Predictable Corporate Distributions and Stock Returns

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Corporate managers frequently announce corporate distributions, including stock splits, stock dividends, special dividends, and increases in regular dividends, on the anniversary of a like announcement at the same firm. The market appears to not fully appreciate the implications of current distributions for future distributions and stock returns, as a simple strategy that involves purchasing firms with high predicted probabilities of distribution announcements earns significant abnormal monthly returns. These results are distinct from previously documented return regularities related to regular earnings and dividend announcements and return seasonality. (*JEL* G14, G35)

The determinants and implications of corporate distribution policies apparently are not fully understood by investors. Although the stock market generally reacts positively to announcements of distribution increases, DeAngelo, DeAngelo, and Skinner (2009) conclude that the empirical evidence provides only limited support for the signaling theories that would justify such positive stock price reactions.[1] They further suggest that corporate distribution policies might be best explained by the preferences of corporate managers or large shareholders.

In this paper, we provide evidence that not only sheds new light on corporate distribution decisions but also heightens the puzzle regarding stock market reactions to distribution announcements. In particular, we document a striking tendency for firms to announce corporate distributions, including stock

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[1] See, for example, Fama et al. (1969), Grinblatt, Masulis, and Titman (1984), and McNichols and Dravid (1990) regarding announcement returns for stock dividends and stock splits, Brickley (1983) and DeAngelo, DeAngelo, and Skinner (2000) for returns associated with special dividend announcements, and Lie (2000) and Grullon, Michaely, and Swaminathan (2002) regarding returns at dividend increase announcements.

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splits, stock dividends, special dividends, and substantive increases in regular cash dividends, at recurring twelve-month intervals.[2] Despite the predictable nature of these distribution announcements, we show that a simple strategy of purchasing stocks with high estimated probabilities of distribution events generates significant abnormal returns.

Our results significantly deepen the puzzle documented by Kalay and Loewenstein (1985) and Hartzmark and Solomon (2013), who find excess returns for regular cash dividends, which should be predictable. We show that noncash distributions, in particular stock dividends and stock splits, are also highly predictable, mainly because the events tend to recur on anniversaries of an earlier announcement of the same event at the same firm. In addition, we show that announcements of special dividends and substantial increases in cash dividends are also highly forecastable, a result not necessarily implied by the fact that regular dividends typically occur on a quarterly basis. The forecastability in special dividend and cash dividend increase announcements also arises in large part from recurrence at annual intervals.

The fact that corporate distribution announcements tend to recur on a calendar-linked basis may not be entirely surprising. The board meetings at which decisions are approved are often scheduled far in advance and held on a quarterly basis; earnings are announced quarterly; shareholder meetings are scheduled annually; and each company measures results based on a twelve-month fiscal year. However, we document a striking degree of predictability. In particular, as compared with the unconditional probability of observing each distribution event in a random firm/month, the probability conditional on observing that the same firm announced the same event twelve months earlier is 28 times as high (32.9% vs. 1.2%) for dividend increases, 136 times as high (32.6% vs. 0.24%) for special dividends, 79 times as high (29.2% vs. 0.37%) for stock dividends, and 10 times as high (4.5% vs. 0.45%) for stock splits.

Perhaps more important, we present evidence that the market apparently fails to appreciate the degree to which these distribution events can be forecast. We use a proportional hazard model to estimate the probability of corporate distribution event announcements on a firm-month basis and document significant abnormal returns to simple strategies that involve buying stocks during the month with the highest estimated probabilities of distributions. Four-factor (Fama-French 1993; Carhart 1997) alphas range from approximately 0.50% to 1.20% per month, depending on the distribution event and details of implementation.

[2] Including share repurchases in a study of distribution events is also natural. However, Banyi, Dyl, and Kahle (2008) document significant errors in share repurchase announcement dates. Despite these errors, we document (Figure A1 of the Internet Appendix) a degree of calendar-based recurrence in the repurchase announcement dates in the SDC Platinum database for the 1980 to 2012 period.

In any study that documents significant abnormal returns to a trading strategy, at least three possible interpretations arise. First, the results may reflect individual or collective "data snooping."[3] The only certain cure for data snooping concerns is assessment of whether the results hold in a new sample that is statistically independent of the original. Notably, however, Pontiff and McLean (2013) evaluate the postpublication validity of a large number of financial market anomalies and report that the average out-of-sample decay due to such bias is indistinguishable from zero.

Second, the model of normal returns may be inadequate. Third, the market may not be completely efficient with respect to the information used to form the portfolios. To distinguish between the latter explanations, we study abnormal returns to portfolios of stocks with high predicted probabilities of distribution events in which the predicted event did and did not occur, ex post. If the positive average abnormal return to the full portfolio of high event probability stocks arises because these stocks are characterized by some omitted risk factor or characteristic, then estimated alphas should be positive even for stocks that do not announce the event. In contrast to this reasoning, estimated alphas for high-event-probability stocks that did not announce the event are generally close to zero. We also compare returns on stocks with a high estimated probability of a distribution event in a given month to returns in the same stocks in the preceding and following months. We find that average returns in the high-event-probability months significantly exceed those in the same stocks during the preceding and following months, for all four distribution events. This evidence is difficult to reconcile with risk- or firm characteristic-based explanations, because doing so would require that the omitted risk factor or characteristic be low in the preceding month and following months, while increasing only during the month in which the event probability is high. The evidence is most consistent with the reasoning that the market does not appreciate the extent to which distribution events can be forecast.

The literature has documented anomalous returns related to earnings announcements (e.g., Beaver 1968; Bernard and Thomas 1990; Frazzini and Lamont 2006) and, as noted, regular cash dividend payments (Kalay and Loewenstein 1985; Hartzmark and Solomon 2013), each of which also tend to occur at predictable calendar intervals. Further, Heston and Sadka (2008) document that monthly stock returns are positively related to same-stock returns in the same calendar month of prior years. The findings here are distinct from these previously documented regularities, as they are observed even in samples that exclude earnings or dividend events and in samples that exclude stocks with high returns in the same calendar month of preceding years.

We find that alphas tend to be smaller when we compute portfolio returns on a value-weighted, rather than on an equal-weighted basis, and when we

[3] See, for example, Lo and MacKinlay (1990), White (2000), and Harvey, Liu, and Zhu (2014).

focus on portfolios of larger firms. These findings are consistent with the reasoning expressed by Pontiff (2006) and Stambaugh, Yu, and Yuan (2012), in which misvaluations can be greater for smaller firms, because of their illiquidity and high idiosyncratic risk. We also document somewhat smaller alphas in the second half of the sample, which is consistent with a degree of market learning, and for portfolios of stocks with higher institutional ownership, which is consistent with the reasoning that sophisticated investors reduce the misvaluation. However, the alphas remain significant in all subsamples.

The evidence presented here contributes to our understanding of corporate distribution policies by highlighting the role of recurring annual decisions to distribute. The evidence is also of interest because of the possibility that traders might be able to profitably exploit the anomaly. Perhaps most importantly, the evidence helps to illuminate areas in which existing models of price formation fall short, thereby showing the need for improved theories going forward and guiding their development.

1. Data Sources and Evidence of Predictability

1.1 Sample construction

We study four distribution events: cash dividend increases, special dividends, stock dividends, and stock splits, announced during the period January 1963 to December 2012 to all CRSP common stocks (share code equal to 10 or 11) listed on U.S. stock exchanges.[4] Events are identified using the CRSP distribution master file.

To enter the sample of increases in regular cash dividends, we require (1) the cash dividend is in U.S. dollars, (2) the dividend is quarterly, semiannual, or annual, (3) the dividend is taxable, and (4) the dividend increase is greater than 5% of the immediately preceding regular dividend.[5] Also, following Grullon, Michaely, and Swaminathan (2002), the previous quarterly cash dividend must be paid within a window of 20–90 trading days prior to the current dividend announcement.[6] We construct the special dividend sample following DeAngelo, DeAngelo, and Skinner (2000). In particular, we require (1) the special dividend to be cash, in U.S. dollars, (2) the dividend is taxable, and (3) the dividend is coded as “extra or special” or “year-end or final.” The stock dividend and stock split samples include all new issues of existing common stock. Stock splits are identified by CRSP distribution code “5523” with a split factor greater than 0.25 (corresponding to a five-for-four split), whereas stock

[4] The sample period starts in 1963 because we require accounting data from Compustat that are not available for earlier years for most firms.

[5] We impose the minimum dividend increase requirement to focus on events that should be informative and relevant to valuation. However, our central results are robust to either not imposing a minimum rate of increase or to raising the minimum increase to 10%.

[6] We extend the window to 20–180 trading days for semiannual cash dividends and 20–360 trading days for annual dividends.

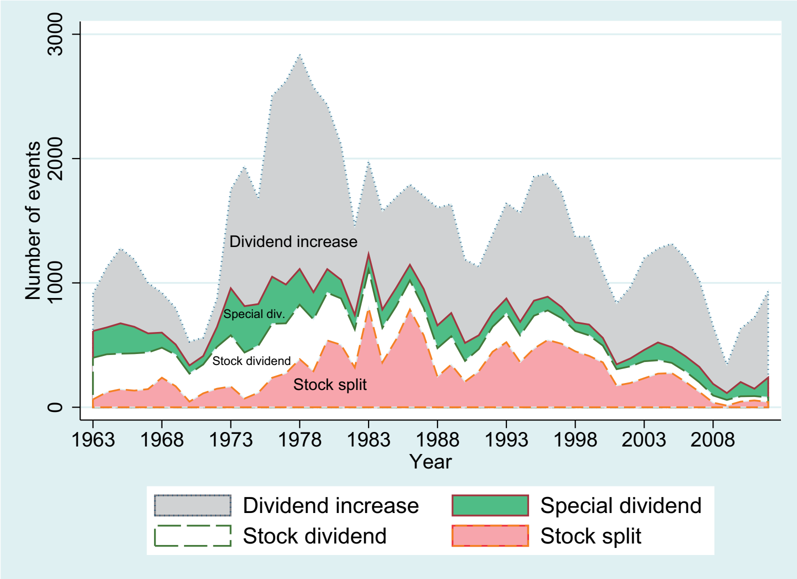

Figure 1
Number of corporate distribution events, 1963 to 2012
This figure depicts the number of each of four distribution events—dividend increases of at least 5%, special dividends, stock dividends, and stock splits—over our sample period.

dividends are identified by CRSP distribution codes of “5533” or “5538.” The samples contain 36,981 dividend increases, 7,673 special dividends, 11,626 stock dividends, and 14,119 stock splits.

Figure 1 displays the sample of distribution events by year. The frequency of events peaked during the 1970s, trended downward to a low point in 2009, and rebounded to almost one thousand events in 2012, which is still smaller than the average in earlier years. In addition, the rebound was mainly in cash dividend increases, while numbers of stock splits and stock dividends remain small late in the sample period.

1.2 Recurrence of distribution events

Table 1 provides data regarding the occurrence and recurrence of the corporate distribution events. Panel A reports the probability of observing each event for a given stock/month, unconditionally and conditional on previously observing the same event at the same firm. Panel B provides information regarding the extent to which multiple distribution events tend to occur simultaneously at the same firm. Panel C focuses on those cases in which a specific distribution recurs at the same firm, reporting the frequency distribution by number of months since the preceding same event at the same firm. Figure 2 displays the same data.

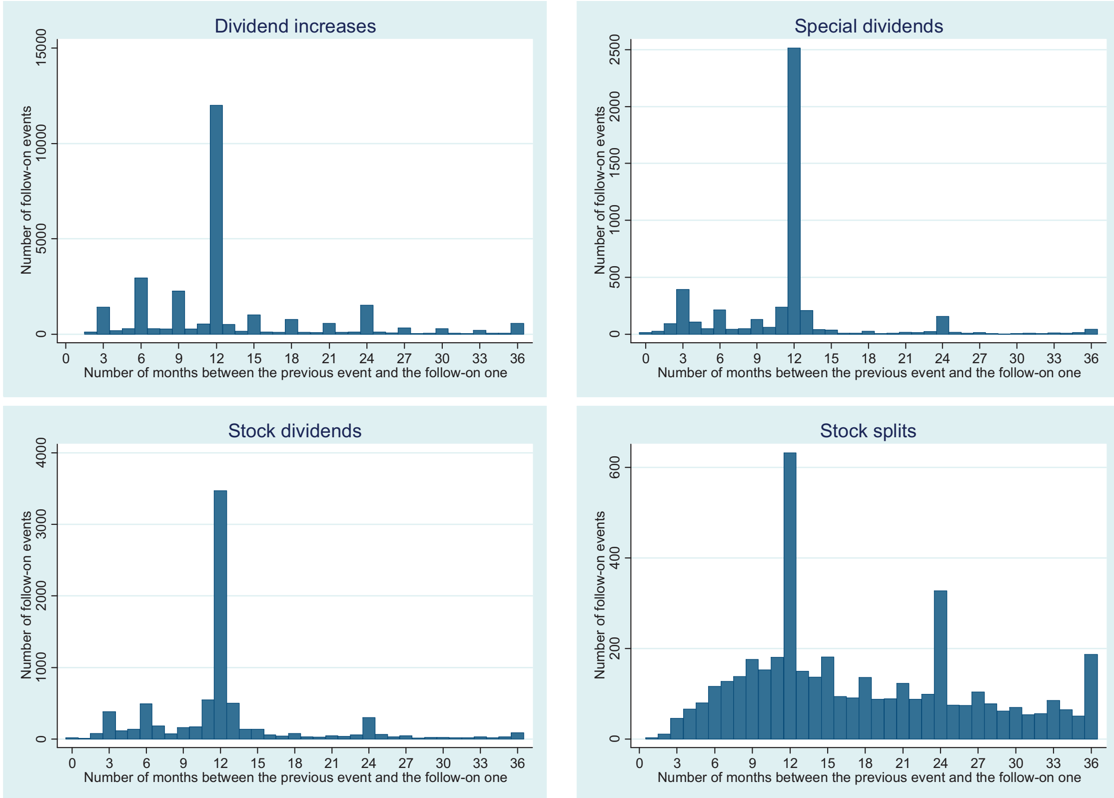

Figure 2
Frequency of follow-on corporate events, by elapsed months since the preceding like event
This figure depicts the number of four types of follow-on corporate distribution events— dividend increases of at least 5%, special dividends, stock dividends, and stock splits—grouped by the number of months between the previous event and the follow-on event of the same type. Our sample includes distributions to all common stock (share code is 10 or 11) announced between 1963 and 2012.

Table 1
Summary statistics regarding corporate distribution events

Panel A: Unconditional and conditional probabilities of distribution announcements

	Dividend increases	Special dividends	Stock dividends	Stock splits
Prob(event in month s)	1.18%	0.24%	0.37%	0.45%
Prob(event in month s |event over months s-12 to s-1)	4.67%	4.24%	4.11%	1.02%
Prob(event in month s |event over months s-24 to s-1)	2.95%	2.41%	2.55%	0.98%
Prob(event in month s |event over months s-36 to s-1)	2.12%	1.65%	1.79%	0.84%
Prob(event in month s |event in month s-12)	32.94%	32.59%	29.24%	4.47%
Prob(event in month s |event in month s-24)	4.23%	2.01%	2.48%	2.31%
Prob(event in month s |event in month s-36)	1.61%	0.55%	0.73%	1.32%

Panel B: Percent of event 1 announcements that occur in the same month as an event 2 announcement

		Event 2			
		Dividend increases	Special dividends	Stock dividends	Stock splits
Event 1	Dividend increases	100%	1.99%	2.37%	6.31%
	Special dividends	9.61%	100%	3.94%	1.69%
	Stock dividends	7.55%	2.60%	100%	0.30%
	Stock splits	16.52%	0.92%	0.25%	100%

(*continued*)

Several results are noteworthy. First, a large percentage of distribution events occur at firms that have recently announced the same event. Comparing the number of follow-on events that occur within thirty-six months (Table 1, panel C) to total sample sizes, we observe that the majority of stock dividends (66.3%), special cash dividends (60.2%), and dividend increases (74.6%) occur at firms that engaged in the same event during the prior three years. A lower, but still substantial, 30.4% of stock splits are recurrences within three years.

Second, the four distribution events tend to not occur in the same month that the same firm announces another distribution event. For example, only 2.0% of all cash dividend increases occur in the same month that a special dividend is announced, and only 7.6% of all stock dividends occur in the same month that a dividend increase is announced. The highest rate of overlap is for stock splits, 16.5% of which occur in the same month that the same firm announces a dividend increase.

Third, and most striking, distribution events tend to occur on anniversaries of preceding events, as evidenced by the spikes observable on Figure 2 at 12, 24, and 36 months. For each of the events, the spike at twelve months is the most noteworthy. More than half (54.4%) of all follow-on special dividends are announced one year after the preceding event. Nearly half of follow-on dividend increases (43.5%) and stock dividends (45.1%) are announced after a twelve months lapse. For stock splits, we also observe an increase, but one that is less dramatic (14.7% of follow-on events), twelve months after the preceding announcement.

The tendency for distribution events to recur implies that probabilities of observing these events are much higher for firms that previously engaged in

Table 1
Continued

Panel C: Frequency of follow-on distribution events by elapsed months since the preceding event

Number of months between the previous event and the follow-on event	Number of follow-on dividend increases	Number of follow-on special dividends	Number of follow-on stock dividends	Number of follow-on stock splits
0	0	13	16	0
1	0	27	7	3
2	120	93	80	11
3	1,418	392	382	46
4	181	107	116	66
5	298	49	138	80
6	2,946	213	492	116
7	294	42	185	127
8	269	50	73	138
9	2,253	131	160	176
10	267	60	172	153
11	541	237	547	180
12	11,992	2,514	3,471	632
13	508	209	501	150
14	152	39	137	137
15	1,019	37	140	181
16	118	9	59	94
17	104	7	43	91
18	772	26	78	136
19	100	6	32	88
20	79	9	29	89
21	566	17	47	123
22	106	13	37	88
23	122	24	58	99
24	1,517	156	298	327
25	112	16	63	75
26	66	7	30	74
27	323	14	45	104
28	39	5	14	78
29	42	3	25	62
30	301	6	22	70
31	51	9	17	54
32	40	5	20	56
33	205	10	34	85
34	43	7	17	65
35	48	14	30	51
36	571	43	89	187
Total	27,583	4,619	7,704	4,292
Follow up events as % of all events	74.6%	60.2%	66.3%	30.4%

Panel A reports the probability that a random CRSP firm announces a distribution event in a month. The unconditional probability of a distribution event is calculated as the number of events announced in a month in year Y divided by the number of common stocks in the CRSP universe at the end of year Y-1, and weighted across time by the number of common stocks. The conditional probability is the probability that a firm announces an event in month s conditional on that the same firm announced the same corporate event during the previous S (=12, 24, or 36) months or in the nth (12th, 24th, or 36th) month before month s. Panel B reports on the frequency of overlap among the four distribution events. Panel C reports the number of follow-on distribution, that is, events preceded by the same event at the same firm within thirty-six months, by the number of months between the previous event and the follow-on event. Our sample includes corporate distributions to common stocks (share code 10 or 11) announced between 1963 and 2012.

the same event as compared with the full sample of firms in the CRSP data. Unconditional probabilities, computed based on the number of sample events relative to the number of CRSP stock/months in the sample, are fairly low.

Specifically, the unconditional probabilities of an event at a random firm/month (panel A of Table 1) are 0.24% for special dividends, 0.37% for stock dividends, 0.45% for stock splits, and 1.18% for increases of at least 5% in regular dividends.

The probability of follow-on events is much higher, particularly in the 12th month after a same-firm event, where the probabilities are 32.9% for increases in cash dividends, 32.6% for special dividends, 29.2% for stock dividends, and 4.5% for stock splits. Stated alternatively, a firm that announced a dividend increase twelve months earlier is 28 times as likely (32.9% vs. 1.2%) to announce a dividend increase as compared with the full sample. A firm that announced a special dividend twelve months earlier is 136 times as likely (32.6% vs. 0.24%) to announce another special dividend as compared to the full sample. A firm that announced a stock dividend twelve months earlier is 79 times as likely (29.2% vs. 0.37%) to announce another stock dividend, whereas a firm that announced a stock split twelve months earlier is ten times as likely (4.5% vs. 0.45%) to announce another stock split.

The data reported in Table 1 and Figure 2 support the conclusion that firms that have recently engaged in distribution events are much more likely than other firms to engage in the event, particularly on the first anniversary. In fact, the majority of the stock dividends, special cash dividends, and increases in regular dividends observed in the CRSP data from 1963 to 2012 occur at firms that recently engaged in the same event, whereas almost one-third of observed stock splits occur at firms that have recently split their stock.

1.3 Distribution event recurrence and the annual calendar

The tendency for distribution events to occur on anniversaries of the same event at the same firm raises the question of whether the distribution announcements are related to other annual events at the firm, including the end of the fiscal year, the annual shareholder meeting, and the announcement of annual earnings. Panels A to D of Figure 3 present relevant data.

Panel A of Figure 3 displays the sample of distribution event announcements by calendar month. The most notable feature is that special dividend announcements cluster strongly in the last quarter of the calendar year. Panel B of Figure 3 displays the same information, based on the firm's fiscal year. The results indicate that increases in regular dividends, as well as stock splits and stock dividends, tend to occur early in the firm's fiscal year, whereas special dividends are predominantly announced in the last quarter of the fiscal year.[7]

Panel C reports the distribution of announcements by the number of months since the last annual earnings announcement. About 18% of dividend increases are announced coincident with the current annual earnings announcement. Special dividends are most often announced coincident with the earnings announcement or seven to ten months thereafter.

[7] About two-thirds of sample firms have a fiscal year that ends in December.

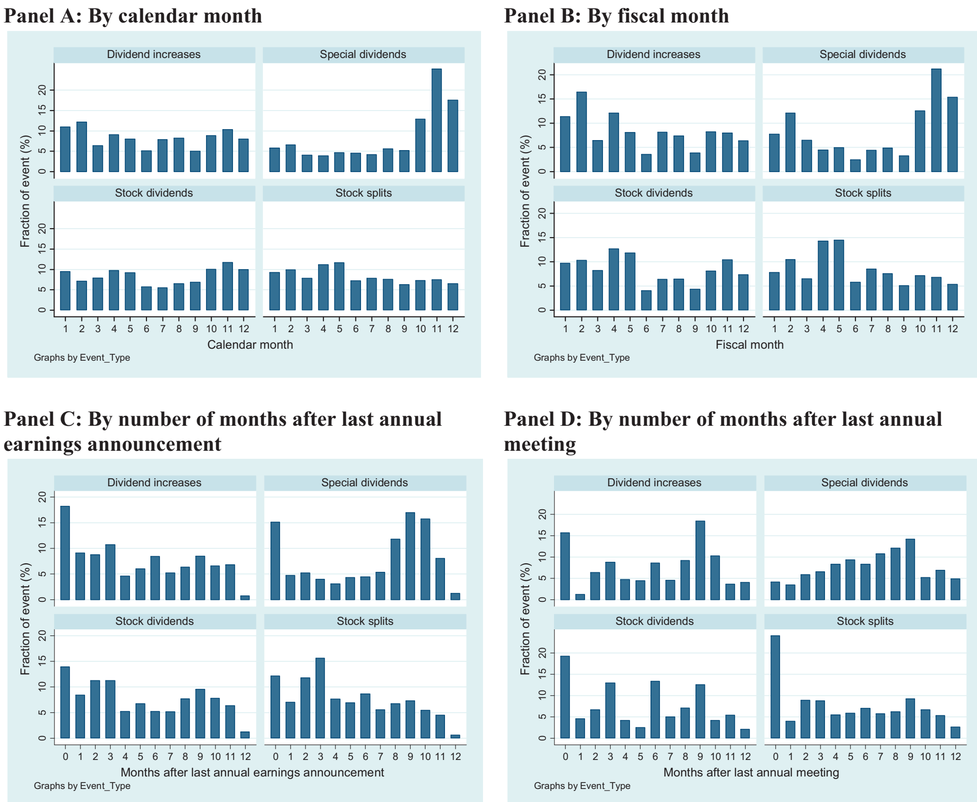

Figure 3
Distribution of corporate distribution events
This figure depicts the percent of each of four distribution events—dividend increases of at least 5%, special dividends, stock dividends, and stock splits—grouped by calendar month (panel A), by fiscal month (panel B), by number of months after the last annual earnings announcement (panel C), and by number of months since the last annual meeting (panel D).

Panel D of Figure 3 reports on the frequency of distribution announcements relative to the annual meeting month.[8] Most notably, almost 25% of stock splits are announced coincident with the annual meeting. Dividend increases and stock dividends also occur frequently during the month of the annual meeting.

On balance, these data indicate that the annual recurrence of corporate distribution announcements is indeed linked to other annual corporate events. However, the results also indicate considerable variation in announcement months that is not linked to these annual events. Further, the relation differs across event types. Special dividends concentrate near the end of the fiscal and calendar years, when the firm likely has good information about the level of annual earnings and cash flow. Cash dividend increases tend to be announced coincident with annual earnings announcements and annual meetings and also nine months after the annual meeting. The latter likely reflects the combination of the final quarterly directors meeting and the fact that considerable information regarding annual operating performance has accrued since the previous annual meeting. Stock splits and stock dividends are by far most common at the time of annual meetings. On balance, the results suggest that firms tend to make cash distribution decisions late in the year when they have more information about annual operating performance and are more likely to make noncash distribution decisions coincident with the annual meeting.

1.4 The market reaction to distribution events

Consistent with extant literature, the average market reaction to the four distribution events we study is positive. Panel A of Table 2 reports average five-day cumulative abnormal returns (CARs) around the announcement dates of 1.18%, 2.31%, 2.37%, and 3.25% for dividend increases, special dividends, stock dividends, and stock splits, respectively, each of which is statistically significant at the 1% level. Announcement returns are significantly positive for all four events, both during the first (1963 to 1987) and second (1998 to 2012) halves of our sample period and in the case of special dividends are larger during the more recent data.

We also report, in panel B of Table 2, average stock returns in each of the five days around the distribution event announcement, as well as average stock returns for the same firm during other trading days from $d=-21$ to $d=21$ around the $d=0$ announcement date. Figure 4 displays a frequency distribution of daily returns for sample firms over the same interval. These data show that returns at the time of the announcement, and in particular on days $d=0$ and $d=1$, are positive and significantly greater than returns for the same firms on other days. Thus, consistent with prior studies, the data indicate that the market views the announcement of these distribution events as value enhancing. The fact that the abnormal returns are clustered at the announcement date itself verifies that

[8] Cukurova (2013) reports that annual corporate meetings are most frequently held in April and May. We obtain annual meeting dates from the RiskMetrics database.

Table 2
Stock returns around distribution event announcements

Panel A: Event-month returns and 5-day abnormal returns

	Dividend increases		Special dividends		Stock dividends		Stock splits	
Year	Monthly stock returns	5-day CARs	Monthly stock returns	5-day CARs	Monthly stock returns	5-day CARs	Monthly stock returns	5-day CARs
1963-1987	4.08%***	1.60%***	4.16%***	2.04%***	5.99%***	2.66%***	8.78%***	3.53%***
1988-2012	2.67%***	0.70%***	5.06%***	2.81%***	5.08%***	1.72%***	9.60%***	2.95%***
1963-2012	3.42%***	1.18%***	4.48%***	2.31%***	5.71%***	2.37%***	9.18%***	3.25%***

Panel B: Daily stock returns around event announcement

Day	Returns on days around event announcement	Average daily returns on days (-21, -3) and (3, 21) around event announcement	Difference
Dividend increases			
−2	0.0011***		0.0001
−1	0.0015***		0.0005***
0	0.0066***	0.0010***	0.0055***
1	0.0047***		0.0037***
2	0.0025***		0.0014***
Special dividends			
−2	0.0015***		0.0005*
−1	0.0020***		0.0011***
0	0.0102***	0.0010***	0.0092***
1	0.0107***		0.0097***
2	0.0035***		0.0025***
Stock dividends			
−2	0.0021***		0.0006**
−1	0.0024***		0.0009***
0	0.0090***	0.0016***	0.0074***
1	0.0094***		0.0079***
2	0.0053***		0.0038***
Stock splits			
−2	0.0043***		0.0017***
−1	0.0047***		0.0021***
0	0.0170***	0.0026***	0.0144***
1	0.0128***		0.0102***
2	0.0053***		0.0027***

Panel A presents the average monthly returns to stocks announcing a corporate distribution event in the month, as well as the average five-day cumulative abnormal returns (CARs), around the announcement date. CARs are computed over days -2 to +2 around the announcement date, based on the market model of Brown and Warner (1980), with beta estimated over the period from 42 to 252 days prior to the announcement date. Panel B presents raw daily stock returns around distribution event announcement, where day 0 is the announcement date. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

the high returns observed for the full announcement month (Table 2, panel A) are attributable primarily to the information contained in the announcements.

The evidence to this point supports (1) that corporate distribution events tend to recur at regular calendar intervals and (2) the market reacts positively to their announcement. These findings raise the question of whether astute investors could have profited from these regularities. To assess this issue, we first implement a formal model to estimate the probability of follow-on

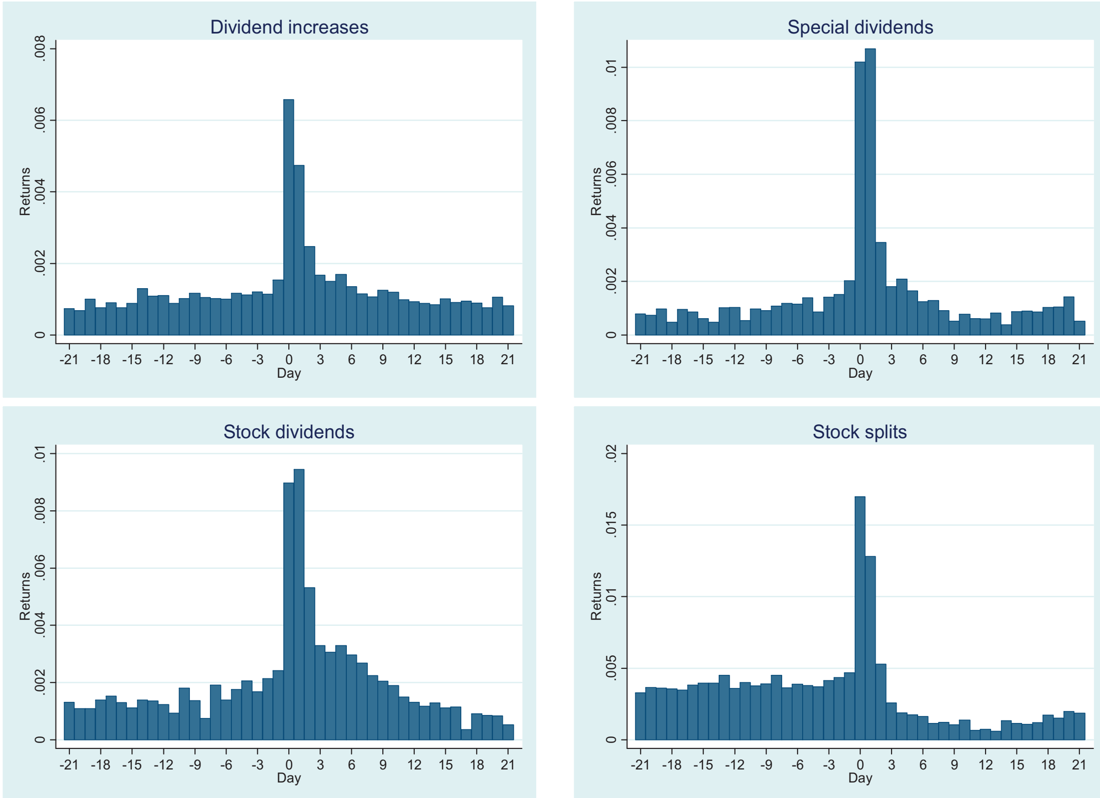

Figure 4
Daily stock returns around event announcements
This figure plots daily stock returns around announcement of each of four corporate events: dividend increases of at least 5%, special dividends, stock dividends, and stock splits. Day 0 corresponds to the announcement day. Our sample includes distributions to common stocks (share code is 10 or 11) announced between 1963 and 2012.

distribution events. We then assess whether the stock market makes efficient use of the fact that follow-on distribution events can be forecast.

2. Estimating the Probability of Follow-on Distribution Events

Given the calendar-related recurrence in distribution events, we implement the proportional hazard model of Cox (1972), which has been widely used to estimate probabilities of events that depend on elapsed time. In our application, the "hazard rate" is the probability that the firm will announce a follow-on corporate event in month t, conditional on (1) the firm announcing the same event in month 0 and (2) the firm not announcing a follow-on corporate event before month t. The hazard rate is modeled as

$$h_i(t)=h_0(t)exp(\beta X_{it}), \tag{1}$$

where $h_0(t)$ is a "baseline" hazard rate that only depends on elapsed time since the previous corporate event. We also incorporate a vector, X_{it}, of firm-specific explanatory variables motivated by theory and economic reasoning to potentially enhance the predictions.[9]

In addition to elapsed time, we consider the potential role of firm-specific explanatory variables. Grullon, Michaely, and Swaminathan (2002) and Lie (2000) present evidence that the decision to increase cash dividends depends on firm profitability and cash balances, whereas DeAngelo, DeAngelo, and Skinner (2009) emphasize the importance of free cash flow in explaining cash dividend payments. In line with this reasoning, we include the firm's return on assets (ROA) and its cash balance, measured as the amount of cash and short-term investments scaled by total assets, as explanatory variables when modeling the likelihood of increases in regular dividends and special dividends.[10] As explanatory variables, we also include the size of the previous dividend increase or the amount of the previous special dividend, as well as the five-day CARs at the previous announcement of a dividend increase or special dividend. A larger preceding dividend increase or special dividend would reduce the firm's cash holding by more and thus is expected to be less likely to be followed by another dividend increase and special dividend ceteris paribus. A positive announcement return on the prior distribution may encourage the firm to announce a follow-on. In addition, we include a large-firm indicator variable, which takes the value of one if the market capitalization

[9] Explanatory variables are winsorized at the upper and lower 1% boundaries to mitigate the effect of outliers.

[10] To ensure that we rely on accounting data that would have been available to investors, we use ROA and cash holdings data from the fiscal year that ends in calendar year *Y-1* as the explanatory variables in the hazard model from July of year Y to June of year $Y+1$. To increase the usable sample size, we replace missing ROA and cash holding data with the market median in the fiscal year when estimating the probability of a follow-on dividend increase or a follow-on special dividend. In unreported results (available upon request), we find that excluding the observations with missing ROA and cash balance does not alter our results.

at the end of the previous announcement month is above the median of NYSE-listed stocks, to assess the potential impact of firm size on the distribution events.

To model the probability of follow-on stock splits or stock dividends, we include an indicator variable that equals one if the nominal stock price at the end of each of the preceding twelve months (or at the end of each month since the most recent event, if fewer than twelve months) is greater than the price just prior to the most recent stock dividend or stock split. The intent is to accommodate the widely studied "trading range" hypothesis (e.g., Lakonishok and Lev 1987; Muscarella and Vetsuypens 1996), which implies that stock splits and dividends are used to return the stock price to a preferred level in the wake of stock price increases. Consistent with the hazard model implemented for dividend increases and special dividends, we use as explanatory variables the size of the preceding stock dividend or the split factor, the five-day CARs around the previous announcement, and the large-firm dummy. Descriptive data pertaining to the explanatory variables are reported in Appendix Table A1.

We initially implement the hazard model for each of the distribution events using all observations for firms that have previously engaged in the event at least one time since the beginning of the sample. Figure 5 depicts the estimated baseline hazard rate, $\hat{h}_0(t)$, for $t=1$ to 60 for the 1963–2012 sample. Consistent with the data reported in Table 1, the hazard rate jumps notably at $t=12$, particularly for dividend increases, special dividends, and stock dividends. Smaller jumps are also observable at $t=24$ and $t=36$ months since the prior event.

In panel A of Table 3, we report coefficient estimates obtained when estimating the hazard model for increases in regular dividends and for special dividends, using the full sample. For each explanatory variable, the first row reports the estimated coefficient ($\hat{\beta}$), the second row reports the hazard ratio ($\exp(\hat{\beta})$), and the third row reports t-statistic in parentheses. Column 3 reports results when all explanatory variables are included, and Columns 1 and 2 explore the effects of excluding subsets of the explanatory variables. The large-firm dummy is positively associated with the hazard rate for dividend increases, but not for special dividends. Both ROA and cash holding are positively associated with the probability of both special dividends and increases in regular cash dividends. The size of the previous special dividend and of the prior dividend increase (each of which reduces cash holding) are both negatively associated with the probability of a follow-on event.

Panel B of Table 3 reports estimation results for stock dividends and stock splits. The size of the latest stock dividend is negatively associated with the probability of a follow-on event, and the probability of a follow-on stock split declines if the prior split factor was larger. Large firms are less likely to announce a follow-on stock split, but the large-firm indicator is not significant for follow-on stock dividends. Consistent with the optimal trading range

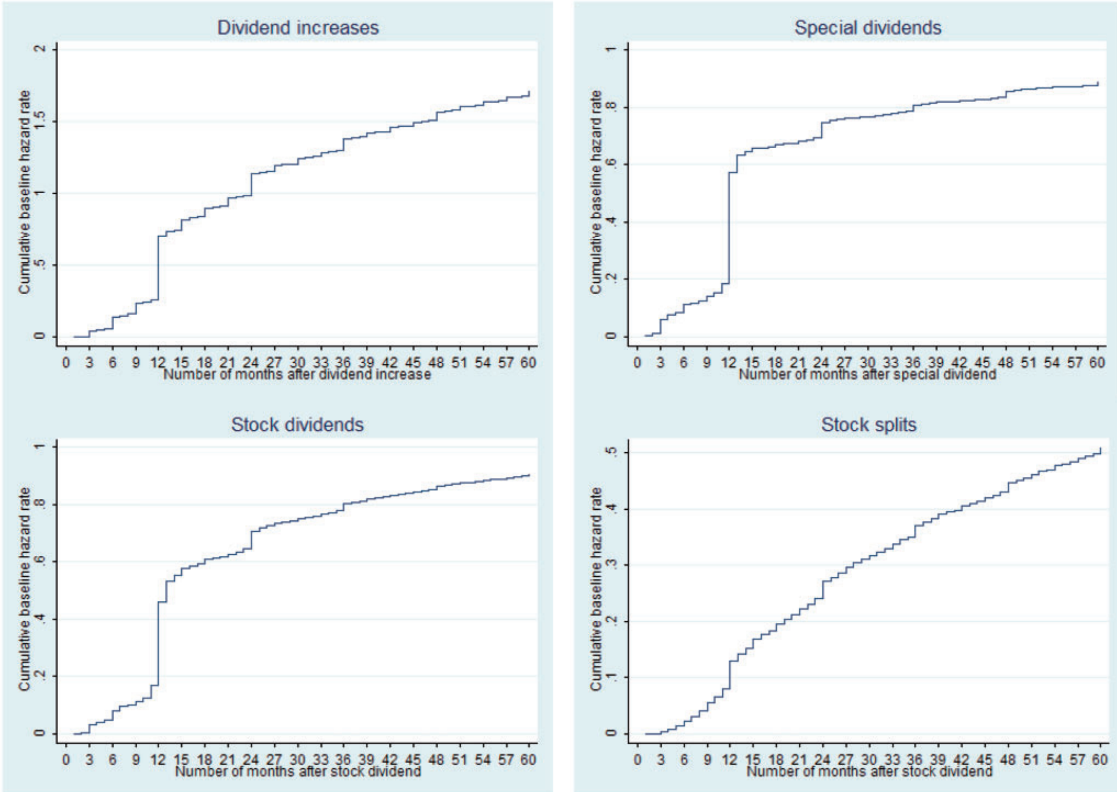

Figure 5
Estimated baseline hazard rate of a follow-on corporate event
This figure plots the cumulative baseline hazard rate (cumulative $\hat{h}_0(t)$) of a follow-on corporate event in the t^{th} month after the previous corporate event of the same type, estimated using the proportional hazard model with all economic explanatory variables and all sample events. The length of the vertical line at each month t is the estimated baseline hazard rate for the t^{th} month after the previous corporate event. Depicted is the baseline hazard rate for $t = 1$ to 60 estimated from the whole sample of data. The overall hazard rate in the t^{th} month for stock i is modeled as $h_i(t) = h_0(t)\exp(\beta X_{it})$. Our sample includes cash dividend increases of at least 5%, special dividends, stock dividends, and stock splits of common stocks (share code is 10 or 11) announced between 1963 and 2012.

Table 3
Estimating probabilities of follow-on corporate distribution announcements with the hazard model

Panel A: Estimation results for dividend increases and special dividends

	(1)	(2)	(3)	(4)	(5)	(6)
	Dividend increases			Special dividends		
Prior event dividend increase	−0.2281***		−0.2386***	−3.7780***		−4.0166***
(or size of special dividend)	0.7961***		0.7878***	0.0229***		0.0180***
	(−7.978)		(−8.284)	(−9.765)		(−9.973)
5-day announcement CARs,	0.0536		0.0425	−0.3592		−0.3367
prior event	1.0550		1.0435	0.6983		0.7141
	(0.438)		(0.348)	(−1.439)		(−1.353)
Large firm indicator	0.0622***		0.0582***	0.0372		−0.0026
	1.0642***		1.0599***	1.0379		0.9974
	(5.345)		(4.934)	(1.058)		(−0.073)
ROA		0.3997***	0.3122**		1.8896***	1.4079***
		1.4913***	1.3664**		6.6169***	4.0873***
		(3.198)	(2.458)		(7.524)	(5.260)
Cash balance		0.0991	0.1655***		0.2450**	0.5572***
		1.1042	1.1800***		1.2776**	1.7457***
		(1.579)	(2.621)		(2.309)	(5.030)
Observations	927,860	927,860	927,860	295,212	295,212	295,212
Explained variation	0.20%	0.04%	0.24%	2.13%	1.03%	3.18%

(*continued*)

Table 3
Continued

Panel B: Estimation results for stock dividends and stock splits

	(1)	(2)	(3)	(4)	(5)	(6)
	Stock dividends			Stock splits		
Prior event size of stock dividend or split factor.	−3.0517***		−3.0068***	−0.6061***		−0.4997***
	0.0473***		0.0494***	0.5455***		0.6067***
	(−22.332)		(−22.005)	(−18.475)		(−15.410)
5-day announcement CARs, prior event	0.1700		0.1016	0.7542***		0.5019***
	1.1853		1.1069	2.1259***		1.6519***
	(0.969)		(0.576)	(4.360)		(2.902)
Large firm indicator	0.0378		0.0382	−0.0685***		−0.0501*
	1.0385		1.0389	0.9338***		0.9512*
	(1.133)		(1.146)	(−2.663)		(−1.943)
High stock price indicator		0.3103***	0.1741***		1.5734***	1.4314***
		1.3639***	1.1902***		4.8230***	4.1846***
		(8.175)	(4.541)		(37.736)	(33.797)
Observations	439,305	439,305	439,305	1,022,989	1,022,989	1,022,989
Explained variation	7.56%	0.47%	7.70%	3.85%	8.10%	10.56%

For each of the four corporate events—dividend increases of at least 5%, special dividends, stock dividends, and stock splits—we estimate the proportional hazard model using the whole sample of data. The hazard rate in the t^{th} month after the previous corporate event for stock i is modeled as $h_i(t)=h_0(t)\exp(\beta X_{it})$. Panels B and C of this table present the estimated β of the proportional hazard model. The estimated baseline hazard rate, $\hat{h}_0(t)$, is plotted in Figure 5. Summary statistics for the explanatory variables are contained in Table A1 of the Internet Appendix. Dividend increase is the percentage increase in the prior cash dividend. The amount of prior special dividend is scaled by the stock price at the end of the month prior to the special dividend announcement. Split factor is the increase in the number of shares outstanding after the prior stock split, divided by the number of shares outstanding before the split. The large firm indicator takes the value of one if the firm's market capitalization is above the median market capitalization of all NYSE-listed stocks at the end of month 0, and zero otherwise. ROA is income before extraordinary items scaled by total assets. Cash balance is the amount of cash and short-term investments scaled by total assets. For July of calendar year Y to June of calendar year Y+1, ROA and cash are measured at the end of the fiscal year that ends in calendar year Y-1. The high stock price indicator equals one if the nominal stock price at the end of each of the preceding 12 months (or at the end of each month since the most recent event, if fewer than twelve months) is greater than the price just prior to the most recent stock dividend or stock split. The continuous variables are winsorized at the upper and lower 1% when estimating the proportional hazard model. The first row reports the estimated coefficient ($\hat{\beta}$) and the second row reports the hazard ratio ($\exp(\hat{\beta})$). The associated t-statistics are reported in the parentheses below each coefficient. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. Explained variation is the fraction of the variation in the time to the follow-on event that is accounted for through the explanatory variables (Royston 2006). Our sample includes distributions to common stocks (share code is 10 or 11) announced between 1963 and 2012.

hypothesis, the high stock price indicator is strongly, positively associated with the probability of both a follow-on stock dividend and a follow-on stock split. Lastly, the announcement return at the prior event is positively associated with the probability of a follow-on stock split but is not significantly associated with that of stock dividend.

On balance, the results obtained for the economic variables are consistent with theory and with the prior evidence, as cash distribution events are more likely for firms with greater cash balances and for more profitable firms and are less likely for firms that distributed more cash in the preceding event. Noncash distributions are more likely for firms whose stock price has recently increased, which is consistent with the trading range interpretation.

To assess the overall importance of the economic variables in predicting distributions, we implement the test statistic developed by Royston (2006), which quantifies the fraction of the variation in the number of months until the follow-on event that is explained by the economic variables. The results indicate that the economic variables explain only a small portion (10.6% for stock splits, 7.7% for stock dividends, 3.2% for special dividends, and 0.2% for dividend increases) of the variation. Thus, while the economic variables have significant explanatory power that is generally consistent with economic theory, the main reason that the corporate distribution events can be predicted is due to recurrence at fixed calendar intervals.

Table A2 in the Appendix reports the results of tests intended to assess the accuracy of the predictions obtained from the hazard model. In general, the results indicate that the predictions are of high quality, as regressions of actual event frequencies on predicted event frequencies produce slope coefficients close to one and intercepts close to zero.

3. Does the Market Accurately Price the Predictability in Corporate Distributions?

The evidence reported in Section 2 shows that corporate distribution events are highly predictable, mainly because of a tendency for events to recur at regular calendar intervals. In an efficient stock market, the value implications of such predictability should be fully incorporated in prices, implying the absence of abnormal returns to trading based on the predictability. We test this reasoning by measuring returns to portfolios of stocks with high estimated probabilities of distribution event announcements.

For this specification we estimate the probability of a follow-on event in month s by implementing model 1 using data from months s-120 to s-1.[11] The

[11] To estimate the probability of a follow-on event during the first ten years of our sample period (1963–1972), we rely on distribution data prior to 1963. In light of the evidence that the predictability mainly stems from calendar-related recurrence, we replace missing ROA and cash-holding data with the market median in the fiscal year to increase the usable data points.

choice of the ten-year estimation window reflects a trade-off of sample size versus the relevance of data from the more distant past. Because the estimation is entirely based on data and parameter estimates that would have been available to market participants prior to month s, the estimates and the results of the trading strategies should be viewed as "out of sample."

3.1 Portfolio formation

We assess whether it is possible to profit from simple trading rules that involve purchasing securities with high estimated probabilities of a follow-on event in the upcoming month. For each month and within each sample, we form a portfolio of stocks with the highest estimated probability of a follow-on event during the month. We report results obtained when the portfolio contains those stocks with the highest $K = 1\%$ or 5% probabilities, and we consider samples comprised of all stocks with a corporate distribution event during the prior $T = 12$, 24, or 36 months. We assess raw returns to these strategies and also alphas estimated with respect to the four Fama-French (1993) and Carhart (1997) factors.

In Table 4, we report returns to portfolios of stocks formed on the basis of high probabilities of the individual distribution events, and in Table 5 we report returns to portfolios of stocks that includes firms with a high estimated probability of any of the four distribution events. Returns to the latter portfolios will be estimated more precisely, because of the inclusion of a larger number of stocks in any given month. We consider returns to the full portfolios of high-event-probability stocks and also to subportfolios that condition on whether or not the forecasted event occurs. Returns to the latter cannot be captured by traders but are relevant in distinguishing between potential explanations for the observed returns, as discussed in Section 4.

3.2 Raw portfolio returns

Panel A of Tables 4 and 5 reports average raw returns to the portfolios of stocks with high predicated probabilities of follow-on corporate events and the fraction of portfolio stocks that do announce a follow-on corporate event in the portfolio month. The realized frequency of corporate distribution events for portfolios of stocks selected on the basis of high estimated probabilities is also high, particularly for dividend increases, special dividends, and stock dividends. Realized frequencies range from 36.3% to 48.0% for dividend increases, from 23.7% to 39.5% for special dividends, and from 31.4% to 48.8% for stock dividends. For stock splits, the realized probabilities are lower, ranging between 4.0% and 9.3%, reflecting that these follow-on events are more difficult to forecast, mainly because of a lower degree of event clustering in month $t = 12$ after the prior event. For the pooled portfolio formed across all four distribution events (panel A of Table 5), realized event frequencies range from 34.7% to 51.5%.

Table 4
Estimated probabilities of a follow-on corporate distributions and stock returns, by type of distribution event

Panel A: Returns of stocks with high estimated probabilities

				Fraction of monthly portfolio returns >0		Returns of portfolios of stocks with high estimated probabilities							
						All stocks		Event realized		Event not realized		Diff. (realized - not)	
T	*K*	Number of stocks in portfolio	Realized probability	EW	VW	EW	VW	EW	VW	EW	VW	EW	VW
Dividend increases													
12	5%	32.85	0.4214	0.68***	0.62***	0.0163	0.0145	0.0239	0.0191	0.0110	0.0106	0.0130***	0.0085***
12	1%	7.00	0.4804	0.64***	0.59***	0.0150	0.0134	0.0205	0.0174	0.0098	0.0089	0.0107***	0.0085**
24	5%	44.85	0.3895	0.66***	0.64***	0.0154	0.0139	0.0237	0.0187	0.0106	0.0105	0.0131***	0.0082***
24	1%	9.35	0.4752	0.64***	0.61***	0.0150	0.0138	0.0202	0.0186	0.0118	0.0107	0.0085**	0.0079**
36	5%	52.43	0.3634	0.67***	0.65***	0.0155	0.0142	0.0243	0.0193	0.0109	0.0115	0.0134***	0.0078**
36	1%	10.92	0.4725	0.63***	0.62***	0.0152	0.0144	0.0200	0.0185	0.0124	0.0115	0.0076**	0.0069*
Special dividends													
12	5%	7.03	0.2980	0.66***	0.60***	0.0202	0.0162	0.0353	0.0307	0.0156	0.0138	0.0197***	0.0169***
12	1%	1.80	0.3953	0.60***	0.60***	0.0234	0.0201	0.0402	0.0380	0.0156	0.0116	0.0246***	0.0264***
24	5%	9.84	0.2597	0.65***	0.60***	0.0178	0.0131	0.0362	0.0300	0.0133	0.0114	0.0229***	0.0186***
24	1%	2.39	0.3894	0.63***	0.62***	0.0244	0.0194	0.0402	0.0367	0.0165	0.0126	0.0237***	0.0241***
36	5%	12.22	0.2372	0.65***	0.59***	0.0166	0.0123	0.0341	0.0289	0.0125	0.0116	0.0217***	0.0173***
36	1%	2.75	0.3779	0.63***	0.62***	0.0246	0.0183	0.0400	0.0364	0.0192	0.0146	0.0208***	0.0218***
Stock dividends													
12	5%	10.65	0.4000	0.66***	0.64***	0.0219	0.0213	0.0362	0.0295	0.0112	0.0115	0.0250***	0.0179***
12	1%	2.56	0.4877	0.61***	0.62***	0.0235	0.0227	0.0361	0.0331	0.0128	0.0131	0.0233***	0.0199***
24	5%	15.16	0.3512	0.68***	0.64***	0.0202	0.0181	0.0383	0.0287	0.0103	0.0123	0.0280***	0.0165***
24	1%	3.44	0.4778	0.62***	0.61***	0.0240	0.0200	0.0342	0.0290	0.0137	0.0116	0.0205***	0.0175***
36	5%	18.66	0.3142	0.67***	0.63***	0.0185	0.0164	0.0379	0.0282	0.0100	0.0109	0.0279***	0.0174***
36	1%	4.16	0.4684	0.64***	0.62***	0.0239	0.0204	0.0341	0.0288	0.0123	0.0114	0.0217***	0.0174***
Stock splits													
12	5%	13.32	0.0539	0.61***	0.61***	0.0141	0.0136	0.0711	0.0627	0.0104	0.0109	0.0607***	0.0517***
12	1%	3.08	0.0926	0.59***	0.59***	0.0200	0.0179	0.0659	0.0654	0.0156	0.0142	0.0504***	0.0512***
24	5%	24.21	0.0440	0.59***	0.61***	0.0104	0.0119	0.0637	0.0578	0.0078	0.0098	0.0559***	0.0480***
24	1%	5.24	0.0790	0.58***	0.58***	0.0155	0.0136	0.0659	0.0641	0.0109	0.0093	0.0550***	0.0548***
36	5%	33.24	0.0397	0.58***	0.60***	0.0091	0.0098	0.0629	0.0567	0.0068	0.0082	0.0562***	0.0485***
36	1%	7.04	0.0711	0.58***	0.58***	0.0136	0.0136	0.0668	0.0647	0.0092	0.0096	0.0575***	0.0550***

(*continued*)

Table 4
Continued

Panel B: Estimated four-factor alpha of stocks with high estimated probabilities

		Estimated four-factor alpha of portfolios of stocks with high estimated probabilities							
		All stocks		Event realized		Event not realized		Diff. (realized - not)	
T	*K*	EW	VW	EW	VW	EW	VW	EW	VW
Dividend increases									
12	5%	0.0065***	0.0054***	0.0141***	0.0100***	0.0012	0.0013	0.0128***	0.0087***
		(6.124)	(4.150)	(9.999)	(6.223)	(0.919)	(0.847)	(6.579)	(3.835)
12	1%	0.0062***	0.0049**	0.0098***	0.0072***	0.0016	0.0003	0.0082***	0.0069*
		(3.816)	(2.468)	(4.507)	(3.073)	(0.704)	(0.117)	(2.618)	(1.922)
24	5%	0.0052***	0.0047***	0.0137***	0.0097***	0.0004	0.0008	0.0133***	0.0089***
		(5.506)	(3.975)	(10.361)	(6.109)	(0.377)	(0.568)	(7.750)	(4.160)
24	1%	0.0057***	0.0045**	0.0099***	0.0085***	0.0027	0.0016	0.0072**	0.0069**
		(3.964)	(2.576)	(5.083)	(4.003)	(1.291)	(0.644)	(2.515)	(2.071)
36	5%	0.0053***	0.0049***	0.0143***	0.0106***	0.0007	0.0018	0.0136***	0.0088***
		(6.092)	(4.362)	(11.327)	(6.864)	(0.712)	(1.292)	(8.485)	(4.291)
36	1%	0.0057***	0.0051***	0.0100***	0.0087***	0.0027	0.0019	0.0073***	0.0068**
		(4.367)	(3.088)	(5.353)	(4.223)	(1.461)	(0.842)	(2.772)	(2.200)
Special dividends									
12	5%	0.0102***	0.0071***	0.0265***	0.0221***	0.0058**	0.0047	0.0207***	0.0174***
		(5.160)	(2.882)	(7.829)	(6.129)	(2.382)	(1.631)	(4.955)	(3.752)
12	1%	0.0159***	0.0128***	0.0308***	0.0296***	0.0081*	0.0038	0.0227***	0.0258***
		(4.107)	(3.255)	(5.987)	(5.657)	(1.722)	(0.810)	(3.251)	(3.684)
24	5%	0.0076***	0.0041*	0.0269***	0.0212***	0.0030	0.0021	0.0239***	0.0191***
		(4.636)	(1.899)	(8.374)	(6.160)	(1.435)	(0.807)	(6.261)	(4.456)
24	1%	0.0159***	0.0108***	0.0314***	0.0280***	0.0086**	0.0043	0.0228***	0.0237***
		(5.324)	(3.396)	(6.697)	(6.033)	(2.367)	(1.189)	(3.851)	(4.023)
36	5%	0.0064***	0.0032	0.0246***	0.0201***	0.0022	0.0019	0.0225***	0.0182***
		(4.325)	(1.551)	(8.191)	(6.138)	(1.160)	(0.776)	(6.340)	(4.461)
36	1%	0.0158***	0.0095***	0.0302***	0.0266***	0.0097***	0.0050	0.0205***	0.0216***
		(5.470)	(3.086)	(6.628)	(5.820)	(2.720)	(1.406)	(3.553)	(3.716)
Stock dividends									
12	5%	0.0104***	0.0104***	0.0246***	0.0184***	0.0001	0.0003	0.0244***	0.0181***
		(5.000)	(4.591)	(9.693)	(6.340)	(0.047)	(0.107)	(6.053)	(4.145)
12	1%	0.0141***	0.0123***	0.0264***	0.0236***	0.0019	0.0011	0.0245***	0.0225***
		(3.890)	(3.779)	(6.860)	(5.979)	(0.353)	(0.218)	(3.759)	(3.524)
24	5%	0.0087***	0.0069***	0.0261***	0.0172***	−0.0006	0.0016	0.0267***	0.0156***
		(4.967)	(3.237)	(11.284)	(6.407)	(−0.275)	(0.644)	(8.286)	(4.223)
24	1%	0.0141***	0.0092***	0.0244***	0.0194***	0.0028	−0.0002	0.0216***	0.0197***
		(4.149)	(2.993)	(6.828)	(5.415)	(0.594)	(−0.054)	(3.670)	(3.427)
36	5%	0.0067***	0.0055***	0.0259***	0.0172***	−0.0017	0.0000	0.0276***	0.0171***
		(4.340)	(2.947)	(11.768)	(6.611)	(−0.879)	(0.023)	(9.469)	(5.042)
36	1%	0.0140***	0.0098***	0.0237***	0.0187***	0.0018	0.0002	0.0219***	0.0184***
		(4.719)	(3.424)	(7.243)	(5.590)	(0.443)	(0.060)	(4.181)	(3.497)

(*continued*)

We also report, in panel A of Tables 4 and 5, the average number of stocks contained in each portfolio. These are fairly small and are lowest when the portfolio is based on the $K = 1\%$ highest forecast event probabilities. In this case, the portfolios can contain as few as an average of only 2 to 4 stocks for special dividends and stock dividends, 3 to 7 stocks for stock splits, or 7 to 10 stocks for cash dividends. Portfolios formed on the basis of any of the four distribution events contain an average of 11 to 17 stocks when $K = 1\%$ or 50 to 80 stocks when $K = 5\%$.

Table 4
Continued

Panel B: Estimated four-factor alpha of stocks with high estimated probabilities

		Estimated four-factor alpha of portfolios of stocks with high estimated probabilities							
		All stocks		Event realized		Event not realized		Diff. (realized - not)	
T	*K*	EW	VW	EW	VW	EW	VW	EW	VW
Stock splits									
12	5%	0.0067***	0.0061***	0.0561***	0.0474***	0.0033	0.0034	0.0528***	0.0440***
		(3.280)	(2.602)	(10.020)	(7.992)	(1.619)	(1.458)	(8.878)	(6.922)
12	1%	0.0140***	0.0109***	0.0579***	0.0560***	0.0100**	0.0076*	0.0479***	0.0483***
		(3.697)	(2.638)	(6.701)	(6.594)	(2.541)	(1.752)	(5.074)	(5.097)
24	5%	0.0030**	0.0049***	0.0481***	0.0429***	0.0007	0.0027	0.0475***	0.0402***
		(2.063)	(2.746)	(9.866)	(7.648)	(0.439)	(1.525)	(9.329)	(6.833)
24	1%	0.0100***	0.0078**	0.0555***	0.0524***	0.0056*	0.0035	0.0499***	0.0489***
		(3.135)	(2.168)	(7.223)	(6.752)	(1.731)	(0.964)	(6.011)	(5.723)
36	5%	0.0007	0.0017	0.0472***	0.0409***	−0.0014	0.0002	0.0487***	0.0407***
		(0.579)	(1.099)	(10.831)	(8.374)	(−1.148)	(0.099)	(10.743)	(7.943)
36	1%	0.0067***	0.0061**	0.0519***	0.0489***	0.0026	0.0023	0.0493***	0.0466***
		(2.722)	(2.299)	(7.380)	(6.802)	(1.043)	(0.858)	(6.631)	(6.092)

At the beginning of each month s from January 1963 to December 2012, we identify common stocks whose latest announcement of a corporate distribution event is during the previous T (=12, 24, or 36) months. Among the identified stocks, we form a portfolio of stocks whose estimated probability (hazard rate) of announcing a follow-on corporate event of the same type in month s is among the top K% (=1% or 5%). We form the portfolio for each of the following four distribution events: dividend increases of at least 5%, special dividends, stock dividends, and stock splits. The probability (hazard rate) of a follow-on corporate event in month s is estimated with the proportional hazard model with all explanatory variables using announcements of the corporate event during months s-120 to s-1. Table 3 has more details of the proportional hazard model. Panel A presents the realized probability and the average equal-weighted (EW) or value-weighted (VW) portfolio returns. Column 1 reports the average number of stocks in the monthly portfolios. Column 2 reports the realized probability, that is, the fraction of portfolio stocks that do announce a follow-on corporate event in the portfolio month. Columns 3 and 4 report the fraction of monthly portfolio returns that are positive. *** indicates that a number is statistically greater than 0.5 at the 1% level. Columns 5 and 6 present returns to the portfolios of all stocks with high estimated probabilities; Columns 7 and 8 present the returns to the portfolio stocks that do announce a follow-on corporate event in the month; Columns 9 and 10 present the returns to the portfolio stocks that do not announce a follow-on corporate event in the month; and Columns 11 and 12 present the differences in portfolio return between the stocks that do announce a follow-on corporate event in the month versus the stocks that do not. The equal-weighted portfolio return is weighted by the prior-month gross return to correct for biases due to noise in transaction prices. Panel B presents the estimated four-factor alpha for the portfolios. Columns 1 and 2 present the estimated four-factor alpha for the portfolios of all stocks with high estimated probabilities; Columns 3 and 4 present the estimated alpha for the portfolio stocks that do announce a follow-on corporate event in the month; Columns 5 and 6 present the estimated alpha for the portfolio stocks that do not announce a follow-on corporate event in the month; and Columns 7 and 8 present the differences in portfolio return between the stocks that do announce a follow-on corporate event in the month versus the stocks that do not. The alpha is estimated using the OLS regression in which the dependent variable is the equal- or value-weighted portfolio return in excess of the risk-free interest rate and the independent variables are the four risk factors—MKT, SMB, HML, and UMD—constructed by Fama and French (1993) and Carhart (1997). All model specifications employ robust standard errors. The associated t-statistics are reported in the parentheses below each coefficient. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. The sample includes CRSP common stocks (share code 10 or 11) from 1963 to 2012.

Panel A of Table 4 reports average portfolio returns, measured by aggregating across stocks on both an equal- and value-weighted basis.[12] Portfolios formed on the basis of a high estimated probability of follow-on stock splits generate the smallest average returns, ranging from 0.9% to 2.0% per month. Portfolios

[12] Asparouhova, Bessembinder, and Kalcheva (2013) show that noise in transaction prices leads to upward bias in equal-weighted portfolio returns. We implement their correction, which simply involves weighting each return by the prior-period gross return on the same security.

Table 5
Estimated probabilities of a follow-on corporate distributions and stock returns, for portfolios containing stocks with high estimated probabilities of any of the four distribution events

Panel A: Returns of stocks with high estimated probabilities

						Returns of portfolios of stocks with high estimated probabilities							
				Fraction of positive portfolio returns		All stocks		Event realized		Event not realized		Diff. (realized - not)	
T	*K*	# stocks in portfolio	Realized prob.	EW	VW	EW	VW	EW	VW	EW	VW	EW	VW
12	5%	53.75	0.4239	0.69***	0.65***	0.0172	0.0146	0.0265	0.0190	0.0107	0.0116	0.0159***	0.0074**
12	1%	11.15	0.5154	0.65***	0.61***	0.0178	0.0135	0.0225	0.0166	0.0124	0.0114	0.0102***	0.0052
24	5%	72.99	0.3796	0.68***	0.64***	0.0163	0.0138	0.0271	0.0190	0.0100	0.0101	0.0171***	0.0089***
24	1%	14.99	0.5080	0.67***	0.60***	0.0186	0.0137	0.0250	0.0181	0.0122	0.0115	0.0128***	0.0067*
36	5%	85.48	0.3469	0.68***	0.67***	0.0160	0.0140	0.0271	0.0195	0.0103	0.0106	0.0168***	0.0088***
36	1%	17.50	0.5026	0.68***	0.60***	0.0192	0.0143	0.0259	0.0183	0.0131	0.0125	0.0128***	0.0058

(*continued*)

Table 5
Continued

Panel B: Estimated four-factor alpha of stocks with high estimated probabilities

		Estimated four-factor alpha of portfolios of stocks with high estimated probabilities							
		All stocks		Event realized		Event not realized		Diff. (realized - not)	
T	*K*	EW	VW	EW	VW	EW	VW	EW	VW
12	5%	0.0066***	0.0055***	0.0158***	0.0103***	0.0001	0.0015	0.0157***	0.0088***
		(6.856)	(4.644)	(13.384)	(6.865)	(0.113)	(1.060)	(9.383)	(4.262)
12	1%	0.0081***	0.0044**	0.0128***	0.0079***	0.0028	0.0015	0.0101***	0.0064*
		(5.416)	(2.422)	(6.343)	(3.556)	(1.317)	(0.595)	(3.458)	(1.892)
24	5%	0.0058***	0.0045***	0.0165***	0.0104***	−0.0004	0.0002	0.0169***	0.0103***
		(6.836)	(3.956)	(14.791)	(7.079)	(−0.438)	(0.139)	(11.442)	(5.120)
24	1%	0.0087***	0.0046***	0.0147***	0.0093***	0.0025	0.0014	0.0123***	0.0078**
		(6.362)	(2.652)	(8.159)	(4.495)	(1.350)	(0.630)	(4.755)	(2.565)
36	5%	0.0054***	0.0046***	0.0166***	0.0109***	−0.0004	0.0006	0.0169***	0.0103***
		(6.715)	(4.273)	(15.188)	(7.700)	(−0.422)	(0.486)	(12.039)	(5.405)
36	1%	0.0091***	0.0054***	0.0154***	0.0094***	0.0035*	0.0029	0.0119***	0.0066**
		(7.165)	(3.369)	(9.026)	(4.670)	(1.922)	(1.291)	(4.814)	(2.187)

Panel C: Residual risks

		Summary statistics of regression residuals			
		EW		VW	
T	*K*	SD	Skewness	SD	Skewness
12	5%	0.0215	−0.4643***	0.0271	0.4430***
12	1%	0.0361	0.4449***	0.0440	0.3679***
24	5%	0.0194	−0.3552***	0.0241	−0.0308
24	1%	0.0327	0.4180***	0.0409	0.5965***
36	5%	0.0183	−0.2725***	0.0225	−0.1578
36	1%	0.0304	0.2301**	0.0390	0.6396***

See Table 4 for descriptions of panels A and B. Panel C presents standard deviation and skewness of regression residuals of models 1 and 2 in panel B.

formed on the basis of the estimated probability of a dividend increase are fairly uniform across samples, ranging from 1.3% to 1.6% per month. Portfolios formed on the basis of the estimated probability of a special dividend generate higher average returns, ranging from 1.2% per month to 2.5% per month. Predicted stock dividends provide average portfolio returns ranging from 1.6% to 2.4% per month.

For portfolios aggregated across all four distribution events (panel A of Table 5) returns vary from 1.4% to 1.9% per month. These mean returns are uniformly significant at the 1% probability level, reflecting both the large economic magnitude of the estimates and the reduction in standard errors due to combining stocks across types of distribution events. In general, no strong pattern emerges across subsamples, with the exception that returns for portfolios selected based on the $K = 1\%$ highest probabilities are slightly larger on average as compared with portfolios selected based in the highest $K = 5\%$ probabilities.

While these results indicate significant average returns to investing in stocks with high estimated probabilities of distribution events, the numbers of stocks contained in the portfolios is small, implying relatively high risk. Even for the more diversified portfolios that invest in stocks with a high probability of any of the distribution events, the standard deviation of residual (from the four-factor model) returns is high, ranging from 1.8% to 4.4% (panel C of Table 5).

To obtain some indication of the reliability of the profits obtained from these portfolios, we report, in panel A of Tables 4 and 5, the percentage of sample months in which portfolio returns are positive. These uniformly exceed one-half by a statistically significant margin, and for most samples, they are in the vicinity of 60% to 70%. For the individual distribution events, the proportion of months with positive portfolio returns range from 58% to 68%. For portfolios that invest in stocks with high probabilities of any of the four events, the proportion of months with positive returns ranges from 60% to 69%. Thus, although the strategy is risky, it generates positive returns for the substantial majority of months.

3.3 Portfolio four-factor alphas

The trading portfolios are exposed to market-wide risk factors. Next, we assess whether these portfolios earn excess returns, after allowing for such exposure. In Columns 1 and 2 of Table 4, panel B, we report estimated "alphas" for portfolios formed based on the individual distribution events, and the corresponding columns of Table 5 report results for the portfolio formed from firms with high probabilities of any of the four distribution events. Each alpha is the intercept in an OLS regression of equal- or value-weighted portfolio returns in excess of the risk-free interest rate on the factors attributable to Fama-French (1993) and Carhart (1997).

For portfolios formed based on predicted dividend increases, the estimated four-factor alpha ranges from 0.45% to 0.65% per month and is statistically significant in all cases. Turning to portfolios formed on the basis of predicted special dividends, the estimated alphas for equal-weighted portfolios range from 0.64% to 1.59% and are always statistically significant at the 1% level. The estimated alpha based on value-weighted portfolio returns is 0.32% and statistically insignificant for the trading strategy with $K=5\%$ and $T=36$, whereas for the other five samples the alpha estimates range from 0.41% to 1.28% and are always statistically significant.

For stock dividends, the estimated alpha is always statistically significant, ranging from 0.55% to 1.41% per month. For stock splits, alphas are statistically insignificant for those portfolios in which $K=5\%$ and in which $T=36$. However, alphas for other stock split samples range from 0.30% to 1.40% per month and are always statistically significant. Alphas for the portfolios formed from stocks with high probabilities of any of the four distribution events are uniformly positive, and all are statistically significant at the 1% level (panel B of Table 5). Individual alpha estimates range from 0.44% to 0.91% per month.

On balance, these results indicate significant positive returns to the portfolio strategies considered here, even after allowing for exposure to market-wide risk factors. The evidence of positive abnormal returns is generally stronger when investing in stocks with a higher predicted probability ($K=1\%$) of a follow-on distribution event, and alpha estimates are most often larger for equal-weighted portfolios than for value-weighted portfolios.

4. Potential Explanations and Subsample Results

The results reported in Sections 2 and 3 indicate that corporate distribution events can be forecast to a substantial degree and that portfolio strategies that simply involve purchasing stocks with high estimated probabilities of distribution events earn significant abnormal returns. Next, we assess evidence designed to distinguish between possible explanations for these findings and that assess whether the findings are robust across subsamples.

4.1 Are the positive alphas due to omitted risk factors?

The positive alpha estimates for the portfolios with high estimated probabilities of follow-on events could arise for at least two reasons. The first is that the market fails to fully recognize the high likelihood that these events will recur and therefore does not incorporate the value implication of the potential announcement in prices. This explanation parallels that offered by Bernard and Thomas (1990) who find that the market reacts to earnings announcements that could have been forecast based on earlier announcements. The second possibility is that the Fama-French-Carhart four-factor model is inadequate as the benchmark for normal returns. That is, stocks with high probabilities of follow-on events might be exposed to additional risk factors or might possess certain characteristics that are associated with higher average returns.[13]

To distinguish between these possibilities we separate portfolio stocks into two groups. The first consists of stocks with a high estimated probability of a follow-on event, where the forecasted event did occur, ex post. The second consists of stocks with a high estimated probability of a follow-on event, where the forecasted event did not occur. Although it would not be feasible for traders to capture returns to these portfolios, because they rely on ex post outcomes, their returns are potentially informative with regard to the two alternative explanations.

If the positive returns to the full portfolio of high-event-probability stocks are attributable to unobserved risks or characteristics that pertain to all stocks in the portfolio rather than to the occurrence of the distribution events then average returns should be significantly positive both for stocks in which the event occurred and for stocks in which the event did not occur. Alternatively, if there is not any omitted risk factor and the market does anticipate the high ex ante likelihood of event occurrence, then the ex post abnormal return conditional

[13] For example, Bessembinder and Zhang (2013) document that the apparent abnormal long-run returns to firms issuing equity can be attributed to differences in firm characteristics, including illiquidity and idiosyncratic volatility, that are related to average returns.

on the event not occurring should be negative, reflecting disappointment that the anticipated event failed to be realized.

Columns 7 to 12 of Table 4 Panel A present average raw returns to portfolios of high probability stocks in which the predicted event did occur, to portfolios in which the predicted event did not occur, and the difference in mean returns across occurrence and nonoccurrence portfolios. The corresponding columns of Table 5 report the same results for portfolios formed based on any of the four distribution events. Columns 3 to 8 of panel B of Tables 4 and 5 report the corresponding alphas, based on the four Fama-French-Carhart factors.

Notably, average returns for stocks in which the predicted event did occur uniformly exceed returns for stocks in which the predicted event did not occur, and the differences are with very few exceptions both economically and statistically significant, with or without adjustment for exposure to the Fama-French-Carhart factors. The difference in mean monthly returns across stocks with and without event occurrence is economically large, averaging about 500 basis points for stock splits, 80 basis points for cash dividend increases, 200 basis points for special dividends and stock dividends. Thus the positive returns for portfolios of high event probability are strongly affected by the large returns to stocks that do announce the distribution event.

Focusing on abnormal returns to the portfolio of stocks that did not announce distribution events, we observe that the large majority of alpha estimates do not differ significantly from zero (The few exceptions observed are for equal-weighted portfolios of special dividend and stock splits events). For the portfolio that contains stocks with a high predicted probability of any of the four distribution events (panel B of Table 5), alpha estimates conditional on event nonoccurrence are uniformly indistinguishable from zero. The absence of positive abnormal returns to portfolios of high event probability stocks in which the event did not occur is at odds with the interpretation that the positive abnormal returns to the full portfolio of high-event-probability stocks arise because of an omitted risk factor or characteristic.

Event occurrence is associated with large positive abnormal returns, and event probabilities are generally quite high. In the absence of an omitted risk factor, the failure of the event to occur should be accompanied by negative abnormal ex post returns. The paucity of negative alpha estimates for firms in which the estimated event probability is high but the event did not occur is consistent with the reasoning that the market did not anticipate the high probability of event occurrence and hence was not disappointed by the failure of the event to occur.

We provide additional evidence with potential to distinguish between the imperfect model and market inefficiency explanations in Table 6. In particular, we compute average raw monthly returns for portfolios of stocks with high estimated month s probabilities of distribution events for month s as well as for the *same* stocks in months s-1 and s+1. If the high month s returns

Table 6
Monthly same-stock returns before, during, and after the month with a high estimated probability of a follow-on distribution announcement

T	K	Returns in the month of high probability of follow-on event (month s)	Returns in month s-1	Returns in month s+1	Difference (Month s - average of months s-1 and s+1)
			Dividend increases		
12	5%	0.0178	0.0102	0.0134	0.0060***
12	1%	0.0161	0.0103	0.0120	0.0049***
24	5%	0.0173	0.0107	0.0133	0.0053***
24	1%	0.0164	0.0101	0.0127	0.0050***
36	5%	0.0172	0.0108	0.0136	0.0051***
36	1%	0.0166	0.0102	0.0134	0.0048***
			Special dividends		
12	5%	0.0219	0.0157	0.0124	0.0078***
12	1%	0.0256	0.0173	0.0117	0.0110**
24	5%	0.0206	0.0167	0.0128	0.0059***
24	1%	0.0261	0.0164	0.0111	0.0123***
36	5%	0.0199	0.0164	0.0130	0.0053***
36	1%	0.0270	0.0200	0.0113	0.0113***
			Stock dividends		
12	5%	0.0256	0.0135	0.0168	0.0105***
12	1%	0.0256	0.0134	0.0168	0.0106***
24	5%	0.0239	0.0143	0.0153	0.0092***
24	1%	0.0263	0.0124	0.0174	0.0114***
36	5%	0.0227	0.0157	0.0149	0.0074***
36	1%	0.0270	0.0118	0.0162	0.0130***
			Stock splits		
12	5%	0.0110	0.0077	0.0077	0.0034*
12	1%	0.0171	0.0088	0.0088	0.0084**
24	5%	0.0106	0.0076	0.0092	0.0024*
24	1%	0.0150	0.0086	0.0101	0.0056*
36	5%	0.0104	0.0079	0.0081	0.0026**
36	1%	0.0140	0.0077	0.0073	0.0066**

This table presents monthly stock returns around the month with high estimated probability of a follow-on event. We estimate the probability of a follow-on event as following. At the beginning of each month s from January 1963 to December 2012, we identify common stocks whose latest announcement of each of the four distribution events—dividend increases of at least 5%, special dividends, stock dividends, and stock splits—is during the previous T (=12, 24, or 36) months. Among the identified stocks, we choose stocks whose estimated probability (hazard rate) of announcing any of the four follow-on corporate events in month s is among the top K% (=1% or 5%). The probability (hazard rate) of a follow-on corporate event in month s is estimated with the proportional hazard model with all explanatory variables using announcements of the corporate event during months s-120 to s-1. Table 3 has more details of the proportional hazard model. ***, **, and * in the last column correspond to the difference being statistically significant at the 1%, 5%, and 10% levels, respectively. The sample includes CRSP common stocks (share code 10 or 11) from 1963 to 2012.

are attributable to some unobserved but priced characteristic of high event probability stocks then returns to these stocks should be high in months s-1 and s+1 as well.

In contrast to this reasoning the results, reported in Table 6, indicate that on average month s returns to stocks with a high probability of a distribution event are significantly greater than are returns to the same stocks in months s-1 and s+1. The average margin by which month s returns exceed month s-1 and s+1 returns range from 0.48% to 0.60% for dividend increases, from 0.53% to 1.23% for special dividends, from 0.74% to 1.30% for stock dividends, and from 0.24% to 0.84% for stock splits.

A risk-based explanation for this return pattern would require the omitted risk factor to substantially increase during the high event probability month, followed by an offsetting decrease the month thereafter. Also, abnormal returns within the event month for stocks that do announce the distribution events are concentrated around the announcement date rather than being spread through the month, as displayed in Figure 4.[14] As these return patterns are difficult to reconcile with risk-based explanations, we conclude that the evidence supports the alternative explanation that the market fails to appreciate the extent to which these distribution events are predictable.

4.2 Do the abnormal returns diminish for multiple consecutive annual distributions?

The results reported to this point are based on stocks in which the estimates obtained by implementing the hazard model 1 indicate a high probability of the corporate distribution events. Some might argue that the hazard model is relatively opaque and complex. Further, the model considers the number of months since the most recent same-firm event but does not consider any longer history of repeated distribution events. Next, we assess alphas for portfolios formed based on a simple pattern of multiple annual recurrences in distribution events.

On the first row of panel A, Table 7, we provide information regarding the frequency with which sample firms announce the same distribution event during the same calendar month on a repeated basis. We focus on cases of two, three, and four consecutive annual occurrences. Such repetition is not infrequent. For example, four consecutive annual cash dividend increases by the same firm occurs 4,572 times in the sample. Four consecutive annual same-firm special dividends are observed 1,193 times, and the same firm stock dividends recur on annual basis for four years 1,565 times. Consecutive annual same-firm stock splits are less frequent. However, the sample contains 658 cases in which stock splits recur two consecutive years and 113 cases in which stocks splits recur three consecutive years.

On the second row of panel A, Table 7, we report the number of events in which the same distribution event is observed at the same firm for the nth consecutive year, for $n=3$, 4, and 5. The third row reports the ratio of each observation in the second row to the corresponding observation in the first row. These ratios are interpreted as sample probabilities that a firm that repeats a distribution event on an annual basis for n-1 years does so again in year n.

These probabilities are high. For example, 69% of firms that announce stock dividends on an annual basis for four years do so again for a fifth year. Among firms that announce special dividends on an annual basis for three years,

[14] This evidence parallels that presented by La Porta et al. (1997), who show that returns in the days around earnings surprises can substantially explain the value premium in returns, a result that is also difficult to reconcile with risk-based explanations.

Table 7
Distribution events preceded by a series of like events in the same calendar month; frequencies and abnormal returns

Panel A: Conditional probability of a follow-on corporate event

	Dividend increases	Special dividends	Stock dividends	Stock splits
Probability of a third annual event, conditional on two prior events				
N (firms announcing event in months s-12, s-24)	13662	3004	4173	658
N (firms announcing event in months s, s-12, s-24)	7558	1799	2404	115
Prob(event in month s |event in months s-12, s-24)	55.3%	59.9%	57.6%	17.5%
Probability of a fourth annual event, conditional on three prior events				
N (firms announcing event in months s-12, s-24, s-36)	7441	1814	2416	113
N (firms announcing event in months s, s-12, s-24, s-36)	4663	1180	1560	42
Prob(event in month s |event in months s-12, s-24, s-36)	62.7%	65.0%	64.6%	37.2%
Probability of a fifth annual event, conditional on four prior events				
N (firms announcing event in months s-12, s-24, s-36, s-48)	4572	1193	1565	42
N (firms announcing event in months s, s-12, s-24, s-36, s-48)	3054	813	1077	17
Prob(event in month s |event in months s-12, s-24, s-36, s-48)	66.8%	68.1%	68.8%	40.5%

Panel B: Estimated four-factor alpha of portfolios of stocks with recurring corporate events

Events	EW	VW	EW	VW	EW	VW
	two consecutive prior events		three consecutive prior events		four consecutive prior events	
Dividend increases	0.0094***	0.0080***	0.0091***	0.0077***	0.0082***	0.0075***
	(7.894)	(5.356)	(5.688)	(4.033)	(4.647)	(3.791)
Special dividends	0.0181***	0.0149***	0.0177***	0.0182***	0.0172***	0.0162***
	(5.550)	(4.223)	(5.077)	(4.811)	(5.076)	(4.292)
Stock dividends	0.0183***	0.0156***	0.0201***	0.0161***	0.0216***	0.0185***
	(7.157)	(5.416)	(6.527)	(4.855)	(5.264)	(4.250)
Stock splits	0.0120*	0.0149**	0.0180	0.0182	0.0089	0.0089
	(1.829)	(2.073)	(1.256)	(1.266)	(0.416)	(0.417)
All four events	0.0104***	0.0077***	0.0125***	0.0076***	0.0134***	0.0086***
	(9.799)	(5.258)	(8.816)	(4.098)	(7.211)	(4.011)
All events, except dividend increases	0.0167***	0.0102***	0.0188***	0.0129***	0.0203***	0.0158***
	(8.046)	(3.478)	(7.291)	(4.260)	(6.890)	(5.029)

At the beginning of each month s from January 1963 to December 2012, we form a portfolio of firms that announced the same event at least two times, three times, or four times consecutively at a 12-month. We study four corporate events: dividend increases of at least 5%, special dividends, stock dividends, and stock splits. Panel A reports the frequency of these events, and the probability that these firms announce a follow-on such event in month s. Panel B presents estimated four-factor alphas for the monthly portfolios based on each individual event and combinations of the four events. The alpha is estimated using the OLS regression where the dependent variable is the equal- or value-weighted portfolio return in excess of the risk-free interest rate and the independent variables are the four risk factors—MKT, SMB, HML, and UMD—constructed by Fama and French (1993) and Carhart (1997). The equal-weighted portfolio return is weighted by the prior-month gross return to correct for biases due to noise in transaction prices. All model specifications employ robust standard errors. The associated t-statistics are reported in the parentheses below each coefficient. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. The sample includes CRSP common stocks (share code 10 or 11) from 1963 to 2012.

65% do so again for a fourth year, and among these 68% repeat for a fifth consecutive year. For stock splits the frequencies are somewhat lower but are still substantial. Among firms that split their stock on an annual basis for three consecutive years, 37% repeat for a fourth year, and among these, 41% split their stocks during the same month for a fifth consecutive year.

Next, we evaluate the abnormal returns from investing, at the beginning of month s, in portfolios that include all stocks that engaged in a given distribution event in the same calendar month for all of the prior two, three, or four years. Four-factor alphas for these portfolios, reported in panel B of Table 7, are uniformly positive and are generally as large or larger than corresponding alphas obtained by implementing the hazard model 1, as reported in Tables 4 and 5. For example, alpha estimates in month s for firms with dividend increases in all of months s-12, s-24, and s-36 are 0.77% with value weighting. Alpha estimates for the other three distribution events are larger, exceeding 1.2% when focusing on stocks with two prior annual events and exceeding 1.6% when focusing on stocks with three prior annual events. All alphas are statistically significant when focusing on stocks with two prior annual events, and all alphas with the exception of stocks splits (for which sample sizes are smaller) are statistically significant when considering stocks with three or four prior annual events.

We also report alphas for portfolios that include firms that have completed any of the four distribution events during each of the preceding years and for portfolios that include firms that have conducted any distribution event except a dividend increase during each of the preceding years. Results for the latter portfolio are of particular interest, because as compared with regular dividend increases there is less reason a priori to anticipate that special dividends, stock dividends, and stock splits should recur annually. These alpha estimates are all statistically significant and economically large. For portfolios of firms that have previously engaged in a series of annually recurring special dividends, stock dividends, or stock splits the estimated alphas uniformly exceed 1% per month.

The evidence indicates that those firms that have engaged in a given distribution event in the same calendar month for two, three, or four consecutive years are quite likely to do so again the subsequent year. Nevertheless, portfolios formed in advance of the next anniversary of the distribution events earn positive and significant abnormal returns. This result, based on a very simple portfolio strategy that relies on readily observable information, is also consistent with the interpretation that the market fails to incorporate in prices the implications of the high rate of annual recurrence of corporate distribution events.

4.3 Have the degree of forecastability or the abnormal returns diminished over time?

We examine whether our key results, including that corporate distributions are forecastable and that it is possible to trade profitably based on this forecastability, are robust across time. Regarding the former, Figure 6 reports event probabilities for each year from 1963 to 2012. The figure displays on an annual basis both the unconditional probability of each event (the average number of events in each month of the year relative to the number of sample firms) and the probability of the event conditional on the same event at the same firm twelve months prior. There is a substantial downward trend through time in the unconditional probability of special dividends and stock dividends. The unconditional probability of dividend increases declined markedly in the early 1980s but has been fairly constant since. The unconditional probability of stock

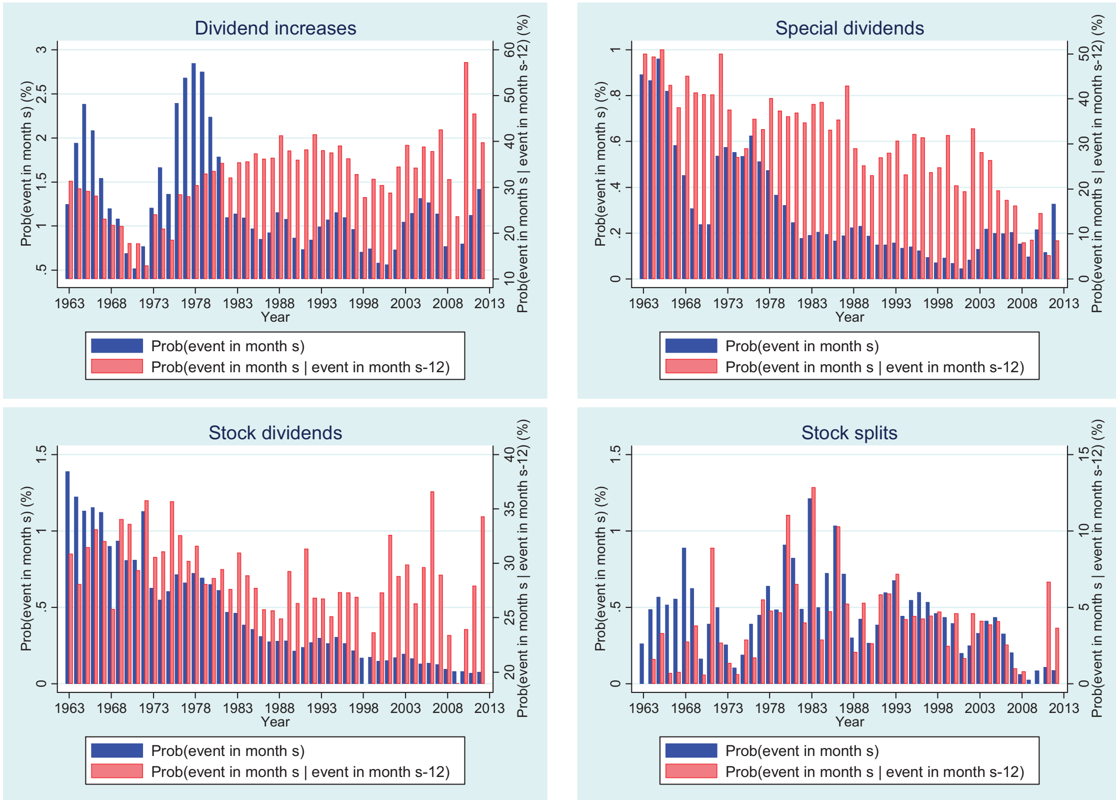

Figure 6
Probability of corporate distribution events, by year
This figure plots the unconditional and conditional probabilities that a firm announces in a given month four corporate distribution events: a dividend increase of at least 5%, a special dividend, a stock dividend, and a stock split. The unconditional probability of a distribution event (the left axis) is calculated as the average number of events announced in a month in year Y divided by the number of common stocks in the CRSP universe at the end of year Y-1. The conditional probability (the right axis) is the probability that a firm announces an event in month s conditional on that the same firm announced the same event in month s-12. Our sample includes distributions to common stocks (share code is 10 or 11) announced between 1963 and 2012.

Table 8
Estimated probabilities of a follow-on corporate distributions and stock returns; results by time period, by firm size, and by level of institutional ownership

Panel A: By time period

		1963–1987		1988–2012		Diff. (late - early)	
T	*K*	EW	VW	EW	VW	EW	VW
12	5%	0.0075***	0.0051***	0.0070***	0.0070***	−0.0006	0.0018
		(8.371)	(3.684)	(5.111)	(3.598)	(−0.351)	(0.756)
12	1%	0.0104***	0.0056**	0.0076***	0.0050*	−0.0028	−0.0005
		(5.318)	(2.263)	(3.615)	(1.880)	(−0.979)	(−0.142)
24	5%	0.0070***	0.0048***	0.0061***	0.0049***	−0.0009	0.0001
		(9.295)	(4.053)	(5.036)	(2.657)	(−0.639)	(0.055)
24	1%	0.0105***	0.0064***	0.0085***	0.0045*	−0.0020	−0.0019
		(6.196)	(2.708)	(4.443)	(1.793)	(−0.797)	(−0.558)
36	5%	0.0067***	0.0049***	0.0054***	0.0051***	−0.0013	0.0003
		(9.687)	(4.308)	(4.820)	(2.960)	(−0.978)	(0.121)
36	1%	0.0119***	0.0067***	0.0079***	0.0057**	−0.0040*	−0.0010
		(7.615)	(2.996)	(4.381)	(2.382)	(−1.688)	(−0.291)

Panel B: By firm size

		Small		Large		Diff. (large - small)	
T	*K*	EW	VW	EW	VW	EW	VW
12	5%	0.0084***	0.0069***	0.0042***	0.0057***	−0.0042**	−0.0013
		(6.211)	(5.282)	(4.094)	(4.461)	(−2.483)	(−0.687)
12	1%	0.0114***	0.0085***	0.0047**	0.0044**	−0.0068*	−0.0041
		(3.921)	(2.745)	(2.322)	(1.990)	(−1.918)	(−1.085)
24	5%	0.0071***	0.0058***	0.0042***	0.0045***	−0.0028*	−0.0013
		(5.987)	(5.152)	(4.819)	(3.828)	(−1.917)	(−0.789)
24	1%	0.0110***	0.0078***	0.0051***	0.0044**	−0.0058*	−0.0033
		(4.649)	(2.960)	(2.738)	(2.139)	(−1.931)	(−0.993)
36	5%	0.0063***	0.0050***	0.0040***	0.0047***	−0.0022*	−0.0003
		(5.889)	(4.811)	(4.934)	(4.120)	(−1.675)	(−0.208)
36	1%	0.0122***	0.0100***	0.0052***	0.0045**	−0.0070**	−0.0054*
		(5.566)	(4.075)	(2.967)	(2.357)	(−2.507)	(−1.747)

(*continued*)

splits has also decreased since the 1980s. Conditional probabilities, which are central to the forecastability of the distribution events as documented here, have remained more or less constant over time for dividend increases, stock splits, and stock dividends, but have declined over time for special dividends.

The fact that probabilities of distribution events have decreased over time, together with the possibility that the market has learned about the predictability of distribution events, suggest that abnormal returns may have diminished over time. To assess this possibility, we divide the 50-year sample period into two subperiods: 1963–1987 and 1988–2012. To conserve on space, we focus here and in subsequent tests on results for portfolios that include stocks with high estimated probabilities of any of the four distribution events.

Alpha estimates for each subperiod are reported in panel A of Table 8. Estimated alphas for the latter period do tend to be slightly smaller in magnitude (though this observation does not hold for every combination of T and K), but each estimate remains positive and statistically significant in both subsamples. Formal statistical tests of whether the alphas are equal across subperiods do

Table 8
Continued

Panel C: By level of institutional ownership

		Low institutional ownership		High institutional ownership		Diff. (high - low)	
T	K	EW	VW	EW	VW	EW	VW
12	5%	0.0102***	0.0046	0.0044***	0.0064***	−0.0058**	0.0017
		(5.146)	(1.624)	(3.900)	(3.790)	(−2.526)	(0.527)
12	1%	0.0110***	0.0094**	0.0058**	0.0069**	−0.0053	−0.0025
		(2.825)	(2.249)	(2.304)	(2.428)	(−1.134)	(−0.500)
24	5%	0.0084***	0.0031	0.0043***	0.0053***	−0.0041**	0.0022
		(4.894)	(1.048)	(4.026)	(3.408)	(−2.050)	(0.662)
24	1%	0.0120***	0.0099**	0.0063***	0.0056**	−0.0057	−0.0043
		(3.540)	(2.577)	(3.155)	(2.351)	(−1.456)	(−0.954)
36	5%	0.0079***	0.0034	0.0036***	0.0053***	−0.0043**	0.0019
		(5.149)	(1.177)	(3.584)	(3.596)	(−2.355)	(0.592)
36	1%	0.0128***	0.0102***	0.0050***	0.0058***	−0.0078**	−0.0044
		(3.919)	(2.719)	(2.977)	(2.700)	(−2.138)	(−1.022)

At the beginning of each month s from January 1963 to December 2012, we identify common stocks whose latest announcement of four distribution events—dividend increases of at least 5%, special dividends, stock dividends, and stock splits—is during the previous T (=12, 24, or 36) months. Among the identified stocks, we form a portfolio of stocks whose estimated probability (hazard rate) of announcing any of the four follow-on corporate events in month s is among the top $K\%$ (=1% or 5%). The probability (hazard rate) of a follow-on corporate event in month s is estimated with the proportional hazard model with all explanatory variables using announcements of the corporate event during months s-120 to s-1. Table 3 has more details of the proportional hazard model. Columns 1 and 2 of panel A present the estimated fourfactor alpha for the portfolios over the period from 1963–1987; Columns 3 and 4 present the estimated alpha over the period from 1988–2012; and Columns 5 and 6 present the difference in alpha between the late and early periods. We also divide the portfolio stocks into two portfolios based on the market capitalization of the stock at the end of month s-1. The portfolio of small (large) stocks contains those with market capitalization below (above) the median of all NYSE-listed stocks. Columns 1 and 2 of panel B present the estimated fourfactor alpha for small stocks; Columns 3 and 4 are for large stocks; and Columns 5 and 6 report the difference in the alpha between large and small portfolios. In addition, we divide the portfolio into two depending on whether the firm's institutional ownership is above or below the median of institutional ownership of all firms. Note that our data on institutional ownership starts in 1980. Columns 1 and 2 of panel C present the estimated four-factor alpha for the portfolio of low institutional ownership; Columns 3 and 4 are for the portfolio of high institutional ownership; and Columns 5 and 6 report the difference in the alpha between the two portfolios The alpha is estimated using the OLS regression where the dependent variable is the equal- or value-weighted portfolio return in excess of the risk-free interest rate and the independent variables are the four risk factors—MKT, SMB, HML, and UMD—constructed by Fama and French (1993) and Carhart (1997). The equal-weighted portfolio return is weighted by the prior-month gross return to correct for biases due to noise in transaction prices. All model specifications employ robust standard errors. The associated t-statistics are reported in the parentheses below each coefficient. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively. The sample includes CRSP common stocks (share code 10 or 11) from 1963 to 2012.

not reject the hypothesis, with a single exception ($K=1\%$, $T=36$ months, and equal-weighted returns). In general, these results support the interpretation that the anomalous returns have decreased slightly but have not been eliminated with the passage of time.

4.4 Are the results concentrated in small capitalization firms?

Many capital market anomalies are stronger for smaller firms, which tend to be characterized by less liquidity and more idiosyncratic volatility. We divide sample stocks into a small-sized group that contains stocks with market capitalization below the median of all NYSE-listed stocks at the beginning of the portfolio month and a large-sized group containing the remaining stocks. The resulting alpha estimates are reported in Panel B of Table 8. These indicate that the anomalous returns are indeed somewhat greater for smaller firms. For example, with $K=1\%$ and a $T=12$ month horizon, estimated alphas for smaller stocks are 1.14% per month based on equal-weighted returns or 0.85% per month based on value-weighted returns, whereas alpha estimates for larger stocks are 0.47% per month equal weighted or 0.44% per month value weighted. Formal statistical tests for the equality of alphas across small and larger stocks indicate rejection for most equally weighted (but less often for value-weighted) portfolios.

Finding larger alpha estimates for smaller firms is consistent with the reasoning (e.g., Pontiff 2006; Stambaugh, Yu, and Yuan 2012) that it is more difficult for traders who recognize mispricing to act on it and correct it in smaller stocks, due to greater illiquidity and risk. Nevertheless, positive and significant alphas are observed for large firms as well.

4.5 Are the results related to institutional ownership?

Numerous authors, including Sias and Starks (1997) and Chordia, Roll, and Subrahmanyam (2011), present evidence that institutional investors are, on average, well informed and that institutional trading improves market efficiency. To test whether this reasoning applies in the case of predictable corporate distributions, we assess whether greater institutional ownership is associated with smaller abnormal returns to trading based on high probabilities of distribution events. We obtain data on institutional ownership from the Thomson-Reuters Institutional Holdings (13f) database and calculate the fraction of institutional ownership for each firm on a quarterly basis. Panel C of Table 8 reports average alphas for portfolios of stocks with high (greater than median) and low (lower than median) rates of total institutional ownership as of the beginning of the quarter.

The results generally support the reasoning that the misvaluation is smaller for stocks with greater institutional ownership, as for every sample the alpha for low institutional ownership firms is greater than the alpha for high institutional ownership firms. For example, the alpha estimate for the $K=1\%$ and $T=12$ month sample with equal weighting is 1.10% per month for low institutional ownership firms, as compared with 0.58% per month for high institutional ownership firms. The difference in alphas across low versus high institutional ownership firms is statistically significant for most equal-weighted samples, but not for value-weighted samples. Notably, however, alphas remain positive and significant for all samples of high institutional ownership firms. These results therefore suggest that institutional ownership mitigates but does not eliminate the mispricing associated with predictable distribution events.

To summarize, the results do not support the interpretation that the positive alphas documented here arise because of model misspecification. Although the abnormal returns are somewhat smaller in the recent data, for large capitalization stocks and for stocks with high rates of institutional ownership, on balance the results support the interpretation that the abnormal returns arise because the market fails to understand the extent to which the distribution events studied here tend to recur periodically.[15]

5. Predictable Distribution Events versus Earnings Announcements, Ex Dividend Dates, and Seasonal Stock Returns

Next, we report a series of tests intended to assess the extent to which the results we report stand independent of calendar-related anomalies documented by other researchers.

5.1 Do these results reflect known anomalies related to earnings announcements?

The predictability of the corporate distribution events we study stems in large part from the tendency for distribution events to be announced on calendar anniversaries of like distribution events. Of course, other corporate events, including earnings announcements, also recur at regular calendar intervals. Beaver (1968) and Frazzini and Lamont (2006) have documented abnormal returns in earnings announcement months. In addition, Bernard and Thomas (1990) document stock price responses to earnings announcements, even when earnings could have been forecast based on prior earnings. It is possible that the results we report overlap with the findings of these authors, particularly if earnings announcement months tend to coincide with announcements of distribution events.

We assess the frequency of such coincidence and report results in the first column of Table 9, panel A. Because firms typically announce earnings on a quarterly basis, we would anticipate a 33% rate of coincidence if earnings announcements and distribution announcements are statistically independent events. The observed frequencies of coincidence differ little from this benchmark. In particular, 28.4% of special dividends are announced in the same month as an earnings announcement, whereas the frequency of coincidence is 29.5% for stock dividends, 36.7% for stock splits, and 39.6% for increases of regular cash dividends. While formal statistical tests reject that these rates of coincidence equal one-third, there is no strong tendency for distribution announcements to occur in the same month as earnings announcements.

To investigate this issue further, we estimate four-factor alphas for portfolios of stocks with high estimated probabilities of any of the four distribution events, while excluding those stocks that are anticipated to make an earnings announcement in the portfolio month. Following Frazzini and Lamont (2006),

15 We also assess the effect of selecting stocks on the basis of high absolute predicted event probabilities, rather than of high relative ($K = 1\%$ and $K = 5\%$) probabilities. In particular, we form portfolios of stocks with estimated probabilities of a follow-on corporate event above the cutoffs of $X = (5\%, 10\%, 20\%, \text{or } 40\%)$. The resulting alpha estimates are reported in Table A3 of the Internet Appendix and are uniformly positive and significant at the 1% level.

Table 9
Robustness to earnings announcement, cash dividend ex-dates, and return seasonality

Panel A: Overlap between earnings announcement and distribution event announcement and between distribution announcement month and ex-date month of regular cash dividends

	Fraction of corporate events announced in the same month of earnings announcement	Fraction of corporate events with announcement date and ex-date of regular cash dividends in the same month
Dividend increases	39.60%***	47.37%
Special dividends	28.37%***	36.67%
Stock dividends	29.46%***	22.08%
Stock splits	36.70%***	21.69%

Panel B: Estimated four-factor alpha of portfolios of stocks with high probabilities of a follow-on event

		(1)	(2)	(3)	(4)	(5)	(6)
		Exclude predicted earnings announcement		Exclude predicted ex-date month		Exclude stocks with high returns in months s-12, s-24, and s-36	
T	K	EW	VW	EW	VW	EW	VW
12	5%	0.0069***	0.0038**	0.0049***	0.0048***	0.0060***	0.0053***
		(5.861)	(2.248)	(4.354)	(3.380)	(6.346)	(4.388)
12	1%	0.0088***	0.0039*	0.0081***	0.0061***	0.0080***	0.0039**
		(4.442)	(1.706)	(4.163)	(2.713)	(5.129)	(2.041)
24	5%	0.0055***	0.0061***	0.0036***	0.0036***	0.0054***	0.0051***
		(5.375)	(4.069)	(4.012)	(2.877)	(6.489)	(4.544)
24	1%	0.0088***	0.0036*	0.0080***	0.0066***	0.0080***	0.0040**
		(5.314)	(1.683)	(4.871)	(3.195)	(5.996)	(2.248)
36	5%	0.0050***	0.0045***	0.0031***	0.0031***	0.0052***	0.0049***
		(4.980)	(3.027)	(3.578)	(2.680)	(6.794)	(4.442)
36	1%	0.0080***	0.0042**	0.0080***	0.0062***	0.0083***	0.0050***
		(5.110)	(2.009)	(5.187)	(3.258)	(6.384)	(3.029)

The first column of panel A summarizes the fraction of corporate events announced in the same month as earnings announcement. We carry out a t-test of whether the fraction equals to one-third. *** corresponds to statistical significance at the 1% level. The second column of panel A summarizes the fraction of each distribution event whose announcement month coincides with the ex-date month of regular cash dividends. At the beginning of each month s from January 1963 to December 2012, we identify common stocks whose latest announcement of a corporate distribution event is during the previous T (=12, 24, or 36) months, excluding stocks with expected earnings announcement in month s, stocks whose expected ex-date month of regular cash dividends is in month s or stocks with highest decile returns in any of months s-12, s-24, or s-36. Among the remaining stocks, we form a portfolio of stocks whose estimated probability (hazard rate) of announcing any of the four follow-on corporate events in month s is among the top K% (=1% or 5%). The probability (hazard rate) of a follow-on corporate event in month s is estimated with the proportional hazard model with all explanatory variables using announcements of the corporate event during months s-120 to s-1. Table 3 has more details of the proportional hazard model. Columns 1 and 2 of panel B present estimated alphas for the non-earnings-announcement portfolios; Columns 3 and present estimated alphas after excluding stocks with an expected ex-date in the same month; and Columns 5 and 6 present estimated alphas after excluding stocks with highest decile returns in any of months s-12, s-24, or s-36. The alpha is estimated using the OLS regression where the dependent variable is the equal- or value-weighted portfolio return in excess of the risk-free interest rate and the independent variables are the Fama-French-Carhart risk factors—MKT, SMB, HML, and UMD. The equal-weighted portfolio return is weighted by the prior-month gross return to correct for biases due to noise in transaction prices. All model specifications employ robust standard errors. The associated t-statistics are reported in the parentheses below each coefficient. ***, **, and * correspond to statistical significance at the 1%, 5%, and 10% levels, respectively.

a stock is expected to announce earnings in a given month if it announced earnings in the same month of the previous year.[16]

[16] An alternative would be to exclude stocks that announced earnings rather than those expected to announce earnings. An effect would be that stocks that unexpectedly did not announce earnings, that is, that were late

The first two columns of Table 9, Panel B, report estimated alphas for portfolios that exclude predicted earnings announcement months. Excluding predicted earnings announcement months from the sample results in slightly smaller estimated alphas for most (but not all) portfolios. Importantly, all of the estimated alphas remain statistically significant (at the 1% level for equal-weighted portfolios, and the 10% level for value-weighted portfolios) after excluding predicted earnings announcement months. On balance, we conclude that the results reported here stand independently of the previously documented abnormal returns in earnings announcement months.

5.2 Are these results distinct from the evidence of abnormal returns related to regular dividends?

Hartzmark and Solomon (2013) report positive abnormal returns of about 30 to 50 bps during the ex-date month for regular cash dividends. Their analysis updates and expands on that of Kalay and Loewenstein (1985), who document abnormally large returns associated with predictable dividend announcements. Because regular cash dividends tend to recur on a quarterly or annual basis, the possibility arises that our findings with regard to distribution events could overlap with these findings regarding abnormal returns related to regular dividends.

We first assess the degree of coincidence between our corporate distributions event announcements and months that contain ex-dividend dates, reporting the results in the last column of Table 9, panel A. The rate of coincidence is about 22% for both stock dividends and stock splits. The rate of coincidence is 47% for increases in regular cash dividends and is 37% for special dividends.[17]

To provide specific evidence by which to gauge whether the results reported here overlap with or are separate from those reported by Hartzmark and Solomon (2013), we form portfolios of stocks that have a high estimated probability of any of the four distribution events studied here but which exclude stocks that are anticipated (following Hartzmark and Solomon 2013) to have an ex-dividend date during the month.[18]

Columns 3 and 4 of Table 9, panel B, report estimated four-factor alphas for portfolios of stocks with a high estimated probability of any of the four distribution events but which exclude stocks with a predicted ex-date during the month. We observe that excluding stocks with predicted ex-dates during

in announcing earnings, would then be retained. However, this event would be informative if it occurred. This analysis is restricted to the post-January 1973 period (following Frazzini and Lamont 2006), because of the poor coverage of earnings announcement dates in the Compustat database before 1973.

17 The rate of coincidence for our sample of dividend increase announcements and Hartzmark and Solomon's (2013) sample of regular dividend ex-dates simply captures the proportion of dividend increase events in which the announcement and the ex-dividend date occur in the same month.

18 In particular, we identify a company as having a predicted ex-dividend date in month s if it had an ex-dividend date for a quarterly dividend in months s-3, s-6, s-9, or s-12, a semiannual dividend in months s-6 or s-12, an annual dividend in months s-12, or a dividend of unknown frequency in months s-3, s-6, s-9, or s-12.

the month reduces estimated alphas for portfolios with probability cutoff of $K = 5\%$, but only modestly (as compared to results in the first two columns of Table 5 panel B). In contrast, when $K = 1\%$, excluding ex-date months results in larger alphas to value-weighted portfolios. Most important, estimated alphas remain uniformly positive and statistically significant at the 1% level after excluding predicted ex-date months.

Hartzmark and Solomon (2013) show that the returns they document around dividend ex-dates are subsequently reversed on average and attribute the abnormal returns to price pressure associated with dividend capture strategies. In untabulated results, we assess whether the returns we document around the time of dividend increase announcements are subsequently reversed and find that they are not. This distinction, along with the fact that our results are observed in a sample that excludes regular dividend ex-dates, supports the conclusion that the results we report for distribution events stand independently of the previously documented abnormal returns associated with regular dividends and therefore have a distinct economic explanation. In particular, our results appear to reflect information effects of the announcements, which are not properly anticipated, not temporary price pressure.

5.3 Are these results distinct from the evidence of annual serial correlation in returns?

Heston and Sadka (2008) document a significant positive relation between the stock return in month s and the return to the same stock in months s-12, s-24, s-36, etc. They show that a strategy of investing in the decile of stocks with the highest returns in the same calendar month of prior years, while shorting stocks with the lowest returns in the same months, generates abnormal returns in excess of 1% per month.

The stocks in our sample with high estimated probabilities of distribution events tend to be stocks that engaged in the same distribution event 12, 24 or 36 months prior. Because the market reaction to the distribution events tends to be positive, these will also tend to be stocks with high returns in those months. It is therefore possible that the positive abnormal returns we document for stocks with high predicted probabilities of distribution events are another manifestation of the return seasonality documented by Heston and Sadka (2008).

To assess this possibility, we constructed portfolios of stocks with high predicted probabilities of any of the four distribution events in month s, while excluding any stock with a return in the top decile of stock returns in any of months s-12, s-24, or s-36. Results, reported in the last two columns of Table 9, panel B, indicate that excluding stocks with high monthly returns one, two, or three years before has little effect on alpha estimates. For example, for the $T = 12$ and $K = 1\%$ sample alphas are 0.81% equal weighted or 0.44% value weighed for all high-distribution-event probability stocks (Table 5, panel B), compared with 0.80% equal weighted and 0.39% value weighted when stocks with prior top-decile returns are excluded. Most importantly, alphas remain positive and statistically significant in all samples after excluding stocks with top-decile prior returns. We conclude that the abnormal returns related to predictable distribution events stand independently of the seasonal pattern in stock returns documented by Heston and Sadka (2008).[19]

6. Conclusions

We document that both cash and noncash corporate distribution events are quite predictable, mainly because announcements of such events tend to occur on annual anniversaries, particularly the first, of previous announcements. However, economic variables such as profitability, cash balances, and share price level also contribute to the predictability.

We also assess whether the stock market incorporates this predictability in prices. We find that simple trading strategies that involve purchasing those stocks with high estimated probabilities of follow-on distributions earn significant positive returns, after allowing for exposure to market risk factors. The excess returns vary from about 0.5% to 1.2% per month, depending on the type of distribution event and portfolio formation choices, and imply that the market does not fully incorporate the predictability of corporate distribution announcements in prices. These results parallel, but are distinct from, the influential findings of Bernard and Thomas (1990), who document abnormal returns associated with earnings announcements, even when the level of earnings is predictable.

This study makes two key contributions. First, we contribute to the understanding of corporate distribution decisions by documenting the relevance of the annual corporate calendar and the tendency for announcements of stock splits, stock dividends, special dividends, and increases in cash dividends to recur at twelve-month intervals. Second, we document anomalous positive returns to stocks that are predicted to make distribution announcements, thereby highlighting shortcomings in existing theories of the information content of corporate distributions and of market price formation. These results highlight the need for improved theories explaining both corporate distribution decisions and investor valuation of corporate distribution announcements.

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