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Corporate Dividends and Seasoned Equity Issues: An Empirical Investigation

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ABSTRACT

This paper investigates whether managers rely on dividends to obtain a higher price in a stock offering and whether the stock price reaction to dividend and offering announcements justifies such a coordination. The evidence does not support either conjecture. Issuing firms are not more likely to pay or increase dividends than nonissuing firms. Moreover, there is little evidence that firms time stock offering announcements right after dividend declarations to benefit from the attendant information disclosure. The analysis of dividend and stock offering announcement effects suggests few if any benefits from linking dividend and stock offering announcements.

IN THE ABSENCE OF informational asymmetries between managers and capital markets, theory predicts that firms should not simultaneously pay dividends and issue new stock. If stock issues are costly, rational value-maximizing firms should avoid incremental issue costs of financing dividends. However, numerous studies have documented that dividend increases lead to stock-price appreciation and dividend decreases to stock-price declines (e.g., Charest (1978) and Aharony and Swary (1980)). These regularities would seem to provide managers with opportunities to benefit their stockholders. For instance, managers could time a stock offering after a stock-price increasing dividend announcement. Or, as some practitioners recommend, managers could deliberately increase dividends before initial public offerings (Miller (1987), p. 46) and seasoned offerings.

This paper examines whether managers do indeed rely on dividends to obtain higher prices in primary stock offerings and whether the market's reaction to dividend and stock-offering announcements justifies such a policy.

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Formal attempts to investigate these questions have only recently started to appear in the literature. Korajczyk, Lucas, and McDonald (1989), for instance, study the effect of regular information releases on the pricing and timing of equity issues. According to their model, firms time equity issues after regular information releases to reduce valuation uncertainty. This then leads to the prediction that the price decline on issue announcement is more severe the longer the time since the last information release. Although earnings announcements are the specific information event examined in their paper, the theoretical analysis could be applied to dividend declarations as well. Their empirical evidence is generally consistent with the model's predictions.

The relation between dividend and stock offering decisions is explicitly modeled in John and Williams (1985). They provide a rationale for why firms raise outside equity while paying dividends. Dividends are used to signal firm value, with the resulting benefit that the firm and/or its stockholders can obtain a higher price when selling shares. The analysis implies that all issuing firms (except those with the lowest value) declare dividends before the offering. Moreover, they predict that the *joint* announcement effect of a stock offering and an immediately preceding dividend is positive when dividends are increased and negative when dividends are decreased.

The purpose of this paper is to empirically investigate the connections between dividend and stock offering decisions that have been suggested in the literature. We begin our investigation by asking whether issuing firms are more likely to pay or increase dividends than nonissuing firms. We next inquire whether stock issues are timed right after dividend declarations to reduce valuation uncertainty. And finally, we examine whether the market's reaction to dividend payments and stock-offering announcements justifies using dividends to support stock sales. In particular, we inquire whether dividend payments actually reduce firm valuation uncertainty and whether offering announcement effects worsen if firms do not announce immediately after a dividend declaration.

We find that the dividend policy of issuing firms is indistinguishable from that of nonissuing firms. For example, issuing firms are not more likely to increase dividends. Additionally, there is only weak evidence that firms time stock offering decisions immediately after dividend declarations to benefit from the attendant information disclosure. This holds regardless of whether dividends are increased, decreased, or left unchanged. We are also unable to detect obvious benefits in the data from linking dividend and stock offering decisions. In particular, dividend decisions do not seem to reduce valuation uncertainty and they do not appear to lead to less negative announcement effects. Moreover, the market does not seem to penalize issuing firms who do not announce a stock offering promptly after a dividend declaration.

The paper is organized as follows. Section I offers the relevant testable hypotheses. Section II explains our selection criteria and sample characteristics. Section III analyzes the results, and the last section provides conclusions.

I. Testable Propositions

A. Dividend Payments of Issuing and Nonissuing Firms

The first question we investigate is whether, as suggested in John and Williams (1985), issuing firms in a general cash offer rely on dividends to obtain a higher price in a stock offering. If so, all firms, except those with the lowest value, should declare dividends before the offering.¹ While the prediction is simply that issuing firms should pay dividends, we also examine whether, as some practitioners have suggested, issuing firms are more likely to increase dividends immediately before the issue. Finally, we compare the dividend payment patterns of issuing and nonissuing firms. If stock offerings provide firms with an added incentive to pay dividends, we would expect a smaller proportion of non-dividend-paying firms in the issuing firm sample.

B. Frequency Test

We next examine whether firms are more likely to disclose a stock issue immediately after a dividend declaration than before that event. According to Korajczyk, Lucas, and McDonald (1989), equity issues should be bunched immediately *after* regular information releases. The intuition is that undervalued firms have an incentive to wait for a regular information release before issuing equity, while overvalued firms have an opposite incentive. The market therefore rationally penalizes issuing firms that do not wait. Consistent with this prediction, the authors find a clustering of equity issues immediately following earnings announcements. Since dividend announcements are also believed to convey information, we test whether issuing firms are more likely to announce an equity issue after a dividend declaration than before a declaration.

We also investigate whether there is a clustering of dividend announcements immediately prior to the actual stock *issue* date. Logically, coordination of offering announcements with dividend declarations would make more sense, since such attempts could ameliorate the negative issue announcement effect documented in the literature.

C. The Market's Reactions to Dividend and Stock Issue Decisions

After exploring the timing relation of dividend and stock issue decisions, we investigate whether the market's reaction to these two decisions justifies the hypothesized coordination. Timing stock offering announcements immediately after a dividend declaration would make sense if: (1) dividend announcements reduced valuation uncertainty and/or led to a more positive reaction to stock offering announcements; and (2) firms had to announce

¹ John and Williams derive their dividend signaling predictions from a single-period model. Thus, to conduct empirical tests, one implicitly has to assume that those predictions also hold in a multiperiod framework; that is, that the relevant economic agents behave as if the world had only one period. This tacit assumption does not violate the spirit of their paper, since the authors make frequent references to phenomenon their model can explain.

their stock offerings immediately after dividend declarations to reap these benefits.

To examine these issues, we first test whether dividend announcements affect the market's reaction to subsequent stock offering announcements. One possible relation between these two events centers on the presumption that every time *new* information is received, market participants update their prior distribution of firm value. If dividend decisions, D , convey information about mean firm value, μ , then the market should update its prior distribution of μ , $P(\mu)$, when dividends are announced and form a posterior distribution, $P(\mu|D)$. The market's reaction to a stock offering, *conditional* on a preceding dividend declaration, therefore reflects a revision of the mean of $P(\mu|D)$. By contrast, the market's reaction to a stock offering by firms that do not pay dividends constitutes a revision of the mean of $P(\mu)$. All else being the same, if dividend decisions convey information which reduces uncertainty about mean firm value, and if that updated forecast of value does not change between the dividend declaration and the offering announcement date, the revision of $P(\mu|D)$ should be smaller in *absolute* magnitude than the revision of $P(\mu)$.

We therefore test whether the price reactions to stock offering announcements are smaller in absolute magnitude when they are preceded by dividend declarations than when they are not. Such a finding would support Korajczyk, Lucas, and McDonald's contention that firms have an incentive to announce equity issues right after (good or bad) information events to reduce the market's uncertainty about firm value. A similar prediction has been advanced by Myers and Majluf (1984; pp. 217, 220), who argue that maintaining a payout policy that closely correlates changes in dividends with changes in the value of assets in place could alleviate potential asymmetries of information between corporate insiders and the market.

Second, we test whether, consistent with Korajczyk, Lucas, and McDonald (1989), the market's reaction to a stock offering is more negative the longer the time since the last dividend declaration. And third, we examine whether the market's reactions to equity issue announcements and any immediately preceding dividend announcements are correlated. Whether or not there is a nonzero correlation depends critically on the type of information conveyed by the two announcements. On the one hand, if both dividends and equity issues signal changes in expected earnings, then the market's reactions to the two announcements could be positively correlated. A dividend increase (signaling higher expected earnings), for instance, could temper an otherwise negative market reaction to the subsequent equity issue (signaling lower expected earnings).² It could then make sense for firms to coordinate dividend and

² Of course, it is possible that the market could react more negatively to an equity issue announcement that comes on the heels of a dividend increase declaration. The market could infer that the equity issue is used to finance the dividend increase. Alternatively, the market may infer that its initial positive reaction to the dividend increase announcement was unwarranted, and therefore the subsequent reaction to the equity issue announcement could be even more negative than if the firm would have left dividends unchanged.

stock offering announcements. On the other hand, if either the dividend or the equity issue announcement is not an information event, or if the two events convey unrelated information, then the two announcement effects could be independent. For instance, while dividend announcements could provide market participants with earnings information, stock offering announcements could have nothing to do with earnings information. Stock offering announcements could depress stock prices simply because of finite price elasticities of demand for the firms' securities (the issue of finite price elasticities is discussed in Barclay and Litzenberger (1988), and Loderer, Cooney, and Van Drunen (1991)). Alternatively, dividends could signal expected earnings whereas stock issues could signal changes in risk (Healy and Palepu (1990)). In either case, firms may not have much to gain from timing the announcement of stock issues immediately after dividend declarations.

For testing purposes, we use a naive expectations model to compute unexpected dividends. Accordingly, we have

$$E_{t-1}(D_{i,t}) = D_{i,t-1}, \quad (1)$$

where E denotes expectation, subscript i refers to the firm, subscript t refers to time, and D represents announced dividends. The unexpected component of dividends is therefore defined as

$$U_{i,t} = D_{i,t} - E_{t-1}(D_{i,t}) = D_{i,t} - D_{i,t-1}. \quad (2)$$

As for the offering expectations model, we assume that stock issues are completely unanticipated events: Kalay and Shimrat (1986) estimate that industrial corporations, like those analyzed here, issue equity only once every 50 years. The market model is used to compute abnormal stock returns associated with dividend and equity issue announcements. Estimation details are provided in the Appendix.³

D. Joint Dividend and Stock Offering Announcement Effects

The final step in our research agenda is to investigate the joint announcement effect of simultaneous dividend and stock offering announcements. As mentioned in the introduction, John and Williams (1985) argue that this effect is positive when issuing firms increase their dividends and negative when they decrease their dividends. If it is beneficial to pay dividends to support stock sales, we would also expect that the joint announcement effect of simultaneous dividend and stock offering announcements is more positive

³ To gauge the robustness of our results, we also computed industry-adjusted returns. For each firm in our sample, industry returns are defined as the returns on an index of firms in the same 3-digit SIC code as the sample firm. The results reported below are the same under either method.

than the simple issue announcement effect experienced by firms who do not pay dividends.

II. Data Sources and Sample Characteristics

The sample consists of all primary offerings of seasoned common stock reported by the Investment Dealers' Digest's *Directory of Corporate Financing* for the years 1973–1984 that satisfy the following criteria:

- (a) The issuing company is listed in the *Center for Research in Security Prices (CRSP) Daily Stock Returns File* starting at least 200 trading days before the offering announcement;
- (b) A preissuance announcement date for the offering is identifiable in the *Wall Street Journal Index (WSJI)*;
- (c) No other securities are sold by the firm with the issue and no other contemporaneous firm-specific announcements (except dividends) appear in the *WSJI* on the offering announcement date;
- (d) The issuing company is not a utility or a financial corporation⁴;
- (e) The offering is not a rights issue, but it can occur in combination with a secondary offering.

The final sample consists of 450 offerings by industrial firms listed on either the New York or the American Stock Exchange. More than 75% of the events fall in the period 1980–1984, and 35% occur in 1983 alone.⁵ The 450 offerings are made by 350 firms. Seventy-eight percent of the firms (273) make only one offering, and only 13 firms issue more than twice.

For each firm we collect from the *WSJI* any announced dividends along with dividend announcement dates in the twelve months before and after the equity issue announcement. Firms can be partitioned into seven dividend categories, of which five are dividend-change categories: dividend increases (80 offerings) or decreases (6 offerings) before the offering announcement date, increases (19 offerings) between the offering announcement and the issue date, and increases (49 offerings) or decreases (2 offerings) after the

⁴ Utilities are excluded because their financing and investment decisions are not necessarily determined by the firm's managers. Those decisions are the outcome of a well publicized and predictable regulatory process.

⁵ It is not clear why so many firms chose to issue stock in 1983. Stock offerings increased during that year in general. Loderer, Sheehan, and Kadlec (1991) find a similar result in a 1980–1984 sample of 1,600 primary issues compiled with less restrictive data availability requirements than those imposed here. Ritter (1991) reports the same phenomenon for initial public offerings: of 2,476 IPOs in 1975–1984, 35% occur in 1983.

⁶ More specifically, dividend changes before the stock offering announcement arise when the last dividend declaration before the offering announcement implies a dividend change. Dividend changes after the stock offering announcement occur when the first dividend declaration after the offering announcement is a dividend change. The average number of trading days between the issue announcement date and the actual issue date is 16, and the median is 12. Cases in which dividends are increased both immediately before and after the offering announcement are classified as increases before the offering announcement. There are only five such cases.

issue date.⁶ The remaining categories are no dividend change (204 offerings), and no cash dividends paid in the two years around the offering announcement (90 offerings).⁷

For each firm, we also collect from the *WSJI* information on the planned use of the offering proceeds. Five use-of-funds categories are identified. The two largest are: (a) debt retirement, mostly refinancing of short-term debt (201 offerings); and (b) investment, e.g., project financing, investment in plant and equipment, mergers, and working capital (165 offerings). The remaining three categories are both debt reduction and investment (46 offerings), general corporate purposes (26 offerings), and no details given (12 offerings).

III. Results

A. Dividend Payments of Issuing and Nonissuing Firms

Table I compares the dividend decisions of issuing firms with those of firms listed on the CRSP daily tapes from January 1 to December 31 of any given year (again, we exclude utilities and financial corporations). Since firms issue stock very infrequently, the sample of CRSP firms is essentially a sample of nonissuing firms. Panel A of the table reports the average annual

Table I
Comparison of Dividend Payment Patterns of CRSP Firms and Firms Issuing Stock, 1973–1984

The sample of CRSP control firms includes all firms listed on the CRSP tapes from January 1 to December 31 of any given year, except utilities, financial firms, and the sample of issuing firms. Dividend payments by these control firms are quarterly cash dividends paid during a particular year. Dividend-paying firms in the issuing firm sample are defined as firms that pay at least one cash dividend during the three quarters preceding or the quarter following the stock-offering date. The dividend payments reported for these firms are the last cash dividend announcements before the stock-offering announcement.

Average Annual Percentage of All Firms in the Sample		Average Annual Percentage of All Dividend Payments in the Sample		
Dividend-paying Firms	Other Firms	Dividend Increases	Dividend Decreases	Unchanged Dividends
Panel A: Issuing firms				
78.3	21.7	22.2	1.7	76.1
Panel B: CRSP firms				
76.3	23.7	21.4	8.1	70.5

⁷ Ten firms which satisfy the data availability requirement are excluded because they pay stock dividends. The results do not change when these firms are left in the sample and classified as non-dividend-paying firms.

percentage of issuing firms that pay dividends before announcing a stock offering, and the average annual percentages of dividend paying firms who announce a dividend increase, decrease, or no change on the dividend declaration date immediately preceding the stock offering announcement. Panel B of the table reports the average annual percentage of CRSP firms that pay dividends, and the average annual percentages of firms who increase, decrease or leave dividends unchanged.

As one can see, 78% of the issuing firms pay dividends before the offering; of these, 22% announce a dividend increase, 2% a decrease, and 76% no change. In comparison, 76% of the CRSP control firms pay dividends, and of these, 21% increase their dividends, 8% decrease them, and 71% leave them unchanged. A χ^2 -test indicates that issuing firms are not more likely than nonissuing firms to pay dividends.⁸ Since there is no difference in dividend payment frequency in the two samples, there is little evidence that seasoned stock offerings provide added incentives to pay dividends. The reason could be that, from a signaling perspective, dividends are paid not only to help firms obtain higher prices in their stock offerings, but also to help shareholders dispose of their stockholdings at favorable prices. If so, both issuing and nonissuing firms could have an incentive to signal by paying regular dividends, regardless of their stock offering plans, simply because there are always shareholders who want to liquidate their investments. However, unless there are substantial costs to signaling with dividends which are not captured in extant models, it is hard to see why so many firms, 22% in the issuing sample and 24% in the nonissuing sample, do not pay dividends. For example, in the John and Williams framework, only firms with the lowest value do not pay dividends.

The only observation at variance with the conclusion that dividend policy decisions and stock issuance are not linked, is that issuing firms are less likely than nonissuing firms to decrease dividends.⁹ (Notice that the relative incidence of dividend increases is the same in both samples.) This may indicate a reluctance on the part of issuing firms to link a "bad" dividend signal with the equity issue. However, this regularity may occur simply because issuing firms experience positive abnormal returns in the several months prior to the offer announcement date (Asquith and Mullins (1986)), and thereby have nothing to do with signaling considerations. As intuition would suggest, firms that perform well should be less likely to decrease dividends. In our sample, the average cumulative abnormal return from day

⁸ We test for independence in a two-way contingency table where row entries are sample and CRSP control firms, and column entries are dividend-paying firms and firms that do not pay dividends. The χ^2 value has a p -value smaller than 0.70.

⁹ According to a χ^2 -test, the percentage of dividend decreases in the issuing firm sample is significantly smaller than the corresponding percentage in the CRSP control sample with 0.99 confidence. The test is a two-way contingency table test where row entries are dividend decreases and dividend declarations other than dividend decreases, and column entries are dividend-paying issuing firms and dividend-paying CRSP control firms.

–169 until day –20 before the offering announcement date is 12.75%; the corresponding return for firms that declare a dividend decrease before the offering announcement is 5.33%¹⁰ Hence, good prior performance, rather than a concern about sending unfavorable signals, could be the reason why issuing firms are less likely to cut dividends than the average nonissuing firm. In fact, of the eight firms that declare a dividend reduction around the issuance date, six make the declaration before the announcement date and only two make it afterward. Thus, there appears to be no systematic attempt by these firms to postpone the bad news of a dividend reduction until after the stock sale.

To further substantiate our claim that dividend decreases are unrelated to the offering announcement, we repeat the analysis with a paired control sample of dividend-paying firms that do not issue stock. For every issuing firm that pays dividends, we select a matching firm from the *CRSP Daily Stock Returns File* with the following characteristics: (a) the matching firm pays dividends and is in the same 4-digit SIC code industry classification as the issuing firm; (b) it meets the same data availability criteria as the issuing firm; (c) its value, defined as the market value of common stock, does not exceed, by 10%, the value of the issuing firm; and (d) its number of shares outstanding does not change by more than 5% during a 150-day period on either side of the issuing firm's stock sale announcement. Matching firms that meet these requirements can be found for 275 of the 360 (dividend paying) issuing firms in our sample. A comparison of the dividend policy decisions of the two matched samples prior to the issuance announcement date, reveals no differences. In both samples, 19% of the firms declare a dividend increase, 2% declare a dividend decrease, and 79% leave dividends unchanged.

Overall, there is no obvious link between dividend policy decisions and stock issuance. Specifically, there is no relation between the decision to pay (or change) dividends and the decision to issue stock. The typical signaling theory presumption that firms pay dividends to support equity sales by their shareholders also must explain why more than 20% of all (issuing and nonissuing) firms do not pay dividends.

B. Frequency of Preoffering Dividend Announcements

Although we find no systematic differences in the dividend policy decisions of issuing and nonissuing firms, this does not preclude the possibility that issuing firms *time* equity issue announcements after dividend declarations to benefit from the attendant information disclosure (Korajczyk, Lucas, and McDonald (1989)). If timing is taking place, we would expect that, in a cross-section of issuing firms, there are more dividend declarations

¹⁰ These returns are calculated with the market model estimated over the interval [–319, –170] in event time. Day 0 is the *WSJI* offering announcement date.

immediately before the equity issue announcement than immediately after that date.

A graphic representation of the number of sample firms that declare a dividend before and after a stock offering announcement as a function of time is shown in Figure 1. The time scale is measured in trading days from the offering announcement day, which is defined as day 0. Within a period of 30 trading days on either side of the offering announcement, dividend declarations are more frequent before than after the announcement. This indicates that dividend declarations are "bunched" closer to the offering announcement in the pre-announcement period.

To statistically determine whether the observed number of dividend declarations is significantly larger in the pre-announcement period than in the post-announcement period, consider the following test. Define n as the number of dividend declarations during a period of T trading days before the stock-offering announcement, and m as the number of dividend declarations during a period of T trading days thereafter. In a sample of k issuers, there can be a maximum of k dividend declarations in the first T trading days and a maximum of k dividend declarations during the second T trading days. Since there are a total of $(n + m)$ dividend declarations during the entire

Observations

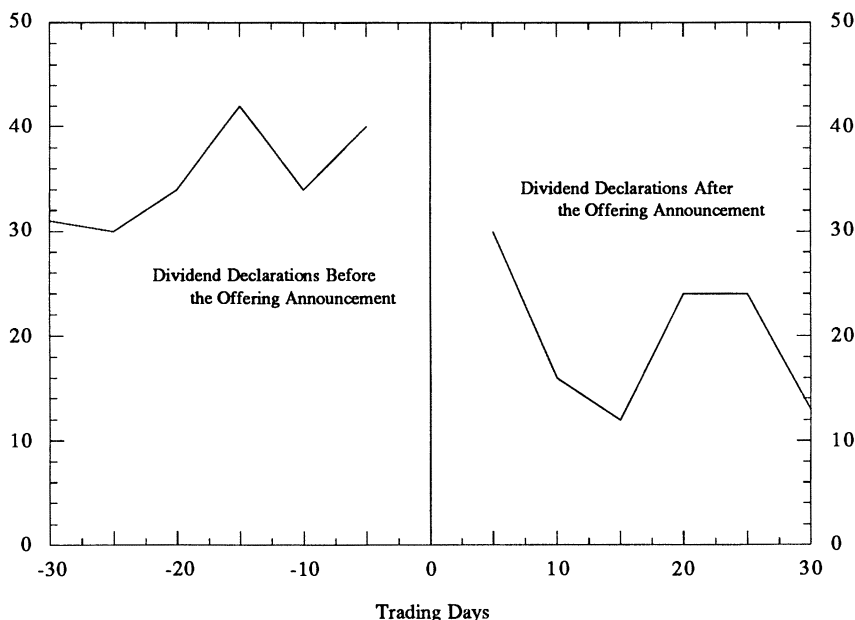


Figure 1. Cross-sectional frequency of dividend declarations by issuing firms before and after stock offering announcement. Time is measured in trading days from the offering announcement day, defined as day 0. Sample of 360 offerings by dividend-paying firms, 1973-1984.

time interval, $(-T, +T)$, drawing a sample of k issuers to examine how many declare a dividend during the T days preceding the offering announcement is identical to drawing, without replacement, a random sample of k items from a population of $2k$ items $((n + m)$ of which are “defective”) to check the number of defective items. The number of dividend announcements observed before the stock offering, n , is therefore hypergeometrically distributed with parameters $(n + m, 2k - n - m, k)$. Accordingly, we can compute the probability of observing n or more dividend announcements before the offering disclosure to test whether that probability value is too low to be consistent with random drawings.¹¹

Test results are reported in Panel A of Table II. In the sample of 360 stock offerings by dividend-paying firms, 74 firms announce a dividend in the 10 days before the offering announcement, and 46 do so in the 10 days afterward. The probability of observing a larger number of dividend announcements before the offering announcement by chance is less than 0.002. When the period of analysis is extended to 20 days, 150 firms declare dividends before announcing stock offerings, compared with only 82 thereafter. Again, the probability of observing these frequencies by chance is essentially zero. Similar results hold for a 30-day interval around the issue announcement date. These findings show that, over the relatively short intervals considered, issuing firms are significantly more likely to declare dividends before rather than after the stock-offering announcement. Korajczyk, Lucas, and McDonald report that, in the weeks immediately around the equity issue announcement, earnings disclosures are also more likely to precede the announcement.

In Panel B of the table, we replicate the analysis around the actual issue date, but find little difference in the frequency of dividend announcements immediately before and after that date. For example, in the 10-day time span on either side of the issue date, there are almost as many dividend announcements before as there are after (51 versus 48). There are significantly more dividend declarations in the pre-issue period when longer time intervals are taken into consideration. However, since the average (median) number of trade days between the equity issue announcement date and the actual issue date is only 16 (12), the latter result for longer time intervals simply reflects our earlier finding of dividend announcement clustering prior to the equity issue announcement date.

Such clustering is a necessary, but by no means sufficient, condition to conclude that firms time the announcement of a stock offering to benefit from the information disclosed in a dividend declaration. Firms should also make the offering announcement “promptly” after the dividend declaration. In the Korajczyk, Lucas, and McDonald model, the market penalizes firms that delay the announcement of an issue after an information event. As it turns

¹¹ Hypergeometric probability values are computed using the logarithmic transformation of Stirling's Formula for factorials (see Abramowitz and Stegun (1970), p. 257).

Table II
Frequency of Dividend Announcements Before and After Stock Offerings, 360
Primary Stock Offerings by Dividend-paying Firms in 1973-1984

In Panel A, we test whether the number of dividend announcements observed in the interval $[AD - T, AD]$, n , is significantly larger than what one would observe if n were hypergeometrically distributed with parameters $(n + m, 2k - n - m, k)$, where k is the number of stock offerings in the sample, and m is the number of dividend announcements in the interval $[AD, AD + T]$. AD is the stock offering announcement date (defined as day 0), and T is the number of trading days before $(-30, -20, -10)$ or after $(+10, +20, +30)$ the stock offering announcement date. Table entries are n and its corresponding probability value. Sample sizes are in parentheses. In Panel B, we repeat the test around the stock issue date.

	Trading Days Around the Stock Offering Announcement Date					
	-30, 0	-20, 0	-10, 0	0, +10	0, +20	0, +30
Panel A: Number of dividend announcements around the stock-offering announcement date.						
Full sample (360)	211	150	74	46	82	129
Probability value	0.000	0.000	0.002			
Offerings By Dividend Change						
Dividend increase before AD (80)	49	38	21	7	14	22
Probability value	0.000	0.000	0.001			
No change before AD (274)						
Probability value	162	112	53	38	67	105
	0.000	0.000	0.033			
Panel B: Number of dividend announcements around the stock issue date.						
Full sample (360)	176	118	51	48	90	149
Probability value	0.080	0.008	0.333			

out, it takes our sample of issuing firms a median number of 24 trading days to disclose a stock offering after a dividend declaration. This is significantly shorter, based on either parametric or nonparametric tests, than the 32 days it would take if the stock offering was announced randomly after a dividend declaration.¹² If the stock-offering announcement date, AD , was a random drawing from a uniform distribution on the interval (TD_{-1}, TD_{+1}) , where TD_{-1} is the last dividend announcement date before AD and TD_{+1} is the first dividend announcement date following AD , then the median number of trading days between TD_{-1} and AD would equal $(TD_{+1} - TD_{-1})/2$; in our sample, this interval has a median value of 32 days.¹³

The evidence therefore indicates that stock offerings occur a median number of 8 trading days sooner after a dividend declaration than random. This is hardly overwhelming evidence in support of equity issue timing. From a practical point of view, a median delay of 24 trading days before disclosing a stock offering seems to be too long. Certainly long enough to raise questions about Korajczyk, Lucas, and McDonald's argument that waiting after an information disclosure is "costly." Interestingly, they also find that firms "do not hurry to issue immediately after an earnings announcement." It could be that many investment opportunities have to be taken right away or else they expire (they "evaporate" in Korajczyk, Lucas, and McDonald's vernacular), which would mean that firms cannot wait until the next quarterly dividend declaration to announce a new offering. However, it is difficult to believe that so many investment opportunities require such immediacy. In fact, in a large number of cases (45% of all offerings in our sample) the stated use of the issue proceeds is not for investments, but for debt refinancing. And, when we sort the full sample by issue purposes, we find no difference in the amount of time managers wait before announcing an offering after a dividend declaration: they wait a median 34 days when funds are used exclusively to retire debt, compared to 36 days when funds are used exclusively for investments. Hence, "evaporating" projects cannot explain the observed delay in issue announcements.

The apparent timing we do find could be coincidence. If a dividend and an equity offering are approved at the same quarterly board meeting, the dividend may be announced immediately, while the offering announcement is delayed to complete agreements with investment bankers and file the

¹² The timing of the stock offering announcement does not depend on the direction of the dividend *change*, except when dividends are decreased. In the few instances (6) in which managers announce a dividend cut prior to the issue, the median number of days between the dividend announcement and the stock offering announcement is 50. This qualifies our previous conclusion that firms are not reluctant to cut dividends before a stock offering announcement (see the preceding section).

¹³ The median interval $(TD_{+1} - TD_{-1})/2$ in the matching sample of nonissuing firms discussed in the preceding section is also 32 days. This suggests that issuing firms do not *shift* their regular dividend declaration cycle around stock offerings to benefit from the information disclosed in the dividend declaration. If they did, we would expect that the median intervals would differ in the two matched samples.

necessary documents with the SEC.¹⁴ The typical delay may be less than the 32 days expected under the null hypothesis of random timing.¹⁴

A closer examination of the numbers reported in Panel A of Table II provides additional reasons to doubt that there is a deliberate attempt by managers to time stock-offering announcements close to dividend declaration dates. As reported there, of the 211 dividend declarations before the issue announcement, 35% (74) occur within ten days of that date. If managers are attempting to announce the offering close to, if not coincidentally with, the preceding dividend declaration, there is no reason to expect a similar clustering of dividend declarations immediately after the offering announcement. Yet, 36% of the 129 dividend declarations reported in the postannouncement period also occur in the first ten days. The same phenomenon is evident in Panel B of Table II, which focuses on the actual issue date: 29% of the dividend declarations occur during the ten days before the issue, compared to 32% during the following ten days.¹⁵

Thus, while firms prefer to disclose a stock offering after rather than before a dividend declaration, they are in no hurry to do so. Similar results hold when dividends are increased. For instance, as can be gleaned from Panel A of Table II, there are three times as many dividend increases in the 10 days before offering announcement than in the following ten days. But again, there is not a pronounced clustering of dividend declarations immediately before issue announcement: 43% of the pre-announcement dividend declarations in the table occur in the 10 days before that announcement, compared to 32% in the 10 days after that announcement. A χ^2 -test cannot reject equality of these two proportions with confidence better than 0.90.

C. The Market's Reactions to Dividend and Stock Issue Decisions

The notion of a coordination of dividend and stock offering announcements is predicated on the presumption that firms can benefit from the information conveyed by a dividend declaration. To investigate whether these benefits are actually available, we test whether dividends reduce valuation uncertainty and whether stock offering announcement effects worsen if firms do not announce immediately following a dividend declaration. Subsequent tests focus on the relation between stock-price reactions to dividend and equity issue announcements.

¹⁴ A delay could also occur if the issue requires stockholders' approval of an increase in authorized stock. That delay, however, would be much more than three weeks and likely extend past the following quarterly dividend announcement. The firm would first have to call a stockholder meeting, stockholders would then have to meet and approve the increase, and finally the issue would have to be registered with the SEC.

¹⁵ One could argue that the reason why so many dividend declarations occur immediately after a stock offering announcement is because managers want to declare dividends before the imminent stock issue date. Recall, however, that there is no evidence that dividend declarations are more frequent immediately before the issue.

The analysis necessitates the computation of the stock-price reactions to dividend and stock offering announcements. Using the market model (see the Appendix for estimation details), abnormal returns are computed for both events over days -1 and 0 , where day -1 is the day before the announcement (of dividend or equity issue) in the *WSJI*, and day 0 is the announcement day. Dividend and equity issue announcement effects are then computed as the sum of the two abnormal returns.

Consistent with recent studies, equity issue announcement effects are negative and significant.¹⁶ For the full sample of offerings, the average two-day abnormal return is -3.23% , with a Z -value of -11.98 , and over 80% of the events have negative two-day abnormal returns (Z -value $= 12.93$).¹⁷ Next, we compute the stock-price reaction to dividends announced on the last declaration date before the offering announcement. As with issue announcement effects, the sign and magnitude of this reaction is almost identical to that reported elsewhere. For firms announcing dividend increases (80 cases), the average two-day abnormal return is positive and significant (1.17%), and for firms announcing decreases (6 cases), it is negative and significant (-3.43%).¹⁸ Dividend announcement effects are not significantly different from zero for firms that do not change dividends (274 cases).

Following Korajczyk, Lucas, and McDonald (1989), we then standardize equity issue announcement effects to compute a measure of stock issue "informativeness." Denoting that measure as *INFORM*; for every firm i , we compute:

$$\text{INFORM}_i = \frac{(1/2) AR_i^2}{s_i^2},$$

where AR_i is the two-day issue announcement abnormal return for firm i , and s_i^2 is the estimated residual return variance from firm i 's market model regression (again, see the Appendix for estimation details). The variable *INFORM* is the ratio of the idiosyncratic component of daily return variance during the two event days divided by the idiosyncratic component observed during nonevent days. If dividend declarations reduce valuation uncertainty, the value of *INFORM* conditional on a dividend announcement should be smaller than the value conditional on no announcement.

We can now examine the relation between issue informativeness and prior dividend declarations discussed in Section I. Three alternative regression

¹⁶ For a comparison, see Asquith and Mullins (1986), Masulis and Korwar (1986), Mikkelsen and Partch (1986), and the review article by Smith (1986).

¹⁷ If P is the number of firms with negative abnormal returns, and n is the sample size, this statistic is given by $Z = (P - n(0.5))/(n^{0.5}(0.5))$. Z is distributed $N(0, 1)$ for large samples under the null hypothesis that the expected value of P is $n(0.5)$.

¹⁸ The weighted average (by sample size) of the mean two-day abnormal stock returns in Charest (1978) and Aharony and Swary (1980) is 0.90% for dividend increases, and -3.60% for dividend decreases. Both figures are significantly different from zero.

models are used:

$$\text{INFORM}_i = \gamma_0 + \gamma_{1,D} \text{DIV}_i + \varepsilon_i, \quad (3a)$$

$$\begin{aligned} \text{INFORM}_i = \gamma_0 + \gamma_{1,D+} \text{DIVPLUS}_i + \gamma_{1,D0} \text{DIVZERO}_i \\ + \gamma_{1,D-} \text{DIVNEG}_i + \varepsilon_i, \end{aligned} \quad (3b)$$

$$\text{INFORM}_i = \gamma_0 + \gamma_{1,DA} \text{DIVA}_i + \gamma_2 \text{TIME}_i + \varepsilon_i. \quad (3c)$$

The first two specifications model dividend policy decisions with indicator variables. In (3a), DIV is set equal to 1 if the issuing firm pays dividends prior to the equity issue, and 0 otherwise. In (3b), a set of three indicator variables are employed, DIVPLUS, DIVZERO, and DIVNEG. Of these variables, DIVPLUS equals 1 if the issuing firm increases dividends prior to the offering announcement, and 0 otherwise. DIVZERO and DIVNEG are analogously defined, except that they apply to cases where the issuing firm either leaves dividends unchanged (DIVZERO) or decreases dividends (DIVNEG) prior to the issue announcement. In both specifications, the regression intercept measures the average issue informativeness for non-dividend-paying firms, whereas the slope coefficients measure the marginal impact on issue informativeness provided by the dividend indicator variable in the equation. The third specification (3c) estimates the relation between issue informativeness and two variables: the dividend announcement effect (DIVA), and the number of trading days between that announcement and the offering disclosure (TIME).¹⁹

The following predictions can be made about the sign of the regression coefficients. If dividend announcements convey information about mean firm value, and if that (updated) value does not change between the dividend declaration and the offering announcement dates, then, following Korajczyk, Lucas, and McDonald, pre-offering valuation uncertainty should be lower when conditional upon a dividend declaration. Accordingly, all indicator variable coefficients in equations (3a) and (3b) should be negative. Furthermore, the coefficient on TIME in equation (3c) should be positive: in a Korajczyk, Lucas, and McDonald world, the information conveyed by “regular” information events is progressively dissipated the longer the time between that event and the equity issue announcement. Finally, as noted earlier, no clear prediction can be made about the coefficient of the dividend announcement effect (DIVA) in equation (3c).

Estimation results are reported in Table III, wherein the three columns correspond to the regression specifications (3a)–(3c). As one can see, the coefficient on the indicator variable DIV, in column (1), is positive, which shows that the offering announcement is actually *more* informative when it is preceded by a dividend declaration than when there is no such declaration. A similar finding is evident in column (2), where firms are categorized by

¹⁹ By definition, the variable TIME can be computed only for the 360 issuing firms that announce a dividend prior to the equity issue. Accordingly, TIME cannot be included in the first two regressions, since they cover non-dividend-paying firms.

Table III
Estimated Coefficients from Regressing Stock Offering
Informativeness on Dividend Declaration Variables, 1973–1984

Model 1: $\text{INFORM}_i = \gamma_0 + \gamma_{1,D} \text{DIV}_i + \varepsilon_i$

Model 2: $\text{INFORM}_i = \gamma_0 + \gamma_{1,D+} \text{DIVPLUS}_i + \gamma_{1,D0} \text{DIVZERO}_i + \gamma_{1,D-} \text{DIVNEG}_i + \varepsilon_i$

Model 3: $\text{INFORM}_i = \gamma_0 + \gamma_{1,DA} \text{DIVA}_i + \gamma_2 \text{TIME}_i + \varepsilon_i$

The dependent variable (INFORM_i) is defined as one-half times the squared two-day equity issue announcement abnormal return for firm i , divided by the residual return variance from firm i 's market model regression. The various explanatory variables are defined as follows: DIV_i is a 0/1 indicator variable set equal to 1 if firm i pays dividends on the last dividend declaration date prior to the offering announcement; DIVPLUS_i , DIVZERO_i , and DIVNEG_i are 0/1 indicator variables set equal to 1 if firm i increases dividends, does not change dividends, or decreases dividends on the last dividend declaration date prior to the offering announcement, respectively; DIVA_i is the dividend announcement effect for firm i on the dividend declaration date immediately preceding the equity issue announcement, and TIME_i is the number of trading days between that dividend announcement and the stock offering announcement. t -Values are in parentheses.

Independent Variables	Model 1	Model 2	Model 3
Intercept	1.58 (4.64)*	1.58 (4.64)*	2.68 (9.94)*
DIV	1.01 (2.62)*		
DIVPLUS		1.38 (2.72)*	
DIVZERO		0.92 (2.35)*	
DIVNEG		-0.50 (-0.30)	
DIVA			0.9×10^{-2} (0.2×10^{-2})
TIME			-0.3×10^{-2} (-0.40)
R^2	0.016	0.022	0.001
F -statistic	7.38*	3.28**	0.11
Sample size	450	450	360

* Significant at the 1% level.

** Significant at the 5% level.

dividend change indicator variables. The dividend increase and unchanged dividend coefficients have essentially the same size, and both are positive and significant. By comparison, when dividends are decreased (only 6 cases), average issue informativeness is not significantly different from that observed for firms that do not pay dividends. The implication of these results is that constant or higher dividend declarations introduce "noise" in the market's perception of issuing firm value, whereas dividend decreases do not have the same effect. The third set of results is shown in the last column of the table. According to these results, there is no relation between dividend

announcement effects and stock issue informativeness. The coefficient on TIME is also not significant.

Overall, these results do not support the contention that dividends convey information that helps market participants reduce valuation uncertainty or that the market penalizes firms who do not announce a stock offering immediately after a dividend declaration. This seems to question the usefulness of coordinating dividend and stock offering announcements.

In Table IV, we re-estimate the three regression specifications in (3) using the offering announcement effect as the dependent variable. The results are very similar to those in Table III. From columns (1) and (2), offering

Table IV
Estimated Coefficients from Regressing Stock-Offering
Announcement Effects on Dividend Declaration Variables,
1973-1984

Model 1: $AR_i = \gamma_0 + \gamma_{1,D}DIV_i + \varepsilon_i$

Model 2: $AR_i = \gamma_0 + \gamma_{1,D+}DIVPLUS_i + \gamma_{1,D0}DIVZERO_i + \gamma_{1,D-}DIVNEG_i + \varepsilon_i$

Model 3: $AR_i = \gamma_0 + \gamma_{1,DA}DIVA_i + \gamma_2TIME_i + \varepsilon_i$

The dependent variable (AR_i) is the two-day equity issue announcement abnormal return for firm i . The explanatory variables are defined as follows: DIV_i is a 0/1 indicator variable set equal to 1 if firm i pays dividends on the last dividend declaration date prior to the offering announcement; $DIVPLUS_i$, $DIVZERO_i$, and $DIVNEG_i$ are 0/1 indicator variables set equal to 1 if firm i increases dividends, does not change dividends, or decreases dividends on the last dividend declaration date prior to the offering announcement, respectively; $DIVA_i$ is the dividend announcement effect for firm i on the dividend declaration date immediately preceding the issue announcement, and $TIME_i$ is the number of trading days between that dividend announcement and the stock-offering announcement. t -Values are in parentheses.

Independent Variables	Model 1	Model 2	Model 3
Intercept	-0.0156 (-2.63)*	-0.0156 (-2.61)*	-0.0316 (-11.85)*
DIV	-0.0209 (-3.12)*		
DIVPLUS		-0.0208 (-2.70)*	
DIVZERO		-0.0207 (-2.87)*	
DIVNEG		-0.0281 (-1.28)	
DIVA			-0.0287 (-0.68)
TIME			-3.96×10^{-5} (-0.69)
R^2	0.025	0.024	0.003
F -statistic	11.57*	3.59**	0.46
Sample size	450	450	360

* Significant at the 1% level.

** Significant at the 5% level.

announcement effects are significantly more negative when they are preceded by dividend declarations than when they are not. This latter relation holds regardless of whether firms declare higher or unchanged dividends. The exception are offering announcements conditional on the declaration of dividend cuts: they cannot be distinguished from the announcements of firms who do not pay dividends at all (there are, however, only six events in this category). Finally, column (3) shows that stock offering announcement effects are not related to either the preceding dividend announcement effects or the time since that dividend declaration.²⁰

As a check on the robustness of the results reported in either table, we extended the basic regression equations to include variables such as issue size, firm size, and pre-announcement cumulative abnormal returns, which have been found to correlate with offering announcement effects (see, among others, Asquith and Mullins (1986), Masulis and Korwar (1986), Korajczyk, Lucas, and McDonald (1989), and Loderer, Cooney, and Van Drunen (1991)). We also included variables that could, in principle, correlate with offering announcement effects, such as the stated use of the proceeds and changes in systematic risk (from pre- to post-offering). The results are unaffected and, with the exception of pre-announcement cumulative abnormal returns, none of the additional variables have a significant coefficient.²¹ Finally, since 35% of the offerings in our sample occur in 1983, we also replicated the analysis excluding those observations. The results are the same.

The results in this section are not easy to explain. The finding that the market's price reactions to dividend and equity issue announcements are unrelated, is consistent with the proposition that the two events convey different information, possibly about cash flow levels in the case of dividends, and about finite price elasticities of demand or risk in the case of stock offerings. This interpretation does not explain, however, why both issue informativeness and issue announcement effects are significantly larger in absolute value for dividend paying firms than for nondividend paying firms.

There are, we believe, two possible explanations for this latter finding, although neither can explain why dividend and stock offering announcement effects are unrelated. The first is that the information conveyed by dividend policy decisions may *magnify* the market's negative perception of the subsequent stock offering. For example, the market may react more negatively to

²⁰ Korajczyk, Lucas, and McDonald (1989) report a marginally significant (10% level) negative relation between offering announcement effects and time since the last *earnings* announcement. However, they do not report the relation between the market's reactions to offering and earnings announcements. The estimated coefficient of TIME in our regression is insignificant regardless of whether the dividend announcement effect is included or excluded from the regression.

²¹ In particular, changes in systematic risk are unrelated to offer announcement effects (see also Jain (1989)). This is inconsistent with Healy and Palepu's (1990) argument that stock offerings signal risk increases. Another finding that casts doubt on Healy and Palepu's conjecture is that, although there is a significant increase in postoffering systematic risk, that increase is driven by a decrease in the market return variance, not by an increase in the covariance between firm and market returns (Lease, Masulis, and Page (1989) find a similar result).

equity issue announcements following dividend increases, simply because it recognizes that its initial positive reaction to the dividend declaration was too optimistic. Something analogous could occur in the case of declarations of unchanged dividends. The market could have taken those declarations to mean no changes in firm profitability, and the subsequent equity issue announcement may force a revision of that belief.²²

The second explanation is that nondividend paying firms are different (as characterized, for example, by investment opportunities) from their dividend paying counterparts. A signaling argument consistent with this explanation is offered by Ambarish, John, and Williams (1987). They argue that the information conveyed by an equity issue is less negative for "high growth" firms than for "mature" firms. Presumably, the former require an infusion of capital to fund valuable investment opportunities, while the latter require funds to make up for current (or projected) operating cash flow deficiencies. If the high growth profile characterizes our subsample of 90 nondividend paying firms, we should observe that most use the proceeds for investment purposes. Yet, only 30 of the 90 nondividend paying firms state investments as the primary use of the proceeds.²³

D. Joint Dividend and Stock Offering Announcement Effects

The last item on our research agenda pertaining to the benefits of a coordination of dividend and stock-offering announcements is the joint valuation effect of paired dividend and stock-offering announcements, which we compute by cumulating dividend and stock-offering announcement-period returns. Table V reports the results for different dividend categories.

For the dividend-increase subsample, the announcement effect of the dividend is 1.17% and the effect of the subsequent stock offering announcement is -3.64%, for a significantly negative net effect of -2.47%. This is inconsistent with the John and Williams model, since it rejects the prediction that the joint valuation effect of dividend and stock-offering announcements is positive when dividends are increased. Interestingly, the other two dividend paying subsamples (unchanged dividends and lower dividends) have joint announcement effects which are considerably more negative than -2.47%. However, the subsample of firms that do not pay dividends at all, has a joint

²² Under this explanation, the apparent lack of issue informativeness associated with the declaration of dividend cuts may simply indicate that the bad news implied by these declarations foreshadows the unfavorable information of the subsequent equity issue.

²³ We also compared the P/E multiples of non-dividend- and dividend-paying firms, with the understanding that such multiples provide a rough, yet reasonable, measure of growth opportunities (Schipper and Smith (1986)). Although both the investing subsample and full sample of non-dividend-paying firms have higher P/E multiples than dividend paying firms (at the time of the stock offering), average and median comparisons yield no significant differences. For example, the 30 investing non-dividend-paying firms have average and median P/E multiples of 13.6 and 10.6, respectively. By comparison, the 360 (450-90) dividend paying firms have average and median multiples of 10.8 and 7.5. Formal mean and median tests indicate no significant differences.

Table V
**Joint Announcement Effects of Dividend and Stock-Offering Decisions,
 1973-1984**

The joint effect is the sum of the dividend and stock offering two-day announcement-period abnormal returns. Dividend announcement effects are those for the dividend declaration date (TD_{-1}) immediately preceding the stock-offering announcement. Joint effects are reported for dividend categories relevant to the John and Williams (1985) dividend signaling model. The model predicts that the joint announcement effect of a stock offering and an immediately preceding dividend is positive when dividends are increased and negative when dividends are decreased.

Dividend Category	Joint Dividend and Stock Issue Announcement-Period Return ^a (%)	Z-Value ^b	Frequency of Negative Returns (%)	Z-Value ^c	Mean Comparison (vs. Row 1) t-Test ^d	Sample Size
Dividend increase on date TD_{-1}	-2.47 (1.17, - 3.64)	-3.47*	69	3.40*	—	80
Unchanged dividend on date TD_{-1}	-3.67 (- 0.04, - 3.63)	-9.07*	81	10.26*	-2.37**	274
Dividend decrease on date TD_{-1}	-7.80 (- 3.43, - 4.37)	-1.69	100	—	-1.37	6
No dividends	-1.56 (—, - 1.56)	-2.48*	71	4.20*	1.57	90

^a Numbers in parentheses are the dividend (if any) and stock offering two-day announcement-period abnormal returns, respectively. Two-day abnormal returns are computed over days -1 and 0, where -1 is the day before the announcement (of dividend or equity issue) in the *WSJ*, and day 0 is the announcement day.

^b Z-Statistic to test the significance of the joint announcement effect under the null hypothesis that the joint effect is zero. Computational details are in the appendix.

^c If P is the number of firms with negative abnormal returns, and n is the sample size, this statistic is given by $Z = (P - n(0.5)) / (n^{0.5}(0.5))$. Z is distributed $N(0, 1)$ for large samples under the null hypothesis that the expected value of P is $n(0.5)$.

^d The t -test assumes independent samples drawn from populations with unknown and unequal variances.

* Significant at the 1% level.

** Significant at the 5% level.

announcement effect, which consists only of the stock-offering announcement return, of -1.56% . This effect is statistically indistinguishable from -2.47% . This latter result confirms our previous findings that dividend payments do not seem to mitigate the negative announcement effect of a stock offering. Hence, there is little evidence to suggest that it would be beneficial for firms to pay dividends to support stock offerings.

IV. Conclusions

The purpose of this paper is to investigate whether managers rely on dividends to obtain better terms in a stock offering and whether the market's reaction to dividend and stock-offering announcements justifies such a policy. No compelling evidence is found to support either conjecture. The main conclusions can be summarized as follows:

- (1) There are no significant differences between the dividend policy decisions of our sample of issuing firms and control samples of nonissuing firms;
- (2) Firms appear to time equity issue announcements after rather than before dividend declarations. However, the median time between the issue announcement and the immediately preceding dividend declaration is 24 trading days;
- (3) There is no relation between stock-offering informativeness or announcement effects and preceding dividend announcement effects;
- (4) Stock-offering announcement effects do not worsen if firms do not announce immediately after dividend declarations;
- (5) Dividend-paying firms have significantly larger stock-offering informativeness and elicit more negative issue announcement effects than non-dividend-paying firms. The only exception is the few firms (6) who announce a dividend decrease prior to the equity issue; and
- (6) Joint dividend and stock-offering announcement effects are not less negative than the simple offering announcement effects experienced by non-dividend-paying firms, and they are inconsistent with the predictions of the John and Williams (1985) signaling model.

The findings that dividends do not appear to reduce valuation uncertainty and that stock offering announcement effects are more negative for dividend paying firms than for non-dividend-paying firms both contradict the standard signaling model presumption that dividends convey information which reduces valuation uncertainty. Two possible explanations were offered for this finding. On the one hand, raised earnings expectations associated with a dividend announcement may be dashed by the subsequent stock offering. On the other hand, non-dividend-paying issuing firms may have relatively more valuable investment opportunities than their dividend-paying counterparts.

Finally, our findings provide an interesting contrast to those of Korajczyk, Lucas, and McDonald (1989). They find evidence that managers time equity

issue announcements close to earnings disclosures to benefit from those information events. Earnings disclosures may provide the market with more accurate information about firm value than dividend declarations. Financial statements, after all, have to be audited by third parties, while dividend decisions represent substantially more discretionary events.

Appendix: Estimation of Abnormal Returns

Abnormal returns are computed assuming that daily common stock returns are described by the market model in the form

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ is the daily rate of return for firm i at time t , $R_{m,t}$ is the daily rate of return on the value-weighted CRSP market index at time t , α_i and β_i are market model parameters for firm i , and $\varepsilon_{i,t}$ is the disturbance term with the usual OLS properties. The market model is estimated using the data from the 150-day interval starting 169 trading days and ending 20 trading days before the announcement day (day 0). Using ordinary least squares estimates of the market model parameters α_i and β_i (a_i and b_i), we compute the abnormal return for the common stock of firm i on event date t as

$$AR_{i,t} = R_{i,t} - (a_i + b_i R_{m,t}). \quad (A1)$$

For each firm i , announcement effects are estimated by cumulating the abnormal returns over the two-day interval $(-1, 0)$ as

$$AR_i = \sum_{t=-1}^0 AR_{i,t}. \quad (A2)$$

For a sample of N firms, the average announcement effect is therefore equal to

$$AR = (1/N) \sum_{i=1}^N AR_i. \quad (A3)$$

To test the hypothesis that the average announcement effect is equal to zero, we first standardize individual firm abnormal returns as

$$SAR_{i,t} = AR_{i,t} / \sqrt{\text{Var}(AR_{i,t})}, \quad (A4)$$

where

$$\text{Var}(AR_{i,t}) = s_i^2 \left[1 + (1/150) + \left\{ (R_{m,t} - R_m)^2 / \sum_{\tau=-169}^{-20} (R_{m,\tau} - R_m)^2 \right\} \right]. \quad (A5)$$

In (A5), s_i^2 is the residual variance from the estimation of (A1) over the period $(-169, -20)$, R_m is the mean return on the market index over the estimation period, and $R_{m,\tau}$ is the return on the market over day τ in

the estimation period. For each security i , the standardized abnormal returns are summed over the two days of the event interval to compute the standardized cumulative abnormal return as

$$SAR_i = \sum_{t=-1}^0 SAR_{i,t} / \sqrt{2}, \quad (A6)$$

which quantity is approximately unit normally distributed assuming that the abnormal returns, $AR_{i,t}$, are normal and independent through time. Thus, to test the significance of the average announcement effect, we compute

$$Z = \sqrt{N} (SAR), \quad (A7)$$

where

$$SAR = (1/N) \sum_{i=1}^N SAR_i. \quad (A8)$$

Under the null hypothesis that the average announcement effect is zero, Z is approximately unit normally distributed.

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