Tests of the influence of a firm's post-*IPO* age on the decision to initiate a cash dividend

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Abstract

As the time since a firm's *IPO* increases, the degree of information asymmetry about the firm should decrease because the information in the firm's regular mandated accounting disclosures will accumulate over time. This decrease in information asymmetry, considered in conjunction with the evidence from the signaling literature that firms initiate a cash dividend to reduce information asymmetry, leads to the prediction that a firm is less likely to initiate a cash dividend as the time since its *IPO* increases. Our empirical analysis, which controls for the factors that prior research finds to influence the decision to initiate a cash dividend, offers support for this prediction. Furthermore, corroborating this initial finding, we find that the market appears to account for a firm's age since its *IPO* when forming its conditional expectation of whether a firm will initiate a cash dividend.

JEL classification: G35, C41

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1. Introduction

According to the signaling literature, one reason that a firm initiates a cash dividend is to reduce the degree of information asymmetry about the firm between managers and outside investors. Based on this argument, the probability that a firm initiates a cash dividend should decrease as the degree of information asymmetry about the firm decreases.

Moreover, a public firm must make regular mandated accounting disclosures subsequent to its *IPO* (*e.g.*, quarterly earnings announcements and audited annual financial statements). As a result, the degree of information asymmetry about a firm should decrease as the time since its *IPO* increases because the information in the firm's regular mandated accounting disclosures will accumulate over time. Supporting this notion, Lang [1991] documents that a firm's earnings response coefficient decreases as the time since its *IPO* increases. Lang argues that this phenomenon occurs because investors learn more about a firm's time-series process of earnings as the firm provides additional post-*IPO* earnings announcements to the market, which results in investors placing a decreasing weight on a firm's earnings announcements over time.

The decrease in a firm's degree of information asymmetry that occurs over time, considered in conjunction with the evidence from the signaling literature that firms initiate a cash dividend to reduce information asymmetry, suggests that a firm is less likely to initiate a cash dividend as the time since its *IPO* increases. In other words, we expect that the likelihood that a firm initiates a cash dividend declines over time because the degree of information asymmetry about a firm is decreasing as the firm provides additional post-*IPO* regular mandated accounting disclosures to the market.

The purpose of this study is to test the preceding prediction after controlling for the factors that prior research finds to influence the decision to initiate a cash dividend. The specific factors that we control for are a firm's profitability and size, whether a firm is in a high-tech industry, the calendar year of a firm's *IPO*, and a firm's share repurchases activity.

This study also examines how the market reacts to the announcement of the initiation of a cash dividend as a function of the time since the initiating firm's *IPO*. If markets are efficient, then investors should understand that a firm is less likely to initiate a cash dividend as the time since its *IPO* increases. As a result, the degree of surprise to the market at the announcement of the initiation of a cash dividend should be increasing in an initiating firm's age, which implies that a firm's initiation announcement abnormal return should be increasing in the time since the initiating firm's *IPO*.

The sample that we use consists of 1873 firms that undertake an *IPO* between the beginning of 1979 and the end of 1998. Among these firms, 400 announce the initiation of a regular cash dividend on or before December 31, 1998 and 1473 announce no regular cash dividends on or before December 31, 1998. Using this sample, we address two primary issues:

Does the marginal propensity to initiate a cash dividend decrease as the time since a firm's *IPO* increases?

Does a firm's abnormal return at the announcement of the initiation of a cash dividend increase as the time since the initiating firm's *IPO* increases?

Our most notable finding is that the marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*. This finding is consistent with the notion of a declining information asymmetry about a firm as the firm ages. Moreover, we find a positive association between a firm's initiation announcement abnormal return and the initiating firm's age since its *IPO*. This result implies that markets are efficient in that investors seem to understand that a firm is less likely to initiate a cash dividend as the firm ages. Further, consistent with the notion of a declining marginal propensity to initiate a cash dividend as a firm ages, this result also suggests that the degree of surprise to the market at the announcement of the initiation of a cash dividend is increasing in an initiating firm's age since its *IPO*.

Regarding our control variables, we find a positive association between a firm's profitability and size and the decision to initiate a cash dividend. Also, we find that firms in high-tech industries tend to delay or refrain from initiating a cash dividend and that firms that undertake their *IPO* more recently in calendar time have a lower propensity to initiate a cash dividend. These findings are consistent with prior research. Finally, we observe no significant association between a firm's share repurchases activity and the decision to initiate a cash dividend. This result does not support the argument that share repurchases and cash dividends are complements to each other, nor does it support the argument that these two forms of distributing a firm's cash are substitutes for each other.

This study adds to our understanding of the determinants of a firm's dividend policy. In particular, our results suggest that after controlling for the factors that prior research finds to influence the decision to initiate a cash dividend, the marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*. To our knowledge, no prior studies argue for or document this phenomenon.

Our results also offer empirical support for the dividend-signaling hypothesis. In particular, we find evidence in favor of our prediction that a firm is less likely to initiate a cash dividend as the time since the firm's *IPO* increases. Since this prediction assumes that the dividend-signaling hypothesis is valid, we are also offering indirect empirical support for the dividend-signaling hypothesis. This support is a meaningful contribution because the validity of the dividend-signaling hypothesis is an unresolved empirical issue (*e.g.*, Grullon, Michaely, and Swaminathan [2002]).

Our results have at least two implications for the accounting disclosure literature. First, broadly viewed, our results indicate that a firm's disclosure environment, to the extent that it is a function of the accumulation of regular mandated accounting disclosures over time, impacts the demand for further disclosures. This finding is consistent with Dye [1998], who demonstrates that the threshold level that determines whether a firm withholds or discloses information is decreasing in the informedness of investors.

Second, a common role for disclosures is to reduce the degree of information asymmetry between managers and outside investors (*e.g.*, Diamond and Verrecchia [1991], Leuz and Verrecchia [2000], Verrecchia [2001], and Healy and Palepu [2001]). Our results suggest that to accomplish this reduction, regular mandated accounting disclosures such as audited annual financial statements can serve as a substitute for one-time information disclosures such as the initiation of a cash dividend. This finding adds to our understanding of the interaction between regular mandated accounting disclosures and one-time voluntary disclosures.

We organize the paper as follows. The next section discusses the factors that should affect the decision to initiate a cash dividend and formulates our testable hypotheses.

Section 3 discusses several econometric issues. Section 4 describes the data. Section 5 provides our empirical evidence that there is a declining marginal propensity to initiate a cash dividend as the time since a firm's *IPO* increases. Section 6 concludes the paper.

2. Hypothesis development

2.1. Firm age and the decision to initiate a cash dividend

A public firm must make regular mandated accounting disclosures subsequent to its *IPO* (*e.g.*, quarterly earnings announcements and audited annual financial statements). As the information in these disclosures accumulates over time, the degree of information asymmetry about a firm will decrease (Lang [1991]). In other words, a firm's degree of information asymmetry should be decreasing in the firm's age since its *IPO*.

According to the signaling literature, one reason that a firm initiates a cash dividend is to reduce the degree of information asymmetry between managers and outside investors. (*e.g.*, Bhattacharya [1979], Miller and Rock [1985], John and Williams [1985], and Nissim and Ziv [2001]). If, as argued above, a firm's degree of information asymmetry decreases as the time since the firm's *IPO* increases, then the signaling incentive for initiating a cash dividend would be decreasing in a firm's age since its *IPO*. As a result, we expect that the marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*. Formally stated, the hypothesis that we test is as follows:

> **Declining Information Asymmetry Hypothesis:** The marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*.

2.2. Firm age and the market reaction to the initiation of a cash dividend

If we find support for the Declining Information Asymmetry Hypothesis and if the market correctly understands that a firm is less likely to initiate a cash dividend as the time since its *IPO* increases, then the degree of surprise to the market at the announcement of the initiation of a cash dividend should be increasing in an initiating firm's age since its *IPO*. In other words, for an older firm with many regular mandated accounting disclosures, the market expects that the probability of the initiation of a cash dividend is relatively low. If such a firm does announce the initiation of a cash dividend, it represents a bigger surprise to the market than if a younger firm with relatively fewer regular mandated accounting disclosures so announces. Based on this argument, we expect that a firm's initiation announcement abnormal return is increasing in the initiating firm's age since its *IPO*. Formally stated, the hypothesis that we test is as follows:

> **Market Reaction Hypothesis:** A firm's abnormal return at the announcement of the initiation of a cash dividend is increasing in the initiating firm's age since its *IPO*.

2.3. Other factors that impact the decision to initiate a cash dividend

Accounting for the influence of a firm's post-*IPO* age on the decision to initiate a cash dividend is the focus of our paper. However, we must also control for other factors that prior research shows to impact the decision to initiate a cash dividend for two reasons. First, we want to determine the effect of these factors for our particular sample. Second, when we estimate the duration model of Section 3, any evidence on the influence of a firm's post-*IPO* age on the decision to initiate a cash dividend may be due to some unobserved heterogeneity in the data rather than to a firm's age *per se* (Heckman and Singer [1982]). For example, the firms in our sample that possess the characteristics that positively influence the decision to pay a cash dividend (*e.g.*, as we discuss below, more profitable firms) may initiate a cash dividend first. As a result, what are left in the sample are those firms that stubbornly refrain from initiating a cash dividend due to their firm-specific characteristics (*e.g.*, low profitability), not due to their age *per se*. Heckman and Singer show that a model specification problem such as the preceding will bias downward the estimate of our model parameter of most interest, a, where we define a in Section 3. To mitigate this bias is the second reason that we control for the firm characteristics that prior research shows to impact the decision to initiate a cash dividend.

The firm characteristics that we include in our analysis are a firm's profitability and size, whether a firm is in a high-tech industry, the calendar year of a firm's *IPO*, and a firm's share repurchases activity. We now discuss our reasons for choosing these particular characteristics and the empirical proxies that we employ.

2.3.1. Profitability. A higher level of profitability will result in a higher probability of free cash flows that managers can invest in negative *NPV* projects (Jensen [1986]). One way to reduce this agency cost is to pay out a firm's free cash flows as dividends. Based on this logic, we expect a positive association between a firm's profitability and the decision to initiate a cash dividend.

Also, a sustained high level of profitability may indicate that a firm is entering its mature phase. Grullon *et al.* [2002] argue that a firm initiates a cash dividend to signal that it is entering this mature phase. This logic again implies a positive association between a firm's profitability and the decision to initiate a cash dividend.

To account for the influence of a firm's profitability on the decision to initiate a cash dividend, we construct a profitability variable *PROFIT* that is equal to a firm's operating income before depreciation scaled by its year-end total assets. We expect a positive association between this measure of a firm's profitability and the decision to initiate a cash dividend.

2.3.2. Size. Jensen, Solberg, and Zorn [1992] argue that when a firm is relatively small, insider shareholdings are likely to be relatively high and insiders are thus more willing to internalize the firm's monitoring costs. Jensen *et al.* also argue that as a firm gets larger, the shareholder base becomes more diverse and, as a result, monitoring by shareholders is more difficult. These factors suggest that it is more difficult to monitor a firm as the firm grows in size. Based on this argument, and on the argument that a firm can reduce the monitoring costs such as those that we discuss here by the payment of a cash dividend (Easterbrook [1984]), we expect a positive association between a firm's size and the decision to initiate a cash dividend.

Also, there should be a positive association between a firm's size and the stability of its cash flows because larger firms are more likely to be better diversified. Moreover, a firm with more stable cash flows is better able to maintain a cash dividend. Considered together, these factors again imply a positive association between a firm's size and the decision to initiate a cash dividend because a firm's managers do not want to cut or omit a cash dividend (Lintner [1956]).

Finally, a firm's size may also indicate that a firm is entering its mature phase. Grullon *et al.* [2002] argue that a firm initiates a cash dividend to signal that it is entering this mature phase. This logic once again implies a positive association between a firm's size and the decision to initiate a cash dividend.

To account for the influence of a firm's size on the decision to initiate a cash dividend, we construct a firm size variable *SIZE* that is equal to the natural logarithm of a firm's year-end total assets. We expect a positive association between this measure of a firm's size and the decision to initiate a cash dividend.

2.3.3. Industry Membership. Casual observation suggests that firms in the high-tech industries are reluctant to initiate a cash dividend. Fama and French [2001] document that this phenomenon is at least in part due to the fundamental characteristics of these firms. In particular, firms in the high-tech industries typically possess the characteristics that prior research finds to negatively influence the decision to initiate a cash dividend. That is, firms in the high-tech industries are typically small, not consistently profitable, and not close to entering their mature phase.

Moreover, beyond the preceding factors that we already control for by the inclusion of the profitability and size variables in our analysis, there should be a negative association between a firm's membership in a high-tech industry and the decision to initiate a cash dividend for at least one other reason. In particular, relative to other firms, firms in the high-tech industries often rely more heavily on stock options as a form of compensation. Further, prior research finds that firms that rely heavily on stock options as a form of compensation are reluctant to pay a cash dividend because most stock option plans do not protect the option holders against ex-dividend price drops in the optioned stock (Lambert, Lanen, and Larcker [1989] and Fenn and Liang [2001]). Taken together, these observations imply that relative to other firms, firms in the high-tech industries are especially reluctant to initiate a cash dividend.

To account for the influence of a firm's membership in a high-tech industry on the decision to initiate a cash dividend, we construct an industry membership indicator variable *INDUSTRY*, which we describe in detail in Section 4. This indicator variable equals 1 if a firm is a member of a high-tech industry and 0 otherwise. We expect a negative association between the industry membership indicator variable and the decision to initiate a cash dividend.

2.3.4. Time Trend. Fama and French [2001] document that a declining proportion of firms pay a cash dividend over time, with the proportion of *Center for Research in Security Prices* (*CRSP*) firms that pay a cash dividend decreasing from 66.5% in 1978 to 20.8% in 1999. Fama and French document that this decline is partially due to the fact that the proportion of publicly-traded firms that possess the characteristics that discourage the initiation of a cash dividend (*e.g.*, lower levels of profitability) is growing over time. Fama and French also find that the decline in the proportion of dividend-paying firms over time is partially due to the fact that firms are simply less likely to pay a cash dividend over time, even after controlling for characteristics such as profitability.

To account for the finding that a declining proportion of firms pay a cash dividend over time, we construct a time trend variable *TREND* that is equal to a firm's *IPO* year minus the year 1978 (*i.e.*, the last year preceding the beginning year of our analysis). The time trend variable is increasing in the calendar year of a firm's *IPO*. We expect a negative association between the time trend variable and the decision to initiate a cash dividend.

2.3.5. Share Repurchases Activity. There is no consensus in the literature concerning the relation between the initiation of a cash dividend and a firm's share repurchases activity. Jagannathan, Stephens, and Weisbach [2000] and Guay and Harford [2000] suggest that these two forms of distributing a firm's cash are complements to each other. In particular, Jagannathan *et al*. find that firms tend to fund cash dividends using sustainable cash flows while firms tend to fund share repurchases using temporary cash flows. Similarly, Guay and Harford find that firms use relatively more permanent types of cash flows to fund dividend payments and relatively less permanent types of cash flows to fund share repurchases. These results suggest that share repurchases do not replace dividends but rather serve the complementary role of paying out a firm's short-term cash flows.

On the other hand, Grullon and Michaely [2003] find that the initiation of a cash dividend and share repurchases are substitutes for each other. In particular, Grullon and Michaely provide evidence that since 1982 the average firm appears to fund its share repurchases with funds that the firm could otherwise use to increase cash dividends.

To account for the influence of a firm's share repurchases activity on the decision to initiate a cash dividend, we construct a share repurchases activity variable *REPURCHASES* that is equal to a firm's dollar repurchases of common and preferred stock scaled by the firm's year-end total assets. Regarding the inclusion of preferred stock in our measure of a firm's share repurchases activity, Grinstein and Michaely ([2002], p. 11) point out that this measure "has a drawback: it includes repurchases of not only common stocks but also of other types of stocks such as preferred stocks. However, repurchases of securities other than common stocks represents a very small portion of firms' repurchase activity (see Allen and Michaely [2003] and Stephens and Weisbach [1998])." Also, we base our analysis on the notion that share repurchases are a way of using cash. As a result, the inclusion of repurchases of preferred stock, which use cash, in our measure of a firm's share repurchases activity should not really be a problem.

If (i) there is a positive association between temporary and sustainable cash flows and (ii) share repurchases do not replace cash dividends but rather serve the complementary role of paying out a firm's short-term cash flows, we should observe a positive association between our measure of a firm's share repurchases activity and the decision to initiate a cash dividend. On the other hand, if share repurchases and cash dividends are substitutes for each other with regards to paying out a firm's cash flows, we should observe a negative association.

3. Econometric issues

To test whether the marginal propensity to initiate a cash dividend is decreasing in the time since a firm's *IPO*, we use a duration model to estimate the hazard function $l(t)$ of exiting a zero-dividend status in year $t+1$ conditional on not having paid a cash dividend in the t years since a firm's *IPO*. In other words, we estimate the probability that a firm initiates a cash dividend in year $t+1$ conditional on the firm's age t since its *IPO*. The hazard function $l(t)$ of initiating a cash dividend in year $t+1$ is as follows:

$$l(t) = \lim_{\Delta t \to 0} \frac{F\left[t \leq T < t + \Delta t \mid T \geq t\right]}{\Delta t} = \frac{f(t)}{1 - F(t)}, \tag{1}$$

where $f(t)$ is the probability density function for duration time T (*i.e.*, firm age) and $F(t)$ is the cumulative density function for duration time T.

To estimate $l(t)$, we must specify the underlying probability density function $f(t)$ for T. The econometrics literature typically recommends that a researcher choose among the exponential, log-normal, log-logistic, and Weibull densities (*e.g.*, Greene [1997], pp. 987-989). The exponential density has a constant hazard rate over time of l, where a hazard rate intuitively is the rate at which firms initiate a cash dividend in year $t+1$ conditional on paying no cash dividends through year t. The log-normal and log-logistic densities allow the hazard rate l to initially increase and then to decrease over time. The Weibull density has a hazard rate l that is either monotonically increasing or monotonically decreasing over time.

The Weibull density may be ideal for our study because the results of a non-parametric test that we report in Section 5.1.1 suggest that the hazard rate l for our sample is roughly decreasing over time. The Weibull hazard function $l(t)$, with a vector of time-varying control variables x, takes the following form:

$$l(t) = e^{xb}\, l a\,(lt)^{a-1}, \tag{2}$$

where l and a are the parameters for the Weibull density that we estimate using the maximum likelihood function Eq. A.11.

To determine how the factors that we describe in Section 2.3 affect the decision to initiate a cash dividend in year *t+1*, Eq. 2 includes a vector of time-varying control variables x for a firm's profitability and size, whether a firm is in a high-tech industry, the calendar year of a firm's *IPO*, and a firm's share repurchases activity. Section A.1 of the Appendix provides an econometric discussion of how we incorporate this vector of time-varying control variables into the analysis. In Eq. 2, b is the vector of parameters relating to the vector of time-varying control variables x. As with l and a, we estimate each b using the maximum likelihood function Eq. A.11.

The first derivative of the hazard function $l(t)$ in Eq. 2 with respect to time t is as follows:

$$\frac{dl(t)}{dt} = e^{xb}\, l^2 a\,(a-1)(lt)^{a-2}. \tag{3}$$

If $a < 1$, referred to as negative duration dependence, then Eq. 3 is negative, which is evidence that the greater the number of years t since a firm's *IPO*, the less likely it is that the firm will initiate a dividend in year *t+1*. If $a > 1$, referred to as positive duration dependence, then Eq. 3 is positive, which is evidence that the greater the number of years *t* since a firm's *IPO*, the more likely it is that the firm will initiate a dividend in year *t+1*. If a = 1, then Eq. 3 is equal to zero, which is evidence that the decision to initiate a cash dividend in year *t+1* does not depend on the number of years *t* since a firm's *IPO*. An a estimate that is less than 1 will support our Declining Information Asymmetry Hypothesis.

For studying the relation between the initiation of a cash dividend and a firm's age, using a duration model to estimate the hazard function $l(t)$ may offer a few improvements over the cross-sectional models that one typically sees in the existing literature. First, the Declining Information Asymmetry Hypothesis that we develop and test assumes that (i) a firm uses a cash dividend to reduce its degree of information asymmetry and (ii) a firm's degree of information asymmetry is decreasing in the firm's age since its *IPO*. As a result, our test design must link the conditional probability of observing a cash dividend initiation to a firm's age. A cross-sectional model that includes a firm age variable will only capture the aggregate probability of observing a cash dividend initiation while the duration model explicitly captures the link between the conditional probability of observing a cash dividend initiation and a firm's age. In other words, the duration model offers us an opportunity to directly estimate the marginal probability of a cash dividend initiation conditional on a firm's age since its *IPO*. To our knowledge, this study is the first attempt to explore this unique aspect of a firm's dividend policy.

Second, cross-sectional analysis ignores a firm's disclosure history since its *IPO*. For example, two firms reporting the same information in their most recent accounting disclosures (*e.g.*, two firms reporting equal profitability and so forth in their audited annual financial statements in year *t*) may still differ in the degree of information asymmetry about the firm because "a firm's age since its *IPO*" differs between the two firms. Failure to account for this factor can create an omitted variable problem. We mitigate this problem by the use of a duration model to estimate the hazard function $l(t)$ because this procedure accounts for the decline in information asymmetry about a firm that will occur as the information in the firm's regular mandated accounting disclosures accumulates over time.

Third, to the extent that a firm's disclosure environment is a function of the accumulation of regular mandated accounting disclosures since the firm's *IPO*, the use of a duration model to estimate the hazard function $l(t)$ offers a dynamic way of studying the relation between the evolution of this disclosure environment and the decision to initiate a cash dividend. In particular, the use of a duration model to estimate the hazard function $l(t)$ accounts for the effect of a firm's regular mandated accounting disclosures in the t years since its *IPO* on the conditional probability that the firm will initiate a cash dividend in year $t+1$. Accounting for this factor allows us to provide evidence on the question of how a firm's dividend policy evolves in terms of its time-varying degree of information asymmetry.

4. Data and test variables

Our study covers the 20-year period from January 1, 1979 to December 31, 1998. We identify the firms that undertake an *IPO* in this period, and the corresponding *IPO* dates, using the *Securities Data Corporation* new issues database. For each firm that undertakes its *IPO* during our sample period, we use the *CRSP* database to determine whether a firm announces the initiation of a regular monthly, quarterly, semi-annual, or annual cash dividend on its common stock on or before December 31, 1998. We focus on regular cash dividends because the initiation of a regular cash dividend marks the beginning of a committed dividend policy.

If a firm announces the initiation of a cash dividend on or before December 31, 1998, we classify the firm as an exited firm. An exited firm exits from a zero-dividend policy to a dividend-paying status by announcing the initiation of a cash dividend on or before December 31, 1998 and the exact duration of the firm's zero-dividend status (*i.e.*, from its *IPO* date until the date that it announces the initiation of a cash dividend) is known. If a firm announces no cash dividends on or before December 31, 1998, we classify the firm as a right-censored firm. For a right-censored firm, the duration of its zero-dividend status is unknown. We code sample firms with an indicator variable that equals 1 for right-censored duration and 0 otherwise. Figure 1 provides a graphical representation of how we identify exited and right-censored firms and Section A.2 of the Appendix provides a discussion of the econometric treatment of right-censored observations in our analysis.

The preceding procedures result in an initial sample of 4946 firms. Of these 4946 firms, 3765 firms appear in the *Compustat Full and Research Primary, Supplementary, and Tertiary* annual data files. For these firms, we retrieve the following *Compustat* data items: year-end total assets (*TA*, item *#6*), operating income before depreciation (*OI*, item *#13*), repurchases of common and preferred stock in dollars (*REPO*, item *#115*), and four-digit *SIC* code. We convert these items into the following measures that we use as control variables in our analysis: *PROFIT* = *OI*/*TA*, *SIZE* = Ln (*TA*), and *REPURCHASES* = *REPO*/*TA*. There are 1873 firms with the required *Compustat* data to calculate the preceding control variables in every year that a firm appears in the sample, among which 400 announce the initiation of a cash dividend on or before December 31, 1998 and 1473 do not so announce. These 1873 firms are the firms that we use in our analysis.

To account for the effect of high-tech industry membership on the decision to initiate a cash dividend, we follow Chen, DeFond, and Park [2002] and define the following industries as high-tech: drugs (*SIC* codes 2833 to 2836), computers (*SIC* codes 3570 to 3577), electronics (*SIC* codes 3600 to 3674), precise measurement instruments (*SIC* codes 3810 to 3845), programming (*SIC* codes 7371 to 7379), and *R&D* services (*SIC* codes 8731 to 8734). We create an industry membership indicator variable *INDUSTRY* that equals 1 if a firm is a member of one of the preceding high-tech industries and 0 otherwise.

Finally, to account for the fact that a declining proportion of firms pay a cash dividend over time, we define a time trend variable *TREND* as a firm's *IPO* year minus the year 1978. The time trend variable is increasing in the calendar year of a firm's *IPO*.

Table 1 provides the time distribution of *IPO*s and dividend initiation announcements for the 1873 firms in our sample. There is a moderate degree of clustering for both *IPO*s and dividend initiation announcements. For example, 15.4% of the sample *IPO*s occur in 1996 and 13.2% of the sample *IPO*s occur in 1997. Also, 10.0% of the sample dividend initiation announcements occur in 1992 and 10.0% of the sample dividend initiation announcements occur in 1993.

5. Empirical results

5.1. Tests of the declining information asymmetry hypothesis

In Section 5.1, we test the Declining Information Asymmetry Hypothesis. In other words, we test the hypothesis that the marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*.

5.1.1. Non-parametric Analysis. We begin by conducting a non-parametric test. This initial analysis does not include controls for a firm's profitability and so forth. The purpose of this non-parametric analysis is to provide some preliminary understanding about the basic shape of the hazard function $l(t)$ of exiting a zero-dividend status by initiating a cash dividend in year $t+1$. The method that we use here is the Life Table Product-Limit Approach of Kaplan and Meier [1958]. Section A.3 of the Appendix provides an econometric discussion of this approach.

Table 2 displays the results of this non-parametric analysis for our sample of 1873 firms. The results in the right-hand-most column of Table 2 suggest that the hazard rate l of exiting a zero-dividend status by initiating a cash dividend in year $t+1$ generally decreases over time. However, inconsistent with this generally decreasing hazard rate l over time, the hazard rate l increases somewhat for two of the last three intervals in Table 2. We suspect that this result is at least partially due to the fact that the number of sample observations that we use to implement the Life Table Product-Limit Approach is relatively small for the later intervals in Table 2. This decreasing sample size could explain the unexpected results that we observe in the later intervals because the Life Table Product-Limit Approach becomes less accurate when the number of sample observations is small.

These results suggest two things. First, the generally decreasing hazard rate l that we observe indicates that the zero-dividend policy appears to demonstrate negative duration dependence. This finding suggests that, as we predict, the greater the number of years since a firm's *IPO*, the less likely it is that the firm will initiate a cash dividend. Second, the generally decreasing hazard rate l that we observe justifies using the Weibull as the underlying density for the hazard function $l(t)$ in our subsequent parametric analyses.

5.1.2. Parametric Analysis. Table 3 reports the results of using a duration model to estimate the hazard function $l(t)$ of exiting a zero-dividend status in year $t+1$, where we assume a Weibull density. The a estimate of 0.8623 is less than 1 at better than the 0.05 one-tailed significance level. This result offers support for the hypothesis that the greater the number of years t since a firm's *IPO* (*i.e.*, the greater the number of post-*IPO* regular mandated accounting disclosures available to the market at the end of year t), the less likely it is that the firm will initiate a cash dividend in year $t+1$. More generally, this result also suggests that to reduce a firm's degree of information asymmetry, regular mandated accounting disclosures can serve as a substitute for one-time voluntary disclosures such as the initiation of a cash dividend.

Regarding the time-varying control variables that we include in our model, the estimated coefficients on profitability and size are both positive and significant at better than the 0.01 one-tailed level, suggesting that these factors contribute positively to the decision to exit a zero-dividend status by initiating a cash dividend in year $t+1$. Also, the estimated coefficient on the industry membership indicator variable is negative and significant at better than the 0.01 one-tailed level. This result suggests that firms in the high-tech industries tend to delay or refrain from initiating a cash dividend. Further, consistent with the finding in Fama and French [2001] that a declining proportion of firms pay a cash dividend over time, the estimated coefficient on the time trend variable is negative and significant at better than the 0.01 one-tailed level. Finally, the estimated coefficient on the share repurchases activity variable is positive but not significant at traditional levels, implying that there is no particular association between a firm's share repurchases activity and the decision to initiate a cash dividend. This result does not support the notion that share repurchases and cash dividends are complements to each other, nor does it support the notion that these two forms of distributing a firm's cash are substitutes for each other.

We observe an interesting link between our finding that an older firm is less likely to initiate a cash dividend and the finding in Botosan [1997] that there is a negative association between a firm's cost of equity capital and its level of disclosure for firms with a low analyst following but not for firms with a high analyst following. Botosan's finding implies that disclosures are less effective in reducing a firm's cost of capital for firms with a high analyst following because there is a negative association between the number of analysts that follow a firm and the firm's degree of information asymmetry. This implication is congruent with the idea that the longer the time since a firm's *IPO* (*i.e.*, the lower a firm's degree of information asymmetry), the smaller the probability that the firm will use the one-time disclosure of initiating a cash dividend to reduce information asymmetry.

5.1.3. Sensitivity Test. Prior research finds a negative association between a firm's growth and the decision to initiate a cash dividend (*e.g.*, Fama and French [2001]). We do not include a firm's growth as a control variable because we expect that we already capture this growth in the time-series pattern of a firm's profitability and size. Nevertheless, as a sensitivity test, we construct the variable *GROWTH* that is equal to a firm's capital expenditures plus its *R&D* expense scaled by its year-end total assets. Sample size declines by approximately 46 percent due to missing *Compustat* data for computing *GROWTH*. When we include *GROWTH* in our analysis, its estimated coefficient is not significant at traditional levels and all other test results are very similar to those that we report in Table 3.

5.2. Tests of the market reaction hypothesis

In Section 5.2, we test the Market Reaction Hypothesis. In other words, we test the hypothesis that a firm's abnormal return at the announcement of the initiation of a cash dividend is increasing in the initiating firm's age since its *IPO*.

5.2.1. Data, Test Variables, and Descriptive Data. To compute a firm's initiation announcement abnormal return, we require that an initiating firm have no missing *CRSP* daily return data from day –70 to day +10, where day 0 is the day on which a firm announces the initiation of a cash dividend. Among the 400 dividend-initiating firms in the original sample, 312 firms satisfy this data requirement.

For each of these 312 firms, we compute the abnormal return at the announcement of the initiation a cash dividend as follows. First, we define a firm's normal return as the average of the firm's daily returns from day –70 to day –11, where day 0 is the day on which a firm announces the initiation of a cash dividend. That is, we compute a firm's normal return as follows:

$$NR_i = \frac{1}{60}\sum_{t=-70}^{-11} r_{it}\,, \qquad (4)$$

where r_{it} is firm i's daily return on day t (t = –70, …, –11). This approach assumes that a firm's stochastic returns-generating process is a mean adjusted returns model. According to Brown and Warner [1980; 1985], this method works well when there is little event-clustering, as in our study.

To capture a firm's initiation announcement abnormal return, we use the firm's cumulative two-day return on day 0 and day +1, where day 0 is the day on which a firm announces the initiation of a cash dividend, minus two times the normal daily return *NR* for that firm. That is, we compute a firm's announcement period abnormal return as follows:

$$CAR_i = \sum_{t=0}^{1} r_{it} - 2NR_i \,. \tag{5}$$

We include day +1's return in Eq. 5 because it is probable that the day 0 announcement of the initiation of a cash dividend is sometimes made after the market closes for day 0.

Table 4 reports the average daily raw, abnormal, and cumulative abnormal returns for each of the days –10 to +10, where day 0 is the day on which a firm announces the initiation of a cash dividend. The largest average daily abnormal return of 0.556% occurs on day 0. This average daily abnormal return is highly significant with a t-value of 2.66. No other average daily abnormal return in Table 4 is nearly as significant as the return on day 0. This result suggests that, not surprisingly, a large proportion of a firm's initiation announcement abnormal return occurs on the day on which the firm announces the initiation of a cash dividend. Also, the fact that this abnormal return is positive is consistent with the finding of prior research that the market interprets the initiation of a cash dividend as good news (*e.g.*, Aharony and Swary [1980] and Asquith and Mullins [1983]).

5.2.2. Regression Analysis. In this section, we use a regression model to test the

Market Reaction Hypothesis that a firm's initiation announcement abnormal return is increasing in the initiating firm's age since its *IPO*. The specification of the model is as follows:

$$CAR_i = a_0 + a_1 YIELD_i + a_2 DURATION_i + a_3 PROFIT_i + a_4 SIZE_i + a_5 INDUSTRY_i + u_i. \quad (6)$$

In Eq. 6, the subscript *i* refers to firm *i*. *CAR* is a firm's two-day initiation announcement abnormal return from Eq. 5. *YIELD* is the annualized dividend to price yield associated with a firm's initiation of a cash dividend, where an initiating firm's stock price at the close of day –1 is the scalar. We include *YIELD* in Eq. 6 to test whether the dividend yield associated with a firm's initiation of a cash dividend impacts the initiating firm's two-day announcement abnormal return. We expect a positive coefficient on *YIELD* in our estimate of Eq. 6 because relative to a lower-yielding dividend initiation, the market should interpret a higher-yielding dividend initiation as a signal of relatively better news about a firm.

We define *DURATION* as the number of years that a firm's zero-dividend policy survives before it announces the initiation of a cash dividend. *DURATION* is equal a firm's dividend initiation announcement year minus its *IPO* year. We include *DURATION* in Eq. 6 to test the Market Reaction Hypothesis that a firm's initiation announcement abnormal return is increasing in the initiating firm's age since its *IPO*. We expect a positive coefficient on *DURATION* in our estimate of Eq. 6.

As before, *PROFIT* is a firm's operating income before depreciation divided by its year-end total assets, *SIZE* is the natural logarithm of a firm's year-end total assets, and *INDUSTRY* is an industry membership indicator variable, which we describe in detail in Section 4, that equals 1 if a firm is a member of a high-tech industry and 0 otherwise.

Since profitability and size have a positive effect on the decision to initiate a cash dividend, we expect that there is less surprise to the market when more profitable or larger firms initiate a cash dividend. As a result, we expect negative coefficients on *PROFIT* and *SIZE* in our estimate of Eq. 6. Also, since membership in a high-tech industry has a negative effect on the decision to initiate a cash dividend, we expect that there is more surprise to the market when a firm in a high-tech industry initiates a cash dividend. As a result, we expect a positive coefficient on *INDUSTRY* in our estimate of Eq. 6.

Eq. 6 does not include the variable *REPURCHASES*, a firm's dollar repurchases of common and preferred stock scaled by the firm's year-end total assets, because the results in Section 5.1 indicate that there is no particular association between a firm's share repurchases activity and the decision to initiate a cash dividend. Also, Eq. 6 does not include the time trend variable *TREND*, equal to a firm's *IPO* year minus the year 1978, because there is a mechanical relation between *DURATION* and *TREND*. Specifically, our sample consists of firms that undertake an *IPO* after January 1, 1979 and that announce the initiation of a cash dividend on or before December 31, 1998. For these firms, the more recently in calendar time that a firm undertakes its *IPO* (*i.e.*, the greater is *TREND*), the smaller is the maximum possible value of *DURATION*. This factor would tend to bias the coefficient on *TREND* in our estimate of Eq. 6 to be negative.[1]

Table 5 reports the results from estimating Eq. 6. As we predict, the estimated coefficients on *YIELD* and *DURATION* are positive and significant at better than the 0.01

[1] If we include *REPURCHASES* in Eq. 6, its estimated coefficient is not significant at traditional levels and all other test results are very similar to those obtained when we exclude *REPURCHASES* from Eq. 6. Similarly, if we include *TREND* in Eq. 6, its estimated coefficient is not significant at traditional levels and all other test results are very similar to those obtained when we exclude *TREND* from Eq. 6.

one-tailed level. However, we do not find the predicted results for the control variables in Eq. 6. Specifically, the estimated coefficient on *PROFIT* is positive and significant at better than the 0.01 one-tailed level and the estimated coefficients on *SIZE* and *INDUSTRY* are not significant at traditional levels.

The preceding results suggest several things. First, the result for the *DURATION* variable supports the Market Reaction Hypothesis that a firm's initiation announcement abnormal return is increasing in the initiating firm's age since its *IPO*. Importantly, the result for the *DURATION* variable also corroborates the Declining Information Asymmetry Hypothesis because we develop our empirically-supported prediction for the *DURATION* variable under the assumption that this hypothesis is valid. Regarding the results for the control variables in Eq. 6, they suggest that (i) the market may view the announcement of the initiation of a cash dividend as a more credible signal of future high profitability if a firm is already highly profitable and (ii) when forming its conditional expectation of whether a firm will initiate a cash dividend, the market appears to focus more on the effect of a firm's age since its *IPO* than on the effect of the factors that prior research finds to influence the decision to initiate a cash dividend.

5.2.3. Sensitivity Test. Sample firms that announce the initiation of a cash dividend in their *IPO* year could create a bias in favor of finding a positive estimated coefficient on *DURATION*. In particular, some of these firms may indicate, in their *IPO* prospectus, an intention to initiate a cash dividend on their newly-issued stock. For these firms, we expect that there is little surprise to the market at the announcement of the initiation of a cash dividend. That is, for these firms, both *DURATION* and *CAR* would be small. This factor would create a bias in favor of finding a positive coefficient on *DURATION* in our estimate of Eq. 6. As a sensitivity test, we reestimate Eq. 6 after removing from the sample those firms that announce the initiation of a cash dividend in their *IPO* year, with little change in our results.

6. Summary

In this study, we examine two questions. First, we examine whether the marginal propensity to initiate a cash dividend decreases as the time since a firm's *IPO* increases. We expect to observe such a decrease because the likelihood that a firm initiates a cash dividend to reduce the information asymmetry between managers and outside investors will decrease over time, as investors learn more about the firm through additional post-*IPO* regular mandated accounting disclosures. Our test results strongly support the prediction that the marginal propensity to initiate a cash dividend is decreasing in a firm's age since its *IPO*.

Second, we examine how the market reacts to the announcement of the initiation of a cash dividend as a function of the time since the initiating firm's *IPO*. We argue that there is a positive association between a firm's initiation announcement abnormal return and the time since an initiating firm's *IPO* because, consistent with our initial finding, the market expectation of a cash dividend initiation should be decreasing in the time since a firm's *IPO*. As a result, the longer the time since a firm's *IPO*, the bigger the surprise to the market when the firm announces the initiation of a cash dividend, leading to a bigger initiation announcement abnormal return. Consistent with this argument, we find a positive association between a firm's two-day initiation announcement abnormal return and the time since the initiating firm's *IPO*.

This study adds to our understanding of the determinants of a firm's dividend policy.

More broadly viewed, our results also suggest that a firm's disclosure environment, to the extent that it is a function of the accumulation of regular mandated accounting disclosures since the firm's *IPO*, impacts the demand for further disclosures. In particular, our results suggest that to reduce a firm's degree of information asymmetry between managers and outside investors, regular mandated accounting disclosures such as audited annual financial statements can serve as a substitute for one-time information disclosures such as the initiation of a cash dividend. This finding adds to our understanding of the interaction between regular mandated accounting disclosures and one-time voluntary disclosures.

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Appendix

A.1. A description of the duration model

In our analysis, the number of years since a firm's IPO is the dependent variable T. Assume that T has a probability density function of $f(t)$, where t is a realization of T. The cumulative density function for $F(t)$ is then as follows:

$$F(t) = prob(T \leq t) = \int_0^t f(s)ds \; . \qquad \text{(A.1)}$$

Eq. A.1 is the probability that a firm's zero-dividend policy does not survive t years. In other words, it is the probability that a firm initiates a cash dividend at or before the end of year t. The probability that a firm's zero-dividend policy survives at least t years is given below:

$$S(t) = prob(T > t) = 1 - F(t) \; . \qquad \text{(A.2)}$$

In a general sense, a hazard function $l(t)$ captures the probability that a policy fails to survive the next period conditional on surviving the previous t periods. In the context of our study, the hazard function $l(t)$ captures the probability that a firm's zero-dividend policy that exists through year t fails to survive in year $t+1$ because the firm initiates a cash dividend in year $t+1$. In other words, the hazard function $l(t)$ captures the probability that a firm initiates a cash dividend in year $t+1$ conditional on the firm's age t since its IPO. The following equation represents the hazard function $l(t)$:

$$l(t) = \lim_{\Delta t \to 0} \frac{F\left[t \leq T < t + \Delta t \mid T \geq t\right]}{\Delta t} = \frac{f(t)}{1 - F(t)} = \frac{f(t)}{S(t)} \; . \qquad \text{(A.3)}$$

Noting that $f(t) = l(t)S(t)$, we can combine Eq. A.1, A.2, and A.3 to derive the following equation:

$$l(t) = -\frac{d \ln S(t)}{dt}, \tag{A.4}$$

which is equivalent to:

$$S(t) = \exp\left[-\int_0^t l(s)ds\right]. \tag{A.5}$$

We use a special case of the generalized procedure of Petersen [1986] to deal with time-varying covariates (*i.e.*, to deal with the control variables in our analysis). In particular, since we are using *Compustat* annual data to compute our control variables, we must measure the number of years that a zero-dividend policy survives as an integer number of years as follows. Suppose that a firm's zero-dividend policy survives for t years. Let $j = 0, \ldots, k$ index these years, let $t_0 = 0$ be the year of a firm's *IPO* (starting point), and let $t_k = t$ be the year in which the firm initiates a cash dividend or the year in which its duration time is right-censored (ending point). From Eq. A.5, the conditional survival function, after incorporating a vector of time-varying control variables, is as follows:

$$S\left[t_j \mid x(t_j)\right] = F\left[T \geq t_j \mid T \geq t_{j-1}, x(t_j)\right] = \exp\left\{-\int_{t_{j-1}}^{t_j} l\left[s \mid x(t_j)\right]ds\right\}. \tag{A.6}$$

where $x(t_j)$ is a vector of time-varying control variables. In Eq. A.6, we measure years in increments of 1 (*i.e.*, $t_j - t_{j\text{-}1} = 1$) and $x(t_j)$ is constant between $t_{j\text{-}1}$ and t_j because we are using *Compustat* annual data to compute the vector of control variables x. For this reason, the integration sign can be taken away in Eq A.6 and the conditional survival function A.6 becomes the following:

$$S[t_j \mid x(t_j)] = F[T \geq t_j \mid T \geq t_{j-1}, x(t_j)] = \exp\left\{-\, l[t_j \mid x(t_j)]\right\}, \tag{A.7}$$

and the survival function for surviving as a zero-dividend policy firm beyond t years is as follows:

$$S[t \mid x(t_0),..., x(t_k)] = \prod_{j=0}^{k} \exp\{- l[t_j \mid x(t_j)]\} = \exp\left\{- \sum_{j=0}^{k} l[t_j \mid x(t_j)]\right\}. \qquad (A.8)$$

Eq. A.8 is the survival function for each firm that we use in the maximum likelihood function Eq. A.11 below.

A.2. Dealing with data censoring

In our analysis, we define a censoring indicator d_i this way: d_i equals 1 when the zero-dividend duration for firm i is right-censored and d_i equals 0 when the zero-dividend duration for firm i is not right-censored. From Eq. A.3, the distribution for t, where t is the number of years since a firm's *IPO*, can be written as follows:

$$f_i[t_{ik} \mid x(t_{i0}),..., x(t_{ik})] = [l(t_{ik} \mid x(t_{ik}))]^{d_i} S[t_{ik} \mid x(t_{i0}),..., x(t_{ik})]. \qquad (A.9)$$

The maximum likelihood function for Eq. A.9 is as follows:

$$ML = \prod_{i=1}^{n} f_i[t_{ik} \mid x(t_{i0}),..., x(t_{ik})] = \prod_{i=1}^{n}[l(t_{ik} \mid x(t_{ik}))]^{d_i} S[t_{ik} \mid x(t_{i0}),..., x(t_{ik})], \qquad (A.10)$$

where i = 1, …, n indexes the firms in the sample. If we substitute Eq. A.3 into Eq. A.10, the logarithm of the maximum likelihood function is as follows:

$$\ln(ML) = \sum_{i=1}^{n} d_i \ln[l(t_{ik} \mid x(t_{ik}))] - \sum_{i=1}^{n}\sum_{j=0}^{k} l[t_{ij} \mid x_i(t_{ij})]. \qquad (A.11)$$

We use Eq. A.11 to obtain our estimated values for Eq. 2's l, a, and each b. Assuming that the underlying probability density function $f(t)$ for T is the Weibull density, an estimated $a < 1$ is evidence that the longer the time since a firm's *IPO* (*i.e.*, the greater is

t), the less likely it is that the firm will initiate a cash dividend in year $t+1$. Also, if the estimated parameter b for a time-varying control variable x is positive (negative), then there is evidence that the variable x contributes positively (negatively) to the probability of exiting a zero-dividend status by initiating a cash dividend in year $t+1$.

A.3. The Kaplan and Meier Life Table Product-Limit approach

In this section, we describe the Kaplan and Meier [1958] Life Table Product-Limit Approach as it applies to our analysis. In our sample, a firm's zero-dividend policy can survive for up to for t = 20 years. As before, let j = 0, …, k index these years, let $t_0 = 0$ be the year of a firm's *IPO* (starting point), and let $t_k = t$ be the year in which the firm initiates a cash dividend or the year in which its duration time is right-censored (ending point). We divide the firm-specific duration times between t_0 and t_k into j = 20 intervals based on their length in years. The number of observations for each interval is n_j, the number of right-censored observations for each interval is c_j, and the number of exited observations for each interval is m_j, where $n_j = c_j + m_j$.

We then define the size of the risk set r_j (*i.e.*, the set of firms that can still exhibit a zero-dividend policy for an interval j) as follows:

$$r_j = n_j - \frac{c_j}{2}. \qquad \text{(A.12)}$$

The proportion of observations in the risk set that exit from a zero-dividend policy in interval j is as follows:

$$q_j = \frac{m_j}{r_j}. \qquad \text{(A.13)}$$

The survival rate for the Kaplan and Meier Life Table Product-Limit Approach, which is the cumulative proportion of observations surviving as following a zero-dividend policy to the beginning of the interval j, is then as follows:

$$p_j = (1 - q_{j-1})p_{j-1}, \tag{A.14}$$

where p_0 = 1. The hazard rate l for the Kaplan and Meier Life Table Product-Limit Approach, which is the probability that a zero-dividend policy fails to survive the next interval conditional on surviving through the current interval, is then as follows:

$$l_j = \frac{2q_j}{2 - q_j}. \tag{A.15}$$

The variance for the survival rate in Eq. A. 14 at time interval j is as follows:

$$Var(p_j) = p_j^2 \sum_{i=0}^{j-1} \frac{q_i}{r_i(1 - q_i)}, \tag{A.16}$$

where $i = 0, \ldots, j - 1$ indexes time from 0 to $j - 1$. Moreover, the variance for the hazard rate l in Eq. A. 15 at time interval j is

$$Var(l_j) = l_j^2 \frac{1 - l_j^2/4}{r_j q_j}. \tag{A.17}$$

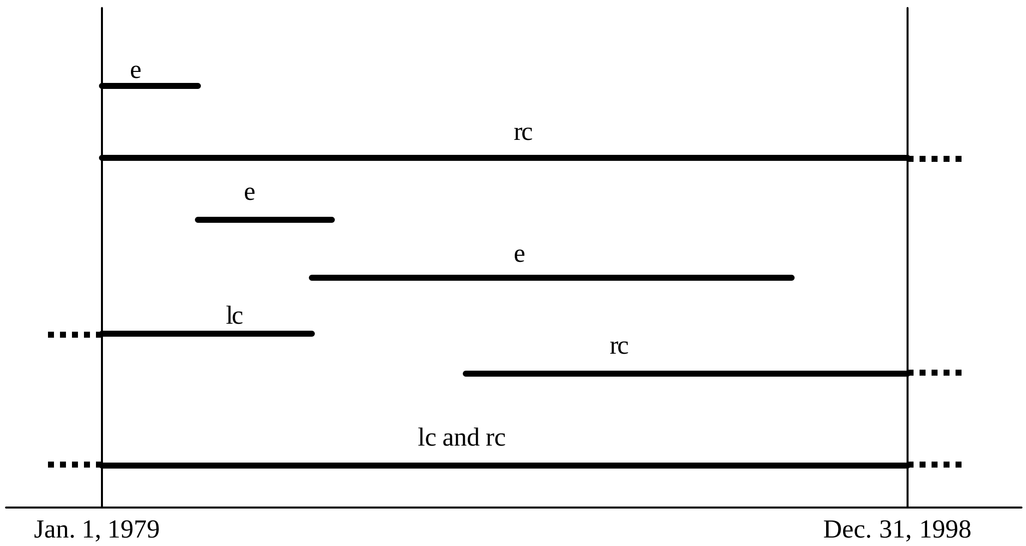

Fig. 1. The Incidence of Exited and Right-Censored Firms. The study covers the 20-year period from January 1, 1979 to December 31, 1998. We obtain *IPO* dates in this period from the *Securities Data Corporation* (*SDC*) new issues database. Regular cash dividend initiation announcement dates are from the *Center for Research in Security Prices* (*CRSP*) database. After eliminating firms that do not have complete *Compustat* data available for calculating our control variables in every year that a firm appears in the sample (see the *Notes* to Table 3), the matching of *SDC* data with *CRSP* data results in a sample of 1873 firms, among which 400 are exited firms that announce the initiation of a regular cash dividend on or before December 31, 1998 and 1473 are right-censored firms that do not announce the initiation of a regular cash dividend on or before December 31, 1998.

In the preceding figure, the e's represent exited firms. For these firms, their *IPO* dates and cash dividend initiation announcement dates are within the 20-year period between January 1, 1979 and December 31, 1998. There are two kinds of censoring of the data, left-censoring (lc) and right-censoring (rc). A firm with left-censoring has its *IPO* date before January 1, 1979. The sample does not include left-censored firms. A firm with right-censoring has its dividend initiation announcement date, if an initiation ever occurs, after December 31, 1998. The sample includes right-censored firms. We code sample firms with an indicator variable that equals 1 for right-censored duration and 0 otherwise.

Table 1
The distribution of *IPO*s and dividend initiation announcements over time. The study covers the 20-year period from January 1, 1979 to December 31, 1998. We identify firms that undertake an *IPO* in this period, and the corresponding *IPO* dates, from the *Securities Data Corporation* (*SDC)* new issues database. To match these *IPO* dates with regular cash dividend initiation announcement dates from the *Center for Research in Security Prices* (*CRSP*) database, we apply the following criteria. If a firm announces the initiation of a regular cash dividend on or before December 31, 1998, we classify the announcing firm as an exited firm. If a firm announces no regular cash dividends on or before December 31, 1998, we classify the firm as a right-censored firm. After eliminating firms that do not have complete *Compustat* data available for calculating our control variables in every year that a firm appears in the sample (see the *Notes* to Table 3), the matching of *SDC* data with *CRSP* data results in a sample of 1873 firms, among which 400 are exited (*i.e.*, dividend-initiating) firms and 1473 are right-censored (*i.e.*, non-dividend-initiating) firms.

	*IPO*s		Dividend Initiation Announcements	
Year	Number	Percentage	Number	Percentage
1979	3	0.16	1	0.25
1980	5	0.27	2	0.50
1981	32	1.71	23	5.75
1982	11	0.59	5	1.25
1983	48	2.56	27	6.75
1984	25	1.33	17	4.25
1985	32	1.71	23	5.75
1986	84	4.48	37	9.25
1987	65	3.47	31	7.75
1988	34	1.82	18	4.50
1989	39	2.08	14	3.50
1990	28	1.49	12	3.00
1991	91	4.86	26	6.50
1992	134	7.15	40	10.00
1993	181	9.66	40	10.00
1994	168	8.97	27	6.75
1995	186	9.93	20	5.00
1996	288	15.38	20	5.00
1997	248	13.24	12	3.00
1998	171	9.13	5	1.25
Total	1873	100.00	400	100.00

Table 2

A nonparametric analysis using the Kaplan and Meier [1958] Life Table Product-Limit approach. The study covers the 20-year period from January 1, 1979 to December 31, 1998. We identify firms that undertake an *IPO* in this period, and the corresponding *IPO* dates, from the *Securities Data Corporation* (*SDC*) new issues database. To match these *IPO* dates with regular cash dividend initiation announcement dates from the *Center for Research in Security Prices* (*CRSP*) database, we apply the following criteria. If a firm announces the initiation of a regular cash dividend on or before December 31, 1998, we classify the announcing firm as an exited firm. If a firm announces no regular cash dividends on or before December 31, 1998, we classify the firm as a right-censored firm. After eliminating firms that do not have complete *Compustat* data available for calculating our control variables in every year that a firm appears in the sample (see the *Notes* to Table 3), the matching of *SDC* data with *CRSP* data results in a sample of 1873 firms, among which 400 are exited (*i.e.*, dividend-initiating) firms and 1473 are right-censored (*i.e.*, non-dividend-initiating) firms.

In the "Survival Rate" column, the numbers in parentheses are the two-tailed p-values associated with a test of the hypothesis that the survival rate (*i.e.*, the cumulative proportion of observations surviving as following a zero-dividend policy to the beginning of an interval, from Eq. A.14 in the Appendix) differs from zero. In the "Hazard Rate" column, the numbers in parentheses are the two-tailed p-values associated with a test of the hypothesis that the hazard rate (*i.e.*, the probability that a zero-dividend policy fails to survive the next interval conditional on surviving through the current interval, from Eq. A.15 in the Appendix) differs from zero. See Section A.3 of the Appendix for an econometric discussion of the Life Table Product-Limit Approach of Kaplan and Meier [1958], which we use to compute the data in Table 2.

Number of Firms in Sample	1873
Number of Exited Firms	400
Number of Right-Censored Firms	1473

Interval in Years Since *IPO*	# Firms in Interval at Beginning of Interval	# Firms in Interval Not Initiating by 1/1/99	# Firms in Interval Initiating in Interval	Survival Rate	Hazard Rate
0 to < 1	1873	166	148	1.0000 (.000)	0.0862 (.007)
1 to < 2	1559	236	129	0.9173 (.007)	0.0937 (.008)
2 to < 3	1194	268	32	0.8352 (.009)	0.0307 (.005)
3 to < 4	894	166	14	0.8100 (.010)	0.0174 (.005)
4 to < 5	714	141	17	0.7960 (.010)	0.0268 (.006)
5 to < 6	556	141	14	0.7750 (.011)	0.0293 (.008)
6 to < 7	401	94	9	0.7526 (.012)	0.0258 (.009)
7 to < 8	298	65	14	0.7335 (.014)	0.0542 (.014)
8 to < 9	219	16	5	0.6948 (.016)	0.0240 (.011)
9 to < 10	198	25	5	0.6783 (.018)	0.0273 (.012)
10 to < 11	168	16	4	0.6601 (.019)	0.0253 (.013)
11 to < 12	148	34	2	0.6436 (.020)	0.0154 (.011)
12 to < 13	112	47	4	0.6337 (.021)	0.0462 (.023)
13 to < 14	61	9	0	0.6051 (.024)	0.0000 (.000)
14 to < 15	52	8	1	0.6051 (.024)	0.0211 (.021)
15 to < 16	43	21	0	0.5925 (.027)	0.0000 (.000)
16 to < 17	22	6	1	0.5925 (.027)	0.0541 (.054)
17 to < 18	15	9	1	0.5613 (.040)	0.1000 (.100)
18 to < 19	5	5	0	0.5078 (.062)	0.0000 (.000)
19 to < 20	0	-	-	-	-
Total		1473	400		

Table 3

Results from using the duration model $l(t) = e^{xb} \, l a \, (l t)^{a-1}$ to estimate the hazard function $l(t)$ of exiting a zero-dividend status in Year t+1. The study covers the 20-year period from January 1, 1979 to December 31, 1998. We identify firms that undertake an *IPO* in this period, and the corresponding *IPO* dates, from the *Securities Data Corporation* new issues database. To match these *IPO* dates with regular cash dividend initiation announcement dates from the *Center for Research in Security Prices* database, we apply the following criteria. If a firm announces the initiation of a regular cash dividend on or before December 31, 1998, we classify the announcing firm as an exited firm. If a firm announces no regular cash dividends on or before December 31, 1998, we classify the firm as a right-censored firm. We code sample firms with an indicator variable that equals 1 for right-censored duration and 0 otherwise.

We obtain the following items from the *Compustat Full and Research Primary, Supplementary, and Tertiary* annual data files: year-end total assets (*TA*), operating income before depreciation (*OI*), repurchases of common and preferred stock (*REPO*), and four-digit *SIC* code. Using this data, we calculate the following test variables: *PROFIT* = *OI*/*TA*, *SIZE* = Ln (*TA*), and *REPURCHASES* = *REPO*/*TA*. Based on four-digit *SIC* code, we consider the following industries as in the high-tech sector: drugs (*SIC* codes 2833 to 2836), computers (*SIC* codes 3570 to 3577), electronics (*SIC* codes 3600 to 3674), precise measurement instruments (*SIC* codes 3810 to 3845), programming (*SIC* codes 7371 to 7379), and *R&D* services (*SIC* codes 8731 to 8734). The industry membership indicator variable *INDUSTRY* equals 1 if a firm belongs to one of the preceding high-tech industries and 0 otherwise. The time trend variable *TREND* is equal to a firm's *IPO* year minus the year 1978.

There are 1873 firms with complete data availability in every year that a firm appears in the sample, among which 400 are exited (*i.e.*, dividend-initiating) firms and 1473 are right-censored (*i.e.*, non-dividend-initiating) firms. These 1873 firms are the sample that we use in the analysis in Table 3. Table 3 reports the estimated parameters from using a duration model with time-varying control variables to estimate the hazard function $l(t)$ of exiting a zero-dividend status in year *t+1*, where we assume a Weibull density. Specifically, Table 3 reports the estimates for the parameters l, a, and b for each time-varying control variable x in the model $l(t) = e^{xb} \, l a \, (l t)^{a-1}$. In the Table, the numbers in parentheses are the t-values associated with a test of the hypothesis that an estimated coefficient differs from zero (from 1 in the case of a), with * (**) signifying significance at better than the 0.01 (0.05) one-tailed level.

---Table 3 continues on the following page---

Table 3 (continued)

Results from using the duration model $l(t) = e^{xb}\, l a\, (l t)^{a-1}$ to estimate the hazard function $l(t)$ of exiting a zero-dividend status in Year t+1.

Number of Firms in Sample	1873
Number of Exited Firms	400
Number of Right-Censored Firms	1473
Number of Firm-Year Observations	8534
Intercept	-4.1877
	(-14.35)**
l	0.0178
	(4.45)*
a	0.8623
	(1.87)**
Profitability	2.9365
(*PROFIT*)	(5.41)*
Size	0.4597
(*SIZE*)	(8.00)*
Industry	-1.1765
(*INDUSTRY*)	(-5.79)*
Time Trend	-0.1155
(*TREND*)	(-5.31)*
Share Repurchases	0.6821
(*REPURCHASES*)	(0.85)
Log Likelihood	-1415.23

Table 4
Average raw, abnormal, and cumulative abnormal daily returns. The study covers the 20-year period from January 1, 1979 to December 31, 1998. The portfolio of 312 firms that we use in the analysis in Table 4 contains firms that (i) undertake an *IPO* during the sample period; (ii) announce the initiation of a regular cash dividend during the sample period; and (iii) have all the required test data from the *Securities Data Corporation* new issues database, the *Center for Research in Security Prices* database, and the *Compustat Full and Research Primary, Supplementary, and Tertiary* annual database. We compute the average daily return of the 312-firm portfolio using the 60 daily returns of the portfolio from day –70 to –11, where day 0 is the day on which a firm announces the initiation of a cash dividend. We calculate AAR_t the average abnormal return on day *t*, as follows:

$$AAR_t = \frac{1}{312}\sum_{i=1}^{312} r_{it} - \frac{1}{60}\frac{1}{312}\sum_{d=-70}^{-11}\sum_{i=1}^{312} r_{id}$$

where r_{it} is firm *i*'s daily raw return on day *t*. In the Table, The "Average Raw Return" column reports the average raw return for all r_{it} on day *t*. The "Average Abnormal Return" column reports *AAR* on day *t*. The "t-value" column is the t-value associated with a test of the hypothesis that *AAR* on day *t* is greater than zero. The "Average Cumulative Abnormal Return" column reports the sum of all *AAR* through a given day *t*.

Day	Average Raw Return	Average Abnormal Return	t-value	Average Cumulative Abnormal Return
-10	0.00104	-0.00023	-0.10949	-0.00023
-9	0.00204	0.00077	0.36971	0.00054
-8	0.00095	-0.00032	-0.15346	0.00022
-7	0.00113	-0.00014	-0.06519	0.00009
-6	0.00253	0.00126	0.60267	0.00135
-5	-0.00126	-0.00253	-1.21010	-0.00118
-4	0.00301	0.00174	0.83173	0.00056
-3	0.00005	-0.00121	-0.58074	-0.00066
-2	0.00220	0.00093	0.44622	0.00027
-1	0.00183	0.00056	0.26851	0.00084
0	0.00683	0.00556	2.65955	0.00640
1	0.00285	0.00158	0.75664	0.00798
2	0.00414	0.00287	1.37336	0.01085
3	0.00238	0.00111	0.53100	0.01197
4	0.00251	0.00125	0.59563	0.01321
5	0.00257	0.00131	0.62446	0.01452
6	0.00039	-0.00087	-0.41769	0.01364
7	0.00240	0.00113	0.53984	0.01477
8	-0.00120	-0.00246	-1.17758	0.01231
9	0.00171	0.00045	0.21348	0.01276
10	-0.00057	-0.00184	-0.88062	0.01091

TABLE 5

Results from estimating the relation between a firm's age since its *IPO* and the abnormal stock return when the firm announces the initiation of a cash dividend. The study covers the 20-year period from January 1, 1979 to December 31, 1998. We identify firms that undertake an *IPO* in this period, and the corresponding *IPO* dates, from the *Securities Data Corporation* new issues database. To match these *IPO* dates with regular cash dividend initiation announcement dates from the *Center for Research in Security Prices* database, we apply the following criteria. If a firm announces the initiation of a regular cash dividend or before December 31, 1998, we classify the announcing firm as an exited firm. If a firm announces no regular cash dividends on or before December 31, 1998, we classify the firm as a right-censored firm. We use exited firms to estimate the following model:

$$CAR_i = a_0 + a_1 YIELD_i + a_2 DURATION_i + a_3 PROFIT_i + a_4 SIZE_i + a_5 INDUSTRY_i + u_i.$$

CAR is a firm's day 0 and day +1 initiation announcement abnormal return, where day 0 is the day on which a firm announces the initiation of a cash dividend. *YIELD* is the annualized dividend to price yield associated with a firm's initiation of a cash dividend, where the initiating firm's stock price at the close of day –1 is the scalar. *DURATION* is equal to a firm's dividend initiation announcement year minus its *IPO* year. To compute the other model variables, we obtain the following items from the *Compustat Full and Research Primary, Supplementary, and Tertiary* annual data files: year-end total assets (*TA*), operating income before depreciation (*OI*), and four-digit *SIC* code. Using this data, we calculate the following test variables: *PROFIT* = *OI*/*TA* and *SIZE* = Ln (*TA*). Also, based on four-digit *SIC* code, we consider the following industries as in the high-tech sector: drugs (*SIC* codes 2833 to 2836), computers (*SIC* codes 3570 to 3577), electronics (*SIC* codes 3600 to 3674), precise measurement instruments (*SIC* codes 3810 to 3845), programming (*SIC* codes 7371 to 7379), and *R&D* services (*SIC* codes 8731 to 8734). The industry membership indicator variable *INDUSTRY* equals 1 if a firm belongs to the one of the preceding high-tech industries and 0 otherwise. After eliminating firms that do not have complete data available to calculate all of the test variables, there are 312 firms left to estimate the model. In Table 5, the numbers in parentheses are the t-values associated with a test of the hypothesis that an estimated coefficient differs from zero, with * (***) signifying significance at better than the 0.01 (0.10) one-tailed level.

Number of Firms	312
Intercept	-0.0201 (-1.62)***
Dividend Yield (*YIELD*)	0.1010 (2.89)*
Duration (*DURATION*)	0.0037 (4.07)*
Profitability (*PROFIT*)	0.0656 (2.85)*
Size (*SIZE*)	0.0005 (0.31)
Industry (*INDUSTRY*)	-0.0037 (-0.49)
Adjusted R-Squared	0.0821