of future profitability: cash dividend payers with low future earnings will find it costly to pay stock dividends.

If stock dividends signal positive information about firm prospects, the stock price will increase upon the announcement of the stock dividend; in addition, the firm's operating performance will improve after the stock dividend. Extant studies test the predictions, and document ample evidence supporting the prediction of positive stock returns around the announcement of stock dividend. Grinblatt, Masulis, and Titman (1984) find two-day cumulative abnormal returns (CARs) of 4.90% around 382 stock dividend announcements over the 1967-1976 period; McNichols and Dravid (1990) find three-day CARs of 2.60% in a sample of 1,308 stock dividends over the 1976-1983 period. In a larger and more recent sample of 11,626 stock dividends from 1962-2012, Bessembinder and Zhang (2015) find five-day announcement CARs of 2.37%. On the other hand, the prediction of improved firm performance after stock dividends does not receive empirical support: for example, Lakonishok and Lev (1987) find insignificant changes in earnings growth after a sample of 1,257 stock dividends over the twenty years from 1962 to 1982.

In the model of Brennan and Copeland (1988), stock splits could also serve as a costly signal for managers' positive private information because they also reduce the nominal stock

price, and by more than stock dividends do because of their larger split factors. Therefore, the model's implications for announcement returns and future operating performance carry over to stock splits. As in the case of stock dividends, prior studies find positive stock returns around stock split announcements,³ but find conflicting results on long-term accounting and stock market performance after stock splits. For instance, some studies find positive earnings growth or increased analyst earnings forecasts after the announcement of stock split (Lakonishok and Lev, 1987; McNichols and Dravid, 1990; Kalay and Kronlund, 2012), whereas others find insignificant or declining firm profitability following stock splits (Asquith, Healy, and Palepu, 1989; Huang, Liano, and Pan, 2006). In addition, the long-run abnormal stock returns after stock splits are sensitive to both the sample period and the return benchmark, and are not present when researchers use characteristic-based benchmark returns or the calendar-time portfolio method to compute abnormal returns.⁴

In summary, the signaling hypothesis of stock dividends receives mixed empirical support: while the implication of positive announcement returns is supported by empirical evidence, that of improved long-run performance is not. Furthermore, Lakonishok and Lev (1987) find evidence that firms use stock dividends to substitute for cash dividends, and use stock splits to restore stock price to the preferred range. The collective evidence casts doubt on the use of stock dividends to signal firm prospectus. Below, we provide new evidence on the signaling hypothesis and discuss whether it is consistent with the phenomenon of vanishing stock dividends.

³ See, among others, Grinblatt, Masulis, and Titman (1984), Asquith, Healy, and Palepu (1989), McNichols and Dravid (1990), and Bessembinder and Zhang (2015).

⁴ See Fisher, Jensen, and Roll (1969); Ikenberry, Rankine, and Stice (1996); Desai and Jain (1997); Fama (1998); Ikenberry and Ramnath (2002); Byun and Rozeff (2003); Bessembinder and Zhang (2013); and Bessembinder, Cooper, and Zhang (2018).

3.2.2. Firm profitability around stock dividends

The first piece of our new evidence is on the prediction of the signaling hypothesis on firm profitability around stock dividend announcements. For each quarter t (= -12, -11, ..., 11, 12) around the stock dividend announcement, we subtract the firm's return on assets (ROA) and return on equity (ROE) by that in the announcement quarter (i.e., quarter 0); this normalizes the ROA/ROE in the announcement quarter to zero. To make the measures comparable across firms, we divide the adjusted ROA/ROE by its standard deviation over the twelve quarters before the announcement.

Table 7 reports the normalized ROA and ROE over the 25 quarters around the stock dividend announcements in our sample. We find that the normalized ROE is positive and statistically significant throughout the twelve pre-announcement quarters, indicating better profitability before stock dividends; it is negative and significant throughout the twelve quarters post announcement and follows a clear downward trend (see also Figure 2). The ROA follows a very similar pattern: it is positive before the stock dividend announcement, and negative and declining thereafter. The findings are consistent with Huang, Liano, and Pan (2006); they suggest that stock dividends are associated with negative information about future performance, which is the opposite of the prediction of the signaling model.

3.2.3. Firm investment around stock dividends

The previous subsection shows that stock dividends are unlikely to be a signal for improved firm profitability. In this subsection, we test whether stock dividends are a signal for increased investment rather than improved firm profitability. As noted above, stock dividends reduce retained earnings and increase paid-in capital by the same amount; because legal restrictions and debt covenants commonly prohibit the firm from distributing cash dividends to

shareholders out of paid-in capital, stock dividends increase the amount of capital reserved for investment and thus could be a signal for increased investment in the future.

To test this possibility, we compute the firm's investment rates (the ratio of capital expenditure to total assets and the ratio of capital expenditure to sales) in each of the 25 quarters around the stock dividend announcement, and normalize the ratios in the same way as we did in the previous subsection to ROA and ROE. Specifically, we subtract the ratio of capital expenditure to asset (Capx/Asset) and the ratio of capital expenditure to asset (Capx/Sales) by that of the announcement quarter (i.e., quarter 0), and then divide the adjusted Capx/Asset (Capx/Sales) by its standard deviation over the twelve quarters before the announcement.

Table 8 reports the normalized Capx/Asset and Capx/Sales ratios over the 25 quarters around the stock dividend announcement. Both ratios are negative and statistically significant in eleven of the twelve pre-announcement quarters, indicating smaller firm investment before the stock dividend. On the other hand, the Capx/Sales ratio is positive and significant throughout the twelve quarters after the stock dividend while the Capx/Asset ratio is positive and significant in ten of the twelve quarters. The findings suggest that on average the firms invest more after the stock dividend than before, consistent with our hypothesis.

Our findings suggest that firm profitability deteriorates while firm investment increases after the stock dividend announcement. One may argue that increased investment is a positive signal about firm prospectus, but the declining profitability implies that the additional investment does not improve firm performance. On balance, stock dividends are at best a mixed signal about firm prospectus.

3.3. The dynamics of stocks returns around the stock dividend announcement

The signaling hypothesis implies positive stock returns around the stock dividend announcement, as discussed above. It is less clear, however, what the signaling hypothesis implies for the dynamics of the announcement return. In particular, will the announcement return increase or increase as the firm announces more and more follow-on stock dividends? It will likely increase with the sequence order of the stock dividend if multiple signals are stronger than a single one; otherwise, it is likely not to depend on the sequence order of the stock dividend. On the other hand, when stock dividends do not contain positive private information (as shown in the declining profitability in Section 3.2.2), the announcement return will likely decrease as the firm announces more and more follow-on stock dividends: over time investors gradually learn that firm profitability deteriorates after the stock dividend. We therefore examine whether the announcement return changes with the sequence order of the stock dividend; the results will shed additional light on the signaling hypothesis versus the investor learning hypothesis.

Before exploring the relationship between the announcement return and the sequence order of the stock dividend, we confirm the well-documented positive announcement returns of stock dividends. Reported in Table 9 Panel A, the average 5-day (day -2 to +2) announcement CARs are 2.33% and statistically significant over the 1954-2017 period; they are positive and statistically significant in each of the six sub-periods, ranging between 0.36% in the 1954-1962 period and 3.31% in the 1974-1984 period.

In Table 9 Panel B, we sort the stock dividends into nine groups based on their sequence order and report the mean and median 5-day announcement CARs for each group. The sequence order is set to one if the firm does not announce any stock dividends during the preceding 24 months; it increases by one for each follow-on stock dividend announced by the same firm

within the following 24 months. The average announcement CARs decrease with the sequence order: they are 3.25% for the first stock dividend announcement, decrease to 2.49% and 2.18% for the second and third announcements, further decrease to below 2% after the fourth announcement, and finally drops to merely 0.44% when the sequence order is above twenty and become marginally significant at the ten percent level. The median CARs are smaller than the corresponding mean CARs and follow a similar pattern as the mean; after the firm announces fifteen stock dividends, the median announcement returns are around 0.4% and marginally significant at the ten percent level.

In addition to the univariate analysis in Table 9 Panel B, we examine the relationship between the announcement return and the sequence order of the stock dividend in multivariate regressions, in which the dependent variable is the announcement CARs and the explanatory variables are the sequence order and the amount of the stock dividend. Table 9 Panel C presents the regression results: column (1) presents the results for the whole sample period, while columns (2) and (3) are for the stock dividends in the periods of 1954-1984 and 1985-2017. The coefficient on the amount of stock dividend is positive and statistically significant at the one percent level in the whole period and also in the 1954-1984 period; it remains positive but becomes insignificant in the 1985-2017 period. The coefficient on the sequence order is negative and statistically significant at the one percent level in the whole period and also in the 1954-1984 period; it remains positive but becomes insignificant in the 1985-2017 period. The coefficient on the sequence order is negative and statistically significant at the one percent level in the whole period and in each of the two sub-periods, indicating that follow-on stock dividends receive less positive stock market responses. The results are consistent with that investors gradually learn the economic substance of stock dividends and thus greet follow-on stock dividends with lower returns; they are inconsistent with the prediction of the signaling hypothesis.

In summary, the stock dividend announcement return is on average positive and economically large. It decreases as the firm announces more and more follow-on stock dividends, and eventually becomes marginally significant, both economically and statistically. While the average positive announcement return is consistent with the prediction of the signaling hypothesis, that the announcement return decreases with the sequence order of the stock dividend is not. In addition, firm profitability drastically decreases following the stock dividend announcement, which is the opposite of the prediction of the signaling hypothesis. On balance, the results impose challenges on the hypothesis that stock dividends are a credible signal of positive private information.

4. Conclusions

We find that stock dividends are vanishing. The probability that the firm pays stock dividends decreases by a factor of 75 from about 15% in the 1950s to less than 0.2% in the 2010s. Our review of the history of stock dividends suggests that investors misunderstand the economic substance of stock dividends in the history, equating them to cash dividends. Although the United States judicial, tax and accounting authorities reach the consensus in the 1950s that stock dividends are different from cash dividends and are not income to shareholders, mail surveys indicate that the investors still seem to be largely indifferent between stock dividends versus cash dividends in the 1950s. The investors who misunderstand the economic substance of stock dividends seem to learn from the long-lasting debate over stock dividends and slowly correct the misunderstanding. In addition, younger generations of investors and institutional investors are less likely to misunderstand stock dividends are prevalent in the

1950s because numerous investors equate them to cash dividends and thus think they are income; they are vanishing as investors slowly learn and correct the misunderstanding. In support of the misunderstanding-learning hypothesis, both the Granger causality tests and the IV regression analysis suggest that institutional ownership has causal and negative impacts on the likelihood that the firm pays stock dividends.

Extant studies of stock dividends center on the signaling hypothesis in which stock dividends are a credible signal of positive private information; these include studies of stock returns around the stock dividend announcement and those of long-run accounting and stock market performance after stock dividends. We add to this strand of literature with new findings: one finding is that firm profitability deteriorates rather than improves after stock dividends; the other is that the announcement return decreases as the firm announces more and more follow-on stock dividends and eventually become economically small and marginally significant after the firm overuses stock dividends. It is a challenge for the signaling hypothesis to explain both these results and the phenomenon of vanishing stock dividends. It is hard to argue that stock dividends are a credible signal of positive information in the earlier years but not anymore in recent years: stock dividends reduce the nominal stock price in the 2010s as well as in the 1950s.

On balance, we conclude that stock dividends are vanishing, and may be extinct in the near future given that only several firms still pay stock dividends in each year in the 2010s. Stock dividends are widely used in the history because shareholders misunderstand their economic substance and mistakenly equate them to cash dividends. They are vanishing because shareholders gradually learn and correct the misunderstanding.

Appendix: Definition of Variables

Variable	Definition
Tobin's Q	V_t/A_t . V_t = Assets (Compustat variable <i>at</i>) – BE _t + stock price (<i>prcc_f</i>) times common shares outstanding (<i>csho</i>). BE _t = Stockholder's equity (<i>seq</i>) [or
	common equity (ceq) + preferred stock par value $(upstk)$; or total assets (at) -
	liabilities (lt)] – preferred stock + balance sheet deferred taxes and investment tax credit (<i>txditc</i>). Preferred stock = Preferred stock liquidating value (<i>pstkl</i>)
	[or preferred stock redemption value (pstkrv); or preferred stock par value
	(upstk)]. A _t : Total assets (Compustat variable <i>at</i>).
Asset growth	$(A_t - A_{t-1})/A_t$
ROA	E_t/A_t . E_t = Earnings before extraordinary items (<i>ib</i>) + interest expenses (<i>tie</i>) if available + income statement deferred taxes (<i>txdi</i>) if available.
ROE	Y_t/BE_t . Y_t = Earnings before extraordinary items (<i>ib</i>) – preferred dividends (<i>dvp</i>) + income statement deferred taxes (<i>txdi</i>) if available
Leverage	L_t/A_t . L_t : Liabilities (<i>lt</i>)
Cash dividends	Dividend per share times number of common shares outstanding
	$(dvpsx_f*csho)$, divided by market capitalization at the end of the last year $(prcc_f*csho)$.
Share repurchases	The expenditure on the purchase of common and preferred stocks (<i>prstkc</i>)
	minus any reduction in the redemption value of the net number of preferred
	shares (<i>pstkrv</i>), dividend by market capitalization at the end of the last year (<i>prcc</i> f^*csho).
Institutional ownership	Ownership of institutions recorded in the Thomson Reuters 13f database.
Ownership of quasi- index institutions	Ownership of "quasi-index" institutions, as classified by Bushee (1998).

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Figure 1: Percent of stock dividend payers and aggregate institutional ownership over time

This figure presents the percent of stock dividend payers of industrial firms in the CRSP database and the aggregate institutional ownership of U.S. corporate equities as reported in the Flow of Funds table of the Federal Reserve Board of Governors. Institutional ownership is the percent of corporate equities owned by insurance companies, private pension funds, state and local government retirement funds, federal government retirement funds, mutual funds, closed-end funds, and brokers and dealers. The sample period is from 1954-2017.



Figure 2: Firm profitability around stock dividend announcements

This figure depicts return on asset (ROA) and return on equity (ROE) of stock dividend payers over the 25 quarters around the stock dividend announcement. Quarter zero corresponds to the quarter of stock dividend announcement. To make the measures comparable across firms, we subtract each firm's quarterly ROA (ROE) by its ROA (ROE) in quarter zero, and then divide by the standard deviation of ROA (ROE) over quarters (-12, -1). The normalized ROA and ROE are winsorized at the top and bottom one percent. See the Appendix for variable definitions. Table 7 reports the same information.



Figure 3: Investment around stock dividend announcements

This figure depicts the ratio of capital expenditure to asset (Capx/Asset) and the ratio of capital expenditure to sales (Capx/Sales) of stock dividend payers over the 25 quarters around the stock dividend announcement. Quarter zero corresponds to the quarter of stock dividend announcement. To make the measures comparable across firms, we subtract each firm's quarterly Capx/Asset (Capx/Sales) by its Capx/Asset (Capx/Sales) in quarter zero, and then divide by the standard deviation of Capx/Asset (Capx/Sales) over quarters (-12, -1). The normalized Capx/Asset and Capx/Sales ratios are winsorized at the top and bottom one percent. See the Appendix for variable definitions. Table 8 reports the same information.



Table 1: Number and size of stock dividends

Panel A reports the number of qualified CRSP firms and the number of firms that pay stock dividends in each year from 1954-2017. Panel B reports the average number and the average percent of stock dividend payers and those of non-payers over different time periods. The annual percent of payers (non-payers) is calculated as the ratio of the number of stock dividend payers (non-payers) in year *t* to the total number of firms at the end of year *t*. Payers announce stock dividend distributions in year *t*, while non-payers do not. "Never Paid" refers to the group of firms that announced stock dividends before year *t*. "Former Payers" refers to the group of firms that announced stock dividends before year *t*. New lists are the firms that appear in the CRSP database for the first year. Our sample includes common stocks of industrial firms recorded in the CRSP database from 1954-2017, excluding firms with missing stock price or missing number of shares outstanding in the year.

	N	Ν	%		Ň	N	%
Year	Firms	Payers	Payers	Year	Firms	Payers	Payers
1954	915	90	9.84	1986	5082	130	2.56
1955	928	129	13.90	1987	5123	97	1.89
1956	922	161	17.46	1988	5024	98	1.95
1957	937	145	15.47	1989	4792	82	1.71
1958	926	97	10.48	1990	4635	60	1.29
1959	936	149	15.92	1991	4685	63	1.34
1960	966	154	15.94	1992	4855	62	1.28
1961	984	115	11.69	1993	5153	68	1.32
1962	1756	215	12.24	1994	5492	78	1.42
1963	1822	253	13.89	1995	5794	91	1.57
1964	1860	226	12.15	1996	6204	69	1.11
1965	1904	221	11.61	1997	6363	65	1.02
1966	1924	246	12.79	1998	6166	43	0.70
1967	1969	242	12.29	1999	5953	41	0.69
1968	1980	197	9.95	2000	5693	30	0.53
1969	2027	208	10.26	2001	5094	33	0.65
1970	2066	185	8.95	2002	4499	29	0.64
1971	2125	185	8.71	2003	4139	24	0.58
1972	4532	270	5.96	2004	3971	17	0.43
1973	4631	316	6.82	2005	3939	11	0.28
1974	4125	287	6.96	2006	3852	7	0.18
1975	3982	296	7.43	2007	3817	16	0.42
1976	4045	335	8.28	2008	3606	11	0.31
1977	3997	307	7.68	2009	3402	8	0.24
1978	3924	319	8.13	2010	3288	8	0.24
1979	3861	285	7.38	2011	3172	6	0.19
1980	4009	273	6.81	2012	3062	7	0.23
1981	4364	270	6.19	2013	3077	6	0.19
1982	4386	201	4.58	2014	3187	5	0.16
1983	4822	189	3.92	2015	3220	4	0.12
1984	4998	165	3.30	2016	3157	5	0.16
1985	4922	148	3.01	2017	3141	5	0.16

Panel A: Number and fraction of firms that pay	v stock dividends, by v	vear
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	1954-2017	1954-1962	1963-1973	1974-1984	1985-1995	1996-2006	2007-2017
		Counts of	of CRSP firm	s			
All firms	3,597	1,030	2,440	4,228	5,051	5,079	3,284
New lists	256	114	125	297	474	336	166
		Percents	of CRSP firm	ns			
Stock dividend payers	5.24	13.66	10.31	6.42	1.76	0.62	0.22
Non-payers	94.76	86.34	89.69	93.58	98.24	99.38	99.78
New lists	6.77	7.77	5.68	6.77	9.31	6.19	5.08
New lists that pay stock div.	2.88	8.67	6.8	2.31	0.26	0.02	0.29

Table 2: Stock dividend decisions in year t conditional on stock dividend status in year t-1

This table presents the probability that a firm pays stock dividends, does not pay stock dividends, is acquired, and delists in year *t* conditional on the firm's stock dividend status in year *t*-1. We first calculate the conditional probability for each year and then calculate the conditional probability over different time periods weighted by the total number of firms in a certain stock dividend status in year *t*-1. Payers announce stock dividend distributions in the year, while non-payers do not. "Never paid" refers to the group of firms that never announced stock dividends before the year. "Former payers" refers to the group of firms that announced stock dividends before the year but not in the year. Our sample includes common stocks of industrial firms recorded in the CRSP database from 1954-2017.

	1954-2017	1954-1962	1963-1973	1974-1984	1985-1995	1996-2006	2007-2017
	What happer	is in year t to j	firms that pay	stock dividen	ds in year t-1	(%)	
Continue to pay	53.19	55.87	57.02	53.46	48.65	36.08	52.44
Stop paying	46.81	44.13	42.98	46.54	51.35	63.92	47.56
	What happens ir	ı year t to firm	is that do not	pay stock divi	dends in year	t-1 (%)	
Start paying	1.79	7.24	5.51	3.17	0.93	0.40	0.10
Do not pay	98.21	92.76	94.49	96.83	99.07	99.6	99.9
	Percent of nor	1-stock divider	nd payers in y	ear t-1 that st	art paying in y	vear t	
All non-payers	1.79	7.24	5.51	3.17	0.93	0.40	0.10
Never paid	1.29	5.64	5.23	2.8	0.66	0.31	0.08
Former payers	3.21	8.85	5.89	3.82	1.69	0.88	0.22

Table 3: Firm characteristics and stock dividend decisions

Panel A presents summary statistics of firm characteristics of stock dividend payers and non-payers at the firm-year level. Payers announce stock dividend distributions in the year, while non-payers do not. See the Appendix for definitions of the characteristics. The firm characteristics are measured at the fiscal yearend that falls in calendar year *t*, and are winsorized at the upper and lower 1%. Panel B presents the logit regression results where the dependent variable takes the value of one if a firm pay stock dividends in the year, and zero otherwise. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	Ν	Mean	sd	p5	p25 N	Aedian	p75	p95
	Stock dividend payers							
Assets (\$m)	5958	253	966	7	21	53	143	1060
ROA	5954	0.06	0.08	-0.02	0.04	0.07	0.10	0.16
Asset growth	5899	0.13	0.16	-0.08	0.04	0.11	0.20	0.41
Tobin's Q	5658	1.43	1.01	0.73	0.92	1.13	1.57	3.06
Leverage ratio	5905	0.49	0.19	0.16	0.35	0.49	0.61	0.80
Cash dividends	5968	0.02	0.02	0.00	0.00	0.01	0.03	0.07
Share repurchases	5968	0.01	0.03	0.00	0.00	0.00	0.00	0.03
Institutional ownership	2246	0.19	0.19	0.01	0.05	0.13	0.28	0.58
_			Non sto	ock divid	end paye	ers		
Assets (\$m)	180575	1044	3350	4	24	96	467	4826
ROA	180327	-0.04	0.26	-0.54	-0.04	0.04	0.08	0.15
Asset growth	177995	0.07	0.30	-0.41	-0.03	0.07	0.19	0.56
Tobin's Q	177218	1.95	1.74	0.72	1.00	1.36	2.14	5.30
Leverage ratio	179864	0.50	0.27	0.11	0.30	0.47	0.64	0.96
Cash dividends	180996	0.01	0.02	0.00	0.00	0.00	0.02	0.06
Share repurchases	180996	0.01	0.04	0.00	0.00	0.00	0.00	0.08
Institutional ownership	146760	0.35	0.31	0.00	0.08	0.28	0.59	0.92

Panel A: Characteristics of stock dividend payers vs. non-payers

Panel B: Firm characteristics and stock dividend decisions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Time period	1963-2017	1963-197	3 1974-198	84 1985-199	5 1996-200	06 2007-202	171980-2017	
Dependent var.	Paying stock dividends in year t							
Log Assets	-0.28***	0.02	-0.13***	-0.11***	-0.27***	-0.17	-0.09***	
	(-16.19)	(0.47)	(-5.44)	(-3.26)	(-5.05)	(-1.12)	(-2.84)	
Tobin's Q	-0.38***	-0.23***	-0.42***	-0.31***	-0.07	-0.02	-0.25***	
	(-9.73)	(-5.47)	(-6.23)	(-4.47)	(-1.23)	(-0.22)	(-5.18)	
Asset growth	0.60***	0.94***	0.40***	0.20	0.02	0.71	0.31***	
	(8.51)	(5.22)	(3.27)	(1.52)	(0.11)	(1.01)	(3.08)	
ROA	6.67***	5.74***	7.03***	4.90***	3.99***	1.01	5.60***	
	(21.09)	(6.77)	(13.98)	(8.67)	(4.66)	(1.41)	(12.81)	
Leverage ratio	1.09***	-0.13	1.31***	0.47**	0.19	0.31	0.48**	
	(8.32)	(-0.45)	(6.04)	(2.17)	(0.55)	(0.26)	(2.42)	
Cash dividends	10.24***	-22.00***	0.79	8.94***	16.20***	22.08**	13.46***	
	(8.92)	(-7.29)	(0.51)	(2.68)	(2.81)	(2.09)	(6.78)	
Share repurchases	-4.68***	-3.71	-1.84***	-3.28***	-3.82**	-10.25	-3.07***	
	(-6.67)	(-1.50)	(-2.81)	(-2.90)	(-2.13)	(-1.19)	(-3.84)	
Institutional ownership							-2.62***	
							(-14.52)	
Constant	-2.53***	-1.85***	-2.63***	-3.30***	-3.54***	-5.23***	-3.03***	
	(-25.52)	(-9.10)	(-15.57)	(-19.54)	(-12.90)	(-6.31)	(-22.76)	
Observations	180,373	16,180	36,509	47,865	49,118	30,701	133,542	
Pseudo R2	0.0876	0.0315	0.0362	0.0396	0.0482	0.0358	0.100	

Table 4: Do changing firm characteristics explain vanishing stock dividends?

This table presents both the observed and the predicted percent of stock dividend payers over different time periods. The observed annual percent of payers is calculated as the ratio of the number of stock dividend payers in year *t* to the total number of firms at the end of year *t*. Payers announce stock dividend distributions in the fiscal year, while non-payers do not. "Never paid" refers to the group of firms that never announced stock dividends before the year. "Former stock dividend payers" refers to the group of firms that announced stock dividends before the year but not in the year. For each group of firms—all firms, payers, former payers, and never paid—we also estimate the probability that the firm pays stock dividends in each year after 1973 using coefficient estimates of model (2) in Table 3 Panel B over the period from 1963-1973. See Table 3 for details of the model estimations. Panels A-D report the average annual (observed and predicted) percent of stock dividend payers over different time periods, weighted by the number of all firms, the number dividend payers, the number of former payers, and the number of never paid, respectively.

	1963-1973	1974-1984	1985-1995	1996-2006	2007-2017
]	Panel A: All f	irms		
Actual percent	10.57	6.96	1.95	0.73	0.24
Expected percent		10.02	9.96	9.64	9.17
Expected - Actual		3.06	8.01	8.91	8.93
	Panel B: Sto	ck dividend p	ayers in year t	:-1	
Actual percent	60.01	55.96	51.14	38.16	54.17
Expected percent		55.51	59.48	59.16	50.76
Expected - Actual		-0.45	8.34	21.00	-3.41
	Panel C: Former	stock dividend	l payers as of	year t-1	
Actual percent	5.49	3.98	1.79	0.95	0.25
Expected percent		5.28	4.54	4.23	3.48
Expected - Actual		1.3	2.75	3.28	3.23
	Panel D: Never	paid stock div	idends as of y	ear t-1	
Actual percent	5.11	2.87	0.7	0.34	0.08
Expected percent		5.13	4.19	3.23	2.52
Expected - Actual		2.26	3.49	2.89	2.44

Table 5: Institutional ownership and stock dividend decisions

For each year from 1954-2017, we compute the fraction of stock dividend payers of industrial firms in the CRSP dababase, and the aggregate institutional ownership of U.S. corporate equities as reported in the Flow of Funds table of the Federal Reserve Board of Governors. Institutional ownership is the percent of corporate equities owned by insurance companies, private pension funds, state and local government retirement funds, federal government retirement funds, mutual funds, closed-end funds, and brokers and dealers. Figure 1 plots the fraction of stock dividend payers and the aggregate institutional ownership over our sample period. This table presents the vector autoregression (VAR) results for the two time series: the fraction of stock dividend payers and the institutional ownership. We also report test results for whether institutional ownership (fraction of stock dividend payers) Granger causes the other variable. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	(1)	(2)
	Percent of stock	Institutional equity
Dependent variable	dividend payer (t)	ownership (t)
Percent of stock dividend payer (t-1)	0.52***	-0.13
	(5.09)	(-1.09)
Institutional equity ownership (t-1)	-0.18***	0.93***
	(-4.47)	(19.62)
Constant	7.92***	3.43*
	(4.46)	(1.65)
Observations	64	64
R-squared	0.942	0.987
Granger causality test, Chi-squared	19.97	1.1817
Granger causality test, p value	0.000	0.277

Table 6: Institutional ownership and stock dividend decisions: Instrumental variable regressions

For each year from 1997-2006, we identify the smallest 100 (200, 300, 400, or 500) firms in the Russell 1000 index and the largest 100 (200, 300, 400, or 500) firms in the Russell 2000 index. "Russell 2000 dummy" takes the value of 1 if the firm is in the Russell 2000 index and zero if it is in the Russell 1000 index. For each firm, we compute the ownership of quasi-index institutional investors (as classified by Bushee (1998)) at the end of September of the year, as well as the market capitalization at the end of May. Panel A presents OLS regression results where the dependent variable is the ownership of quasi-index institutions; Panel B presents the second-stage logit regression results where the dependent variable takes the value of one if a firm pays stock dividends in the year, and zero otherwise. The key explanatory variable is the fitted ownership of quasi-index institution, which is estimated from the first-stage regression. Following Appel, Gormley, and Keim (2016), we control for three orders of the logarithm of market capitalization, the logarithm of the float value computed by the Russell, and year fixed effects. The associated *t*statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
		Panel	A: First-stage	regression	
Dependent var.		Ownershi	ip of quasi-ind	ex institutions	
Russell 2000 dummy	0.06***	0.05***	0.06***	0.06***	0.07***
	(5.31)	(7.51)	(9.53)	(10.60)	(11.18)
Constant	-11.07***	-9.20***	-7.18***	-8.26***	-9.52***
	(-3.70)	(-3.95)	(-3.49)	(-4.79)	(-6.66)
Bandwidth	100	200	300	400	500
Polynomial order, N	3	3	3	3	3
Float control	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,304	2,609	3,892	5,184	6,472
Adjusted R2	0.494	0.417	0.369	0.345	0.324
		Panel E	3: Second-stag	e regression	
Dependent var.		Pa	ying stock div	ridends	
Fitted ownership of	-47.02***	-24.78**	-16.85*	-13.97*	-14.35**
quasi-index institutions	(-3.04)	(-2.19)	(-1.91)	(-1.88)	(-2.03)
Constant	-374.82	-115.24	-74.46	-44.83	-61.09
	(-0.74)	(-0.36)	(-0.26)	(-0.17)	(-0.23)
Bandwidth	100	200	300	400	500
Polynomial order, N	3	3	3	3	3
Float control	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1,018	2,040	3,036	4,040	5,765
Pseudo R2	0.122	0.0481	0.0382	0.0364	0.0525

Table 7: Firm profitability around stock dividend announcements

This table presents average return on asset (ROA) and return on equity (ROE) of stock dividend payers over the 25 quarters around the stock dividend announcement. Quarter zero corresponds to the quarter of stock dividend announcement. To make the measures comparable across firms, we subtract each firm's quarterly ROA (ROE) by its ROA (ROE) in quarter zero, and then divide by the standard deviation of ROA (ROE) over quarters (-12, -1). The normalized ROA and ROE are winsorized at the top and bottom one percent. See the Appendix for variable definitions. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Figure 2 depicts the ROAs and ROEs.

		ROA	_	ROE
Quarter	N	Mean	N	Mean
-12	2,455	0.05*	2,427	0.11***
-11	2,409	0.03	2,370	0.11***
-10	2,528	0.17***	2,492	0.23***
-9	2,648	0.17***	2,614	0.22***
-8	2,794	0.06**	2,762	0.10***
-7	2,711	0.03	2,670	0.09***
-6	2,826	0.14***	2,784	0.18***
-5	2,932	0.15***	2,900	0.19***
-4	3,172	0.04*	3,139	0.07***
-3	3,060	0.02	3,017	0.06**
-2	3,142	0.15***	3,099	0.17***
-1	3,230	0.15***	3,191	0.15***
0	3,449	0.00	3,419	0.00
1	3,276	-0.12***	3,233	-0.13***
2	3,248	-0.09***	3,205	-0.11***
3	3,221	-0.13***	3,180	-0.17***
4	3,324	-0.23***	3,288	-0.26***
5	3,189	-0.31***	3,144	-0.34***
6	3,159	-0.32***	3,114	-0.35***
7	3,118	-0.36***	3,079	-0.40***
8	3,153	-0.41***	3,118	-0.47***
9	3,072	-0.47***	3,025	-0.48***
10	3,032	-0.44***	2,985	-0.44***
11	3,010	-0.50***	2,966	-0.52***
12	3,002	-0.54***	2,965	-0.58***

Table 8: Investment around stock dividend announcements

This table reports the ratio of capital expenditure to asset (Capx/Asset) and the ratio of capital expenditure to sales (Capx/Sales) of stock dividend payers over the 25 quarters around the stock dividend announcement. Quarter zero corresponds to the quarter of stock dividend announcement. To make the measures comparable across firms, we subtract each firm's quarterly Capx/Asset (Capx/Sales) by its Capx/Asset (Capx/Sales) in quarter zero, and then divide by the standard deviation of Capx/Asset (Capx/Sales) over quarters (-12, -1). The normalized Capx/Asset and Capx/Sales ratios are winsorized at the top and bottom one percent. See the Appendix for variable definitions. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Figure 3 depicts the Capx/Asset and Capx/Sales ratios.

	Capx/Asset		Capx/Sales		
Quarter	N	Mean	N	Mean	
-12	1,474	-0.44***	1,456	-0.47***	
-11	1,493	-0.38***	1,476	-0.40***	
-10	1,536	-0.29***	1,518	-0.33***	
-9	1,572	-0.40***	1,554	-0.43***	
-8	1,579	-0.46***	1,560	-0.48***	
-7	1,588	-0.36***	1,571	-0.38***	
-6	1,620	-0.21***	1,603	-0.23***	
-5	1,639	-0.32***	1,619	-0.34***	
-4	1,649	-0.36***	1,631	-0.37***	
-3	1,661	-0.27***	1,641	-0.27***	
-2	1,667	-0.04	1,648	-0.06	
-1	1,675	-0.11***	1,654	-0.12***	
0	1,679	0.00	1,664	0.00	
1	1,662	0.27***	1,644	0.31***	
2	1,650	0.59***	1,633	0.60***	
3	1,625	0.28***	1,606	0.33***	
4	1,604	0.09**	1,583	0.16***	
5	1,584	0.30***	1,561	0.40***	
6	1,564	0.45***	1,544	0.56***	
7	1,543	0.21***	1,518	0.32***	
8	1,517	0.03	1,494	0.15***	
9	1,498	0.20***	1,473	0.33***	
10	1,469	0.40***	1,447	0.52***	
11	1,449	0.20***	1,427	0.34***	
12	1,433	-0.00	1,409	0.17***	

Table 9: Stock returns around stock dividend announcements

Panel A presents the five-day (-2, +2) cumulative abnormal returns (CARs) around stock dividend announcements, grouped by sample period. In Panel B, we group stock dividend announcements by its sequence order. The sequence order is set to one if the firm has not announced any stock dividends during the previous 24 months, and increases by one for each follow-on stock dividend announcement. CARs are calculated using the market model with the market beta estimated using daily stock returns over the days (-252, -42). Panels C-D report OLS regression results where the dependent variable is the 5-day CARs. The firm characteristics are measured at the fiscal yearend that ends in the 365 days before the stock dividend announcement, and are winsorized at the upper and lower 1%. See the Appendix for variable definitions. All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Period	Ν	Mean	Median
1954-1962	1457	0.36***	-0.13
1963-1973	2760	2.40***	1.71***
1974-1984	3115	3.31***	2.03***
1985-1995	1041	1.84***	1.08***
1996-2006	396	2.71***	1.32***
2007-2017	115	2.05**	0.88***
Total	8884	2.33***	1.27***

Panel A: 5-day announcement CARs, by sample period

Sequence					
order	Ν	Mean	Median		
1	3,216	3.25***	2.06***		
2	1,428	2.49***	1.40***		
3	883	2.18***	1.13***		
4	642	1.63***	0.80***		
5	468	1.46***	0.93***		
(6, 10)	1,209	1.50***	0.69***		
(11, 15)	502	1.62***	0.93***		
(16, 20)	245	1.07**	0.36*		
> 20	291	0.45**	0.46*		
Total	8,884	2.33***	0.84***		

Panel C: Determinants of 5-day CARs around stock dividend announcements

	(1)	(2)	(3)
Sample	1954-2017	1954-1984	1985-2017
Dependent variable	5-day CARs (%)		
Log stock dividend amount	1.16***	1.30***	0.42
	(12.52)	(13.45)	(1.36)
Log sequence order	-0.38***	-0.31***	-0.64***
	(-4.68)	(-3.55)	(-3.02)
Constant	6.07***	6.53***	3.88***
	(21.81)	(21.55)	(5.24)
Observations	8,884	7,332	1,552
Adjusted R-squared	0.031	0.039	0.011