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SENSITIVITY OF INVESTOR REACTION TO MARKET DIRECTION AND VOLATILITY: DIVIDEND CHANGE ANNOUNCEMENTS

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Abstract

We examine whether investor reactions are sensitive to the recent direction or volatility of underlying market movements. We find that dividend change announcements elicit a greater change in stock price when the nature of the news (good or bad) goes against the grain of the recent market direction during volatile times. For example, announcements to lower dividends elicit a significantly greater decrease in stock price when market returns have been up and more volatile. Similarly, announcements to raise dividends tends to elicit a greater increase in stock price when market returns have been normal or down and more volatile, although this latter tendency lacks statistical significance. We suggest an explanation for these results that combines the implications of a dynamic rational expectations equilibrium model with behavioral considerations that link the responsiveness of investors to market direction and volatility.

JEL Classifications: G14, G19

I. Introduction

Several studies document that economic and market conditions affect investor reactions to otherwise identical events, (e.g., Klein and Rosenfeld 1987; Boyd, Hu, and Jagannathan 2001). These studies indicate that the recent direction of the market or the recent state of the economy may have a bearing on the extent to which investors respond to new information.

We contribute to the dialogue by considering the market's recent volatility, as well as its direction, to examine whether either or both market conditions affect investors' responsiveness to firm-specific news. We conduct an event study to

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assess investor reaction to dividend increases or decreases. We partition a sample of dividend change announcements along two dimensions, according to whether the recent market direction has been up, normal, or down, and whether recent market volatility has been high, medium, or low. If these market conditions do not affect investors' responsiveness to firm-specific news, we would expect indistinguishable event study results across all subsamples of events. Instead, our results indicate that the firm's stock price reaction to new information depends on the interaction of both market conditions.

First, we find that announcements to reduce dividends elicit a significantly greater decline in stock price when market returns have been up and volatile. Specifically, when the subsample of dividend decrease announcements in an up and volatile market is compared with other subsamples of events, the negative abnormal return is significantly larger in magnitude. Second, we find that announcements to increase dividends tend to elicit a greater increase in stock price when recent market returns have been normal or down, and volatile. However, this second tendency lacks statistical significance across subsamples based on different combinations of market conditions. The first result is consistent with implications of the dynamic rational expectations equilibrium model built by Veronesi (1999), though the second tendency is not. The lack of statistical significance of the second tendency makes it more palatable in light of Veronesi's model. Still, this latter tendency calls for an explanation beyond that provided in Veronesi's model. We suggest an explanation that reconciles both results, based on behavioral considerations motivated by the work of Epstein and Turnbull (1980) and Robichek and Myers (1966), and that builds on the probabilistic framework in Veronesi.

II. Background

An explanation for the results found in this study requires a linkage between the nature of the news about the firm (i.e., whether it is good or bad news) and the recent direction and volatility of the market (i.e., the economic backdrop against which the news is announced). We develop this linkage by first contrasting the implications of market efficiency with the growing literature on behavioral finance. We then establish a link between market direction and the nature of firm-specific news by summarizing recent work that documents and models divergent market behavior in up versus down markets. Finally, we build on the spirit of Veronesi's (1999) model by introducing the potential influence of recent market volatility on the extent of investors' reaction to good or bad firm-specific news, as discussed in Epstein and Turnbull (1980) and Robichek and Myers (1966).

Recent Market Conditions, Market Efficiency, and Behavioral Finance

Our results indicate that firm-specific news is perceived as more important (i.e., has a greater effect on stock returns) when the nature of the news goes

against the recent direction of the market during volatile times. In particular, we find good (bad) news tends to be perceived as better (worse) news when the underlying market is down (up) and more volatile. Thus, identical economic events tend to provoke different market reactions depending on the recent direction and volatility of the market. These results initially appear inconsistent with the basic premise of market efficiency, that investment decisions reflect investors' rationally formed expectations. Following this premise, the notion of semistrong form efficiency suggests that security prices should adjust identically to identical information events, within limits reflecting transactions costs and information costs.

One counter viewpoint is that group psychology and irrational behavior may also drive investment decisions to some degree. Psychologists have long understood that no piece of information stands alone, arguing that information cannot be interpreted unless one knows the context in which it has been related. The psychological term "frame reference" expresses the importance of context and implies that information is colored by the circumstances in which it is presented (Allport 1940). Similarly, behavioral finance theories postulate that investors' perceptions of risk and return are influenced by how decision problems are framed. Shefrin (2000) terms this behavior "frame dependence."

Behavioral finance theories assume that framing effects may cause market prices to deviate from fundamental values. Burr (1997) shows that people alter choices depending on how a problem is framed and that they tend to be more concerned about losses than gains. Evidence of frame dependence is also provided by Kahneman and Tversky (1979) in their work on prospect theory. In this light, firm-specific information (such as a dividend change announcement) received in a market context of good times and high uncertainty can be interpreted differently than if it is received in a context of bad times and low uncertainty.

Recent Market Direction and Market Behavior

An empirical link between prevailing market direction and event study results has been established in the recent literature. Fabozzi and Francis (1977) question whether bull and bear markets influenced individual security returns but find that bull and bear markets yield similar market model estimates. In contrast, Goldberg and Vora (1981) find that security returns varied with the magnitude and direction of stock market returns. Klein and Rosenfeld (1987) show that certain event study models produced divergent results if the events took place during either bull (up) or bear (down) markets. Bowman, Robin, and Weintrop (1995) also investigate the effect of underlying market conditions on a sample of major dividend change announcements. These studies imply that event study results can be influenced by the general direction of underlying market movements prevailing at the time of the announcement.

Recent Market Direction, Volatility, and Abnormal Returns

Several studies suggest that security price behavior may be sensitive to the recent volatility of the underlying market. For example, Robichek and Myers (1966) and Epstein and Turnbull (1980) show that the pattern of expected returns over time partly depends on the resolution of overall uncertainty. They argue that early resolution of uncertainty has a positive effect on price, for it allows individuals to revise their consumption and investment decisions to compensate for unfavorable outcomes or take advantage of possible favorable outcomes. These two studies suggest that news arriving in a context of greater overall market uncertainty (high volatility) resolves more ambiguity than when the same information is received in a more certain (low volatility) environment. Firm-specific news may be more informative during periods of high market volatility because individuals are willing to more drastically revise their subjective beliefs regarding future cash flows in times of greater overall uncertainty. Furthermore, Epstein and Turnbull state that the overall market risk associated with a firm is reduced by the arrival of asset-specific information. This implies that, the greater the overall market risk (volatility), the greater is the impact of the asset-specific information received.

Veronesi's (1999) Dynamic Rational Expectations Equilibrium Model

Veronesi (1999) builds a dynamic model of asset prices based on rational economic decision making to establish a theoretical linkage between market direction and the extent of investors' responsiveness to firm-specific information. According to Veronesi's model, firm-specific news that goes against the grain of the recent market direction increases investor uncertainty about the future course of events, causing investors to discount the new information at a higher rate. That is, investors discount good news at a higher rate if it is announced during bad times, and investors discount bad news at a higher rate if it is announced during good times.

For example, consider an announcement to decrease dividends when the market has been up. According to Veronesi (1999), the fact that this bad news arrives during good times increases uncertainty about the firm's prospects. This increase in uncertainty leads investors to discount the lower expected future stream of dividends at a higher rate, exacerbating the downward adjustment in stock price. Thus, bad news is perceived as worse news when times are good.

Similarly, investors apply a higher discount rate to good news if the recent market direction has been down. Because this good news is announced during bad times, the information once again increases investors' uncertainty about the future course of dividends, leading them to discount the higher expected future stream of dividends at a higher rate. However, in this case the higher uncertainty and discount rate attenuate the upward adjustment in stock price resulting from the good news.

Thus, Veronesi's (1999) model implies asymmetric behavior for investors: they will overreact to bad news in good times but underreact to good news in bad times.[1]

Influence of Both Market Direction and Volatility

We build on the framework of Veronesi (1999) by suggesting that, in addition to recent market direction, market volatility reflects an important dimension of uncertainty that also has a bearing on how investors perceive firm-specific news. We focus on the notion that any firm-specific news may be perceived as more important or informative if announced in a more volatile marketplace (Epstein and Turnbull 1980; Robichek and Myers 1966). The presence of higher market volatility likely reflects greater uncertainty about overall equity valuation that may translate into greater uncertainty about individual firm performance, which can be resolved with firm-specific information. Thus, in a volatile market, firm-specific good or bad news may represent a greater surprise and go further in alleviating the greater uncertainty about individual firm performance, leading to a greater change in expected future cash flows for the firm. As a result, good or bad firm-specific news may elicit a greater investor reaction if announced in a more volatile market.

In this scenario, firm-specific news is more informative when the overall market is more volatile, magnifying investors' revisions of expected future cash flows after a firm-specific announcement. When this effect of market volatility is combined with Veronesi's (1999) influence of market direction, both market conditions become important in determining the extent of the market's revised valuation following a firm-specific announcement. It is noteworthy that although both market direction and volatility may now influence the extent of the market's reaction to firm-specific information, one condition works on the numerator of market value and the other condition influences the denominator. That is, greater market volatility increases the importance of firm-specific information by magnifying the change in expected future cash flows. This effect on the numerator of market value contrasts with the discount rate effect in Veronesi's model, in which good or bad news that goes against the grain of the market's direction increases uncertainty and thus the rate at which investor's discount the expected future cash flows following a firm-specific announcement.

In this light, when both recent market direction and volatility are considered, we deduce the following two contrasting implications for the arrival of bad news and good news, respectively. First, the market's reaction to bad news is unambiguously exacerbated if the overall market has been up and more volatile. If bad news is

[1] Veronesi's (1999) first result coincides with our first finding that investors overreact to bad news (dividend decreases) in good times (an up market), but his latter result is inconsistent with our second finding that investors also tend to overreact to good news (dividend increases) in bad times (a down market).

announced in an up market, the increased discount rate applied by investors to account for the greater uncertainty (according to Veronesi 1999) implies that bad news is perceived as worse news. In addition, the presence of greater overall market volatility exacerbates this effect, as investors perceive the bad news as being more informative in a volatile market. Together, these two forces reinforce one another, leading to an unambiguous tendency for investors to overreact to bad news in this situation.

Second, the market's tendency to over- or under-react to good news is ambiguous if announced in a down and volatile market. If good news is announced in a down market, the increased discount rate applied by investors to account for the greater uncertainty (according to Veronesi 1999) diminishes the increase in value resulting from the good news. On the other hand, if the market is more volatile this effect is counteracted by investors' perception that the good news is more informative in a volatile market. These two countervailing forces lead to an ambiguous result in which the market may over- or under-react, depending on which force outweighs the other in this situation.

Our first event study result provides statistical support for the first situation, in which bad news is unambiguously perceived as worse news in an up and volatile market. The lack of statistical significance of our second result is consistent with our explanation for the second situation, in which the countervailing forces tend to offset one another, leading to an ambiguous tendency for market over- or under-reaction, and a lack of statistical significance or robustness across subsamples in that situation.

III. Data

Data

Dividend changes are chosen for this analysis because they: (1) represent an important economic event, (2) have attracted considerable prior research, (3) occur frequently enough to produce adequate samples for testing, (4) can produce either positive or negative reactions, and (5) allow one to form a priori theoretical expectations of event study results (i.e., dividend increases (decreases) should be associated with positive (negative) abnormal returns).

In this study, we assume that dividend increases are associated with an increase in stock price (good news), whereas dividend decreases are associated with a decline in stock price (bad news). This assumption is grounded in considerable prior research documenting this relation, (e.g., Aharony and Swary 1980). Of course, individual investors may not always interpret a dividend increase (decrease) as good (bad) news. Often it is the circumstances surrounding an action that make it either good or bad. For example, a firm might decide to cut its dividend in an up market because an up market implies better growth opportunities in the form of

new profitable projects, and it might make sense for a company to cut dividends (rather than issue stock) to fund these new profitable projects. Therefore, a cut in dividends might signal better growth opportunities.[2]

We use the 1997 stock distribution files from the Center for Research in Security Prices (CRSP) listing stocks from July 2, 1962, through December 31, 1997. We identify changes in ordinary, quarterly cash dividends occurring between consecutive quarters. The percentage change in dividends serves as the dividend surprise variable. To enhance the power of the test, only substantial dividend changes are included in the sample. Consistent with Aharony and Swary (1980) and Bowman, Robin, and Weintrop (1995), substantial dividend changes are defined as events meeting the following criteria: (1) the absolute change in dividends is at least 3 cents per share, and (2) the absolute percentage change in dividends is at least 50%. This screen initially yields 5,153 regular dividend change announcements. Because CRSP does not report when a dividend amount equals zero, we cannot distinguish dividend omissions or reinitiations. We examine only regular dividend announcements, excluding the initial dividend and any subsequent omissions and reinitiations.[3]

We define confounding events as two substantial dividend changes occurring within six months (130 trading days). In such cases, we exclude the subsequent announcement from the sample. We further screen the sample to ensure that complete returns are available beginning 130 days before the dividend announcement date. We also eliminate 8 outliers (greater than 5 standard deviations from the mean). These screens yield a final sample of 4,336 regular announcements: 1,436 dividend increases and 2,900 dividend decreases.[4]

Sample Partitioning

Suppose that investors price assets based in part on their expectations of the future trend and volatility of the market. Furthermore, suppose that investor forecasts of expected market trend and volatility are a function of recent market trend and volatility. In this light, we partition the 4,336 announcements according to the underlying market direction and volatility experienced during the 30-trading-day interval (approximately six weeks) preceding the event date [−31,−2]. We label this interval the pre-announcement period. For this time frame, we calculate the mean and standard deviation of daily value-weighted market index returns for each announcement. We then partition the sample as follows:

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[2]For further discussion of these issues, see Statman and Sepe (1989). The authors wish to thank Meir Statman for this insight.

[3]Several dividend studies show that dividend initiations and omissions are different from regular dividend changes (e.g., Christie 1994).

[4]The analysis was also performed including the outliers, with similar results.

1. We rank the full sample of events according to the mean market returns experienced over this pre-announcement period and partition the sample into quartiles. The up market is then defined as the quartile with the highest mean market returns, the down market as the lowest quartile, and the normal market as the middle 50%.
2. We rank the full sample of events according to the standard deviations of market returns experienced over this pre-announcement period and partition the sample into quartiles. The high-volatility market is then defined as the quartile with the highest standard deviations, the low volatility market as the lowest quartile, and the medium volatility market as the middle 50%.
3. Within each category of market direction, we also classify into the analogous three categories of market volatility. That is, the sample is partitioned into nine cells to investigate the possible interactive influence of both market direction and volatility.
4. For every cell in each partitioning scheme, we divide the sample into two parts to be analyzed separately: dividend increases and dividend decreases.

We then apply event study methodology to every subsample in this partitioning scheme.

Pre-Announcement-Period Sample Characteristics

Table 1 provides summary statistics for the sample of pre-announcement periods when partitioning events by market direction or volatility, or both.[5] It is possible that the type of dividend change announced (increase or decrease) is associated with the market direction or market volatility classification for that event. For example, it is possible that dividend increases tend to be announced in up markets or that dividend decreases tend to be announced in down markets. However, this does not appear to be the case in our sample. We find that firms are only slightly more likely to announce a dividend increase in an up market ($n = 374$) than in a down market ($n = 350$). Similarly, firms are only slightly more likely to announce a dividend decrease in a down market (734) than in an up market (710). In a similar vein, firms are roughly equally likely to announce a dividend increase in a

[5]In Tables 1 to 4, one might expect the (25%) − (50%) − (25%) partitioning scheme to yield proportional subsample sizes. This is not the case because the entire sample of 4,336 events is first ranked by market mean or market standard deviation, and the entire ranked sample is partitioned into quartiles. Only after this ranking and partitioning is the entire sample segregated into dividend increases and dividend decreases. Hence, although the entire sample of 4,336 events is partitioned according to the proportions (25%) − (50%) − (25%), these exact proportions are not carried through to the subsamples of dividend increases and decreases.

TABLE 1. Summary Sample Statistics for Pre-Announcement Period.

Panel A. Dividend Increases

	N	$avg(\alpha)$	$avg(\beta)$	$avg(R_m)$	$avg(\sigma(R_m))$	$avg(\$Divchg)$	$avg(\%Divchg)$
Market direction							
Up	374	9.79E-04***	0.747***	0.25%***	0.78%***	$0.13***	399.61%***
Normal	712	1.10E-03***	0.768***	0.05%***	0.66%***	$0.13***	183.26%***
Down	350	9.65E-04***	0.824***	−0.18%***	0.93%***	$0.13***	146.52%***
Total	1,436	1.04E-03***	0.776***	0.05%***	0.75%***	$0.13***	230.65%***
Market volatility							
High	363	7.55E-04***	0.782***	0.00%	1.24%***	$0.17***	285.32%***
Medium	704	1.16E-03***	0.766***	0.07%***	0.67%***	$0.12***	157.86%***
Low	369	1.08E-03***	0.789***	0.07%***	0.43%***	$0.11***	315.75%**
Total	1,436	1.04E-03***	0.776***	0.05%***	0.75%***	$0.13***	230.65%***
Market direction and volatility							
Up-high	98	7.87E-04***	0.744***	0.30%***	1.17%***	$0.15***	456.34%**
Up-medium	217	1.17E-03***	0.757***	0.25%***	0.69%***	$0.13***	212.58%***
Up-low	59	6.02E-04***	0.713***	0.20%***	0.44%***	$0.13***	993.25%
Normal-high	115	7.85E-04***	0.805***	0.05%***	1.16%***	$0.20***	337.56%***
Normal-medium	336	1.20E-03***	0.761***	0.04%***	0.67%***	$0.12***	113.94%***
Normal-low	261	1.12E-03***	0.760***	0.07%***	0.42%***	$0.12***	204.52%***
Down-high	150	7.11E-04***	0.789***	−0.24%***	1.35%***	$0.16***	133.53%***
Down-medium	151	1.06E-03***	0.790***	−0.14%***	0.67%***	$0.11***	176.97%***
Down-low	49	1.44E-03***	1.034***	−0.09%***	0.47%***	$0.07***	92.43%***
Total	1,436	1.04E-03***	0.776***	0.05%***	0.75%***	$0.13***	230.65%***

(Continued)

TABLE 1. Continued.

Panel B. Dividend Decreases

	N	$avg(\alpha)$	$avg(\beta)$	$avg(R_m)$	$avg(\sigma(R_m))$	$avg(\$Divchg)$	$avg(\%Divchg)$
Market direction							
Up	710	4.05E-04***	0.690***	0.25%***	0.73%***	−$0.20***	−55.67%***
Normal	1,456	7.38E-04***	0.693***	0.05%***	0.65%***	−$0.21***	−55.33%***
Down	734	6.78E-04***	0.715***	−0.18%***	0.92%***	−$0.20***	−55.43%***
Total	2,900	6.41E-04***	0.698***	0.04%***	0.74%***	−$0.21***	−55.44%***
Market volatility							
High	721	4.45E-04***	0.693***	−0.02%**	1.16%***	−$0.20***	−56.88%***
Medium	1,464	6.78E-04***	0.679***	0.05%***	0.68%***	−$0.21***	−55.12%***
Low	715	7.65E-04***	0.743***	0.08%***	0.44%***	−$0.21***	−54.64%***
Total	2,900	6.41E-04***	0.698***	0.04%***	0.74%***	−$0.21***	−55.44%***
Market direction and volatility							
Up-high	184	−2.39E-04	0.723***	0.30%***	1.08%***	−$0.21***	−58.37%***
Up-medium	368	5.97E-04***	0.677***	0.24%***	0.69%***	−$0.20***	−54.66%***
Up-low	158	7.09E-04***	0.682***	0.20%***	0.44%***	−$0.20***	−54.87%***
Normal-high	195	4.28E-04***	0.745***	0.05%***	1.11%***	−$0.18***	−56.91%***
Normal-medium	775	7.68E-04***	0.644***	0.05%***	0.68%***	−$0.21***	−55.24%***
Normal-low	486	8.15E-04***	0.752***	0.06%***	0.43%***	−$0.22***	−54.83%***
Down-high	342	8.23E-04***	0.646***	−0.22%***	1.24%***	−$0.21***	−56.06%***
Down-medium	321	5.53E-04***	0.766***	−0.15%***	0.67%***	−$0.21***	−55.35%***
Down-low	71	5.42E-04**	0.817***	−0.11%***	0.48%***	−$0.18***	−52.78%***
Total	2,900	6.41E-04***	0.698***	0.04%***	0.74%***	−$0.21***	−55.44%***

Note: Sample statistics are shown for 1,436 dividend increases and 2,900 dividend decreases over the 30-day pre-announcement partitioning periods. N is the sample size, $avg(\alpha)$ and $avg(\beta)$ are the average alpha and beta from the pre-announcement period by partition subsample, $avg(R_m)$ and $avg(\sigma(R_m))$ are the average daily percentage return and the average standard deviations of the Center for Research in Security Prices (CRSP) value-weighted market index from the pre-announcement period by partition subsample, and $avg(\$Divchg)$ and $avg(\%Divchg)$ are the average dollar and percentage dividend change for those events in the pre-announcement period by partition subsample. The t-test significance for the hypothesis that the population mean is zero is noted.

***Significant at the 1% level.
**Significant at the 5% level.

high-volatility market (363) or low-volatility market (369). Likewise, for dividend decreases, firms are almost as likely to announce when market volatility is high (721) as when it is low (715).

When we partition the sample of events by either market direction or market volatility, several empirical regularities appear. Randolph (1991) points out that market volatility tends to be higher when stock prices are declining and lower when stock prices are advancing. Similarly, Lockwood and McInish (1990) document that the variance of returns is greater during bear markets than during bull markets. Thus, one might expect higher volatility, $avg(\sigma(R_m))$ in a down market (when the mean market return, $avg(R_m)$, is low). This expectation is borne out in our results. Likewise, when the market is partitioned by volatility, the high-volatility market displays the lowest average market returns. These results characterize both dividend increases and decreases, and corroborate the findings of Lockwood and McInish (1990) and Randolph (1991).

When we partition by both market direction and volatility, Table 1 shows that, holding market direction constant, the high-volatility market produces the largest positive mean returns in an up market and the largest negative mean returns in a down market. Likewise, holding volatility constant, the down market in each volatility category usually has the greatest volatility.[6]

IV. Empirical Results

Partitioning by Market Direction Alone

We use standard event study methodology to estimate abnormal stock returns around the announcement of dividend changes, along with their corresponding test statistics. We estimate the regression parameters using the single-index model and a 100-day estimation period that begins 130 trading days before the event date and ends 31 trading days before the event date $[-130,-31]$.[7] The event date ($t = 0$) is the dividend declaration date listed on the CRSP Distribution File. To avoid a potential bias created in abnormal returns due to alpha ($\hat{\alpha}_j$) in the single-index model, we first estimate alpha ($\hat{\alpha}_j$) and beta ($\hat{\beta}_j$) using the single-index model over

[6]It is also noteworthy that the average alphas estimated from the pre-announcement period, by partitioned subsample, are significantly different from zero but small in an economic sense and not significantly different across partitioned subsamples. In addition, the average betas across pre-announcement periods tend to be larger when the market has been down with low volatility, but these differences are once again rarely significant.

[7]We also test three other models: the market-adjusted returns model, the mean-adjusted returns model, and the raw market returns model. In addition, we test the single-index and market-adjusted returns models using both an equally weighted and a value-weighted index. These alternative approaches do not affect our major conclusions.

TABLE 2. Mean Cumulative Abnormal Returns of Substantial Dividend Changes for Subsamples Partitioned by Market Direction.

	Market Direction			
	Up	Normal	Down	Total
Panel A. Dividend Increases				
MCARs	1.22%	1.64%	1.34%	1.46%
z-statistic	8.47***	15.42***	8.22***	19.24***
N	374	712	350	1,436
ANOVA results	*F*-test			
H_1: Normal = down	1.23			
H_2: Up = down	0.15			
H_3: Up = normal	2.52			
H_4: Up = normal = down	1.44			
Panel B. Dividend Decreases				
MCARs	−1.08%	−0.87%	−0.87%	−0.92%
z-statistic	−8.88***	−10.97***	−7.63***	−16.00***
N	710	1,456	734	2,900
ANOVA results	*F*-test			
H_1: Normal = down	0.00			
H_2: Up = down	0.73			
H_3: Up = normal	0.98			
H_4: Up = normal = down	0.55			

Note: Cross-sectional mean cumulative abnormal returns (MCARs), using the single-index market model with alpha equal to zero and a value-weighted index, are shown for 1,436 dividend increases and 2,900 dividend decreases over the event period [−1,0] partitioned by market direction (up, normal, down). Market direction classification is conditioned on the mean of the Center for Research in Security Prices (CRSP) value-weighted market index over the 30-day period [−31,−2] preceding the event date. *N* is the sample size. One-tailed *z*-statistics are calculated by standardizing the excess return on each day for each security and then aggregating the standardized excess returns. ANOVA = analysis of variance.

***Significant at the 1% level.

the 100-day pre-announcement (estimation) period. We then set $\hat{\alpha}_j = 0$ when we apply the estimated beta ($\hat{\beta}_j$) to calculate abnormal returns in the post-announcement (event) period.[8]

In Table 2 we present the results for dividend increases and decreases when partitioning by underlying market direction only. First, consider the results

[8]To understand the potential bias created when α is not set to zero in this fashion, imagine that the normal return for stock *j* is 10% but that stock *j* had a 12% return during a given pre-announcement period (i.e., positive momentum). For this event, α for stock *j* will be positive 2%. A normal 10% return of stock *j* during the post-announcement period would then register as a negative 2% because 10% is compared with 12%. We are indebted to a referee for pointing out this potential source of bias in our event study results. We provide the results setting alpha to zero, but the overall event study results and conclusions are robust when we do not set alpha to zero.

for dividend increases shown in Panel A of Table 2. Mean cumulative abnormal returns (MCARs) are significant and positive for the total sample and for all three subsamples partitioned by market direction. The MCAR is smallest for the up market (1.22%), slightly larger for the down market (1.34%), and largest for the normal market (1.64%). However, these differences are not statistically significant ($F = 1.44$).[9]

According to Veronesi's (1999) model, when a dividend increase (good news) is announced during a down market (bad times), the new information increases investors' uncertainty about the future course of dividends, leading them to discount the higher expected future stream of dividends at a higher rate. This implies that investors underreact to good news in bad times. Thus, according to Veronesi's model, the down market should experience the smallest positive MCAR. Our results show little evidence to support this implication of Veronesi's model.

Next, consider dividend decreases in Panel B of Table 2. In this panel we show MCARs that are significant and negative for the total sample and for all subsamples. The up market yields the largest negative MCAR (–1.08%), and the normal and down markets yield smaller negative MCARs (–0.87% for both). However, once again, ANOVA indicates that these differences are not statistically significant ($F = 0.55$).

According to Veronesi's (1999) model, when a dividend decrease (bad news) is announced during good times (up market), the new information increases investors' uncertainty, leading them to discount the lower expected future stream of dividends at a higher rate. Thus, bad news is perceived as worse news when times are good in Veronesi's model. Consequently, the up market should yield the largest negative MCAR as investors overreact to bad news in good times. Our results support this assertion in an economic sense but not in a statistical sense.

In summary, Veronesi's (1999) model implies asymmetric behavior for investors: they overreact to bad news in good times but underreact to good news in bad times. The relative magnitudes of the MCARs in Panel B of Table 2 are consistent with Veronesi, although the results in Panel A are not. In both panels, ANOVA tests fail to detect significant differences in MCARs across subsamples partitioned by market direction alone. Apparently, for both dividend increases and decreases, there is too much noise or market turbulence surrounding these events to detect statistically significant differences across subsamples when partitioning by market direction alone.

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[9] Additionally, we perform analysis of variance (ANOVA) to test for differences in the cumulative abnormal returns (CARs) across the various subsamples. We regress the CARs generated on various dummy variables that indicate whether a given event occurs in a down, normal, or up market, or in a low-, medium-, or high-volatility market. An *F*-test and two sample *t*-tests are also performed, comparing the MCARs across the market subsamples. Results are robust with the ANOVA tests and are available on request.

TABLE 3. Mean Cumulative Abnormal Returns of Substantial Dividend Changes for Subsamples Partitioned by Market Volatility.

	Market Volatility			
	High	Medium	Low	Total
Panel A. Dividend Increases				
MCARs	1.64%	1.36%	1.46%	1.46%
z-statistic	9.64***	13.59***	9.62***	19.24***
N	363	704	369	1,436
ANOVA results	*F*-test			
H_5: Medium = low	0.14			
H_6: High = low	0.32			
H_7: High = medium	1.05			
H_8: High = medium = low	0.53			
Panel B. Dividend Decreases				
MCARs	−1.12%	−0.89%	−0.79%	−0.92%
z-statistic	−8.93***	−12.00***	−6.10***	−16.00***
N	721	1,464	715	2,900
ANOVA results	*F*-test			
H_5: Medium = low	0.25			
H_6: High = low	1.82			
H_7: High = medium	1.14			
H_8: High = medium = low	0.97			

Note: Cross-sectional mean cumulative abnormal returns (MCARs), using the single-index market model with alpha equal to zero and a value-weighted index, are shown for 1,436 dividend increases and 2,900 dividend decreases over the event period [−1,0] partitioned by market volatility (high, medium, low). Market volatility classification is conditioned on the standard deviation of the Center for Research in Security Prices (CRSP) value-weighted market index over the 30-day period [−31,−2] preceding the event date. *N* is the sample size. One-tailed *z*-statistics are calculated by standardizing the excess return on each day for each security and then aggregating the standardized excess returns. ANOVA = analysis of variance.

***Significant at the 1% level.

Partitioning by Market Volatility Alone

Panels A and B of Table 3 present the results for dividend increases and decreases, respectively, when partitioning by underlying market volatility alone. Again, dividend increases (decreases) reveal MCARs that are significantly positive (negative) for the total sample and for all three subsamples partitioned by market volatility. For dividend increases, the high-volatility market yields the largest positive MCARs (1.64%), and the medium- and low-volatility markets yield smaller MCARs (1.36% and 1.46%, respectively). Likewise, for dividend decreases, the high-volatility market yields the largest negative MCAR (–1.12%), and the medium- and low-volatility markets yield smaller negative MCARs (–0.89% and −0.79%, respectively). However, for both cases, ANOVA indicates that these differences are not statistically significant ($F = 0.53$ for dividend increases, $F = 0.97$ for dividend

decreases). Thus, once again there is apparently too much noise or turbulence around this phenomenon to obtain robust, significant results when partitioning by market volatility alone.

Partitioning by Market Direction and Volatility

When we partition by market direction and volatility, both market conditions are statistically important for the sample of dividend decreases but not for dividend increases. First, consider the results for dividend increases, presented in Panel A of Table 4 and Figure I. The greatest positive abnormal returns occur in two cells: when market volatility is high and market direction is either down or normal (MCARs = 1.76% and 1.77%, respectively). This outcome is consistent with the results in Tables 2 and 3, indicating that investors tend to react more positively to good news in a normal or down market when there is high volatility. The difference in abnormal returns between these two cells and several of the remaining seven cells is large in economic terms. For example, this difference is 0.46% when the down-high market is compared with the up-high market direction–volatility combination, and as large as 0.82% when compared with the down-low market direction–volatility combination.

At first glance, these results in Panel A appear to support the view that, when market volatility is high, good news (such as a dividend increase) may be more informative in alleviating uncertainty, especially if the market is normal or trending down. Nonetheless, ANOVA tests indicate that these differences in Panel A are not statistically significant across all cells in each row or column. Hence, for dividend increases there is once again too much noise surrounding this phenomenon to obtain robust, statistically significant results across each row or column when partitioning by both market direction and volatility.

According to Veronesi (1999), if good news is announced in a down market, the increased discount rate applied by investors to account for the greater uncertainty diminishes the change in value resulting from the good news. On the other hand, if the market is more volatile, this effect is counteracted by investors' perception that the good news is more informative in a volatile market. These two countervailing forces lead to an ambiguous result in which the market may over- or under-react, depending on which force outweighs the other in this situation. These countervailing effects of the larger price increase due to greater informativeness, when market volatility is high, and the smaller price increase due to the increased discount rate, when the announcement goes against the grain of the market's direction (as in Veronesi's model) tend to offset one another. As a result, we cannot distinguish statistically whether there is a net over- or under-reaction across cells in each row or column of Panel A in Table 4 and Figure I.

In Panel B of Table 4 and Figure I, we provide analogous results for dividend decreases. In this case, the subsample of events in an up market with high

TABLE 4. Mean Cumulative Abnormal Returns of Substantial Dividend Changes for Subsamples Partitioned by Both Market Direction and Market Volatility.

	Market Volatility			
	High	Medium	Low	Total
Panel A. Dividend Increases				
Market direction				
Up	1.30%***	1.11%***	1.48%***	
N	98	217	59	374
Normal	1.77%***	1.66%***	1.56%***	
N	115	336	261	712
Down	1.76%***	1.05%***	0.94%**	
N	150	151	49	350
Total	363	704	369	1,436
ANOVA results			*F*-test	
H_9: Down-high = down-medium = down-low			1.34	
H_{10}: Normal-high = normal-medium = normal-low			0.11	
H_{11}: Up-high = up-medium = up-low			0.21	
H_{12}: Low-up = low-normal = low-down			0.45	
H_{13}: Medium-up = medium-normal = medium-down			1.68	
H_{14}: High-up = high-normal = high-down			0.44	
H_{15}: Down-high = down-medium = down-low = normal-high = normal-medium = normal-low = up-high = up-medium = up-low			0.78	
Panel B. Dividend Decreases				
Market direction				
Up	−1.82%***	−0.98%***	−0.46%	
N	184	368	158	710
Normal	−0.71%***	−0.94%***	−0.83%***	
N	195	775	486	1,456
Down	−0.98%***	−0.67%***	−1.25%***	
N	342	321	71	734
Total	721	1,464	715	2,900
ANOVA results			*F*-test	
H_9: Down-high = down-medium = down-low			0.61	
H_{10}: Normal-high = normal-medium = normal-low			0.23	
H_{11}: Up-high = up-medium = up-low			3.72**	
H_{12}: Low-up = low-normal = low-down			0.74	
H_{13}: Medium-up = medium-normal = medium-down			0.46	
H_{14}: High-up = high-normal = high-down			2.94*	
H_{15}: Down-high = down-medium = down-low = normal-high = normal-medium = normal-low = up-high = up-medium = up-low			1.28	

Note: Cross-sectional mean cumulative abnormal returns (MCARs), using the single-index market model with alpha equal to zero and a value-weighted index, are shown for 1,436 dividend increases and 2,900 dividend decreases over the event period [−1,0] by market direction (up, normal, down) and market volatility (high, medium, low). Market direction and volatility classifications are conditioned on the mean and standard deviation of the Center for Research in Security Prices (CRSP) value-weighted market index over the 30-day period [−31,−2] preceding the event date. *N* is the sample size. One-tailed *z*-statistics are calculated by standardizing the excess return on each day for each security and then aggregating the standardized excess returns. ANOVA = analysis of variance.

***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

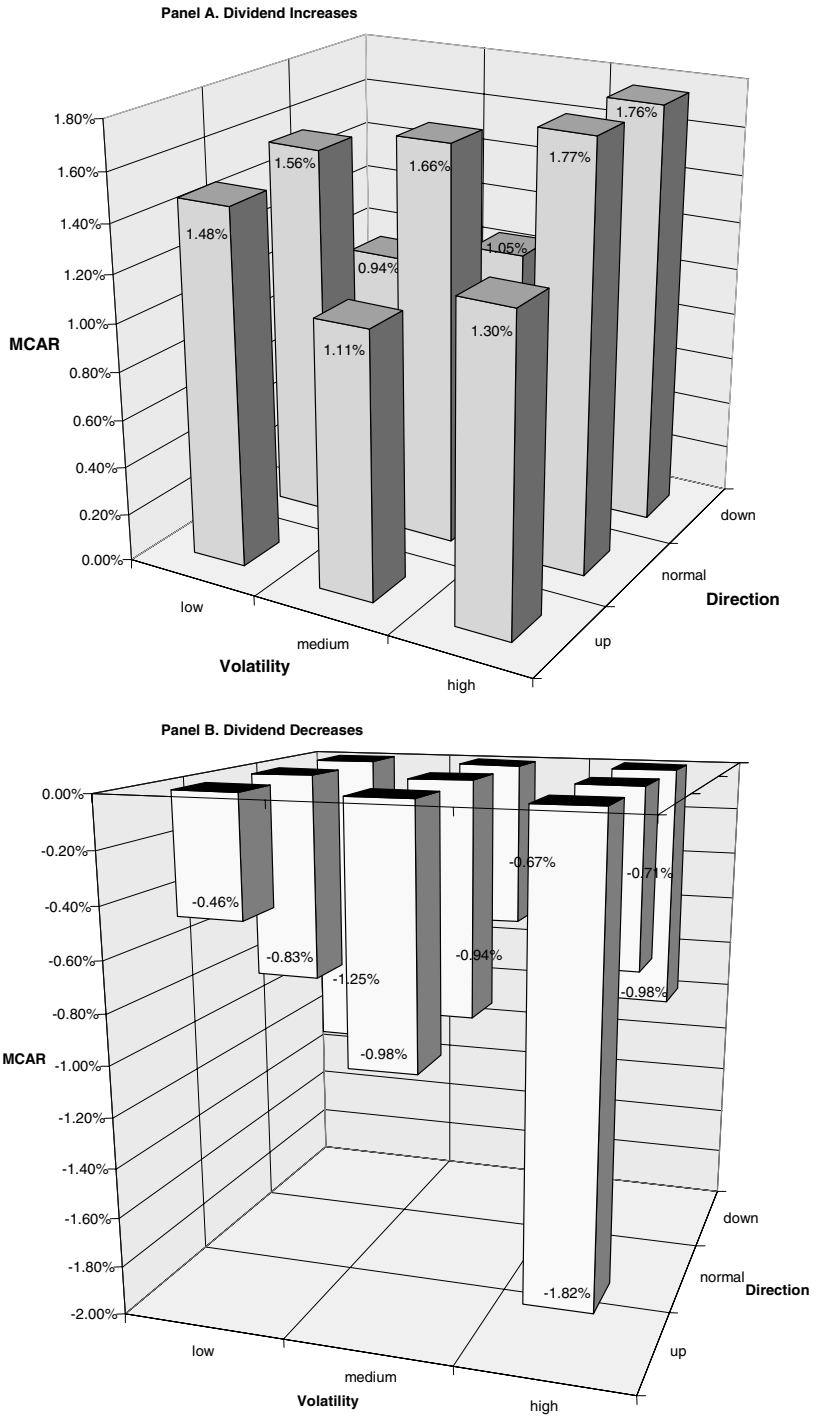

Figure I. Single-Index Model Results When Partitioned by Market Direction and Volatility. Dividend increases are in Panel A, and dividend decreases are in Panel B.

volatility yields a negative MCAR that is dramatically larger in magnitude than all other cells. ANOVA results reveal that when this up market–high volatility combination is compared with the other two cells in that row or that column of the table, these two ANOVA tests reject the hypothesis of equality across cells. These two tests imply that when market direction is up, differences in market volatility are relevant ($F = 3.72$), and when market volatility is high, differences in market direction are important ($F = 2.94$). It is noteworthy that the largest negative MCAR in Panel B appears when the market direction is up and volatility is high (MCAR = −1.82%), and the smallest negative MCAR occurs when the market direction is up and volatility is low (–.46%).

These results support the implication of Veronesi's (1999) model that if bad news is announced in an up market, the increased discount rate applied by investors to account for the greater uncertainty implies that bad news is perceived as worse news. Furthermore, these results also support the view that an environment of greater overall market volatility reinforces the implication of Veronesi's model, as investors perceive the bad news as being more informative in a volatile market. Together, these two forces reinforce one another when bad news is announced in an up and volatile market. As a result of these reinforcing effects, we can distinguish a statistically significant market overreaction across cells in Panel B of Table 4 and Figure I.

V. Conclusions

In this study we investigate the sensitivity of investor reactions to recent market direction and volatility. In particular, we examine whether the stock market's reaction to dividend change announcements is systematically associated with the direction or volatility of the underlying market during the six weeks before the announcement.

When the sample of dividend change announcements is partitioned by both market direction and volatility, two empirical regularities stand out. First, announcements to increase dividends tend to elicit greater positive abnormal returns when the market direction is normal or down and volatility is high. That is, good news tends to be perceived as better news in a normal or down market with high volatility. However, these tendencies are not statistically significant or robust across all subsamples. Apparently, there is substantial noise across events that limit the statistical significance and robustness of these tendencies. Second, announcements to decrease dividends elicit significantly greater negative abnormal returns when market direction has been up and volatility high. That is, investors react more strongly to bad news when the market has been up and highly volatile.

Our first result contrasts with one major implication of Veronesi's (1999) model—that investors will underreact to good news (a dividend increase) in bad

times (a down market). On the other hand, our second result is consistent with the other major implication of Veronesi's model—that investors will overreact to bad news (a dividend decrease) in good times (an up market).

We reconcile both results with the implications of Veronesi's (1999) model by introducing market volatility as a second factor that may influence the extent to which investors perceive news as good or bad (as in Epstein and Turnbull 1980; Robichek and Myers 1966). We suggest that a highly volatile marketplace embodies greater overall uncertainty that may translate into greater firm-specific uncertainty, which can be relieved by firm-specific news (such as a dividend change announcement).

In the first situation, when good news (a dividend increase) is announced in bad times (a down market), the underreaction implied by Veronesi's (1999) model is attenuated when the market is more volatile. That is, the influences of market direction and volatility are countervailing in this situation, so that whether the market under- or over-reacts to good news in bad and volatile times depends on which effect dominates. The lack of statistical significance we find for this situation is consistent with our expansion of Veronesi's framework to incorporate the influence of both market direction and volatility. If these two forces offset one another in this situation, it should be more difficult to find statistically significant differences across subsamples partitioned by market direction or volatility.

In the second situation, when bad news (a dividend decrease) is announced in good times (an up market), the overreaction implied by Veronesi's (1999) model is exacerbated when the market is more volatile. That is, the influences of market direction and volatility reinforce each other in this situation, strengthening Veronesi's implication that bad news is worse news in an up (and volatile) market. The robust statistical significance of our second result is consistent with this expansion of Veronesi's framework to include market volatility.

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