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Investor Disagreement on Corporate Spin-offs News

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INVESTOR DISAGREEMENT ON CORPORATE SPIN-OFFS NEWS

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To my father and mother

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Abstract

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This study analyzes temporal trading volume surge associated with a firm's public announcement of its spinoff divesture. Combining Miller (1977)'s static difference-of-opinion (DO) model with Banerjee and Kremer (2010)'s dynamic DO model, this study investigates the effects of investors' differential interpretations of spinoff announcements on price changes for 221 corporate spinoffs in the U.S from 1964 to 2005. We measure the *ex-ante* level of DO as the degree of DO about a firm's value in a typical trading day prior to a spinoff announcement, and the event level of DO as the changed level of DO triggered by investors' differential interpretations of its spinoff announcement. We find that spinoff announcements spark a sudden and sharp increase in the level of DO. This increase is positively correlated with abnormal returns generated by the announcements. Consistent with the notion of investors' limited attention, the *ex-ante* level of DO is negatively related to disagreement shock. Further, defining the *ex-ante* level of DO as disagreement factor, we validate its statistical significance after controlling for other known determinants for these returns in the entire study period. For the first study period between 1964 and 1991, we confirm the results of prior studies on the effects of a change in industrial focus and the relative size of a spun-off on the abnormal returns. For the second study period from 1992 to 2005, all these factors are found insignificant. Only variable that consistently accounts for the cross-sectional variation in the abnormal returns for both periods is disagreement factor.

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Part 1

Introduction and Overview

Trading volume behavior around an informational event typically display abnormally high level of trading volume on the date of the event and gradual attenuating or declining trading volume during a period, usually a few days, following the event. This behavior is not easily explained by the traditional asset pricing models based on the assumption of rational expectations in which agents share common priors and interpret information homogeneously. Departing from this assumption of rational and homogeneous agents, Banerjee and Kremer (2010) develop a dynamic difference-of-opinion model in which investors have heterogonous beliefs and interpret information differently. In particular, focusing on a change in the level of disagreement induced by an infrequent, yet a material event, Banerjee and Kremer's model is able to explain those patterns in trading volume without assuming exogenous noisy processes typically employed in noisy rational expectations models.

The purpose of this study is to investigate the effects of changes in the levels of differences of opinion (henceforth DO) on stock prices around corporate spinoff announcements. We apply Banerjee and Kremer's idea of changes in DO levels to Miller's (1977) static DO model to predict prices changes. Guided by dynamic DO models, we measure several (trading) volume-based proxies for what we define as the *ex-ante* level of DO or the *disagreement factor* of a sample firm, which reflect the level of disagreement about the firm's value on a typical trading day prior to its spinoff announcement. Alternatively, we consider the disagreement factor as a firm-specific characteristic defined by heterogeneous investors. We document that these proxies account for a large fraction of the cross-sectional variation in abnormal returns generated by the announcements using a sample of corporate spinoffs announced during a 41-year period from 1964 to 2005. This finding results because changes in the levels of DO occur in the manner that is consistent with the notion of limited attentions on the part of investors. Moreover, controlling for other known sources for the abnormal returns reported in the literature on corporate spinoffs, we find that these sources are no longer associated with the abnormal returns for our 41-year of study period. Only disagreement factor is able to consistently account for the cross-sectional variation in these returns.

Our choice of spinoff announcements is motivated by Moeller, Schlingemann, and Stulz (2007). They note that the announcement of an acquisition effectively increases the shares of an acquirer for trading (*i.e.*, the float), which implies a shift in the supply curve of the acquirer's stock in Miller (1977)'s model. This increased float has to be absorbed by investors who hold less optimistic opinions about the bidder. Thus bidders with higher levels of DO (*i.e.*, steeper slopes of the demand curves) should earn lower abnormal returns. Consistent with this implication, Moeller et al. document a negative relationship between the levels of DO and acquirer abnormal returns for the case of equity offer but not cash offer. In contrast to an acquisition announcement, a spinoff announcement made by a firm does not involve an increase in its float, yet has a potential to incur substantial disagreement among investors about the prospect of the firm[1]. This

[1] Miller (1977) illustrates an example in which a steelmaker and a meatpacking firm individually will be valued higher than a merged firm (*i.e*. a meatpacking-steelmaking firm) in his model. He explains that those who have high opinions about either meatpacking or steelmaking firm alone would not value the merged firm as high as they do for a standalone firm. Thus, less optimistic investors will buy the shares of the merged firm.

allow us exclusively look at changes in the level of DO and its implications on price reactions days surrounding spinoff announcements.

Our analytical framework is based on a simple adaptation of a change in the level of DO into Miller's model. In this model in which short-sales constraints are binding, it is the level of DO about the value of a firm that causes the demand curve for the firm to be downward sloping. Thus, the slope of the demand curve increases with disagreement about its value among investor. If the firm's announcement of spinoff spurs large disagreement among investors, this event raises the slope of the demand curve. We interpret this jump in the level of DO as a change in the slope of demand curve. To measure a change in the level of DO, we consider a two-period setting: the pre-event (the 250-trading-day period before the announcement of a spinoff) and the event period (the 3-trading-day period around the date of the announcement). From each period, we estimate the *ex-ante* and the *event* level of DO for the firm.

We propose the following three hypotheses. Hypothesis 1 states that the event level of DO should be larger than the *ex-ante* level of DO. As a baseline test for Hypotheses 2 and Hypothesis 3, we test whether there is a sudden increase in the level of DO sparked by a spinoff announcement. Given that the level of DO spikes up, which implies a (upward) shift in the slope of the demand curve (*i.e.*, a steeper slope), in the event period, Hypothesis 2 states that the disagreement shock should be positively correlated with announcement abnormal return. The disagreement shock defined as the difference between the event and the *ex-ante* level of DO is also translated to the magnitude of a change in the slope of the demand curve. Hence, sample firms with greater disagreement shocks relative to their *ex-ante* levels of DO are expected to earn larger abnormal returns. Finally, Hypothesis 3 states that the *ex-ante* level DO is negatively correlated with the disagreement shock. This proposition is based on the idea of limited attention which states that cognitively overloaded investors pay attention to only a subset of information (*e.g.*, Hirchleifer & Teoh, 2003; Peng & Xiong, 2006). Because of this type of cognitive constraint, a firm that is out of investors' attention, perhaps due to infrequent coverage by the media, would have a low *ex-ante* level of DO. In other words, it is less susceptible to heterogeneous interpretations by investors because it is rarely reported by the media. However, when the announcement of a spinoff, which is very likely to receive wide and intense media coverage, becomes publicly, a firm characterized by a lower *ex-ante* level of DO is expected to incur larger disagreement relative to its *ex-ante* level of DO than is a firm with a high *ex-ante* level of DO.

For the construction for proxies for the *ex-ante* and the event level of DO, we note that as the event period lasts for three days, a proxy for both levels of DO should be comparable to properly estimate a change in the level of DO. That is, since the latter reflects the changed level of DO on the *announcement date* of a spinoff, the former should reflect the *normal* level of DO on a *typical* trading day prior to the announcement. We use daily trading volume turnover as a basic variable for estimating a proxy for disagreement. Our use of trading volume is based on recent developments in dynamic DO models in which disagreement is the key variable that drives the positive correlation between trading volume and overpricing (*e.g.*, Hong, Scheinkman, & Xiong, 2004; Scheinkman & Xiong 2003). In other words, the level of trading volume for a firm contains information about the degree of investor disagreement about the firm's value. Specifically, we follow the estimation methods developed by Garfinkel (2009). The focus of his methodology is to isolate a part of trading volume after controlling for the other parts related to the market-wide and the mean level of firm-specific trading volume or information-related trading on a particular day. We refer these estimators as the (trading) volume-based measures of DO (VDO). We employ five different VDOs including daily volume turnover, and estimate them each day during the pre-event and the event (see Section 4.C for the measurement details of VDOs). Our preliminary analysis of statistical characteristics of daily estimates of VDOs shows that these estimates in the pre-event period have stable normal distributions. This result allows us to properly take an average of daily estimates of a VDO in the pre-event period, and meaningfully define it as a proxy for the *ex-ante* level of DO or an *ex-ante* DO proxy. Similarly, we define the three-day mean of daily estimates of a VDO in the event period as a proxy for the *event* level of DO or an *event* DO proxy.

It is commonly accepted in the investment literature that a high level of trading activity is widely regarded as a sign of a stock's market liquidity (*e.g.*, Brennan, Chordia, & Subrahmanyam, 1998; Datar, Naik, & Radcliffe, 1998). Because our *ex-ante* DO proxies are based on VDOs that are essentially geared to estimate extra portion of trading volume, we attempt to establish our *ex-ante* DO proxies as an indicator for the level of DO rather than for liquidity. Comparing with five popular proxies for liquidity (*i.e.*, dollar trading volume, firm size, the effective spread, and the standard deviation of return residuals), we find that none of our *ex-ante* DO proxies (except volume turnover) is related to these liquidity proxies. Interestingly, we also find that the *ex-ante* DO proxy based on volume turnover is strongly positively related to the effective spread and the residual standard deviation. This result is the opposite of the notion that high volume turnover is a sign of liquidity. But dollar trading volume has the expected signs with the effective spread and the residual standard deviation as a proxy for liquidity. Apparently, volume turnover (*i.e.*, a ratio of the number of share traded to shares outstanding), or our basic ingredient for estimating the other VDOs, contains information more than, or perhaps other than market liquidity about the sample firms.

In addition, we check the robustness of our *ex-ante* DO proxies by comparing them with the extant DO proxies (*i.e.*, breadth of ownership by Chen, Hong, & Stein, 2002; the dispersion of analysts' earnings forecasts by Diether, Malloy, & Scherbina, 2002); the dispersion of analysts' forecasts on the long-term earnings growth by Moeller et al., 2007). We find that our proxies are not significantly related to these extant disagreement proxies. One exception is the relationship between the *ex-ante* DO proxy based on volume turnover and the dispersion of analysts' long-term earnings growth for which we find a significant correlation. Since the dispersion of analysts' earnings forecasts is often used as a proxy for liquidity by researchers, we show that it is more closely related to liquidity at least in our sample. In particular, dollar trading volume is highly negatively correlated with the dispersion measured based on analysts' earnings forecasts, consistent with the notion that they both represent liquidity. However, volume turnover is not related to the dispersion of analysts' earnings forecasts, but it is significantly associated with the dispersion in analysts' long-term earnings growth. Thus, our results suggest that the information content of volume turnover is the degree of disagreement among investors about the value of a sample firm.

Furthermore, we find that the *ex-ante* DO proxy based on volume turnover has a significant negative correlation with the pricing indicators (*i.e.*, book-to-market ratio and earning-to-price ratio). Consistent with the central prediction of DO models, this result lends further support for our *ex-ante* DO proxy that it captures the cross-sectional variation in the degrees of overpricing, or the *ex-ante* levels of DO, of the sample firms. For *ex-ante* DO proxies based on the other four VDOs, though their correlations with the liquidity proxies are non-existent, their relationship with the extant DO proxies is insignificant. Nevertheless, given their strong relationship with the *ex-ante* DO proxies based on volume turnover, their empirical relevance as proxy for disagreement will be validated by testing the hypotheses.

The test results of the three hypotheses are as follows. For Hypothesis 1, we find that there is a sudden increase in the level of DO in the announcement period (*i.e.,* the event level of DO). The mean values of *ex-ante* DO proxies are about zero. However, *event* DO proxies spike up such that their mean values hover about 0.65. Indeed, the announcement of a spinoff is a significant information event that invokes huge disagreement among investors. Measuring the disagreement shocks (*i.e., ex-ante* level of DO minus event level of DO), we find that they are significantly and positively related to announcement abnormal returns as it is postulated in Hypothesis 2. This result substantiates our analytical setup that a change in the level of DO triggered by a public announcement of a spinoff can be interpreted as a shift in the slope of a demand curve in Miller's framework. Moreover, this evidence suggests that the VDOs employed in this study adequately capture investor disagreement. That is, by extrapolating the *ex-ante* and the *event* level of DO from daily estimates of VDOs, we are able to examine the effect of a change in the level of DO on price reactions around the spinoff announcement. Finally, consistent with Hypothesis 3, we find that the lower the *ex-ante* level of DO, the greater the disagreement shock. Across the sample, the correlation between the *ex-ante* levels of DO and the disagreement shocks is negatively significant regardless of the choice of a VDO. More importantly, this result implies that it is a negative correlation between the *ex-ante* level of DO and the disagreement shock that gives rise to a negative correlation between announcement abnormal returns and the *ex-ante* levels of disagreement. We find the evidence in support of this implication. Therefore, the *ex-ante* level of DO can be a potent determinant that can be helpful in understanding for the cross-sectional variation in the abnormal returns.

In Part 2, we broaden our investigation by extending the bivariate analyses in Part 1 to multiple regression analyses. We test whether the cross-sectional variation in announcement abnormal returns can be accounted for with our key variable, the *ex-ante* level of DO, when controlling for other known sources for these returns reported in the literature. We rename the *ex-ante* level of DO as *disagreement factor* in Part 2. We select the following three factors or determinants that have received strong empirical coverage as the sources for the abnormal returns: *relative size* which is a portion of a parent's assets assigned to its spun-off subsidiary, the level of *information asymmetry ex ante*, and *focus factor* which indicates whether a (parent) firm split up a related or unrelated subsidiary to its core business (*i.e.*, focus-increasing or non-focus-increasing spinoff). Note that since spinoff announcements have shown to generate, on average, positive abnormal returns—we also verify this stylized fact in Part 1, these returns are often referred to as wealth gains or wealth effects.

Prior to multivariate analyses, we examine two control variables individually: information asymmetry and focus factor because we find that the evidence for the effect of both variables on wealth gains are inconclusive in the literature. Our preliminary analysis of *information asymmetry* finds that there is a significant deterioration in all the proxies that we employ for information asymmetry from the pre-spinoff to the post-spinoff period. Moreover, this exacerbation in information asymmetry is more severe for, and limited to, focus-increasing firms. Our finding rejects the information hypothesis proposed by Krishnaswami and Subramaniam (1999), while it is consistent with the result of Huson and MacKinnon (2003). For focus factor or industry focus hypothesis, we show that there is no difference in wealth gains whether a sample firm is engaged in focus-increasing or non-focus-increasing spinoff with our full sample. But, noting that most of empirical studies on the industry focus hypothesis cover the spinoff announcements made before the year of 1992 (*e.g.*, Daley, Mehrotra, & Sivakumar, 1997; Desai & Jain, 1999; Krishnaswami & Subramaniam, 1999), we confirm the hypothesis that only focus-increasing firms earn significantly positive abnormal returns, while non-focus increasing firms' abnormal returns are, on average, not statistically different from zero for the first study period from 1964 to 1991. However, in the second study period, we find no statistically significant differences in abnormal returns between focus-increasing and non-focus-increasing firms. Investors' responses are equally positive to both types of spinoff.

In cross-sectional regressions with the full sample, we find that announcement abnormal returns are significantly negatively related to disagreement factor after controlling for the known determinants for these returns. This result validates the implication of Hypothesis 3 in which we suggest disagreement factor as a potent explanatory variable for the abnormal returns. Moreover, disagreement factor adds explanatory power as large as that provided by all the control variables combined. The economic effect of the relationship between disagreement factor and the abnormal return is substantial. For instance, when there is one standard deviation increase (from the mean) in disagreement factor, the abnormal return decreases roughly by 1.11%. However, confirming the results of the preliminary analyses of information asymmetry and focus factor, we find that these determinants no longer explain the abnormal returns for our full sample of spinoffs.

We also analyze the relationships between disagreement shock and the control variables (including disagreement factor) because the information content of some of these variables can be the sources engendering disagreement in the announcement period. We show first that disagreement shock is larger for a firm with a lower disagreement factor in the confirmation of Hypothesis 3. Second, disagreement shock is also larger for a firm that has a lower level of information asymmetry *ex ante*, that engages in focus-increasing spinoff, and that splits up a larger portion of its assets to its spun-off subsidiary. If investors perceive that a firm is mired by a higher level of information asymmetry, they seem to inhibit expression of their disagreement and refrain from trading based on their own interpretations.

Finally, in the sub-period analysis, our regression results substantiate the findings of previous studies in that focus factor and relative size jointly explain the cross-sectional variation in announcement abnormal returns for the first study period from 1964 to 1991. But in the second study period from 1992 to 2005, these two determinants become insignificant. In both sub-periods, we find no evidence for the information hypothesis that the level of information asymmetry *ex ante* is not related to the abnormal returns. Only variable that remains significant in both study periods is disagreement factor, which consistently negatively related to the abnormal returns, and thus account for a significant faction of the cross-sectional variation in these returns.

Our study adds to the literature largely in two distinctive ways. First, many empirical studies test the implications of DO models—mainly Miller (1977)'s proposition that the overpriced stocks due to investor disagreement forecasts low expected returns—in a static cross-sectional asset-pricing test at an aggregate market level (*e.g.*, Chen et al., 2002; Diether et al., 2002; Piqueira, 2006). However, we focus on a particular corporate event, namely the announcement of a spinoff, and show the relevance of Miller (1977)'s framework to which we adopt a change in the level of DO (Banerjee & Kremer, 2010) for understanding the joint behavior of trading volume and overpricing around the announcement. Furthermore, our results suggest that information content of daily trading volume turnover is about either more than, or other than, conventionally accepted proxy for the market liquidity of a stock. Thus, a firm-specific level of DO in the pre-event period as well as in the event period can be inferred from trading volume turnover.

Secondly, our study adds to a recent development in the application of DO models to corporate finance. For example, Moeller et al. (2007) study the effect of the level of DO about a bidder on its abnormal return around the acquisition announcement, while Chatterjee, John, and Yan (2012) examine the effect of the level of DO about the target's equity value on the takeover premium that a bidder has to pay for the target. These studies focus on changes in the float (or the supply curve), assuming no changes in the demand curve. In contrast, our investigation of spinoffs sheds light on potential effects of changes in the demand curve induced by heterogeneous interpretation on various significant corporate events (*e.g.*, earnings announcements) since these events also tend to generate similar patterns: excessive trading volume on the event date and a gradual decline of trading volume over a few days after the event date.

More importantly, the prior literature has examined sources for wealth gains generated from spinoff announcements (*i.e.*, motives for spinoffs) based on the assumption that managers act rationally to maximize the shareholder value—most likely because their compensations are tied to this, and thus rational investors react positively to spinoff decisions. However, these motives—value creation through a spinoff by reducing information asymmetry, by focusing on core business, or by splitting up a large portion of assets to a spun-off— at best have limited power to explain wealth gains. In particular none of these motives are related to announcement abnormal returns associated with spinoffs occurred since 1992. But, our key result suggests that understanding behavioral characteristics of investors proves to be critical for analyzing the effects of their reactions to the announcement of a spinoff on price changes. As we show, not only because investors have different priors and interpret information differently, but also because they react to the announcement in the manner that is consistent with the idea of limited attention, disagreement factor can account for a significant fraction of the cross-sectional variation in announcement abnormal returns. In this sense, our research is related to a branch of behavioral corporate finance which emphasizes the effect of investor behavior that is less than fully rational (Baker & Wurgler, 2012).

One interesting implication of the dissertation that we will tackle in future research is whether managers engage in a spinoff to create value or more correctly overpricing by catering to investors who hold the most optimistic views on either a parent or its subsidiary. The presence of disagreement among investors implies that the sum of the parent' and the subsidiary's value as separate entities can be greater than the current value of the combined firm. If informed managers are aware this situation, they will exploit such less-than-rational investor behavior to increase the firm's value. A research on this topic would show that not only does investor disagreement have a temporal impact (triggered by the announcement of a spinoff) on contemporaneous overpricing, but also might affect the long-term values of the parent and the spun-off subsidiary.

Restatement of Miller's Analytical Framework

We consider Banerjee and Kremer (2010)'s dynamic model in the context of Miller (1977)'s static model. As the former model is focused on a change in the level of difference of opinion driven by an information-driven event, we interpret this sudden change in disagreement among investors as a change in the slope of the demand curve for a stock in Miller's framework.

Figure 1 illustrates how the market price of a stock is determined in Miller's model in which the main two constructs are the existence of disagreement among investors and short-sale constraints. Suppose, in period *t*, a fixed number of firm A's stock is available for trading at $X = x$ (*i.e.*, the float). Within the traditional asset-pricing paradigm in which investors have an identical estimation of the expected return from the stock, or they agree on its value, its market price is set at P_0. The demand curve for the stock is flat because there is no disagreement regarding the value of the stock among investors. However, the presence of disagreement induces a downward-sloping demand curve shown as Curve A in the figure, and the price is set at P_A. Now, Stock A is owned by the optimists (*i.e.*, a small subset of the entire investor population) who have the highest valuation for the stock. Consequently, P_A is greater than P_0 because P_A reflects the valuation of those optimists rather than that of the average valuation of investors. But, under no restrictions in short sales, the price would fall back to P_0.

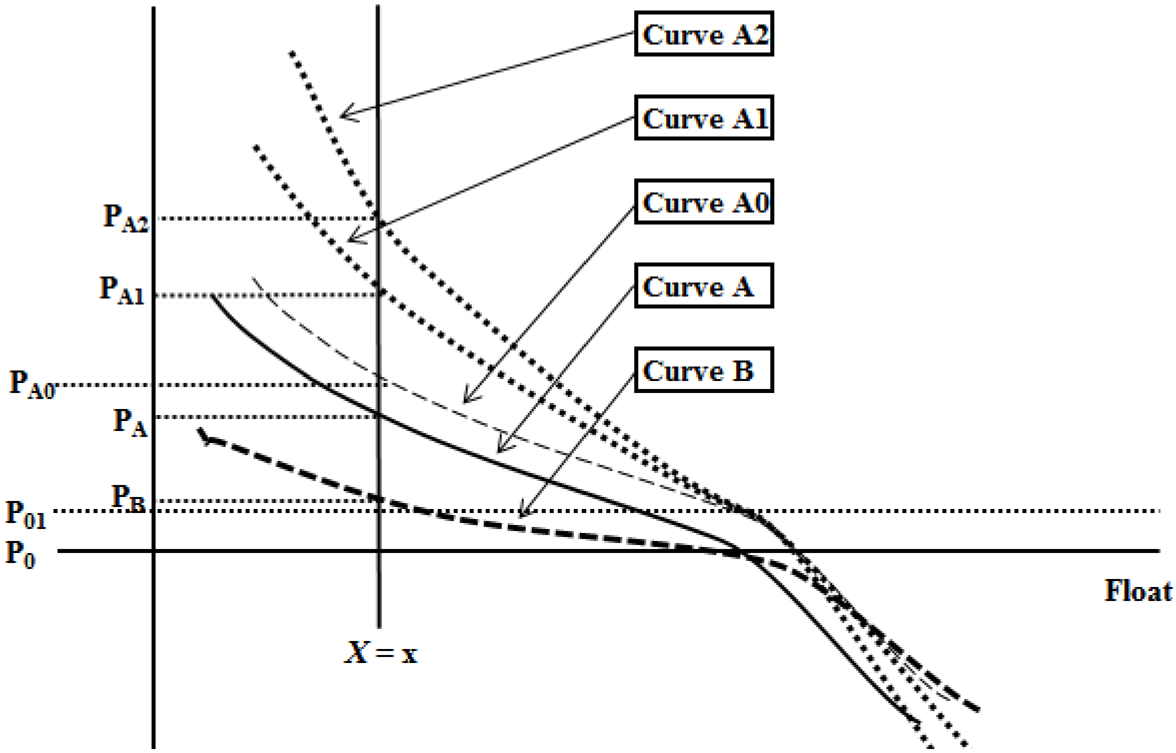

Figure 1. Price Reactions from a Change in the Level of Differences of Opinion in the Announcement Period

Assume further that we have firm B which is identical to firm A in characteristics, but it differ only in the degree of disagreement in investors' belief such that investors disagree *less* about the value of firm B than they do about that of firm A. If there are no differences of opinion or no short-sales constraints, stock B would also be priced at P_0. But, those constraints are a market reality, and thus the pessimists are unable to arbitrage mispricing away by selling the stock short due to high costs of or institutional constraints against engaging in short-sales.[2] However, compared to firm A, a lower divergence of opinion for firm B reduces the steepness of its demand curve, or the slope of its demand curve at ($X = x$) shown as Curve B, and therefore the market price of firm B is determined at P_B. Note that P_B is lower than P_A because firm A has lower level of disagreement than does firm B.

We define $D_i^{ex-ante}$ (where *i* = A or B) as the parameter for the level of DO in a period prior to the announcement of a spinoff and label it as *the ex-ante level of DO*. Suppose that the announcement cause investors to interpret information content of the announcement heterogeneously, thereby increasing the level of disagreement, or causing a jump in disagreement since this announcement can be reasonably regarded as an infrequent, but a significant information event that invokes widely differential interpretations from investors. We define this elevated level of disagreement as D_i^{event}, which we label as *the event level of DO*. In turn, changes in the levels of DO ($D_i^{ex-ante}$ to D_i^{event}) for both firm A and B implies corresponding changes in the slopes of their demand curves.

Therefore, by adapting a change in the level of DO (from the pre-event to the event period) into Miller (1977)'s model, we derive testable hypotheses by examining relationships between $D_i^{ex-ante}$and D_i^{event}, and their effect on prices during the announcement period. Hereafter, we will use the level of DO and the slope of a demand

[2]Hong et al. (2006) state that the assumption of investors (even large institutions such as mutual funds) who face short-sales constraints is eminently plausible. They report that there are about 70% mutual funds that are prohibited to take a short position as stated in in SEC Form N-SAR (Almazan, Brown, Carlson, & Chapman, 2004). Moreover, a majority of equity mutual funds (79%) does not use any synthetically devised short position, for example, with options and futures (Koski & Pontiff, 1999).

curve (in the absolute magnitude) interchangeably since the "downwardness" in the slope arises only in the presence of DO.

Testable Hypotheses

In this study we follow the SEC definition of a corporate spinoff: the creation of an independent public company from its parent firm. This form of divesture involves neither a dilution of equity nor a transfer of ownership from the current equity holders. Therefore, the shares of the spun-off unit are distributed to the current shareholders of the parent firm on a pro rata basis and there should be no change in the supply of the shares (*i.e*., the float of the parent) unless there is hoarding of stocks by corporate insiders or informed investors who anticipate an imminent corporate spinoff. Additionally, there should be no abrupt and significant change in the demand a priori for the parent firm's stock by the firm's existing shareholders.

In contrast to an acquisition, a spinoff does not involve an increase in the float, and yet a public announcement of corporate spinoff has all ingredients for substantial disagreement among investors.[3] If a spinoff announcement by a sample firm spurs a large disagreement among investors about the prospects of the firm following the divesture, the announcement raises the slope of its demand curve in the context of Miller's model in a two-period setting encompassing a pre-announcement and a post-announcement periods. This in turn allow us to analyze a change in the level of DO and its implications on price reactions days surrounding a spinoff announcement based on

[3] Miller (1977) illustrates an example in which a steelmaker and a meatpacking firm individually will be valued higher than a merged firm (*i.e*. a meatpacking-steelmaking firm) in his model. He explains that those who have high opinions about either meatpacking or steelmaking firm alone would not value the merged firm as high as they do for a standalone firm. Thus, less optimistic investors will buy the shares of the merged firm.

Miller's (1977) proposition that given the constraint of short sale, the price of the stock will reflect the valuation of the optimists while that of pessimists is not registered into the price since they stay away from the market. In this study, we use a sample of 235 firms which announced a spin off during the 41 year period from 1964 to 2005 to test the following hypotheses (The sample selection criteria are detailed in Section 5.A).

Hypothesis 1. *The level of DO in the event period should be larger than that in the pre-event period.*

Provided that firm A (in Figure 1) announces its decision to spin off one or more of its business units, consider a situation where investor would re-evaluate the firm's value by without disagreement. More specifically, the announcement does not induce a change in the level of DO, or $D_A^{ex-ante}$and D_A^{event}. In this case, there would be an upward shift in its demand curve shown as Curve A0, given that spinoff announcements generate wealth effect. Then, its price is set at P_{A0} when there is no change in the level of DO, but P_{01} when there is no disagreement in the first place. Suppose that the announcement also spurs a large disagreement among investors causing a jump in the level of DO in the event period. In turn, the slope of firm A's demand curve changes so that its curve moves to Curve A2. We consider that the effect of a change in the level of DO on the price would be much larger than or dominate that of other rational factors that drives revaluation of the firm. Therefore, in Part 1, we focus on relationship between changes in disagreement and price changes. But in Part 2, we will control for other known determinants for price changes prompted by spinoff announcements.

Given a sudden hike in the level of DO in the event period and assuming two different event levels of DO ($D_{A2}^{event} > D_{A1}^{event}$) for firm A, the stock price of firm A is set at $[P_{A2}]_{X=x}$ at Curve A2 and $[P_{A1}]_{X=x}$ at Curve A1 in Figure 1. Apparently, the larger the change in the level of DO, the larger is the accompanying change in price from the announcement. Note that it is the differential changes in the level of DO $(D_{A2}^{event} - D_{A}^{ex-ante}) > (D_{A1}^{event} - D_{A}^{ex-ante})$, and thus the changes in the slope of the demand curve (from Curve A to Curve A2 or A1), that results in the differential price changes $(P_{A2} - P_{A}) > (P_{A1} - P_{A})$. By defining the change in the level of DO ($\Delta D_i \equiv D_i^{event} - D_i^{ex-ante}$) as the disagreement shock, we have the following hypothesis.

Hypothesis 2.*Unconditional on the ex-ante level of difference of opinion, or equivalently the slope of demand curve in the pre-event period, there should be a positive correlation between disagreement shock and abnormal return in the announcement period*

This hypothesis is a modified version of the prediction of Banerjee and Kremer's (2010) model, the prediction that is solely based on the event level of DO that stock return is increasing in the magnitude of D_i^{event}. But by modifying Banerjee and Kremer's result into Miller's model, we derive the size of disagreement shock by explicitly taking into account of $D_i^{ex-ante}$. Thus we can propose a more cogent hypothesis as compared to Banerjee and Kremer's model prediction. More importantly, we argue that this hypothesis will show that (i) whether it is disagreement that causes a downward-sloping demand curve and (ii) whether the interpretation of the *level* of DO as the *magnitude* of the slope of a demand curve is relevant for our analysis.

We derive additional empirical implications by postulating a relationship between $D_i^{ex-ante}$ and D_i^{event}, and the impact on announcement returns resulted from this relationship. We consider the idea of limited attention (*e.g.*, Hirchleifer & Teoh, 2003; Peng and Xiong, 2006) which states that cognitively overloaded investors pay attention to only a subset of information. Hong and Stein (2007) suggest that if a public announcement of information is released in an attention-grabbing manner (*e.g.*, a wide coverage by news media), perhaps because of weighty consequence of information content of the announcement, these investors' reactions will result in large responses in price and trading volume. Limited and sporadic attention of investors also implies that a firm with less frequent arrival of news or limited coverage by the media prior to the announcement could be a firm with a low level of DO. In the DO model of Scheinkman and Xiong (2003) in which investors interpret news differently, a greater stimulus of the news results in higher disagreement and more trading, as investors' valuations fluctuate more. Thus, if a spinoff announcement is released in an attention-grabbing fashion, we propose that *relative to the ex-ante level of DO*, a firm characterized by a lower *ex-ante* level of DO will trigger a greater level of differential interpretation of the announcement than a firm with a higher *ex-ante* level of DO. In other words, the disagreement shock, or the magnitude of a change in the slope of the demand curve, would be larger for a "lower disagreement firm" than for a "higher-disagreement firm."

Hypothesis 3. *The ex-ante level of DO is negatively correlated with the disagreement shock in the event period*

The importance of this hypothesis is that no correlation between the two variables would suggest that $D_i^{ex-ante}$, or the pre-event slope of the demand curve, has no connection to price changes in the announcement period. Then, as discussed for Hypothesis 2, announcement abnormal returns depend only on the slope changes caused by spinoff announcements, or the sizes of the disagreement shocks, ΔD_i. However, if there is a negative relation, it implies that a firm with a lower $D_i^{ex-ante}$ or a flatter pre-event slope of the demand curve will incur a greater magnitude of ΔD_i or a change in the slope. Furthermore, if a lower-disagreement firm is affected by a greater disagreement shock (*i.e.*, a larger jump in the level of DO during the event period relative to its *ex-ante* level of DO) than a higher-disagreement firm, then the former should earn a higher abnormal return than the latter.

Therefore, we draw an important implication for the cross-sectional variation in abnormal returns in the announcement period, which is resulted from the posited relationship between the *ex-ante* level of DO and the disagreement shocks. If $D_i^{ex-ante}$ and ΔD_i are negatively correlated, this relationship suggests a negative correlation between the *ex-ante* level of DO and the abnormal returns. Thus, the *ex-ante* level of DO can be a significant factor for understanding the cross-sectional variation in the abnormal returns.

Methodology

A. *Empirical Issues and Event-Study Design*. Testing the hypotheses developed in the preceding section, our primary focus is to define a proper measure that captures the level of DO in the pre-event and the event period, namely $D_i^{ex-ante}$and D_i^{event}. To examine an empirical relationship between the *ex-ante* and the *event* levels of DO requires that a proxy we use should have comparability, especially for measuring a change in the level of DO. Since D_i^{event} should reflect the level of DO in *the announcement day* of a spinoff, $D_i^{ex-ante}$ should be measured to mirror a *normal* degree of disagreement in *an ordinary trading day*. When these conditions are met, we can properly estimate the disagreement shock or the magnitude of a change in the slope of the demand curve from the pre-event period to the event period.

However, the extant proxies developed to measure disagreement (breadth of ownership in Chen et al., 2002) and the dispersion of analysts' earnings forecasts in Diether et al., 2002) are infeasible within our analytical parameters. First, the data used for both proxies are recorded in a low frequency (monthly for the dispersion and quarterly for breadth of ownership). Second, these two proxies—breadth of ownership and the dispersion of analysts' earnings forecasts—are employed in testing the predictive power of the level of DO for stock returns in the Miller (1977)'s static setting, implying that they may not be able to capture a change in disagreement driven by a flash information event such as a sudden public announcement of a corporate spinoff.

However, the progress in the literature (Harrison & Kreps, 1978; Hong et al., 2006; Scheinkman & Xiong, 2003) that develops dynamic models with disagreement provides theoretical ground for using trading volume to derive the level of investor disagreement. These models generate a speculative component in prices (*i.e*., bubble or overpricing) accompanied by excessive trading volume and volatility when investors are overconfident (*i.e*., a source of disagreement). Hence, the main prediction of these dynamic models is a positive correlation between the level of trading volume and the degree of overpricing. That is, the higher the level of disagreement or the greater the volatility in disagreement, the more intensive the trading activity and the higher the price. In other words, trading activity contains information about the level of DO regarding the value of the stock in question among investors.

Strictly speaking, there is no theoretical ground in Miller's (1977) static model for mapping trading volume to divergence of opinion, because investors do not change their initial positions until liquidation (Hong & Stein, 2007). However, dynamic DO models provide an alternative venue for studying the effect of disagreement on the joint behavior of volume and overpricing. Due to the importance of these dynamic models for our study, we review studies on dynamic disagreement models in the next section. But for now, based on the prediction drawn from these dynamic models, that is a positive correlation between trading volume and overpricing, we use daily *trading volume turnover* as a basic ingredient for the estimation of both $D_i^{ex-ante}$ and D_i^{event}. Furthermore, we follow Garfinkel (2009) whose model isolates a part of volume turnover after controlling for the known determinants of trading volume, such as market-wide trading volume and average level of firm-specific trading volume. We refer to these estimators as the volume-based measures of DO (VDO). We employ five different VDOs including daily volume turnover and estimate them each trading day during the pre-event and the event period (see Section 4.C for the details for the measurement of VDOs).

To measure $D_i^{ex-ante}$ and D_i^{event}, we define the pre-event period as a 250-trading-day period ending 11 trading days prior to a spinoff announcement date or the window of (260-AD, 11-AD) where AD is the announcement date. The event period is defined as a three-day period surrounding AD, the window of (AD-1, AD+1). To measure $D_i^{ex-ante}$, we extrapolate it by computing the mean of daily estimates of a VDO over the pre-event period. Thus, for firm *i*, the *ex-ante* level of DO is defined by

$$D_i^{ex\_ante} = \frac{1}{250} \sum_{t=-260}^{t=-11} VDO_{i,t} \tag{3}$$

Similarly, we estimate D_i^{event} by calculating the three-day mean of daily estimates of a VDO over the event period.

$$D_i^{event} = \frac{1}{3}\sum_{t=-1}^{t=1} VDO_{i,t} \qquad (4)$$

Recall that our purpose is to derive the value of $D_i^{ex-ante}$ that reflects the degree of disagreement among investors about a firm's value on a typical trading day. With sufficient data points (250 observations for a VDO) that have a well-behaved stable empirical distribution, which we will show in Section 7, we argue that the mean of daily VDO estimates in the pre-event period properly captures the representative or normal level of DO in the ordinary trading day.

B. *Literature Review for Measuring Disagreement with Trading Volume.* Harrison and Kreps (1978) publish the initial work on speculative markets in a dynamic setting with heterogeneous agents. In their model, under the assumptions of heterogeneous expectations and no short-sales conditions, they demonstrate that speculative behavior (*i.e.*, bidding up the price) is engendered by the anticipation that an agent can resell a stock to other more optimistic investor at a higher price in the future. The equilibrium price reflects not only the valuation of the optimist but also the resale option so that he pays above his own valuation in anticipation of future capital gain. While their model sets a ground for overpricing of an asset in a speculative market with agents with divergent opinions, it does not provide a theoretical connection that link asset price and trading volume.

Scheinkman and Xiong (2003) and Hong et al. (2006) extend the insights of Harrison and Kreps (1978) and analyze the link between price and trading volume in dynamic setting in which heterogeneous beliefs and short-sale constraints are the main ingredients. Specifically, Schinkman and Xiong (2003) develop a model in which overconfident investors' speculative behavior leads to overpricing of a stock, increased trade frequency and ensuing excessive price volatility. In their model the mechanism by which trading volume is generated is through the crossing effect that occurs whenever the valuation of the stock by other investors exceeds a current owner's valuation. This effect is intensified when some exogenous factors, for example frequent arrival of news about the stock, exacerbate disagreement among investors. In turn, constrained by the market reality of short-sale restrictions, the stock will be more overpriced. The key insight in their model is that the level of DO is not a variable that is exogenously given, but rather endogenously driven in a dynamic setting, and it is being manifested in trading volume. Therefore, the central prediction of dynamic DO models is that trading volume is positively correlated with the extent of overpricing. This pricing implication of trading volume, hence, gives a basis for using it for estimating the level of disagreement.

Following the theoretical work of Scheinkman and Xiong (2003), Mei, Scheinkman, and Xiong (2004) empirically investigate the joint effect of heterogeneous beliefs and short-sale constraints on trading volume and price with a unique data set from Chinese stock markets from 1994 to 2001.[4] With a sample of 73 Chinese company stocks, they find that monthly share turnover of Class A shares are 4.7 times larger than those of Class B, and at the same time the average premium ($i.e.$, $\frac{monthly\ A-\ share\ price}{monthly\ B-share\ price} - 1$) for Class A shares is 422%. In a regression analysis, controlling for risk and liquidity, they

[4]The data consists of 73 stocks that have twin shares (*i.e.*, Class A and B) with equal payoffs and voting right. During the sample period, short sales were illegal, there were no derivative market for equity, and the reopening of the stock market was a fertile ground for speculative trading similar to the IT boom in the U.S in the late 1990s due to a dominant participation of less experienced individual investors. Class A shares were only available for domestic investors, while Class B only for foreigners.

report a significant and positive correlation between A-share turnover and A-share premium over B-share: monthly A-share turnover explains on average 20% of the cross-sectional variation in the A-share premium. Their findings lend empirical support for the implications of dynamic DO models in that trading activity driven by disagreement is positively related to overpricing and, thus, it explains the cross-sectional variation in overpricing.

Intuitively, large trading volume might simply be a manifestation of a liquid stock. According to the liquidity premium hypothesis, a stock with low trading costs is expected to have high trading volume and low return. There is a large body of literature studying the effect of liquidity on stock returns. Some representative works from this area include Datar et al. (1998) on trading volume turnover, Brennan et al. (1998) on dollar trading volume, and Amihud and Mendelson (1986) on bid-ask spreads. Among them, using trading volume as a proxy for liquidity, Brennan et al. (1998) examine the effect of non-risk factors on expected stock returns. Controlling for the known non-risk factors (size, momentum, price, and book-to-market ratio), they document a significant and negative relation between risk-adjusted returns and dollar trading volume. Moreover, Amihud (2002) shows that stocks with higher illiquidity (measured by the ratio of daily return to daily trading volume) have higher returns in the subsequent period. In other words, stocks with higher trading volume tend to be stocks with lower illiquidity. So, these stocks earn lower future returns than do stocks with lower trading volume.

These studies suggest that there are two competing explanations for the link between trading volume and contemporaneous changes in price. In DO models, higher trading volume due to a higher level of disagreement causes overpricing, hence forecasting a lower return. In liquidity-based models, stocks with low trading costs are liquid assets. Thus, all else equal, these stocks are expected to have high trading volume and low returns. On the other hand, illiquid stocks are expected to have low trading volume and high returns because investors require compensation for the liquidity risk inherent in these stocks (Hong & Stein, 2007).

Piqueira (2006) attempts to isolate the implications of DO models from the liquidity hypothesis. Noting that the standard measures of liquidity (*i.e*., proportional quoted and effective bid-ask spread) perform poorly in a cross-sectional regression of stock returns, she derives a measures of illiquidity that better reflects information asymmetry (*i.e*., price impact) than the bid-ask spread normally does. Controlling for illiquidity as well as size, book-to-market, and momentum, she shows that monthly volume turnover in the current month (de-meaned by the average turnover over previous three months) is negatively related to stock returns in subsequent months for a sample of NYSE and NASDAQ stocks for a period from 1993-2002. Specifically, she finds that one standard deviation increase in monthly turnover forecasts 0.75 % decrease in monthly stock returns for NASDAQ samples and 0.35% for NYSE samples. When annualized, a predicted decline in expected returns is equivalent to roughly to 9% for NASDAQ and 4.25 % for NYSE stocks. Furthermore, even among liquid stocks, a group of NYSE stocks in the largest size quintile, turnover still enters significantly in the cross-sectional regression. If turnover is a proxy for liquidity, she argues, the effect of turnover on returns should be negligible among very liquid stock.

C. *Volume-Based Measures of Differences of Opinion (VDOs)*. In the previous section, we review theoretical and empirical DO literature that provide rationale for using daily trading volume as a proxy for the level of DO among investors for a given stock. It stands to reason that an empirically more relevant proxy for the divergence of opinion from trading volume can be measured if we can isolate a portion of trading volume generated from disagreement. This would also require a testable equilibrium model of trading volume, which is still in quest in the literature.[5]

While there is a lack of a testable equilibrium model for trading volume, Gafinkel (2009) develops statistical measurements for the level of DO using trading volume, which he refers to as volume-based measures of DO (VDO). Using the propriety data on investors' orders for stocks in NYSE, he constructs a benchmark for the level of DO for each sample based on the notion that the optimal order submission strategy (*i.e.*, limit vs. market order) and the optimal price requested (in the case of a limit order) are directly related to private valuations by investors or their reservation prices (Handa, Schwartz, & Tiwari, 2003).[6] Thus, he argues that a distance between the requested prices on two adjacent orders can be used for measuring the divergence of opinion on the value of a stock. Using a sample of NYSE stocks from January to March 2002, he finds that the volume-based measures of DO have the highest power in explaining the cross-sectional variation of the benchmarks relative to other DO proxies such as return volatility or the

[5]Though Lo and Wang (2000) develop a model for trading volume within a framework of traditional Capital Asset Pricing Model (CAPM), it only captures trading volume generated by portfolio rebalancing needs. They concede that a complete or a unified model would have to incorporate such factors as information asymmetry, idiosyncratic risks, transaction costs, and other forms of market imperfections.

[6] Following an order executed at price A, either a market order will hit the current bid or ask quote, or a limit order will be submitted. If the incoming order is a market order, Garfinkel (2009) assumes the requested price equals to price A, implying no divergence on the valuation of the stock. In the case of the incoming limit order with the bid or ask price worse than the current quote, the distance between the previous trade price and limit order price mirrors divergence on the value of the stock.

dispersion of analysts' earnings forecasts. Further, his principal component analysis shows that only the volume-based measures contribute to and correlate positively with the first common component of the benchmark.

Following Garfinkel's (2009) estimation methods, we start with daily volume turnover of a stock which is defined as the ratio of the number of shares traded to the number of shares outstanding at the end of the trading day. We further transform it by taking the natural logarithm of daily volume turnover (henceforth log turnover), denoting it as $LNTO_{i,t}$.[7] From $LNTO_{i,t}$, we subtract the market-wide log turnover ($MKLNTO_{i,t}$), which gives the market-adjusted log turnover or $MATO_{i,t}$. To measure the market-wide log turnover for day *t*, we compute a value-weighted average of daily log turnovers of all ordinary common stocks in NYSE and AMEX.[8] Following Tkac (1999), we further correct for the on-average level of idiosyncratic aspects (or the on-average firm-specific deviation from the market turnover) of a firm's trading volume by subtracting the average of $MATO_{i,t}$ over a 200-day period prior to day *t* from $MATO_{i,t}$. Hence, we have the first VDO, which we call it the unexplained volume and label it as $UV_{i,t}$.[9] It is given by

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[7]Lo and Wang (2002) show that the most proper measures for trading activity is volume turnover under a reasonable assumption that all investors hold the same relative proportion of risky assets all the time (*i.e*. two fund separation theorem). Hence, they argue that it provides the sharpest empirical implications.

[8]Tkac (1999), deriving volume implications by extending on a traditional ICAPM model , shows that 20% of a sample of large NYSE and AMEX stocks have volume turnover ratio that are not significantly different from that of the market. In addition, she finds that about half of the sample stocks exhibits significant positive time-series correlation between the samples' turnovers and market turnovers. Her results suggest that adjustment for the market-wide trading volume is appropriate when studying the behavior of individual stocks' trading volume.

[9]While $MATO_t$ roughly measures trading volume generated by firm-specific factors, those factors may include some factors other than difference of opinion, notably idiosyncratic liquidity (*i.e*., unrelated to the market-wide trading volume) and trading motived by investors with private

$$UV_{i,t} = MATO_{i,t} - \frac{1}{200}\sum_{k=t-200}^{t-1} MATO_{i,k} \text{ where } MATO_{i,t} = LNTO_{i,t} - MKLNTO_{i,t} \quad (5)$$

For the second VDO, we employ a market model for log turnovers analogous to a market model for stock returns. A support for the use of the model comes from the work of Tkac (1999) and Lo and Wang (2002). In particular, building an equilibrium model for turnover assuming a *K*-funds separation theorem, Lo and Wang show that turnover has a linear *K*-factor structure. And their principal component analysis for turnovers of NYSE/AMEX stocks for the period from 1962 to 1996 show that the first component explains between 70% and 85% of the variation in turnover. Thus, we estimate a one-factor market model for log turnover over the 200-day period as in the measure of the unexplained volume.

$$RESD_{i,t} = LNTO_{i,t} - E[LNTO_{i,t}] \text{ where } E[LNTO_{i,t}] = \alpha_i + \beta_i MKLNTO_{i,t} \quad (6)$$

where $REDS_{i,t}$ is a residual part of volume for firm *i* on day *t.* A close look at equation 6 reveals that it is similar to the unexplained volume in that the intercept term captures the on-average portion of turnover specific to the firm. However, the coefficient $MKLNTO_{i,t}$ captures the firm-specific sensitivity to the market-wide turnover.[10]

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information. This implies that UV_t is a measure of a deviation of those aspects from the normal level (*i.e.*, a 200-day moving average of *MATO*) on day *t*. Therefore, we concede that the unexplained volume is not a perfect measure of the portion of trading volume due to difference of opinion, being not able to attribute it entirely to trades engendered by investors with differing opinions. Nevertheless, given the evidence of Garfinkel (2009) and the lack of an equilibrium model for trading volume, we consider the unexplained volume to be a proper proxy for investor divergence of opinion.

[10]Recall that we subtract the market turnover in calculation of the unexplained volume, thereby implicitly assuming the beta in the market model equals to one. However, by estimating the beta for each sample stock with the market model, we consider it could be more empirically based than the unexplained turnover (Tkac, 1999).

Finally, the third VDO is the standardized unexpected volume. As Garfinkel (2009) notes, *UV* and *RESD* assume that new information about stock *i* arrived on day *t*, which changes investors' mean valuation of the stock and stimulate trades, has the same effect on trading volume on day *t* as in our estimation period of (*t*-200, *t*-1).To control for the effect of the arrival of new information on trading volume on day *t*, we estimate the following equation:

$$LNTO_{i,t} = \varphi_i + \theta_{1,i}\left|r_{i,t}^{+}\right| + \theta_{2,i}\left|r_{i,t}^{-}\right| + \varepsilon_{i,t}\ ,\ SUV_{i,t} = \frac{\varepsilon_{i,t}}{\sigma_{i,t}} \qquad (7)$$

This model is built on the empirical evidence that trading volume is related differently to price changes, depending on the sign and the magnitude of a price change (*e.g.*, Karpoff, 1987; Kim & Verrecchia, 1991, 1994). We assume a linear relationship between price changes and trading volume, which is captured by $\theta_{1,i}$ and $\theta_{2,i}$ for positive and negative price changes respectively. The superscripts on the absolute value of a daily return indicate whether the return is positive or negative on day *t*. The intercept captures the mean level of liquidity-driven trading volume specific to the firm. Hence, $\varepsilon_{i,t}$represents the portion of trading volume that is not related the average level of the firm's liquidity and the information effect on trading volume due to the arrival of news. Finally, we scale $\varepsilon_{i,t}$ with the standard deviation of the residuals ($\sigma_{i,t}$) to get the standardized unexplained volume or $SUV_{i,t}$ on day *t*.

Sample of Corporate Spinoffs

A. *Sample Selection*. We draw the initial sample of firms that successfully completed spinoffs from the Center for Research in Security Prices (CRSP) distribution file for the period between 1991 and 2005.[11] In the CRSP distribution file, the firms that engage in spinoff are identified with one of the following four distribution codes: 3762, 3763, 3764, and 3765. There are a total of 255 distribution records with those codes in the initial sample of which 13 cases have two distribution records for the same spinoff.[12] After taking account of the double entries of spinoffs, our sample consists of 242 spinoffs. Among those spinoffs, approximately 96% (232 out of 242), have the distribution code of 3763. This code is identified as tax-free spinoff in CRSP. We focus on non-taxable spinoffs or 232 sample firms in this study to maintain homogeneity of the sample.

We extend our sample by combining the sample collected by Vijh (1994) for the period between 1964 and 1990, which is comprised of 113 parent firms that spin off 121 subsidiaries. To maintain integrity of the sample, we follow the sampling procedures of Vijh (1994) as closely as possible. His sampling procedure requires identifying *clean* or *bona fide* spinoffs from the initial sample. Thus, a spinoff is defined as a corporate divesture decision that involves separation of a subsidiary or a division from its parent firm by distributing the shares of the subsidiary to the current shareholders of the parent on pro-rata basis. The separation is such that the parent firm does not hold any shares of the subsidiary; 100 % of ownership is transferred to the current shareholders of the parent, and the subsidiary is established as an independent publicly traded company in the market after the completion of spinoff. To select the firms that meet the definition of a

[11]Since the distribution file does not report the announcement date, we instead use ex-dates recorded in the distribution file as the cut off for removing the firms whose ex-dates precede the year of 1991. It is because we extend our sample by combining Vijh (1994)'s sample that has the last records of the ex-dates in 1990. Therefore, our sample starts with firms that have the ex-dates of spin-off distribution in 1991 and ends in 2006.

[12] A distribution may involve both cash and share or two spun-off units.

clean spinoff, which requires the detail of a spinoff transaction, we search articles on Dow Jones News Wire and the Lexis-Nexis database by querying the name of a sample firm and using the keyword: spin off or spin-off. We eliminate firms that meet any of the following criteria:

1) The announcement date or the detail of a spinoff transaction is not available.
2) A spinoff distribution is actually new issuance of another class of share by the same firm.
3) Spinoffs involve distribution of the shares of other publicly traded firms that are not subsidiaries of parent firms.
4) Spinoffs are equity carve-outs in which firms engage in an initial public offering of a fraction of the total shares of a subsidiary to be spun off, and later the remaining fraction is distributed to the current shareholders.
5) Either a parent or a subsidiary is merged or acquired by another firm immediately after spin-off.
6) The spinoff is partial in which a parent holds a portion of ownership of its subsidiary.
7) The sample stocks with CRSP share code other than 10 and 11 (common stocks of firms incorporated in the U.S) are discarded. The eliminated stocks include ADRs (American Depository Receipt), Units, and SBIs (Shares of Beneficial Interest).[13]

[13]The key variable for our study is trading volume that is the base ingredient for measuring proxies for DO. In the literature that studies trading volume (*e.g.*, Chordia, Roll, & Subrahmanyam, 2011; Lo and Wang, 2000), securities other than ordinary equities are usually removed due to different trading characteristics that make it difficult to interpreting their trading

For the initial samples, the ex-dates and the distribution or the payment dates, and the record dates are unambiguously recorded in the CRSP distribution file, coinciding with the dates reported in media coverage. Because the announcement dates of spinoffs are not recorded in CRSP distribution file, we identify the announcement dates of the sample firms by searching relevant articles in Dow Jones News Wire and the Lexis-Nexis database up to two years before the ex-dates. Imposing the seven elimination criteria above, we identify the final sample of 120 parent companies of which 9 sample firms spin off two independent subsidiaries in a single instance, hence creating a total of 129 subsidiaries. Finally, combining Vijh (1994)'s sample which covers the period from 1964 to 1990, our final sample consists of 233 parent firms that announced and successfully completed the spin-offs of 250 independent subsidiaries for the sample period from 1964 to 2006.

B. *Sample Distribution*. In Table 1, we report the distribution of the sample firms over the study period. The study period is divided into the seven sub-periods, each of which lasts for five years except the first sub-period that lasts for seven years. Few spinoffs occurred before 1976. However, the activity picked up in the subsequent years, and peaked during the 5-year

period from 1986 to1990 with 53 announcements reported. In the final three sub-periods, the spinoff activity declines from the peak, and seems stabilize at 30 to 40 range afterwards.

Out of 221 samples, 173 firms are listed on either NYSE or AMEX (about 78% of the sample) and 48 firms on NASDAQ at the time they publicly announced spinoff.

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volume in usual sense. Therefore, to make sure of the comparability of the volume-based DO proxies across the sample, we choose only ordinary equities.

Table 1. Sample of Spinoffs from 1964 to 2005

The table reports the number of spin-offs for the seven five-year sub-periods over the entire sample period from 1971 to 2005; the first sub-period spans seven years from 1964 to 1970. The initial sample of 255 firms is drawn from CRSP distribution file for the period from 1991 to 2005, and only non-taxable (distribution code of 3763) spin-offs are selected. The sample elimination criteria are applied to the initial sample (See Section 5.A). After applying the criteria, we have 120 parent companies. Combining with Vijh (1994)'s sample of 101 parents†, which covers the period from 1964 to 1990, the size of the sample becomes 221. The announcement dates and the details of spin-offs are identified by searching relevant news reports in Dow Jones News Wire and Lexis and Nexis database. Exchange listings for the parents are by the spinoff announcement dates and for the subsidiaries by the ex-dates. We classify a parent firm as a focus-increasing spinoff if its two-digit primary SIC code is different from that of the spun-off. Otherwise, we classify it as a non-focus-increasing spinoff.

Time period	Announcement		NYSE/AMEX		NASDAQ		Change in Focus		
	Parent (Subsidiary)		Parent (Subsidiary)		Parent (Subsidiary)		Increasing	Non-increasing	Percentage of Increasing
1964 - 1970	1	(1)	1	(1)	0	(0)	0	1	0%
1971 - 1975	7	(7)	5	(6)	2	(1)	6	1	86%
1976 - 1980	17	(17)	10	(8)	7	(9)	14	3	82%
1981 - 1985	30	(35)	20	(18)	10	(17)	23	7	77%
1986 - 1990	53	(56)	45	(29)	8	(27)	36	17	64%
1991 - 1995	30	(32)	26	(16)	4	(16)	24	6	78%
1996 - 2000	39	(43)	33	(31)	6	(12)	27	12	67%
2001 - 2005	44	(47)	33	(29)	11	(18)	19	25	43%
Total	221	238	173	138	48	100	149	72	67%

†Among the sample firms in Vijh (1994), the subsidiaries of nine parent firms have their first trading dates preceding the spinoff announcement dates. This suggests that those spinoffs are either a distribution of a publicly traded firm owned by a parent or a distribution of the carved-out shares. Since they fall into the sample elimination criteria, we discard those firms. In addition, three more firms are removed because they were either merged or acquired prior to the ex-dates.

Table 1 also presents the numbers of subsidiaries separated from their parents. While 205 firms spun off one single subsidiary, 15 firms created two subsidiaries, and one spun off three subsidiaries, making the total number of the subsidiaries to 238. As can be observed in the Table 1, more subsidiaries are listed on NASDAQ than either NYSE or AMEX.

In the last column, we report the percentages of the parents that engage in *focus-increasing* spinoffs. It is well known in the spinoff literature that a firm experiences a positive price response upon the announcement of spinoff when the firm separates a subsidiary that is unrelated to the main business of the parent. Daley et al. (1997) initially document significantly larger announcement abnormal returns
for focus-increasing firms than for non-focus-increasing firms. Desai and Jain (1999) further investigate the effect of focus-increasing spinoffs on long-term stock performance as well as operating performance. They find that focus-increasing spinoffs have significantly higher long-run abnormal stock returns and improvements in operating performance than non-focus increasing spinoffs. Following Desai and Jain (1999), we define a focus-increasing spinoff as a firm that creates a subsidiary whose two-digit primary Standard Industrial Classification (SIC) code is different from that of the parent. Otherwise, we classify a firm as a non-focus-increasing spinoff.[14] In all sub-periods except the last, a majority of the sample is a focus-increasing or cross-industry spinoff. The preponderance of focus-increasing spinoffs in the sample suggests that refocusing strategy is one of primary motivations behind spinoff decision, and thus investors respond to this type of corporate re-structuring positively as documented in the literature.

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[14] Desai and Jain (1999) define two alternative measures of "industrial focus"; a change in the Herfindahl index calculated using sales, and the change in the number of segments from the year before the announcement to the year of the completion of the spinoff. They report that about 90% of their samples are insensitive to the definition of focus used.

C. *Descriptive Statistics of the Sample*. To draw a broad picture of the sample characteristics, in Table 2 we present the descriptive statistics for the market capitalizations (*i.e*., firm size) of the sample. For a (parent) firm, the pre-spinoff size is the product of its price and shares outstanding by the end of the month prior to the month of the spin-off announcement (henceforth month-1). Likewise, the post-spinoff size of the parent and its subsidiary is measured as of the end of the month of the ex-dates (henceforth ex-date month). Because the sample period spans 41 years, the usual sense of firm size in terms of raw dollar value might be misleading. For this reason, in each year we assign a sample firm—based on its size by the end of the year prior to the spinoff announcement year—to one of the size deciles. The size deciles are formed based on market capitalizations of NYSE, AMEX, and NASDAQ firms in CRSP by the same year end.

In terms of the size deciles, only about 9 % of the sample is included between the second and the fifth decile, while the rest (91 %) are all clustered in the sixth and the tenth decile. Moreover, 54 % of the sample belongs to the largest size decile, showing extreme skewness in the distribution of firm sizes. In Table 2, therefore we segment the sample firms into the two size categories: Group-large for firms in the tenth decile and Group-small in the remaining deciles (*i.e.*, decile nine to two) respectively. We also deflate sizes with the GDP deflator, setting year 2005 as a base year.

Before spinoffs, for Group-large the mean of firm sizes (pre-spinoff sizes) is $12.8 billion and the median is $4.3 billion, suggesting that even in the largest decile there is an extreme positive skewness in the distribution. The mean of pre-spinoff sizes in the remaining deciles is $496 million, which is only 3.9 % of that of Group-large. By

Table 2. Descriptive Statistics of the Sample

The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005.The market capitalization of a parent firm is computed as follows: (1) by the end of the month prior to the month of the spinoff announcement (*i.e*., the pre-spinoff parent size) and (2) by the end of the month in which the ex-date occurs (*i.e*., the post-spinoff parent size); the market capitalization of the subsidiary is calculated as in (2). A sample firm based on its market capitalization by the end of the year prior to its spinoff announcement year is assigned to one of the deciles constructed with the same year-end market capitalizations of the universe of NYSE/AMEX/NSADAQ firms. The parent firms are further classified either as Group-large to which the firms assigned to decile 10 belong or as Group-small to which the firms assigned to decile 2 to 9 belong. The combined market value is the sum of the post-spinoff parent size and the subsidiary's size. Relative size-pre is the ratio of the market capitalization of a subsidiary to the pre-spinoff parent size. Relative size-post is the ratio of the market capitalization of a subsidiary to the combined market value.

	Obs	Mean	Median	Min	Max	Std
Panel 1: Mkt. capitalization by the end of the month prior to the spinoff-announcement (in millions 2005 dollars)						
Group-large (decile 10)†	105	12,813	4,308	401	148,517	23,187
Group-small (decile 2-9)	115	496	240	10	6,792	786
Panel 2: Mkt. capitalization by the end of the month of the ex-date (in millions 2005 dollars)‡						
Group-large†						
Parents	105	11,979	3,762	154	120,750	22,413
Subsidiaries		1,780	671	43	14,581	2,653
Combined		13,759	4,897			
Group-small						
Parents	115	371	155	2	3,161	517
Subsidiaries		211	85	2	1,953	357
Combined		582	274			
Panel 3: Relative-size ratios						
Relative size-pre						
Group-large	106	0.250	0.124	0.004	3.041	0.388
Group-small	115	0.500	0.371	0.020	2.560	0.452
Relative size-post						
Group-large	106	0.207	0.117	0.005	0.962	0.231
Group-small	115	0.375	0.324	0.021	0.907	0.257

†The market value of Lucent Technology deceased by $122 billion from month-1 to ex-date month (as a combined firm). Thus, including it makes the change in the mean of the market value of Group large -$217 million. Because of the undue influence of Lucent Technology's loss in market value, Lucent Technology is excluded in calculation of the statistics for Group-large in Panel 1 and 2.

‡The subsidiaries of 16 parent firms did not begin to be traded by the end of the month of

the ex-date. In these cases, we use the market capitalizations by the ends of the months in which they started to be traded.

ex-date month, the mean of the post-spinoff sizes of the parents in Group-large decline by about $834 million (approximately 6.5 %) from month-1, while that of the parents in Group-small decrease by $125 million (approximately 25.2 %). The larger percentage decline in the mean size of Group-small suggests that smaller firms tend to spin off a larger portion of their assets to their newly created subsidiaries than do larger ones.

When comparing the mean of the pre-spinoff sizes of the parents with that of the post-spinoff sizes as combined firms (*i.e*., the sum of the market capitalization of the parents and their subsidiaries by ex-date months), the market values of the sample firms in Group-large and Group-small increase on average by $946 million and $86 million, respectively, from month-1 to ex-date month. Though the average dollar value gain in market value for Group-large from month-1 to ex-date month is about 11 times greater than that of Group-small, the percentage gain (*i.e*., the change in the average market value from month-1 to ex-date month divided by the average market value of the sample as of month -1) of Group-small (about 17.3 %) is more than two times larger than that of Group-large (about 7.4 %). Hence, this observation seems to suggest the role of firm size in market value gain. That is, smaller firms tend to spin off larger portions of assets, and experience much greater proportional increases in their market value from month-1 to ex-date month.

However, given the extremely skewed distribution of the firm sizes of the sample and the 41-year study period, the inferences drawn based on the market values of the sample firms might be tenuous because of the undue influence of extreme observations and exogenous factors affecting the U.S stock market in general over the entire study period. To mitigate these concerns, instead of firm size we employ the relative size of a subsidiary defined as the ratio of the size of a subsidiary to the size of its parent. The literature on corporate spinoffs documents that abnormal returns around spinoff announcements are positively associated with the relative sizes of subsidiaries (*e.g*., Hite & Owers, 1983; Krishnaswami & Subramaniam, 1999; Miles & Rosenfeld, 1983). Therefore, because of the importance of the effect of the relative size on the announcement returns, we consider it worthwhile to analyze it, particularly in the context of the firm size group (*i.e.*, Group-large and Group small). Following Subramaniam and Krishnaswami (1999), we define the relative size of a subsidiary as the ratio of the market capitalization of the subsidiary at its ex-date month to either the market capitalization of its parent at month-1 (*Relative size-pre*) or to the combined market value of the parent and the subsidiary at the ex-date month (*Relative size-post*).

In Panel 3, we present the distribution of the relative sizes of the subsidiaries for both size groups. In terms of *Relative size-pre*, the firms in Group-large spin off on average 25 % of their assets, while those in Group-small split 50%. Alternatively, when the relative size is measured with the value of the combined firm by the end of ex-date month (*i.e*., *Relative size-post*) the ratios of both groups decline to 20.7% for Group-large and 37.5% for Group-small. But regardless how the relative size is measured, the evidence suggests first that small firms spin off a larger percentage of their assets. We also note that *Relative size-pre* and *Relative size-post* differ only in the denominator in both ratios (*i.e*., pre-spinoff firm value versus post-spinoff combined firm value). If *Relative size-pre* is larger than *Relative size-post,* it indicates an increase in the shareholder value of a parent firm from month-1 to ex-date month. As can be seen in Panel 3, the difference between *Relative size-pre* and *Relative size-post* (= 50% minus 37.5%) for Group-small is much larger that for Group-large (= 25% minus 20.7%). In other words, the mean positive gain in firm value from month-1 and to ex-date month (as a combined firm) is far greater for firms in Group-small. Thus, in addition to the fact that smaller sample firms tend to spinoff a larger percentage of their assets as we discussed above, we conclude that the difference in the market value gain between Group-small and Group-large from month -1 to ex-date month strongly hints at the potentially significant effect of firm size on firm value.

D. *Value Gain and Firm Size effect.* We explore further the relationship between the pre-spinoff firm sizes and the value gains of the sample firms in the cross-section of the sample. Note that in the previous section we roughly inferred the relationship by comparing averages of two size groups. For a sample firm, we compute the value gain as a change in the market value (in dollar) of a sample firm from month -1 to ex-date month. In addition, the percentage value gain is measured by dividing the change in the market value by the pre-spinoff parent's market capitalization. It is analogous to a buy-and-hold return earned by an investor who purchases the stock at the end of month -1, receives the share of the subsidiary at the payment date, and holds the share of the parent and its subsidiary until the end of the ex-date month.

In Table 3, we present the mean of the market value gain in dollar and in percentage for Group-large and Group–small. While the market value gain in Group-large is as much as 12 times larger than that in Group-small, the percentage gain of Group-small is more than 1.8 times larger than that of Group-large. Given that the

Table 3. Value Gain and Firm Size

The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005. The market value gain in dollars is measured by subtracting the pre-spinoff parent's market capitalization from that of the combined firm. The percentage gain is computed by dividing the market value gain by the pre-spinoff parent market capitalization. The pre-spinoff market capitalization is the product of the share outstanding and the closing share price of a sample firm by the end of the month prior to the spinoff announcement month (*i.e*., month-1). The combined market value is the sum of the market capitalization of the parent and its subsidiary, which are measure by the end of the month of completion of the spinoff (*i.e*., ex-date month).The Spearman correlations in Panel A are calculated by the simple correlation between the pre-spinoff sizes and the percentage gains. A market model for daily returns is estimated over the pre-event period, (AD-260, AD-11), to compute abnormal returns in the three-day event period, (AD-1, AD+1) where AD is the announcement date. In Panel B, the Spearman correlations are between the pre-spinoff parent sizes and relative size-pre, and relative size-post. Relative size-pre is the ratio of the market capitalization of a subsidiary by the ex-date month to the market capitalization of the parent as of month-1. Relative size-post is the ratio of the market capitalization of a subsidiary by the ex-date month to the market capitalization of the combined firm (*i.e*., the parent's size plus its subsidiary's size) by the ex-date month. The statistical significance of the difference in the means and in the median is estimated using the parametric *t*-test and the nonparametirc Wilcoxon rank-sum test respectively. For the *t*-test, we assume unequal group variance. [a,b,c] indicate the significance at the 1, 5, 10% level, respectively.

Panel 1. Market value gain (from month -1 to the ex-date month) and 3-day CAR

			Market Value Gain				
			$ (in million)[†]		Percent		
	Obs[‡]	Corr	Mean	Median	Mean	Median	Positive
Group-large (decile 10)	105		980	352	14.22	7.98	59
Group-small (decile 2-9)	113		81	25	25.19	14.73	71
Difference: Group-small - Group-large					10.97	6.75[b]	
All samples		-0.17[a]	512	52	19.91	10.52	

Panel 2. Spearman rank correlation (Pre-spinoff parent size, Relative size)

	Pre
Group-large	-0.28[a]
Group-small	-0.16[c]
All samples	-0.45[a]

Panel 3. Spearman rank correlation (Market value gain in %, Relative size)

	Pre	Post
Group-large	0.14	-0.10
Group-small	0.50[a]	0.14
All samples	0.37[a]	0.09

Table 3. Value Gain and Firm Size, Continued

Panel 1. Market value gain (from month -1 to the ex-date month) and 3-day CAR					
			3-Day CAR		
			Percent		
	Obs[‡]	Corr	Mean	Median	Positive
Group-large	105		2.46	2.12	68
Group-small	113		4.19	3.43	70
Difference: Group-small - Group-large			1.73[c]	1.31[c]	
All samples		-0.13[b]	3.36	2.57	

Panel 2. Spearman rank correlation (Pre-spinoff parent size, Relative size)	
	Post
Group-large	-0.23[a]
Group-small	-0.18[c]
All samples	-0.42[a]

Panel 3. Spearman rank correlation	(3-day CAR, Relative size)	
	Pre	Post
Group-large	0.30[a]	0.22[b]
Group-small	0.17[c]	0.10
All samples	0.26[a]	0.18[a]

[†] Including Lucent Technology in Group-large, the mean market value gain is -$194, which severely distorts the distribution. Hence, we report the mean and median of the market value gains in dollar by excluding Lucent Technology.
[‡] Three parent firms have insufficient data (less than 60 trading days) in estimation of the parameters of the market model for daily returns. These firms are dropped from the sample, which decreases the sample size from 221 to 218.

percentage gain is more relevant as a measure of the wealth increase for shareholders, we test for the differences in the mean and in the median of the percentage gains between the two size groups and find that while the difference in the mean is not significant, that in the median is significant at the 5% level.

Since we segment the samples roughly into two size groups, we test whether the effect of firm size on the percentage value gain holds across the sample firms. As can be seen in Panel 1 in Table 3, across all the sample firms the Spearman correlation is -0.17 and significant at the 1% level. This finding suggests that the pre-spinoff parent size is significantly inversely related to the market value gain from month-1 to ex-date month. However, as it takes on average 261 and 245 calendar days for Group large and Group-small from month-1 to ex-date month, the negative correlation between the market value gain and the pre-spinoff firm size might reflect notably small-firm premium among other confounding factors. But, the calculation of the Spearman correlation between the market value gain and the pre-spinoff firm size in each size group shows that only Group-large has a significant correlation equal to -0.20 at the 5% level, while no correlation exists for Group-small. It appears that the inverse relationship between the value gain and the pre-spinoff firm size arises not because of general outperformance of small firms but because of the pre-spinoff firm size itself. Therefore, for the sample of spinoffs, the size of a firm is an important factor that affects the shareholder's wealth at least for a period from month-1 to ex-date month.

An interesting pattern which we discussed in the previous section (Panel 3 in Table 2) is a negative relationship between the sizes of the parents and the subsidiaries. Either in *Relative size-pre* or *Relative size-post*, the ratio was always higher for firms in Group-small. Simply put, small firms are more likely to break up a larger fraction of their assets than do large ones. To examine whether this observation holds across the sample firms, especially for firms in Group-large, we compute the Spearman correlation between the pre-spinoff parent firm sizes and the relative size measures. In Panel 2 of Table 3, we report the Spearman correlations for both size groups and the whole sample. Regardless of the measurements of *Relative size*, the correlations are significant at the 1% and the 10% level for Group-large and Group-small, respectively. For the whole sample, the correlation is highly negative and equals to -0.45 for *Relative size-pre* and -0.42 for *Relative size-post*. Thus, we confirm an inverse relationship between a parent firm's size and the size of its spun-off subsidiary.

Notice the fact, that the pre-spinoff sizes of the parent firms are negatively related not only with the market value gains but also with their subsidiaries' sizes, implies a positive correlation between the value gains and the relative sizes of the subsidiaries. As can be seen in Panel 3, the percentage value gains are strongly associated with *Relative size-pre* (correlation = 0.37), though for *Relative size-post* the correlation is not significant, albeit it is found in the correct directional sign. As we discussed, the literature on corporate spinoff documents a positive relationship between the relative size of subsidiary and the announcement abnormal returns, which is often referred to as the wealth gain. In the same panel, we also report the correlation between the three-day CAR and the subsidiaries' relative sizes (see Section 10 for the details on the measurement of abnormal returns). Consistent with the literature, we find that, regardless of the measure of relative size of a subsidiary, a strong positive correlation exists between the announcement abnormal returns and the relative sizes. Thus, the proportion of the assets that a parent firm decides to spin off have a positive effect on the announcement abnormal returns as well as the market value gain.

Consequently, we argue that there exists a connection between the pre-spinoff size of the parent firms and the announcement abnormal returns given our finding that the smaller the size of a parent firm, the larger is the size of its subsidiary. In Panel 1 of Table 3, we present the means and the medians of the three-day CAR for both size groups, and test for the differences in CAR between two size groups. On average, the firms in Group-small earns on average 1.73% more than those in Group-large in three days surrounding the announcement of spinoff. The difference in the mean is significant at the 10% level. This inference is not influenced by outliers as the nonparametric test of the difference in the median also shows the same result. In addition, across the sample, the negative relation between CAR and the pre-spinoff firm size holds with the correlation of -0.13, which is significant at the 5% level.

Therefore, we infer from Table 3 that the effect of the relative size of a subsidiary on the positive abnormal returns in the announcement period as well as on the value gain from year-1 to ex-date month originates from the same source; namely the pre-spinoff size of the parent firms. In other words, the positive correlation of the relative sizes with the announcement abnormal returns as well as with the value gain could in fact be the firm-size effect.

Market Characteristics of the Sample Firms

As we discussed in Section 4.C, daily trading volume is used as a basic ingredient from which daily volume-based measures of difference of opinion (VDOs) are estimated. Therefore, we first investigate the characteristics of daily trading volumes along with other relevant market characteristics of the sample firms prior to spinoff announcements. For each sample firm, we obtain daily data on return, price, number of shares traded, and the number of shares outstanding from the CRSP. While trading volume is the number of shares traded on a particular day, volume turnover is the ratio of the trading volume to the

Table 4. Summary Statistics of the Sample Firms' Stock Market Characteristics
This table presents the summary statistics of firm characteristics of the sample of spinoffs. The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005. To be included in the table, a sample firm must have at least 80% of daily data for the pre-event period, which is a 250-trading-day period ending 10 days before the announcement of a spinoff. On day *t* for a sample stock, daily trading volume is the number of shares traded, volume turnover is the ratio of daily trading volume to the number of the shares outstanding, and log turnover is the natural logarithm of volume turnover. The reported figures are the cross-sectional means of the summary statistics (mean, standard deviation, skewness, and kurtosis) for the pre-event period. The samples are sorted into four size groups. Group 1, which is the smallest, consists of firms with size decile 1 to 6, Group 2 with size decile 7 to 8, Group 3 with size decile 9, and Group 4 with size decile 10. A sample firm based on its market capitalization by the end of the year prior to its spinoff announcement year is assigned to one of the deciles constructed with the same year-end market capitalizations of the universe of NYSE/AMEX/NSADAQ firms.

Size Group	Obs[†]	Mean	Std	Skewness	Kurtosis
			Trading volume (in 1,000)		
1	23	35	48	4.43	32.62
2	37	79	79	4.51	35.35
3	41	167	158	4.23	31.30
4	105	1,295	850	3.58	25.84
All samples	206	712	484	3.97	29.39
			Raw turnover (%)		
1	23	0.26	0.38	4.49	33.13
2	37	0.30	0.31	4.54	35.73
3	41	0.33	0.39	4.30	32.15
4	105	0.38	0.31	3.58	25.93
All samples	206	0.34	0.33	4.00	29.73
			Log turnover		
1	23	-6.97	1.34	-0.60	1.77
2	37	-6.68	0.99	-0.25	1.11
3	41	-6.43	0.89	0.03	0.50
4	105	-6.03	0.60	0.28	0.90
All samples	206	-6.33	0.81	0.04	0.96

Table 4. Summary Statistics of the Sample Firms' Stock Market Characteristics, Continued

Size Group	Obs†	Mean	Std	Skewness	Kurtosis
			Return (%)		
1	23	0.17	3.22	0.41	5.08
2	37	0.01	3.09	0.34	5.46
3	41	0.03	2.60	0.12	5.05
4	105	0.04	2.15	0.09	4.71
All samples	206	0.05	2.53	0.18	4.95
			Price		
1	23	10.54	6.90	-1.60	9.50
2	37	16.85	4.23	-1.09	12.90
3	41	23.04	5.22	-0.84	10.78
4	105	40.03	5.22	0.21	-0.33
All samples	206	29.19	5.23	-0.44	5.36

†To be included in the table, a sample firm must have at least 80% of daily data during the pre-event period. The size of the sample decreases to 206 from the sample size of 218 in Table 3. The exclusion of 12 samples is due to non-availability of daily trading volume data for NASDAQ samples prior to Nov 1, 1982.

number of the shares outstanding on that day. We further transform volume turnover by taking the natural logarithm of the volume turnover to get log turnover.

The literature on trading volume tends to study exclusively NYSE/AMEX stocks, and suggests a separate investigation between NYSE/AMEX and NASDAQ stocks.[15] In our study we include NASDAQ firms by adjusting the overstatement of trading volumes on NSADAQ firms. Following Anderson and Dyl (2005), we scale down raw turnover of NASDAQ sample firms by 38% after 1997 and by 50% before 1997. Though this

[15] Because our samples include firms listed on NYSE/AMEX (173) and NASDAQ (48), trading volumes are not comparable across the sample firms. It is primarily due to different market structure of these exchanges. Specifically, NASDAQ is a dealer’s market in which a dealer is one side of every transaction, therefore a transaction being double counted. In contrast, NYSE and AMEX are auction markets in which a majority of transactions are between actual buyers and sellers

procedure would make NASDAQ firms' turnovers roughly comparable with those on NYSE, it is admittedly a very rough approximation.

In Table 4, we present the summary statistics of various daily trading activity measures (trading volume, volume turnover, and log turnover) and of other firm characteristics (return and price) during the pre-event period. The sample firms are sorted into the four size groups based on the size decile assigned to each sample firm. Group 1, which is the smallest, consists of firms with size decile 1 to 6, Group 2 with size decile 7 to 8, Group 3 with size decile 9, and Group 4 with size decile 10.

Consistent with the previous studies on trading volume (*e.g.*, Llorente, Michaely, Saar, & Wang, 2002; Lo & Wang 2000), trading volume and volume turnover increase with firm size as does the prices of the sample firms despite the small sample size of our study. As can be seen in Table 4, across the sample, trading volume is far more variable than volume turnover. While the mean trading volume of Group 4 is approximately 36 times higher than that of Group 1, it is 1.4 times for volume turnovers.

Recall that volume turnover is a scaled version of trading volume. For a stock, while trading volume is a *raw* number of the shares traded, volume turnover is the ratio that measures the intensity of trading activity after taking account of all the shares of the stock available for trading. Even though both measures of trading activity are generally accepted to measure "trading activity," the information content contained in them might be different as it is suggested by dissimilar distributional characteristics between trading volume and volume turnover across our sample firms. Furthermore, the distribution of daily trading volume and volume turnover are highly non-normal with positive skeweness and fat tails. In contrast, the distribution of log turnover approximates a normal distribution with skewness and kurtosis close to zero in all size groups, though Group 1 and 2 exhibit modest leptokurticity. This suggests that in contrast to large firms, small firms tend to have extremely high as well as low level of trading activity in particular days during the pre-event period.

A. *Trend in trading volume.* As our study covers a 41-year period, an important statistical issue in our analysis is whether the cross-sectional variation in *volume-based* measures of DO of the sample is stationary or non-stationary.[16] For example, consider two hypothetical firms, which are similar in their characteristics, but different only in the calendar dates of their spinoff announcements. If there is a secular time trend in a volume turnover series, using it to examine its cross-sectional implications for temporal abnormal returns without controlling for the trend may lead to incorrect inferences.

To examine a secular time trend in trading activity, we segment the study period into seven sub-periods, each of which spans a five-year period starting from 1971 and ending 2005. Panel 1 of Table 5 shows the mean of daily trading volumes, turnovers, and log turnovers over the pre-event period for each of the sub-periods. In each of the three different measures of trading activity, there is a significant and clear upward trend, particularly for trading volume. While the average daily turnover is 0.08% in the first sub-period, it continues to rise over time, reaching 0.5% in the last sub-period. An

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[16] Lo and Wang (2000)'s study on trading volume of NYSE/AMEX common stocks for the period from 1962 to 1996 documents a upward time trend not only for the weekly log market turnover but also log turnovers in individual stock levels, albeit weak upward time trend. (See Figure 1 and Figure 3 in their paper). Chordia, Roll, and Subrahmanyam (2011) whose sample period from 1993 to 2008, roughly following Lo and Wang (2000)'s study period, show that increase in monthly trading volume turnover is not merely an artifact of indexation and firm size. Specifically, they demonstrate that both S&P 500 (large cap) stocks and non-S&P 500 (small cap) stocks experience a positive and significant (approximately two folds on average) increase in turnover from the first period 1993-2000 to the second period 2001-2008.

Table 5. Various Measures of Trading Activity of the Sample, 1971-2005
This table presents the sub-period means of various measures of trading activity (trading volume, volume turnover, and log turnover) of the sample. The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005. To be included in the table, a sample firm must have at least 80% of daily data during the pre-event period. On day *t* for a sample stock, daily trading volume is the number of shares traded, volume turnover is the ratio of daily trading volume to the number of the shares outstanding, and log turnover is the natural logarithm of volume turnover. Each sample firm is assigned to one of seven sub-period groups based on the year prior to its spinoff announcement year. In each sub-period, the reported figures are the cross-sectional averages of the means of daily trading volumes, volume turnovers, and log turnovers over the pre-event period. A sample firm based on its market capitalization at the end of the year prior to its spinoff announcement year is assigned to one of the deciles constructed with the same year-end market capitalizations of the entire NYSE/AMEX/NASDAQ firms.

Period	Obs	Trading volume in (1,000)	Raw turnover (%)	Log turnover	Size
Panel 1. All samples					
1971 - 1975	6	17	0.08	-7.56	9.8
1976 - 1980	9	44	0.33	-6.45	8.9
1981 - 1985	26	66	0.24	-6.73	8.5
1986 - 1990	52	153	0.28	-6.51	8.9
1991 - 1995	30	207	0.26	-6.44	8.8
1996 - 2000	38	923	0.41	-6.07	8.9
2001 - 2005	44	2,161	0.50	-5.81	8.4
Panel 2. NYSE/AMEX only					
1971 - 1975	6	17	0.08	-7.56	9.8
1976 - 1980	9	44	0.33	-6.45	8.9
1981 - 1985	20	73	0.27	-6.65	8.8
1986 - 1990	44	161	0.29	-6.48	9.1
1991 - 1995	26	229	0.27	-6.41	9.0
1996 - 2000	32	1,014	0.35	-6.13	9.2
2001 - 2005	33	2,388	0.46	-5.77	8.8

increase of volume turnover in this magnitude over the study period cannot be simply attributed to the differential composition of the sample firms in each sub-period. Note that the average firm sizes, which are calculated with the size deciles of the sample firms, are comparable across the sub-periods, indicating the effect of firm size on turnover is insignificant.

In Panel 2, we present the same statistics as in Panel 1, but for NYSE/AMEX sample firms only. Though the number of NASDAQ firms in every sub-period is small relative to that of NYSE/AMEX, an overstatement of trading volume is apparent even after applying the adjustment factors to volume turnovers of NASDAQ firms. Particularly, the mean daily turnover for all sample firms is 0.41% in the sixth and 0.50% in the last sub-periods. However, for the NYSE/AMEX samples the mean daily turnover decreases to 0.35% and 0.46%. In the analyses to follow, if there is a case in which the volume overstatement of the NASDAQ sample firms becomes an issue as to have a material effect on inferences for the whole sample, we report a result for the entire sample firms, and NYSE/AMEX and NADSDAQ sample firms separately.

Throughout our study, we use detrended time-series of daily log turnovers to measure an additional volume-based proxy for DO. During the pre-event period, daily log turnovers are detrended with a 200-trading-day moving average. Specifically, for a day *t* the detrended log turnover is

$$Detrend_{i,t} = LNTO_{i,t} - \sum_{k=t-200}^{t-1} LNTO_{i,t} \quad (9)$$

We simply use a 200-trading-day moving average to remove a trend in log turnover.[17]

[17] Our choice of a moving average follows the detrending method of Llorente et al. (2002). In their study of the dynamic volume-return relation, they detrend daily log turnovers of individual NYSE/AMEX stocks with a 200-trading-day moving average for the sample period of 1993-1998. Of course, because our samples are distributed over a 41-year period detrending uniformly by a moving average might not be appropriate. However, Lo and Wang (2000) document that the time-series properties of detrended turnovers are substantially different depending on the method used, and find that imposing structural models for detrending volume turnover does not render satisfactory results. Therefore, we hold on to a simple detrending procedure of using a 200-trading-day moving average.

Summary Statistics of VDOs

As discussed in the methodology section, for each day in the pre-event period we estimate five VDOs (*LNTO, Detrend, UV, RESD,* and *SUV*). Though the VDOs are dynamic, changing daily, our purpose is to extrapolate the degree of divergence of investors' opinion about the value of a sample firm on a *typical* trading day in the pre-event period or $D_i^{ex-ante}$. To do so, we proposed the mean of daily VDO estimates in the pre-event period as the proxy for the *ex*-*ante* level of DO.

The cross sectional means of the summary statistics for daily VDOs estimates are presented in Table 6. As in Table 4, we again form the four size groups based on the size decile of each sample firm. The skewness and kurtosis indicate that all daily VDO estimates of each size group appear to approach a normal distribution. Given the approximate normality of the empirical distributions of VDOs, we can meaningfully measure the *ex*-*ante* level of DO for a sample firm from daily estimates of these VDOs as the *ex*-*ante* level of DO reflects the average (normal) degree of disagreement about a sample firm in an ordinary trading day. Therefore, the *ex*-*ante* level of DO can be considered as a firm-specific characteristic prior to the announcement of a spinoff.

Nevertheless, on surface, $D_i^{ex-ante}$ can be seen as the mean level of extra portion of daily trading volumes, hence one may argue that it indicates market liquidity. In finance literature, a high level of trading volume is generally associated with market liquidity of a stock, and is often used as a proxy for market liquidity. In Table 6, the mean of log turnover is increasing in firm size group. As firm size is also widely used by researchers as a liquidity proxy, a positive relationship between log turnover and firm size seems to indicate that these two variables are proxies for liquidity. However,

Table 6. Summary Statistics of Five Daily VDOs during the Pre-Event Period

The table presents the descriptive statistics of daily estimates of the five VDOs (Volume-based Differences of Opinion measures) during the pre-event period for the sample of spinoffs during 1964-2005. To be included in the table, a sample firm is required to have 80% of daily VDO estimates in the pre-event period. On day *t* in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The model takes daily absolute return (separately depending on the sign of daily return) as the independent variables is estimated over the control period. The samples are grouped into four size groups. Group 1, which is the smallest, consists of firms with size decile 1 to 6, Group 2 with size decile 7 to 8, Group 3 with size decile 9, and Group 4 with size decile 10. A sample firm based on its market capitalization by the end of the year prior to its spinoff announcement year is assigned to one of the deciles constructed with the same year-end market capitalizations of the universe of NYSE/AMEX/NSADAQ firms. A reported figure is the cross-sectional mean of a statistic in a size group.

Size Group	Obs	*LNTO*	*Detrend*	*UV*	*RESD*	*SUV*
				Mean		
1	21	-6.996	-0.025	-0.042	-0.039	-0.031
2	36	-6.682	0.008	-0.008	0.000	-0.022
3	41	-6.434	-0.044	-0.054	-0.052	-0.039
4	104	-6.027	0.027	0.006	0.008	0.031
				Standard Deviation		
1	21	1.388	1.402	1.386	1.392	1.019
2	36	0.989	0.999	0.978	0.983	1.015
3	41	0.890	0.898	0.875	0.873	1.032
4	104	0.596	0.599	0.557	0.557	1.042
				Minimum		
1	21	-11.346	-4.466	-4.516	-4.553	-3.605
2	36	-10.028	-3.397	-3.281	-3.343	-3.683
3	41	-9.153	-2.771	-2.627	-2.642	-3.251
4	104	-7.741	-1.671	-1.359	-1.370	-3.133

Table 6. Summary Statistics of Five Daily VDOs during the Pre-Event Period, Continued

Size Group	Obs	*LNTO*	*Detrend*	*UV*	*RESD*	*SUV*
				Maximum		
1	21	-3.647	3.419	3.427	3.538	2.703
2	36	-3.897	2.802	2.790	2.792	2.969
3	41	-3.716	2.695	2.686	2.686	3.139
4	104	-3.979	2.079	2.052	2.050	3.573
				Skewness		
1	21	-0.541	-0.435	-0.388	-0.369	-0.521
2	36	-0.253	-0.245	-0.192	-0.191	-0.290
3	41	0.034	0.054	0.139	0.132	-0.004
4	104	0.281	0.308	0.553	0.543	0.200
				Kurtosis		
1	21	1.556	1.318	1.336	1.285	1.437
2	36	1.099	1.076	0.963	1.013	1.345
3	41	0.502	0.527	0.549	0.585	0.554
4	104	0.913	0.908	1.155	1.159	0.950

no such relationship is observed between all the other VDO estimates and firm size groups in our analysis. In those measures, there is no such pattern suggesting that they reflect liquidity.

Finally, we check whether a secular time trend identified in log turnover exist in the other VDO estimates as well. If trading shares has become easier and cheaper over the sample period, it might as well influence trading activity driven by divergence of investors' opinion. If investors were able to express their valuation of a firm by trading shares (*i.e.*, more frequent changing hands between optimists and pessimists) because of improving trading conditions, we would observe an uptrend in a VDO as well. In Table7, we again assign a sample firm to one of the seven sub-period groups as in Table 4. Compared log turnover, which is shown to have a secular trend, the other VDO estimates

Table 7. Ex-Ante Levels of DO of the Sample

This table presents the sub-period means of the *ex-ante* levels of DO calculated with five VDO (Volume-based Differences of Opinion measures) estimates during the pre-event period. To be included in the table, a sample firm is required to have 80% of daily estimates of a VDO in the pre-event period. The sample firms grouped into one of the seven 5-year sub-periods based on the year end prior to the announcement year. On day *t* in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The model takes daily absolute return (separately depending on the sign of daily return) as the independent variables is estimated over the control period. The *ex-ante* level of differences of opinion is calculated as follows: $D_i^{ex\_ante} = \frac{1}{250}\sum_{t=-260}^{t=-11} VDO_{i,t}$ for *VDO* = $LNTO_{i,t}$, $Detrend_{i,t}$, $UV_{i,t}$, $RESD_{i,t}$, and $SUV_{i,t}$ and *t* is the announcement date, For Size decile, a sample firm based on its market capitalization by the end of the year prior to its spinoff announcement year is assigned to one of the deciles constructed with the same year-end market capitalizations of the universe of NYSE/AMEX/NSADAQ firms.

Period	Obs	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$	$SIZE$
1971 - 1975	6	-7.561	-0.018	-0.049	-0.028	-0.051	9.83
1976 - 1980	9	-6.445	0.140	0.068	0.032	0.156	8.89
1981 - 1985	24	-6.739	0.011	-0.022	-0.025	0.026	8.83
1986 - 1990	52	-6.511	0.019	0.034	0.039	0.011	8.87
1991 - 1995	30	-6.443	-0.036	-0.040	-0.035	-0.035	8.83
1996 - 2000	37	-6.070	0.027	-0.018	-0.009	-0.002	8.92
2001 - 2005	43	-5.796	-0.035	-0.057	-0.053	-0.017	8.44
	201						

do not follow a similar upward trend in log turnover. This evidence suggest that a secular trend in daily log turnover is not a serious concern for the ex-ante level of DO estimated with the other VDOs in the cross-section of the sample.

In sum, we find the evidence that VDOs have a stable empirical distribution, which in turn allows us to measure the *ex-ante* level of DO appropriately. The preliminary evidence suggests that the *ex-ante* level of DO is not related to liquidity and void of a secular trend observed for log turnover. In next two sections, therefore we attempt to establish the more robust empirical relevance of the volume-based measures of differences of opinion first by comparing with widely-used liquidity proxies and second by relating to extant disagreement proxies.

***Ex-Ante* Disagreement Proxies versus Liquidity Proxies**

In the next two sections, we examine further on the relationship between $D_i^{ex-ante}$ and other popular liquidity proxies as well as the relation between $D_i^{ex-ante}$ and the extant proxies for DO. We will attempt to establish $D_i^{ex-ante}$ as a proxy for DO rather than for liquidity.

In the literature, there are two views on the role of trading volume on stock returns. One view is the *liquidity premium hypothesis*, which states that trading volume contains information about a firm's market liquidity. Therefore, firms with high trading volume require lower expected return than firms with low trading volume. Brennan et al. (1998) investigate whether non-risk factors (size, book-to-market ratio, trading volume, price, dividend yield and lagged returns) have marginal explanatory power for stock returns for NYSE/AMEX/NASDAQ non-financial firms for the period 1966-1995. They find that *dollar trading volume* has a strong negative effect on excess returns (over the risk-free rate) as well as risk-adjusted returns. Their finding implies that trading volume (*i.e*., non-risk factor) provides incremental power to explain a part of expected returns that are not related to the Fama-French risk factors. Thus, their study renders a strong support for trading volume as a proxy for market liquidity, validating the existence of liquidity premiums in stock returns.

Datar et al. (1998) implement a similar empirical study (a cross-sectional asset pricing test) to Brennan et al. (1998). A major difference between these two studies is a method for measuring trading activity. They use *monthly volume turnover* (the average of the previous three-month volume divided by shares outstanding) while Brennan et al. (1998) use dollar trading volume (monthly trading volume times monthly stock price). Their finding is in accord with Brennan et al. (1998) that low turnover stocks tend to earn higher returns than high turnover stocks.

While it seems that there are robust empirical evidences for the role of trading volume as an indicator of market liquidity and its effect on returns, Lee and Swaminathan (2000) provide an alternative view on the role of trading volume on stock returns. Specifically, they link the joint effect of past trading volume and past return to future returns from momentum strategies. With the sample firms drawn from NYSE/AMEX from 1965 to 1995, they sort them first based on their past *j*-month returns and then independently sort them based on the averages of *daily volume turnover* for the same period. Thus, they form the two-way sorted portfolios. They find that conditional on past returns, low-volume portfolios outperform high volume portfolios regardless of their ranks in the past *j*-month returns. While this result corroborates the *liquidity premium hypothesis*, they report that returns on a zero-investment portfolio (*i.e.*, long in the winner and short in the loser) in a low volume portfolio are lower than those of a high volume portfolio. It means that the momentum premium is higher in supposedly more liquid (high volume) portfolios, even though according to the *liquidity premium hypothesis* these liquid firms (*i.e.*, firms with high trading volume) should earn low expected returns. Investigating this puzzle further by implementing time-series regression based on the three factor Fama-French (1993), they find that the factor loadings on HML are positively higher for low volume portfolios than high volume portfolios regardless of their past performances. In other words, low volume stocks act like a value stock (*i.e.*, high book-to-market ratio) while high volume stocks behave like a glamour stock. Their finding sheds light on an alternative role of or information content of trading volume. That is, the level of trading activity is related to the pricing of a stock, not to market liquidity.

Similar to Lee and Swaminathan (2000), Piqueria (2006) tests the role of trading volume for forecasting future returns using NYSE and NASDAQ samples for the period from 1993-2002.[18] Controlling illiquidity in addition to size, book-to-market, and momentum, she shows that the coefficient of turnover is significant and strongly negative: one standard deviation increase in monthly turnover is translated to a decline in expected return of 0.34 % and 0.74 % for NYSE and NASDAQ firms, respectively. Her finding provides an empirical support for an alternative interpretation to liquidity premium regarding the role of trading turnover. That is, a firm with a higher level of volume turnover, or equivalently with a higher degree of disagreement about its value among investors, earns lower returns. She shows that lower future returns are forecasted not

[18] She points to empirical evidences that bid-ask spread—when entered into a cross-sectional asset-pricing regression—tends to have an insignificant or negative slope coefficient. To overcome the ineffectiveness of the bid-ask spread, she derives alternative illiquidity or price impact measures based on the theoretical model of Glosten and Harris (1988). Specifically, these measures are designed to capture a better estimate of the adverse selection component of a trade than the bid-ask spread. She documents that her illiquidity measures are positively related to percentage quoted and effective spread, yet they have greater variances (two times greater than) than the spread measures do, thereby being a better approximation of the difference in trading cost considered by investors. She further shows that volume turnover is not significantly correlated with these illiquidity cost measures.

because of better liquidity, but because of overpricing of stocks, which is captured by volume turnover.

In summary, these studies indicate that trading volume is a multi-faceted variable and challenges a simplistic one-way interpretation. That is, it is used as a proxy for market liquidity of a stock. Therefore, it is important to not only specify what one does measure from trading volume but also establish the relevance of the measurement. To establish $D_i^{ex-ante}$ as a proxy for investor disagreement rather than for liquidity, we compare $D_i^{ex-ante}$ measured with five VDOs with other popular *liquidity proxies*. We estimate four *liquidity proxies* which are most frequently used in the literature: Daily dollar trading volume, the bid-ask spread, idiosyncratic volatility, and firm size. Except for firm size, we estimate the other three liquidity proxies over the pre-event period.

For each day in the pre-event period, daily trading volume is multiplied by the closing price to get daily dollar trading volume. For bid-ask spreads, we employ the estimation method (*i.e.*, high-low estimator of bid-ask spreads) recently developed by Corwin and Schultz (2011). Their estimator is based on the notion that daily high and low prices are most likely for buy and sell orders, respectively. Therefore, the ratio of the highest price to the lowest price of a day represents the fundamental volatility of a stock and its bid-ask spread. Assuming that the variance and the spread over two single trading days are constant, and that return are serially uncorrelated, the sum of each day's high-low price ratio over the two days should reflect twice of the daily variance and the spread, while the high-low price ratio over a single two-day period should reflect two days' volatility and one-day spread. They subsequently derive a close form solution for the spread. Hence, their estimator only requires daily high and low prices, which are readily available in CRSP for all of our sample firms to compute daily spread.

In addition, we include idiosyncratic volatility of stock return as an additional proxy for liquidity. Over our 41-year study period, trading volume and the cost of trading have a strong time trend that is caused by regulatory changes and rapid technological developments. For the period from 1988 to 1998, Chordia, Roll, and Subrahmanyam (2001) document a steady decline in both quoted and effective bid-ask spreads, which are accompanied by a concomitant upward trend in trading volume for NYSE stocks. These trends in bid-ask spread and trading volume continued after 1998 as Chordia, Roll, and Subrahmanyam (2011) document.[19] Because a downward trend in the spread complicates a cross-sectional comparison of the sample firms' spread estimates, we add idiosyncratic volatility of stock return to *liquidity proxies*. For the pre-event period, we estimate the market model of daily returns for a sample stock, and compute the standard deviation of the residuals from the regression. Finally, the sizes of the sample firms are the market capitalizations by the year end prior to the year in which the spin-off announcements are made.

In Table 8, we present the Pearson correlations between the natural log of the *liquidity proxies* (dollar trading volume: $\overline{DOLVOL}$, firm size: *SIZE*, the idiosyncratic volatility: *SIGMA*, and Corwin and Schultz (2011)'s measure of the effective

[19] They show that the value-weighted average monthly share turnover of NYSE stocks increases from about 5% in 1993 to about 26% in 2008, while, on average, the effective spread is about eight cents lower in 2001-2008 than in 1993-2000. Moreover, they stress that an upward trend in trading volume and downward trend in trading cost is a market-wide phenomenon, affecting all firms irrespective of their sizes.

Table 8. Pearson Correlations between Liquidity and Volume-based DO Proxies

The table shows Pearson correlations between liquidity proxies:(*DOLVOL, SIZE*, *SIGMA*, and *CSSPRD)* and the proxies for the *ex-ante* level of DO estimated from five *VDO* (volume-based measure of differences of opinion (*LNTO, Detrend, UW, RESD*, and *SUV*) To be included in the table, a sample firm is required to have 80% of daily estimates of a VDO in the pre-event period. $\overline{DOLVOL}$ is the mean of the products of daily trading volumes and the closing prices of a stock (*DOLVOL*). $\overline{CSSPRD}$ is the mean of daily bid-ask spreads (*CSSPRD*), which are measured by the estimation method proposed by Corwin and Schultz (2011). *SIGMA* is the standard deviation of the residuals from the market model of daily stock returns estimated over the pre-event period. *SIZE* is the market capitalization of a sample firm by the year end prior to the spinoff announcement year. On day *t* during the pre-event period, each *VDO* is estimated, and averaged over the pre-event period to calculate the *ex-ante* level of differences of opinion ($\overline{LNTO}, \overline{Detrend}, \overline{UV}, \overline{RESD},$ and $\overline{SUV}$). On day *t* in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The model takes daily absolute return (separately depending on the sign of daily return) as the independent variables is estimated over the control period. The pre-event period is defined as a 250-trading-day period that ends 11 days before the announcement date. All correlations are calculated by taking the natural log of the liquidity proxies. The sample size is 207 for all the reported correlations.

	$\overline{DOLVOL}$	*SIZE*	*SIGMA*	$\overline{CSSPRD}$	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$
SIZE	0.91[a]							
SIGMA	-0.34[a]	-0.54[a]						
$\overline{CSSPRD}$	-0.05	-0.28[a]	0.79[a]					
$\overline{LNTO}$	0.67[a]	0.35[a]	0.18[a]	0.34[a]				
$\overline{Detrend}$	0.21[a]	0.14[b]	0.07	0.09	0.28[a]			
$\overline{UV}$	0.21[a]	0.14[b]	0.05	0.07	0.29[a]	0.96[a]		
$\overline{RESD}$	0.20[a]	0.13[c]	0.07	0.09	0.28[a]	0.94[a]	0.99[a]	
$\overline{SUV}$	0.21[a]	0.19[a]	-0.02	0.00	0.22[a]	0.90a	0.85[a]	0.84[a]

[a,b,c] indicate the significance at the 1, 5, 10% level, respectively.

spread: $\overline{CSSPRD}$) and $D(VDO)_i^{ex-ante}$ (*VDO =LNTO, Detrend, UW, RESD, and SUV*) or$\overline{LNTO}, \overline{Detrend}, \overline{UW}, \overline{RESD}, and\ \overline{SUV}$. Recall that the *ex-ante* level of DO is the mean of daily *VDO* estimates measured over the pre-event period.

As can be seen, all the *liquidity proxies* are highly correlated with expected signs. For example, *SIGMA* is positively significantly related to $\overline{CSSPRD}$ (correlation = 0.79), while it is negatively associated with *SIZE* (correlation = -0.54) and $\overline{DOLVOL}$ (correlation = -0.34). Consistent with the stylized fact documented in the literature, the large sample firms are characterized by high trading volume, low spread, and low residual standard deviation of returns compared to small firms. Since we are interested in the information content of $D(VDO)_i^{ex-ante}$, we focus on the comparison of $\overline{DOLVOL}$ and $\overline{LNTO}$ in terms of their relationship with the other *liquidity proxies*. While the correlation between *SIZE* and $\overline{DOLVOL}$ is 0.91, it declines to 0.35 for the correlation between *SIZE* and $\overline{LNTO}$. Moreover, if one considers both $\overline{LNTO}$ and $\overline{DOLVOL}$ as a liquidity proxy, the relationship between $\overline{LNTO}$ and *SIGMA* is the opposite of what one would expect (correlation = 0.18). As a liquidity proxy, $\overline{LNTO}$ should be negatively correlated with *SIGMA*. On contrary, $\overline{DOLVOL}$ has the expected negative sign on its correlation with *SIGMA* (correlation = -0.34). A similar inference can be made for $\overline{CSSPRD}$ since $\overline{DOLVOL}$ is negatively related with $\overline{CSSPRD}$, albeit insignificantly, as a liquidity proxy. However, again $\overline{LNTO}$ is significantly positively related with $\overline{CSSPRD}$. Therefore, while $\overline{LNTO}$ still has significant relationships with $\overline{DOLVOL}$ and *SIZE* (correlation = 0.67 and 0.35), the results in Table 8 indicate the information content of volume turnover, more specifically *daily turnover*, is not limited to or include more than liquidity. This finding is consistent with Lee and Swaminathan (2000).

For $\overline{Detrend}, \overline{UW}, \overline{RESD}, and\ \overline{SUV}$, they are all insignificantly related to the *liquidity proxies* except $\overline{DOLVOL}$ and *SIZE*. Yet, they are significantly related to $\overline{LNTO}$ and $\overline{DOLVOL}$ at the 1 % level, which is expected, given that all these variables are essentially measured from daily trading volume. Therefore, our evidence in Table 8 suggests that dollar trading volume is more closely associated with *liquidity*. But when it is scaled by the number of shares outstanding (*i.e.*, $\overline{LNTO}$), it represents more than *liquidity* as does $\overline{Detrend}, \overline{UW}, \overline{RESD}, and\ \overline{SUV}$. Furthermore, it renders support for our proposition that $D_i^{ex-ante}$ does not merely capture liquidity, but it may mirror the level of DO among investors

As we discuss in Section 4.B, one of the main predictions of dynamic DO models is a positive relation between return volatility and volume (*e.g.*, Banerjee & Kremer, 2010; Harris & Raviv, 1993; Scheinkman & Xiong, 2003). Consistent with this implication, we find that the correlation between $\overline{LNTO}$ and *SIGMA* equals to 0.18, and is statistically significant at the 1 % level. This evidence supports DO models' prediction if we regard $\overline{LNTO}$ as a proxy for disagreement. In the case of $\overline{DOLVOL}$, interestingly, the sign of the correlation with *SIGMA* reverses. As *SIGMA* is also widely used to measure *information asymmetry* in literature, then its negative correlation of -0.34 with $\overline{DOLVOL}$ shows its relevance as a measure of liquidity. These results point to two alternative interpretations or the duality of idiosyncratic volatility, which is revealed when it is related to $\overline{DOLVOL}$ as a *liquidity proxy* and $\overline{LNTO}$ as a *disagreement proxy*. Therefore, our results in Table 8 give us the confidence that the *ex-ante* levels of DO extrapolated from daily estimates of VDOs, especially $\overline{LNTO}$, do not simply mirrors the market liquidity of the samples.

Ex-Ante Disagreement Proxies versus Extant Disagreement Proxies

In this section, we attempt to establish empirical relevance of $D_i^{ex-ante}$ as a proxy for investor disagreement by directly comparing them with the extant DO proxies developed in literature, namely the *dispersion of analysts' earnings forecasts* by Diether et al. (2002) and *breadth of ownership* by Chen et al. (2002).

The *dispersion of analysts' earnings forecasts* for a given month is defined as the standard deviation of analysts' earnings-per-share (EPS) estimates for a current fiscal year. Since this measure shows how diverse analysts'—market participants who are deemed to be an efficient information processor, yet not privately informed—predictions about a firm's annual earnings, the more spread it is, the more obscure the firm's information environment. Thus, it is intuitively appealing as a *proxy for information asymmetry*, and has been used widely by researchers. In particular, Krishnaswami and Subramaniam (1999) utilize the analysts' forecasts of earnings in their analysis of the effect of information asymmetry on spinoff announcement returns. They show that, controlling for other known factors affecting the announcement returns, the *dispersion of analysts' forecasts* is positively related to the abnormal returns of a sample of spinoffs from 1979 to 1993.

However, Diether et al. (2002) suggest an alternative interpretation of the *dispersion of analysts' earnings forecasts*. They posit that the dispersion of analysts' forecast represents disagreement about the value of a stock rather than its level of *information asymmetry* and find that stocks with higher dispersion earn significantly lower future returns than stocks with lower dispersion. Their investigation is a direct test of Miller (1977)'s insight on the pricing of a stock. If the *dispersions of analysts'* *forecasts on earnings* reflect the level of DO among investors, a higher DO on the value of a stock (or the greater the slope of the demand curve of the stock) implies a greater upward bias in the market price relative to its true value, and hence its future return is expected to be lower.

Thus, the information content of *the analysts' forecast dispersion* seem open to dispute. Nonetheless, as our paper is closely related to Diether et al. (2002), we use it as a proxy for disagreement, and examine how it is related to the *ex-ante* level of DO. We utilize the Summary file from the Institutional Broker Estimate System (IBES). The Summary file is available in two versions, adjusted and unadjusted. Each version calculates monthly summary statistics (*e.g.* the mean and the standard deviation) of effective analyst forecasts on the earnings in a current fiscal year either from the adjusted or the unadjusted Detail file. The adjusted version uses analysts' earnings forecasts by taking into account of the effect of stock splits, which IBES applies to smooth the time series of the forecasts. Since Diether et al. (2002) point out rounding errors in the adjusted Detail file—though they show that the summary statistics from both files closely match each other—we use the unadjusted Summary file to collect the means and the standard deviations of analysts' earnings-per-share (EPS) forecasts for a current fiscal year (IBES fiscal period=1) for a period of 12 months ending a month prior to the month of a spinoff announcement. Further, following Garfinkel (2009) we scale a standard deviation of forecasts in month *m* with the absolute value of the mean of forecasts (*DISP1*) in that month or with the average of a monthly stock price as of month *m-1* and month *m* (*DISP2*). *DISP1* can be excessively large when the mean of forecasts are close to zero. To mitigate this concern, we estimate *DISP2* as well. In addition, we collect from the Summary file the *dispersion of analysts' forecasts on the long-term earnings growth* (*DISP3*). According to IBES, it is defined as a three- to five-year forecast of the expected annual increase in operating earnings over a firm's next full business cycle. Moeller et al. (2007) propose this measure as a proxy for disagreement for testing the effect of diversity of opinion on abnormal returns around acquisition announcements.[20] To be consistent with the method implemented for $D(VDO)_i^{ex-ante}$, for each sample we calculate the mean of *DISP1*, *DISP2* and *DISP3* over the pre-spinoff period or 12 months prior to the month of a spinoff announcement.

Finally, we add another proxy for DO, *breadth of ownership*. This measure is borne out of the theoretical and empirical work of Chen et al. (2002). Similar to Diether et al. (2002), the main focus for their work is based on Miller (1977) idea on investor disagreement and stock pricing. In search of more powerful proxy for investor disagreement, they demonstrate that *breadth of ownership*, which is defined as the number of investors in possession of a stock, can be a valuation indicator, hence a predictor for future returns. In other words, the *breadth of ownership* of a stock represents the slope of its demand curve in Miller (1997)'s model. When a small fraction of investors owns the stock (*i.e.*, optimists), while other pessimistic investors are kept out of the market due to short-sale constraints, the price of the stock is set at the valuation of a small fraction of optimistic investors. Thus, as the *breadth of ownership* reduces, the

[20] Moeller et al. (2007) argue that the advantages of long-term forecasts over yearly or quarterly forecasts on earnings are that 1) they are less affected by the timing of forecast issuance (or how close to a quarterly or yearly fiscal year end) and 2) that they are free of noise that are usually introduced to yearly or quarterly forecasts through normalization for comparison purpose across the sample firms. Since the long term forecasts are reported as a percentage, they are directly comparable across the sample firms and hence do not require any normalization.

Table 9. Spearman Correlations between Volume-based DO and Extant DO Proxies

The table shows Spearman rank correlations between various proxies for the *ex-ante* levels of differences of opinion and the extant difference-of-opinion proxies. Extant proxies: *BREADTH* and *HI* is the breadth of ownership and the Hirfindahl index of mutual fund holdings respectively as of quarter *q-1* where *q* is the quarter in which a spinoff is announced. *DISP1* is the standard deviation of analysts' forecasts on the current year's earnings divided by the average of forecasts. *DISP2* is the standard deviation of analysts' forecasts on the current fiscal year's earnings scaled by the average of the current and the previous month-end stock price. *DISP3* is the standard deviation of analysts' forecasts on three- to five-year expected annual increase (%) in operating earnings over the firm's next full business cycle. Over the pre-event period (*i.e.*, 12 months), monthly estimates of *DISP1*, *DISP2*, and *DISP3* are averaged to calculate the disagreement proxies. On day *t* during the pre-event period, each *VDO* is estimated, and averaged over the pre-event period to calculate the *ex-ante* level of differences of opinion ($\overline{LNTO}, \overline{Detrend}, \overline{UV}, \overline{RESD},\ and\ \overline{SUV}$). On any day in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The model takes daily absolute return (separately depending on the sign of daily return) as the independent variables is estimated over the control period. The pre-event period is defined as a 250-trading-day period that ends 11 days before the announcement date. *BK/MKT* is the book-to-market ratio calculated by dividing the book value of a sample firm (the sum of common equity, deferred taxes, and investment tax credit minus the book value of preferred shares) with the market capitalization by the fiscal year end prior to the announcement year. *E/P* is the earnings of a sample firm divided by the stock price by the fiscal year end prior to the announcement year.

	Obs	*BREADTH*	*HI*	*DISP1*	*DISP2*	*DISP3*	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$	*BK/MKT*
HI	205	-0.77[a]										
DISP1	171	-0.34[a]	0.49[a]									
DISP2	171	-0.38[a]	0.57[a]	0.90[a]								
DISP3	140	-0.16[c]	0.12	0.53[a]	0.41[a]							
$\overline{LNTO}$	187	0.45[a]	-0.61[a]	-0.21[a]	-0.31[a]	0.21[a]						

[a,b,c] indicate the significance at the 1, 5, 10% level, respectively.

Table 9. Spearman Correlations between the Volume-Based and the Extant Differences-of-Opinion Proxies, Continued

	Obs	*BREADTH*	*HI*	*DISP1*	*DISP2*	*DISP3*	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$	*BK/MKT*
$\overline{Detrend}$	187	0.13[c]	-0.05	-0.06	-0.05	-0.04	0.19[a]					
$\overline{UV}$	187	0.12[c]	-0.03	-0.02	-0.05	-0.01	0.17[b]	0.93[a]				
$\overline{RESD}$	187	0.10	-0.03	0.01	-0.04	0.01	0.16[b]	0.91[a]	0.98[a]			
$\overline{SUV}$	187	0.15[b]	-0.08	-0.04	-0.05	-0.04	0.19[a]	0.95[a]	0.90[a]	0.89[a]		
BK/MKT	162	-0.36[a]	0.44[a]	0.52[a]	0.63[a]	0.25[a]	-0.28[a]	-0.02	0.01	0.02	-0.01	
E/P	145	-0.06	0.15[c]	-0.04	0.19[b]	-0.12	-0.18[b]	0.05	0.04	0.02	0.04	0.42[a]

[a,b,c] indicate the significance at the 1, 5, 10% level, respectively.

stock is more overpriced relative to its fundamental value since the ownership of the stock become more concentrated to investors with the highest valuation of the stock.

Following Chen et al. (2002), we gather quarterly equity holdings of the mutual funds established in the U.S for our study period from CDA/Spectrum. The *Breadth of ownership* (*BREADTH*$_q$) of a sample firm is defined as the ratio of the number of mutual funds that own the sample stock to the total number of mutual funds in quarter q. We measure it by the quarter end prior to the quarter in which a spinoff announcement is made. In addition, as a complementary measure to *BREADTH*$_q$, we estimate a change in the Herfindahl Index of mutual fund holding (*HI*$_q$). For a sample stock, we compute the percentages of mutual funds' holding of the stock, and square and sum them to get *HI*$_q$. One advantage of this measure is that it reflects a degree of concentration of a sample firm's share within mutual funds industry, while *BREADTH*$_q$ mirrors a degree of ownership concentration (*i.e.*, the number of mutual funds that own the stock).

In Table 9,[21] we present the Spearman rank correlations between the extant disagreement proxies (*BREADTH*, *HI*, *DISP1*, *DISP2*, and *DISP3*) and the proxies for the *ex-ante* level of DO measured fom daily VDO estimates ($D_i^{ex-ante} = \overline{LNTO}, \overline{Detrend}, \overline{UW}, \overline{RESD}, or\ \overline{SUV}$). In the first column, as we expect, *BREADTH* is highly negatively correlated with *HI* (correlation = -0.77); notice that all the correlations of *HI* have the opposite sign of those of *BREADTH*. As the shares of a sample firm become more concentrated (*i.e.*, higher HI ratio), the *breadth of ownership* or the number of

[21] Obs in the first column in Table 9 shows the numbers of the sample firms in the correlation between *BREADTH* and all the other DO proxies. The number of observation changes because of differential availability of the data for *BREADTH*, *HI*, *DISP 1* to *3*, *BK/MKT*, and *E/P* for the sample firms. Requiring the complete data, we have 96 firms. Since there is no material difference between correlation computed with all the available data or the complete data set, we report the correlations computed with all the available data.

mutual funds that are in long position of the stock decreases as well. In other words, when the stock is owned by a small number of mutual funds relative to all existing mutual funds, these mutual funds also tend to have a large position in the stock.

Observe that *BREADTH* and *HI* (in the first and second column) have the significant correlations with correct directional signs with *DISP1* and *2*, but not with $\overline{LNTO}, \overline{Detrend}, \ \overline{UW}, \overline{RESD}, and\ \overline{SUV}$. As a lower *BREADTH* and a higher *HI* implies a higher level of disagreement, *BREADTH* and *HI* are negatively and positively correlated with *DISP1* and *2* respectively. Firms with a lower *BREATH (HI*) have a greater (less) *dispersion of analysts' forecasts*. But, this interpretation is based on the implicit assumption that the proxies measured from analyst forecasts on earnings properly capture disagreement among investors. As we addressed previously, there is a little consensus about the role of the *dispersion of analysts' forecasts* in the literature. For the volume-based DO proxies, the correlation signs are opposite of what we expect: Positive correlations with *BREADTH* and negative correlation with *HI*. With the sample of NYSE, AMEX, and NASDAQ stocks for a period 1979 – 1998 Chen et al. (2002) find that *breath of ownership* in level is in effect a permanent firm characteristic marked by a high correlation with firm size and volume turnover as well as a high first order autocorrelation. Thus, the correlations between disagreement proxies measured with the mutual fund ownership data and the volume-based DO proxies seem to reflect the fact that mutual funds tend to hold large, liquid stocks.

In most cases, *DISP*'s correlations with $D_i^{ex-ante}$ are negative, which is opposite of what we expect since a higher level of *DISP* would indicate a higher level of $D_i^{ex-ante}$, assuming both represent a degree of disagreement about the values of a sample firm among investors. However, an exceptional case is the relationship between $\overline{LNTO}$ and *DISP3*. Consistent with Moeller et al. (2007)'s use of *DISP3* as a proxy for investor opinion divergence, *DISP3* is positively and significantly associated with $\overline{LNTO}$ (correlation = 0.21). As can be seen in Table 9, it is the only statistically significant relationship with the correct sign (as a disagreement indicator) among correlations between the extant disagreement proxies (including *BREADTH* and *HI*) and $D_i^{ex-ante}$. Note also that *DISP1* and *DISP2* are highly correlated with $\overline{LNTO}$, but with a opposite directional sign. The correlation should be positive because a higher level of DO implies a higher *dispersion in the analysts' forecasts* and a higher value of $\overline{LNTO}$.

Since *DISP1* and *DISP2* have been widely used as a measure of *liquidity*, we examine whether the interpretation of *DISP1* and *DISP2* as a *liquidity proxy* rather than a disagreement proxy is more relevant. We choose dollar trading volume as a liquidity indicator to highlight dissimilarity between dollar trading volume ($\overline{DOLVOL}$) and volume turnover ($\overline{LNTO}$). Above all, we note that there is a strong trend in *DISP1* and *DISP 2* over our study period. The correlation with the sub-periods assigned to the samples is -0.35 for *DISP1* and -0.48 for *DISP2*, while it is -0.06 for *DISP3*. Because of a secular upward trend in $\overline{DOLVOL}$ and $\overline{LNTO}$ and a downward trend in *DISP1* and *2* across the sample firms over the study period, we control for the sub-periods in computing the following correlations.

When *DISP1* and *DIPS2* is correlated with $\overline{DOLVOL}$, we find that they are significantly associated, having the correlation coefficient of -0.38 and -0.43, respectively. In contrast, the corresponding correlations of *DISP1* and *DISP2* with $\overline{LNTO}$ are insignificant with the correlation of -0.05 and -0.11 respectively. Moreover, consistent with the interpretation of *DISP3* as a disagreement proxy, *DISP3* is insignificantly related to $\overline{DOLVOL}$ (correlation = -0.05), but it is significantly positively related to $\overline{LNTO}$ (correlation = 0.26). Therefore, we argue that this result shows that the information content of $\overline{DOLVOL}$ and $\overline{LNTO}$ clearly differ in that the latter represents the extent of *investor disagreement* rather than the *market liquidity* of the sample firms.

Finally, we investigate how the proxies for DO are related to pricing indicators (*i.e*., the book-to-market ratio and the earnings-to-price ratio). As we discussed in Hypothesis Development, if disagreement among investors causes the slope of the demand curve for a firm to become downward sloping (Miller, 1977), firms with a higher level of $D_i^{ex-ante}$ and the extant DO proxies (*i.e*., a higher slope of the demand curve) should be overpriced compared to those with a lower level of DO in the pre-event period. For *BREADTH*, we expect a *positive* correlation with those pricing indicators and for the rest of the DO proxies a *negative* correlation. Following French and Fama (1993), we define the book-to-market ratio (*BK/MKT*) as the ratio of the book value to the market value of a firm by the fiscal year-end prior to a spinoff announcement year. The book value of the common equity is the sum of common equity, deferred taxes, and investment tax credit minus the book value of preferred shares and the market value is the product of the number of shares outstanding and the stock price by the fiscal year end. The earnings-to-price ratio (*E/P*) is the earnings of a sample firm divided by the stock prices by the fiscal year end prior to the announcement year.

As can be seen in the 11^{th} and 12^{th} row in Table 9, only $\overline{LNTO}$ has both the correct negative sign and the significant correlations with *BK/MKT* and *E/P* (correlation = -0.28 and -0.18, respectively). However, all the other volume-based DO proxies have statistically insignificant correlation with the pricing indicators. Firms with higher volume turnover tend to have lower *BK/MTK* ratios, consistent with the prediction of Miller (1977) and the finding of Lee and Swaminathan (2000) in which stocks with low turnover have greater factor loading in HML than those with high turnover.[22] For *BREADTH* and *HI*, the correlations with both value indicators are in the opposite direction to what we expect, reflecting a tendency that mutual funds hold glamour stocks (Chen, Hong, & Stein, 2002).

All the *dispersion measures of analysts' forecasts* have positive and significant correlation with *BK/MKT*, which contradicts the expected negative correlation, if they are a proxy for disagreement. In particular, the correlation is especially strong for *DISP1* (= 0.50) and *DISP2* (= 0.61), while it declines almost by half for *DISP3* (= 0.23) though *DISP1* and *DISP3* have the expected, but insignificant correlation with *E/P*. Therefore, we conclude this evidence strengthen our previous finding that *DISP1* and *DISP2* do not capture the level of DO, but rather reflect *market liquidity*.

In sum, our analysis of the correlations between the extant disagreement proxies and the volume-based DO ($D_i^{ex-ante}$) proxies—in an attempt to establish them as proper proxy for the level of investor disagreement or the slope of the demand curve for a sample firm —reveals the followings: First, $\overline{LNTO}$ that involves no adjustment at all except scaling daily trading volume by outstanding shares, seems to reflect more about

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[22] Piqueria (2006), using NYSE and NASDAQ samples for the period from 1993-2002 documents the correlation between volume turnover and *BK/MKT* of -0.06 for NYSE firms and -0.143 for NASDAQ firms. Similarly, Chen et al. (2002), for the sample of NYSE, AMEX, and NASDAQ stocks from 1979 to 1998, report the correlation of -0.10 between volume turnover and *BK/MKT* and the correlation of -0.09 between volume turnover and *E/P*. Both studies use *monthly volume turnover* demeaned by a corresponding exchange trading volume.

the extent of *diversity of investors opinion* regarding the value of a stock than *the level of liquidity*. Second, as we show in the previous and this section, $\overline{Detrend}, \overline{UW}$, $\overline{RESD}$, *and* $\overline{SUV}$ are related neither to the popular *liquidity proxies* or to the extant *disagreement proxies*. Nonetheless, in addition to the evidence that they are highly positively correlated with $\overline{LNTO}$, we argue that their empirical relevance as a proxy for disagreement are validated by the test results of the hypotheses in the next section.

Disagreement and Abnormal Return in the Spinoff Announcement Period

For the estimation of abnormal returns, we implement the standard event-study methodology in which benchmark parameters are measured during the pre-event period. We use two different benchmarks: The mean of daily stock return over the pre-event period (AD-260, AD-11), and the expected stock return calculated with the parameters of the market model for daily return estimated over the same period. During the event period (AD-1, AD+1), we compute a *mean-adjusted* abnormal return by subtracting the mean daily return from a daily stock return. Similarly, we calculate a *market-adjusted* abnormal return by subtracting the expected stock return estimated with the parameters from a daily return. The market returns in the calculation of the market-adjusted abnormal return is based on the returns on the CRSP value- as well as equal-weighted portfolio of returns for all NYSE/AMEX/NASDAQ stocks. To test statistical significance of abnormal return (AR) or three-day cumulative abnormal return (CAR), we use the standard deviation of AR and CAR in the cross-section of the sample. Specifically, the *t*-statistic for AR (or CAR) on day *t* is given by

$$t_{AR} = \overline{AR_t} \Big/ \frac{\sigma(AR_{i,t})}{\sqrt{n}} \qquad (10)$$

where $\overline{AR_t}$ and $\sigma(AR_{i,t})$ are, respectively, the sample average and the standard deviation of abnormal returns, which are calculated in the cross-section of n sample firms (Barber & Lyon, 1997).

The same approach is implemented for testing statistical significance of the level of disagreement in the event period. The statistic is given by

$$t_{VDO} = \overline{VDO_t} - \overline{D(VDO)^{ex-ante}} \Big/ \frac{\sigma(VDO_{i,t})}{\sqrt{n}} \quad (11)$$

where $\overline{D(VDO)^{ex-ante}} = \frac{1}{n}\sum_{i=1}^{i=n} D(VDO)_i^{ex-ante}$, $D(VDO)_i^{ex-ante} = \frac{1}{250}\sum_{t=-260}^{t=-11} VDO_{i,t}$ and the five volume-based measure of DO (or *VDO*) are *LNTO*, *Detrend*, *UV*, *RESD*, and *SUV*. On event day *t*, $\overline{VDO_t}$ and $\sigma(VDO_{i,t})$ are the sample average and the standard deviation of VDO, both of which are calculated in the cross-section of *n* sample firms.

Table 10 reports daily abnormal return from AD-10 to AD+10 in which AD is the date of a spinoff announcement. Since there is no material difference in either using the value-weighted or the equal-weighted market returns, we report abnormal returns computed with the value-weighted market returns. There is no discernible abnormal price reaction before AD-1. But, the abnormal return on AD-1, AD and AD+1 is significantly positive in both measures of abnormal return. Note that on AD+2, the market-adjusted AR is significantly negative at the 5% level. Following AD+2, most of days are marked by negative ARs. There appears to be a reversal of the returns earned during the announcement period in the days following the announcement. For the event window (AD-1, AD+1), the mean of three-day market-adjusted and mean-adjusted CARs equals

Table 10. Abnormal Returns in the Announcement Period

This table reports the abnormal returns of the spinoff sample days surrounding the date of a spinoff announcement. The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005. The sample firms are further required to have at least 80% of daily returns during the pre-event period. The final sample consists of 202 firms. The pre-event period is defined as a 250-trading -day period over AD-260 to AD-11 (AD is the announcement date). A market model for daily returns is estimated over the pre-event period to compute a market-model adjusted abnormal return in an event day. The market returns are the CRSP value-weighted portfolio of returns of all NYSE/AMEX/NASDAQ stocks. A mean-adjusted abnormal return is calculated by subtracting the mean of daily returns during the pre-event period from a daily return. CAR is the cumulated abnormal returns for the announcement period, (AD-1, AD+1). The *t*-statistics are reported in parentheses.

Date	Obs	Market-model adjusted abnormal return (%)		Mean-adjusted abnormal return (%)	
-10	202	0.134	(0.833)	0.109	(0.640)
-9	202	-0.138	-(0.845)	-0.134	-(0.765)
-8	202	0.169	(1.006)	0.204	(1.105)
-7	202	0.180	(1.199)	0.218	(1.314)
-6	202	-0.122	-(0.792)	-0.131	-(0.842)
-5	202	-0.058	-(0.276)	0.058	(0.261)
-4	202	-0.141	-(0.808)	-0.185	-(0.955)
-3	202	0.103	(0.505)	0.022	(0.104)
-2	202	0.119	(0.472)	0.157	(0.607)
-1	202	1.367	(5.230)	1.478	(5.519)
(AD) 0	202	1.647	(3.901)	1.589	(3.756)
1	202	0.439	(1.541)	0.545	(1.956)
2	202	-0.335	-(2.043)	-0.254	-(1.449)
3	202	-0.127	-(0.708)	-0.052	-(0.286)
4	202	-0.288	-(1.338)	-0.184	-(0.809)
5	202	-0.070	-(0.304)	-0.163	-(0.658)
6	202	0.142	(0.813)	0.130	(0.681)
7	202	-0.228	-(1.631)	-0.190	-(1.221)
8	201	-0.214	-(1.217)	-0.134	-(0.723)
9	201	0.257	(1.253)	0.158	(0.757)
10	200	0.097	(0.610)	0.127	(0.741)
CAR (AD-1, AD+1)		3.452	(6.160)	3.612	(6.400)

to 3.45% and 3.61% with the t-statistic of 6.16 and 6.40, respectively. Our result is consistent with the finding of the prior spinoff literature. For example, Veld and Veld-

Merkoulova (2009) review 26 empirical studies on spinoff announcements, and find that spinoff announcements generate, on average, a 3.02% of abnormal return. In all our subsequent tests to follow, we focus on CARs in this event window. As can be seen in Table 10, a significant market reaction starting AD-1 suggests a leakage of news, partial anticipation of news, or delayed news reporting. Hence, we use three-day CAR around the announcement for testing our hypotheses.

In Table 11, we report the cross-sectional mean of the event level of DO, or $\overline{VDO_t} = \frac{1}{202}\sum_{i=1}^{i=202} VDO_{i,t}$, for each day from AD-10 to AD+11. For any measure of VDO, there is no significant change in the disagreement level before the announcement period (*i.e.*, AD-1, AD+1). However, starting from AD-1 it increases significantly, peaks in the actual announcement date, and then gradually declines until AD+10. Even after the announcement date, the level of DO is significantly larger than the *ex-ante* level of DO. This pattern in abnormal trading activity has been also observed for other important corporate announcements.[23] In the rational expectation paradigm in which investors have common priors and interpret information in the same way, the same pattern does not emerge since investors reach consensus quickly regarding the firm value following the announcement (Hong & Stein, 2007). Thus, this pattern seems to suggest that investors continue to trade based on their own interpretations even several days after the announcement.

At the bottom of Table 11, we present the test result for Hypothesis 1. For each sample firm, we calculate the event level of DO as the mean of a VDO over the

[23] For example, see Figure 4 in Hong and Stein (2007) for quarterly earnings announcement and Table 3 in Chae (2005) for acquisition announcement.

Table 11. Event Level of DO in the Announcement Period

The sample consists of 221 spinoff announcements undertaken by the publicly traded U.S firms from 1964 to 2005. The sample firms are further required to have at least 80% of daily VDOs (volume-based measure of difference of opinion) during the pre-event period. The final sample consists of 202 firms. The table presents the cross-sectional means of the event level of differences of opinion in the announcement period starting from 10 days before and ending 10 days after the announcement date (AD). Five VDOs are *LNTO*, *Detrend*, *UV*, *RESD*, and *SUV*. On any day in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The model takes daily absolute return (separately depending on the sign of daily return) as the independent variables is estimated over the control period. The pre-event period is defined as a 250-trading-day period that ends 11 days before the announcement date. The *t*-statistic for testing the null hypothesis that there is no difference between the *ex-ante* level of disagreement and the event level of disagreement is given by $t_{VDO} = \overline{VDO_t} - \overline{D(VDO)^{ex-ante}} \Big/ \frac{\sigma(VDO_{i,t})}{\sqrt{n}}$, $\overline{D(VDO)^{ex-ante}} = \frac{1}{n}\sum_{i=1}^{i=n} D(VDO)_i^{ex-ante}$, $D(VDO)_i^{ex-ante} = \frac{1}{250}\sum_{t=-260}^{t=-11} VDO_{i,t}$. On day *t* in the event period, (AD-10, AD+10), $\overline{VDO_t}$ and $\sigma(VDO_{i,t})$ are the sample average and the standard deviation of *VDOs*, both of which are calculated in the cross-section of the sample firms. The *t*-statistics are reported in parenthesis.

Date(*t*)	Obs	*LNTO*		*Detrend*		*UV*		*RESD*		*SUV*	
-10	202	-6.27	(0.63)	0.05	(0.76)	0.04	(0.89)	0.04	(0.84)	0.07	(0.90)
-9	202	-6.32	(0.11)	0.01	(0.06)	-0.01	-(0.01)	-0.02	-(0.06)	0.00	-(0.05)
-8	202	-6.26	(0.73)	0.06	(0.90)	0.03	(0.81)	0.03	(0.63)	0.01	(0.16)
-7	202	-6.29	(0.49)	0.04	(0.53)	0.01	(0.44)	0.02	(0.44)	-0.01	-(0.18)
-6	202	-6.37	-(0.45)	-0.04	-(0.78)	-0.04	-(0.43)	-0.03	-(0.24)	-0.07	-(1.01)
-5	202	-6.28	(0.56)	0.04	(0.66)	0.02	(0.65)	0.03	(0.61)	0.00	(0.05)

Table 11. Event Level of DO in the Announcement Period, Continued

Date(*t*)	Obs	*LNTO*		*Detrend*		*UV*		*RESD*		*SUV*	
-4	202	-6.32	(0.10)	0.01	(0.03)	-0.02	-(0.04)	-0.01	-(0.04)	0.04	(0.45)
-3	202	-6.20	(1.42)	0.12	(1.72)	0.11	(1.80)	0.10	(1.71)	0.12	(1.62)
-2	202	-6.20	(1.48)	0.12	(2.02)	0.10	(2.03)	0.10	(1.99)	0.12	(1.58)
-1	202	-5.90	(4.57)	0.42	(5.65)	0.38	(5.61)	0.38	(5.56)	0.34	(4.16)
(AD) 0	202	-5.38	(10.94)	0.94	(13.86)	0.91	(13.84)	0.89	(13.46)	0.88	(10.26)
1	202	-5.65	(7.46)	0.67	(9.14)	0.63	(9.19)	0.62	(8.78)	0.77	(8.54)
2	202	-5.84	(5.99)	0.47	(7.24)	0.46	(7.71)	0.44	(7.29)	0.64	(7.82)
3	202	-6.02	(3.40)	0.29	(4.23)	0.27	(4.41)	0.27	(4.21)	0.41	(4.98)
4	202	-6.05	(3.44)	0.25	(4.06)	0.26	(4.53)	0.25	(4.29)	0.36	(4.55)
5	202	-6.01	(4.15)	0.30	(4.71)	0.29	(5.04)	0.28	(4.88)	0.29	(3.73)
6	202	-6.12	(2.39)	0.19	(2.81)	0.19	(3.09)	0.18	(2.92)	0.20	(2.67)
7	202	-6.21	(1.26)	0.09	(1.37)	0.11	(2.23)	0.10	(1.89)	0.15	(2.08)
8	201	-6.10	(2.76)	0.20	(3.21)	0.22	(4.07)	0.22	(3.86)	0.27	(3.65)
9	201	-6.14	(2.16)	0.16	(2.39)	0.18	(2.89)	0.17	(2.69)	0.20	(2.85)
10	200	-6.14	(2.18)	0.16	(2.25)	0.15	(2.53)	0.15	(2.44)	0.22	(2.66)
$\overline{D^{event}}$		-5.64		0.68		0.64		0.63		0.66	
$\overline{D^{ex-ante}}$		-6.33		0.00		-0.01		-0.01		0.00	
Difference		0.68	(8.94)	0.67	(12.73)	0.65	(12.96)	0.64	(12.62)	0.66	(10.83)

announcement period ($D_i^{event} = \frac{1}{3}\sum_{t=-1}^{t=1} VDO_{i,t}$). As can be seen in Table 11, in support of Hypothesis1, the mean of the event levels of DO (*i.e.*, $\overline{D^{event}} = \frac{1}{202}\sum_{i=1}^{i=202} D_i^{event}$) is significantly larger than that of the *ex-ante* level of DO (*i.e.*, $\overline{D^{ex-ante}} = \frac{1}{202}\sum_{i=1}^{i=202} D_i^{ex-ante}$) in all VDOs with the *t*-statistics greater than 8.94. As the news of a corporate spinoff arrives in the market, it spurs differential interpretation among investors regarding the prospect of the firm following spinoff. Thus, consistent with Hypothesis 1, the event level of disagreement is significantly larger than the *ex-ante* level of disagreement. This implies that the announcement of a spinoff trigger highly differential interpretation of the announcement among investors.

Test Results of Hypotheses

A. *The Event Level of Disagreement and Abnormal Return*. We first test a prediction of Banerjee and Kremer (2010)'s model: When there is a sharp increase in investor disagreement prompted by a public announcement of the news, the model predicts that trading volume and return are increasing in proportion to the degree of disagreement. Therefore, firms affected by greater disagreement about the announcement of a spinoff (*i.e.* higher event level of DO) should earn higher returns. We sort the sample firms into the quintiles based on their estimated event levels of DO (as we defined in the previous section) and compute the mean of the three-day cumulative abnormal returns in each quintile.

Table 12 reports the relationship between the event level of DO (henceforth Event DO) and the three-day CARs. Consistent with the model, as Event DO quintile increases, the mean of CAR rises in tandem. This positive relation between Event DO and CAR is

Table 12. Event Level of DO and Announcement Abnormal Return

This table presents the relations between the event levels of DO and the abnormal announcement returns. On any day in the pre-event period, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. A market-wide daily log turnover is the value-weighted log turnovers of NYSE/AMEX firms. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. The pre-event period is defined as a 250-trading-day period that ends 11 days before the announcement date. On day *t* during the event window of (AD-1, AD+1), each *VDO* (*LNTO, Detrend, UV, RESD, SUV*) is estimated, and averaged over the same window to calculate the event level of DO. The sample firms are sorted into the quintile based on the estimated event levels of DO (EventDO). In each qunitile, the mean of EventDO and cumulative abnormal returns (CAR) over the event window is calculated across the samples. The *t*-tests for the difference in the means (Panel 1), assuming an unequal variance, and the Wilcoxon-rank-sum tests for difference in the medians (Panel 2) are calculated by using cross-sectional distribution of CARs and EventDOs. The Spearman rank correlations are the sample correlations between EventDOs and CARs of the entire sample firms.

Panel 1. The mean of the event-levels of differences of opinion and three-day CARs

		LNTO		*Detrend*		*UV*		*RESD*		*SUV*	
Rank	Obs	EventDO	CAR	EventDO	CAR	EventDO	CAR	EventDO	CAR	EventDO	CAR
(Low)1	40	-7.22	2.54	-0.31	0.64	-0.27	1.43	-0.29	1.28	-0.51	1.59
2	41	-6.17	2.29	0.29	1.74	0.27	0.70	0.25	1.40	0.21	4.34
3	40	-5.56	2.53	0.58	2.79	0.55	3.18	0.53	3.15	0.62	4.94
4	41	-5.05	5.20	1.02	3.82	0.91	3.30	0.90	3.24	1.08	3.30
(High)5	40	-4.22	4.69	1.80	8.30	1.75	8.72	1.76	8.25	1.93	3.08
	202										
Difference:											
High-Low		3.00[a]	2.15	2.11[a]	7.66[a]	2.02[a]	7.29[a]	2.05[a]	6.97[a]	2.44[a]	1.49
Rank correlation			0.17[a]		0.34[a]		0.34[a]		0.32[a]		0.09

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

Table 12. Event Level of DO and Announcement Abnormal Return, Continued

Panel 2. The median of the event-levels of differences of opinion three-day CARs

		LNTO		*Detrend*		*UV*		*RESD*		*SUV*	
Rank	Obs	EventDO	CAR	EventDO	CAR	EventDO	CAR	EventDO	CAR	EventDO	CAR
(Low)1	40	-6.98	1.49	-0.21	0.18	-0.17	1.22	-0.20	0.92	-0.46	1.22
2	41	-6.14	2.22	0.30	1.46	0.27	0.56	0.26	1.75	0.21	3.04
3	40	-5.53	1.75	0.58	3.05	0.57	2.60	0.53	2.99	0.61	2.42
4	41	-5.12	4.68	1.05	3.96	0.89	3.81	0.92	3.43	1.10	3.43
(High)5	40	-4.33	5.72	1.71	8.58	1.70	8.58	1.65	8.46	1.74	4.74
	202										
Difference:											
High - Low		2.65[a]	4.23[c]	1.92[c]	8.40[a]	1.87[a]	7.36[a]	1.85[a]	7.54[a]	2.20[a]	3.52[c]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

consistently observed for any VDO except *SUV*. For example, when the quintiles are formed based on detrended turnover (*Detrend*), firms in the lowest quintile—equivalently firms with the lowest level of disagreement on their valuation following the announcement of a spinoff — earn the mean CAR of 0.64%, while those in the highest quintile earn 8.30%. Using the unpaired *t*-test for the difference in the mean CAR and the nonparametric Wilcoxon Rank Sum test for the difference in the median CAR, we find that the difference in the mean CAR (difference = 7.66%) and the median CAR (difference= 8.40%) between the highest and the lowest quintile are significant at the 1% level.

In addition, we measure the strength of the relationship between Event DO and CAR across all the sample firms by a Spearman rank correlation. For all Event DO, except *SUV*, the correlations range from 0.17 to 0.34, and are significant at the 1% level. In the case of *SUV*, recall that *SUV* is intended to measure a portion of disagreement-driven trading volume after controlling for the average firm-specific level of liquidity trading and trading motivated by private information (see equation 7). The measurement of *SUV* treats a whole announcement return as if it is solely driven by informed trading. Therefore, during the announcement period the expected daily volume turnover estimated by *SUV* might also capture a portion of volume turnover related to disagreement, which should be reflected on announcement returns. We find no such pattern emerge between CAR and *SUV*.

B. *Disagreement Shock and Abnormal Return*. We test the second hypothesis in this section by combining Banerjee and Kremer (2010)'s time-varying level of DO with Miller (1977)'s DO model. Hypothesis 2 states that there should be a positive correlation between disagreement shock and abnormal return in the announcement period. If a firm publicly announces its spinoff decision, the announcement sparks heterogeneous interpretation about the news among investors, raising the level of DO to the event level during the event period from the *ex-ante* level in the pre-event period. In Miller (1977)'s model, it is the presence of disagreement about the valuation of the stock that induces its demand curve downward-sloping. Thus, in this two-period setting (*i.e.*, the pre-event and the event period), a change in the level of DO implies a corresponding change in the slope of the demand curve. Since a spinoff announcement entails no change in the float (*i.e.*, the supply curve), firms affected by a larger change in the slope of a demand curve, or a greater change in the level of DO, should have larger abnormal returns. Note that in the prior section we examined the relationship between the event level of DO and abnormal return. But, in this section we focus on the magnitude of a change in the level of DO or disagreement shock and its effect on the prices of the sample during the event period.

We define the disagreement shock (henceforth SHOCK) as a difference between the event and the *ex- ante* level of DO or ($\Delta D_i \equiv D_i^{event} - D_i^{ex-ante}$). As we discussed in Methodology section, $D_i^{ex-ante}$ is measured to reflect the normal level of DO of a firm in a *typical* trading day and thus can be considered as a pre-spinoff firm characteristic. Similarly, D_i^{event} proxies for the elevated or abnormal level of DO in the announcement period.

In Table 13, we sort the sample firms into the quintiles according to their sizes of SHOCK, and compute the mean and the median of CAR and SHOCK in each quintile. Under Hypothesis 2, as the mean value of SHCOK in each quintile increases, so does the

Table 13. Disagreement Shock and Announcement Abnormal Return

This table presents the relations between the disagreement shocks and the abnormal announcement returns. The shock on the level of difference of opinion (DO) or the disagreement shock is calculated by subtracting the *ex-ante* level of differences of opinion (DO) from the event level of DO. The event level of DO is measured by averaging daily estimates of a VDO (VDO = *LNTO*, *Detrend*, *UV*, *RESD* and *SUV*) over the event window of (AD, AD+1). The *ex-ante* level of DO is measured by averaging daily estimates of a VDO over the pre-event period or (AD-260, AD-11). During the pre- and event period on any day, five VDOs are estimated as follows with a 200-day control period prior to day *t*: Log Turnover (*LNTO*) is the natural logarithm of daily volume turnover. Volume turnover is the ratio of the number of the shares traded to the total number of shares outstanding on that day. *Detrend* is calculated by subtracting the average of daily trading volume over the control period. Unexplained Volume (*UV*) is computed by first subtracting the market-wide log turnover, which gives the market-adjusted turnover (*MATO*). And it is further adjusted by the mean of *MATO* over the control period. *RESD* is the residual from a one-factor market model of daily log turnover that is estimated over the control period. Standardized Unexplained Volume (*SUV*) is the residual from a two-factor model of daily log turnover, which is further scaled by the standard deviation of the error terms of the model. A daily abnormal return is a residual calculated from the market model, using the value-weighted market returns, estimated over the pre-event period. CAR is the sum of abnormal returns during the announcement period. The *t*-tests for the difference in the means (Panel 1), assuming an unequal variance, and the Wilcoxon-rank-sum tests for the difference in the medians (Panel 2) are calculated by using the cross-sectional distribution of CARs and Shocks. The Spearman rank correlations are the sample correlations between Shocks and CARs of the entire sample firms.

Panel 1. The mean of disagreement shocks and three-day CARs

		LNTO		*Detrend*		*UV*		*RESD*		*SUV*	
Rank	Obs	Shock	CAR	Shock	CAR	Shock	CAR	Shock	CAR	Shock	CAR
(Low)1	40	-0.30	0.59	-0.37	0.80	-0.29	0.67	-0.29	0.85	-0.55	1.12
2	41	0.29	2.59	0.28	1.61	0.28	0.99	0.26	0.40	0.21	5.43
3	40	0.58	2.48	0.62	2.25	0.58	2.42	0.55	3.26	0.62	4.53
4	41	1.02	3.57	1.05	5.15	0.96	4.95	0.95	4.03	1.07	2.33
(High)5	40	1.84	8.06	1.79	7.46	1.74	8.26	1.74	8.79	1.96	3.82
	202										
Difference:											
High - Low		2.14[a]	7.47[a]	2.16[a]	6.66[a]	2.03[a]	7.59[a]	2.03[a]	7.94[a]	2.51[a]	2.70[c]
Rank correlation			0.33[a]		0.38[a]		0.39[a]		0.38[a]		0.14[b]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively

Table 13. Disagreement Shock and Announcement Abnormal Return, Continued

Panel 2. The median of disagreement shocks and three-day CARs

		LNTO		*Detrend*		*UV*		*RESD*		*SUV*	
Rank	Obs	Shock	CAR	Shock	CAR	Shock	CAR	Shock	CAR	Shock	CAR
(Low)1	40	-0.19	0.67	-0.27	0.67	-0.14	0.27	-0.20	0.27	-0.42	0.92
2	41	0.29	2.54	0.28	0.96	0.28	0.96	0.27	0.96	0.24	2.79
3	40	0.57	2.48	0.61	2.38	0.58	2.11	0.56	2.42	0.63	3.04
4	41	1.03	3.81	1.06	5.49	0.94	4.89	0.93	4.97	1.06	3.32
(High)5	40	1.76	8.09	1.71	8.58	1.62	8.66	1.66	8.66	1.83	4.78
	202										
Difference:											
High - Low		1.95[a]	7.42[a]	1.98[a]	7.91[a]	1.76[a]	8.39[a]	1.86[a]	8.39[a]	2.25[a]	3.86[a]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively

mean CAR. The differences in the mean CAR and the median CAR between the top and the bottom quintiles are significant at the 1 % level regardless of a VDO we choose to measure SHOCK except *SUV*, which is significant at the 10 % level. The sample firms in the top quintile on average earn about 7% more than those in the bottom quintile during the announcement period. Moreover, in the cross-section of the entire sample, SHOCK is significantly and positively related to CAR with the Spearman rank correlation ranging from 0.39 to 0.14.

Frazzini and Lamont's (2006) study of stocks returns and trading volume around earnings announcement offers the findings that can be interpreted within our analytical framework. They document that abnormal returns are on average positive, and trading volume increases sharply around earnings announcement dates. Since those announcements include both good and bad news, the on-average positive abnormal return (*i.e.*, the earnings announcement premium) can be explained by disagreement shock resulted from a heightened level of disagreement among investors that is brought forth by earnings announcements. The elevated level of disagreement is also reflected in abnormally high trading volume during the earnings announcement period. Note that this event itself does not involve a change in the float as the announcement of a spinoff does not. As we discussed in the preceding two sections, spinoff announcements also elicit such market reactions as highly elevated level of trading volume and positive abnormal return.

Note that the overall correlations reported in Table 13 are higher than those in Table 12. In particular, the correlation between SHOCK measured with *SUV* and CAR is significant at the 5 % level. But, recall that the correlation between the event level of DO and CAR is insignificant in Table 12. This suggests that disagreement shock rather than disagreement in levels better captures the variations in the abnormal returns during the event period. More importantly, our result implies further that the interpretation of the level of DO as the slope of the demand curve is pertinent because we find a significantly positive correlation between CAR and SHOCK measured with any VDOs.

Accordingly, we conclude that VDOs employed in this study adequately capture the degree of disagreement among investors in the pre-event as well as in the event period. Thus, by extrapolating the *ex-ante* and the event level of DO from daily estimates of VDOs, we are able to measure a change in the level of DO from the typical trading day to the event day, and its effect on announcement return.

C. *Ex-Ante Level of Disagreement, Disagreement Shock and Abnormal Return*. In this section, we examine a dynamic relationship between the *ex-ante* level of DO and the event level of DO, and its linkage to price reactions of the sample stocks in the announcement period. In Hypothesis 3, we posit that the pre-event level of DO is negatively correlated with disagreement shock. This proposition is based on the idea of limited attention on the part of investors (*e.g.*, Hirchleifer & Teoh, 2003; Peng & Xiong, 2006) which states that cognitively overloaded investors pay attention to only a certain subset of information. Because of this type of cognitive constraint, a firm that, for example, is not frequently covered by the media would have a low level of DO. In other words, it is less susceptible to heterogeneous interpretations by investors. However, when the firm announces its plan to spin off, which is very likely to receive a wide and intense media coverage, this firm that has a lower *ex-ante* levels of DO (*i.e.*, a low-disagreement firm) is expected to incur larger disagreement shock than a firm with a higher *ex-ante*

Table 14. Ex-Ante Level of DO, Disagreement Shock and Announcement Abnormal Return

This table presents the relation between the *ex-ante* levels of difference of opinion (DO) and the disagreement shocks (Shock). The shock on the level of difference of opinion (DO) or the disagreement shock is calculated by subtracting the *ex-ante* level of differences of opinion (Ex-Ante) from the event level of DO. The event level of DO is measured by averaging daily estimates of a VDO (VDO = *LNTO*, *Detrend*, *UV*, *RESD* and *SUV*) over the event window of (AD, AD+1). The *ex-ante* level of DO is measured by averaging daily estimates of a VDO over the pre-event period or (AD-260, AD-11). See the Table 13 for the details about the measurement of VDOs. A daily abnormal return is a residual calculated from the market model, using the value-weighted market returns, estimated over the pre-event period. CAR is the sum of abnormal returns during the announcement period. The *t*-tests for the differences in the means (Panel 1), assuming an unequal variance, and the Wilcoxon-rank-sum tests for the differences in the medians (Panel B) are calculated by using cross-sectional distribution of Ex-Ante, Shocks and CAR. For the entire sample firms, Rank correlation 1 is the Spearman rank correlation between Ex Ante and Shock. Rank correlation 2 is the Spearman rank correlation between Ex Ante and CAR.

Panel 1. The mean of the ex-ante level of DO, disagreement shock and three-day CAR

		LNTO			*Detrend*			*UV*		
Rank	Obs	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR
(Low)1	40	-7.69	0.79	5.47	-0.27	0.95	5.66	-0.28	0.86	5.72
2	41	-6.72	0.82	5.15	-0.08	0.79	3.81	-0.09	0.66	3.58
3	40	-6.25	0.67	2.84	0.01	0.64	1.91	0.00	0.67	2.60
4	41	-5.86	0.70	2.05	0.09	0.37	1.46	0.07	0.58	1.88
(High)5	40	-5.13	0.43	1.73	0.27	0.61	4.45	0.23	0.50	3.52
	202									
Difference:Q1-Q5		2.56[a]	-0.36[b]	-3.74[c]	0.54[a]	-0.34	-1.21	0.51[a]	-0.36[c]	-2.20
Rank Correlation 1			-0.15[b]			-0.20[a]			-0.15[b]	
Rank Correlation 2				-0.19[a]			-0.19[a]			-0.22[a]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

Table 14. Ex-Ante Level of DO, Disagreement Shock and Announcement Abnormal Return. Continued

Panel 1. The mean of the ex-ante level of DO, disagreement shock and three-day CAR

		RESD			*SUV*		
Rank	Obs	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR
(Low)1	40	-0.27	0.89	5.74	-0.33	0.98	4.50
2	41	-0.08	0.59	3.44	-0.13	0.73	5.85
3	40	0.00	0.65	2.78	0.00	0.64	1.42
4	41	0.07	0.45	2.08	0.14	0.63	1.18
(High)5	40	0.22	0.63	3.25	0.32	0.33	4.31
	202						
Difference:Q1-Q5		0.49[a]	-0.26	-2.49	0.65[a]	-0.65[a]	-0.19
Rank Correlation 1			-0.14[b]			-0.22[a]	
Rank Correlation 2				-0.22[a]			-0.19[a]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

Table 14. Ex-Ante Level of DO, Disagreement Shock and Announcement Abnormal Return. Continued

Panel 2. The median of the ex-ante level of DO, disagreement shock and three-day CAR

		LNTO			*Detrend*			*UV*		
Rank	Obs	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR
(Low)1	40	-7.46	0.64	3.82	-0.24	0.80	5.77	-0.24	0.76	5.88
2	41	-6.69	0.66	4.22	-0.08	0.62	3.72	-0.09	0.45	2.66
3	40	-6.23	0.56	2.13	0.01	0.60	0.91	0.00	0.59	1.52
4	41	-5.86	0.62	1.46	0.09	0.33	1.73	0.08	0.50	1.77
(High)5	40	-5.22	0.42	1.95	0.23	0.70	2.02	0.18	0.49	1.56
	202									
Difference:Q1-Q5		2.24[a]	-0.22[b]	-1.87	0.47[a]	-0.10	-3.75[c]	0.42[a]	-0.27	-4.32[b]

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

Table 14. Ex-Ante Level of DO, Disagreement Shock and Announcement Abnormal Return. Continued

Panel 2. The median of the ex-ante level of DO, disagreement shock and three-day CAR

		RESD			*SUV*		
Rank	Obs	Ex Ante	Shock	CAR	Ex Ante	Shock	CAR
(Low)1	40	-0.24	0.76	5.77	-0.29	0.87	5.22
2	41	-0.08	0.44	2.30	-0.13	0.60	4.97
3	40	0.00	0.59	2.21	0.01	0.67	1.46
4	41	0.07	0.44	1.77	0.14	0.61	1.75
(High)5	40	0.18	0.56	0.87	0.29	0.24	1.85
	202						
Difference:Q1-Q5		0.42^{a}	-0.20	-4.90^{b}	0.58^{a}	-0.63^{a}	-3.37^{c}

[a,b,c] indicate the significance at the 1, 5, 10% level respectively.

level of DO (*i.e*., a high-disagreement firm). Consequently, the former should earn higher announcement abnormal return than the latter. Furthermore, we argued in Section 3 that this relationship—a negative correlation between the *ex-ante* level of DO and disagreement shock— will give rise to a negative correlation between the *ex-ante* level of DO and announcement abnormal return.

We sort the sample firms into the quintile based on the values of proxies for their *ex-ante* levels of DO. Table 14 shows the mean (Panel 1) and the median (Panel 2) of the *ex-ante* level of DO, SHOCK, and CAR in each quintile. As can be seen, in all VDOs, as the *ex-ante* level of DO increases, SHOCK and CAR decrease. The difference of the mean or the median of SHOCK and CAR between the top and the bottom quintile are negative, but insignificant in some VDOs. In particular, the test for the difference in the mean CAR appears inconclusive because the mean CAR is larger in the fifth (largest) quintile as compared to that in the third or in the fourth quintile. It seems to suggest that the existence of some outliers in CAR that mitigate a negative association between the *ex-ante* DO and CAR.

However, across the entire sample we find that the correlations between the *ex-ante* level of DO and SHOCK (rank correlation 1) are significantly negative in all VDOs. The correlations range from -0.14 to -0.22, and are significant at least 5 % level. This result confirms Hypothesis 3 that low-disagreement firms tend to experience larger disagreement shocks—greater changes in the level of DO in the announcement period relative to the *ex-ante* level of DO—than high-disagreement firms.

Finally, we confirm an inverse relation between the *ex-ante* DO and CAR, which is implied by a negative correlation between the *ex-ante* DO and SHOCK, in the cross-section of the entire sample by Spearman rank correlations (Rank correlation 2). As reported in Table 14, the correlations range from -0.19 to -0.22 in all VDOs, and are significant at the 1 % level. As we postulated, it is a negative relationship between the *ex-ante* level of DO and SHOCK that gives a negative correlation between the *ex-ante* level of DO and CAR.

In other words, compared to a high-disagreement firm, a low-disagreement firm, or a firm with a low slope of the demand curve, sustains a large (negative) change in the slope in the announcement period because it is affected by a large disagreement shock triggered by the spinoff announcement. Thus, CARs are higher for low disagreement firms than for high-disagreement firms. Therefore, it follows that for our sample of spinoffs the *ex-ante* level of DO can be a potentially significant factor for explaining the cross-sectional variation in abnormal returns days surrounding spinoff announcements. Moreover, we argue that the-*ex-ante* level of DO of a firm can be considered as a firm specific characteristic because its measurement reflects the average extent to which a firm is affected by investor who have different beliefs about its value and interpret information differently over a period of time. Therefore, we re-define the *ex-ante* level of DO as the disagreement factor in Part Two. In that part of the dissertation, we will analyze the relevance and robustness of disagreement factor for abnormal gains in the announcement period by controlling for the known determinants that have identified in the literature.

Conclusions

Excessive trading volume accompanied by overpricing in the U.S stock market (especially the IT boom in the late 1990) and highly abnormal volume behavior around an information event such as earnings, acquisition, and spinoff announcements are not easily explained by the traditional asset pricing models because these models have no role for trading volume. However, the development in disagreement models attempts to overcome this difficulty, and are able to explain a positive relation between trading volume and overpricing. Unlike these risk-based rational asset pricing models, the disagreement models set forth a market model in which investors have heterogeneous beliefs and interpret public information differently, and that investors are bounded by short sales restrictions.

Building on differences-of-opinion (DO) models of Banerjee and Kremer (2010) and Miller (1977), we empirically examine changes in the levels of DO among investors and their impacts on price reactions days surrounding the announcements of corporate spinoffs. We use a sample of spinoffs undertaken by the U.S public firms from 1964 to 2005. As an empirical investigation strategy, we adopt a two-period setting (*i.e.*, the pre-event and the event period) which allow us to estimate the *ex-ante* level of DO prior to the announcement of a spinoff and the event level of DO in the three-day period surrounding the announcement. The *ex-ante* level of DO is measured to proxy for the degree of disagreement about a sample firm in a *typical* trading day and can thus be regarded as its firm specific characteristic *ex ante*. The event level of DO mirrors the degree of disagreement that is triggered by differential interpretation of the announcement by investors. Thus, we propose and test the following hypotheses: 1) the announcement spinoff will spark a high degree of differential interpretation about the announcement, 2) disagreement shock (*i.e.*, the *event* level of DO minus the *ex-ante* level of DO) will be positively correlated with abnormal announcement return, and 3) the *ex-ante* level of DO will be negatively correlated with disagreement shock.

With theoretical guidance from dynamic models of DO, we use daily trading volume turnover, which is the basic ingredient for measuring disagreement. Following Garfinkel (2009), we estimate five volume-based measures of DO (VDO) including volume turnover itself in each trading day during both the pre-event and the event period, and extrapolate the *ex-ante* and the *event* level of DO from these daily estimates.

Since volume turnover is widely regarded as an indicator of liquidity, and VDOs are constructed to isolate extra portion of volume turnover after controlling for its known determinants, we first substantiate proxies for the *ex-ante* level of DO or the *ex-ante* DO proxies for a sample firm as relevant and adequate measures for investor disagreement by comparing with the popular proxies for market liquidity of the firm in the literature (dollar trading volume, firm size, the effective spread, and the standard deviation of return residuals). We find that *ex-ante* DO proxies (except one based on daily turnover) are not correlated with these *liquidity proxies*. Interestingly, while the *ex-ante* DO based on volume turnover is positively associated with dollar trading volume and firm size, which is consistent as a *liquidity proxy*, it has also significantly positive correlations with the effective spread and the residual standard deviation, which is inconsistent as a *liquidity proxy*. Considering that the effective spread and the standard deviation of return residuals trace the market liquidity of a stock more closely, we conclude that the *ex-ante* DO proxies does not reflect *liquidity*. Further, we compare our DO proxies with the extant DO proxies (*i.e.*, *breadth of ownership* by Chen et al., 2002; the *dispersion of analysts' earnings forecasts* by Diether et al., 2002; and the *dispersion of analysts' forecasts on the long-term earnings growth* by Moeller et al., 2007). We, however, find no significant relationship between them except the DO proxy measured with volume turnover, which has a significant correlation with *the dispersion of analysts' forecasts on the long-term earnings growth*. Furthermore, we find that this DO proxy also has a significant negative correlation with the pricing indicators (*i.e*., book-to-market ratio and earning-to-price ratio). This is consistent with the prediction of Miller (1977)'s DO model, namely positive relation between trading volume and overpricing. Hence, our results overall indicate that *ex-ante* DO proxies for a sample firm seem to properly capture the degree of disagreement among investors about its value prior to the announcement of a spinoff.

Our tests of the three hypotheses reveal the following results. We find that there is a sharp increase in the level of DO in the announcement period. For example, the means of *ex-ante* DO proxies are around zero, but those of event DO proxies, or the level of DO in the three-day period around the date of a spinoff announcement, surge up to around 0.6. This implies that the announcement is a significant information event that generates large disagreement among investors about the prospect of a sample firm following spinoff. In support of Hypothesis 2, we find that firms impacted by higher disagreement shocks—the difference between the *ex-ante* level of DO and the event level of DO—earn higher abnormal returns generated from their spinoff announcements. We argue that this evidence provides empirical support for the interpretation of a change in the level of DO as a shift in the slope of demand curve in the framework of Miller (1977)'s model. Furthermore, we find that the abnormal returns have a statistically significant positive correlation with the disagreement shocks for all the VODs used to measure them including the one that control for information related trading volume in the announcement period. Finally, we find that firms characterized by low disagreement (*i.e*., a lower level of *ex-ante* level of DO) in the pre-event period evoke higher disagreement (*i.e*. a higher *event* level of DO)—hence higher disagreement shock— upon a spinoff announcement than do firms with a higher level of *ex-ante* level of DO. This result is consistent with the idea of limited attention on the part of investors. This negative correlation between the *ex-ante* and the event level of DO further suggests a negative correlation between the *ex-ante* level of DO and the abnormal returns. We find the evidence in support of this implication. Therefore, the *ex-ante* levels of DO of the sample firms can be an important determinant helpful in understanding the cross-sectional variation in the abnormal returns days surrounding spinoff announcements.

Part 2

Introduction

A. *Recapitulation***.** In Part One, we empirically investigate the effect of changes in the levels of differences of opinion (henceforth DO) on stock prices during the three-day period around the date of a spinoff announcement. Our sample consists of 202 corporate spinoffs that announced (during the period between 1964 and 2005) and successfully completed. Specifically, we combine analytical properties of Miller (1977)'s static DO model with those of Banerjee and Kremer (2010)'s dynamic DO model, and propose and test three hypotheses. The nature of the hypotheses and our findings are:

1) As prognosticated by Banerjee and Kremer's (2010) dynamic model, the announcement of a spinoff sets off a sudden jump in the level of DO, which reflects widely differential interpretation about the news among investors (Hypothesis 1).
2) Interpreting the observed sudden increase in the level of DO from a normal level in the framework of Miller (1977)'s model, we measure "disagreement shock." We find that there is a positive relationship between the disagreement shock abnormal return in the three-day period surrounding the announcement (Hypothesis 2).
3) The *Ex-ante* levels of DO of sample firms, which we define as the normal levels of disagreement, or more specifically the levels of DO in a typical trading day—in contrast to the levels of DO in the announcement day or the *event* levels of DO—among investors about their values, are negatively

correlated with their disagreement shocks (Hypothesis 3). It is our contention that it is the relationship between the *ex-ante* levels of DO and the disagreement shocks that renders a negative correlation between the *ex-ante* levels of DO and the abnormal returns.

In addition, we investigate *the firm size effect* on gains in the firm's market value *ex post* and find that the pre-spinoff parent size is significantly inversely related to the market value gain from the spinoff. We also evaluate our *ex-ante* DO proxies as appropriate measures for investor disagreement by comparing our *ex-ante* DO proxies not only with several widely used liquidity proxies but also with the extant DO proxies in the form of *dispersion of analysts' earnings forecasts* and *breadth of ownership*. In summary, we demonstrate that our trading volume-based *ex-ante* DO proxies capture investor disagreement, and therefore are potentially cogent explanatory variables for the cross-sectional variation in abnormal returns observed immediately following the announcement of a spinoff.

It should be noted that our analysis in Part 1 is based on comparative statistics in the form of behavioral equations that are both bivariate (see equation (1) and equation (6)) and partial multivariate (see equation (7) and Table 8)). Thus, we focus largely in Part 1 on the statistical relationship between "disagreement proxies" and abnormal returns from spinoff announcements. In this respect, we may not sufficiently control for the effect of other independent variables which may determine the abnormal returns.

B. *Purpose and Overview*. The primary purpose of Part 2 is to broaden our investigation by extending the bivariate analyses in Part 1 to multiple regression analyses. We test whether the cross-sectional variation in announcement abnormal returns can be accounted for with our key variable, the *ex-ante* level of DO, which we rename it as disagreement factor in Part 2, when controlling for other known sources for these returns reported in the literature. Our multivariate analyses set a stringent test for the ability of disagreement factor to explain the abnormal returns.

Note that since spinoff announcements have shown to generate, on average, positive abnormal returns as we also verify this stylized fact in Part 1, it is often referred to as wealth gain or wealth effect in the literature. We select the following three determinants that have received strong empirical support as the sources for wealth gains or “announcement abnormal returns”: *relative size* which is the portion of a (parent) firm’s assets assigned to its spun-off subsidiary, the level of *information asymmetry* of the firm prior to a spinoff announcement, and *focus factor* which indicates whether the firm split up a related or unrelated subsidiary to its core business (*i.e.*, the focus-increasing or non-focus-increasing spinoff).

Part 2 considers disparities in available evidence related to the effects of information asymmetry and focus factor on wealth gain. First, regarding information asymmetry, in their work on the information hypothesis, Krishnaswami and Subramaniam (1999) postulate that information asymmetry between outside investors and managers can cause undervaluation of a firm. Management uses this valuation “error” as an opportunity to undertake a spin-off and correct for the valuation discrepancy, or enhance the firm's value. The authors find evidence for the hypothesis that firms with higher information asymmetry earn higher abnormal returns because investors rationally expect greater improvement in information asymmetry for these firms than firms with lower information asymmetry. Moreover, they show that there is a significant decline or improvement in information asymmetry after the completion of spinoffs. However, Huson and MacKinnon (2003) document that information asymmetry worsens after the completion of spinoff. Furthermore, Veld and Veld-Merkoulova's (2004) study of spinoffs in the E.U also reach a similar conclusion in that they find no relation between information asymmetry and abnormal announcement return.

It is also important to note that a majority of the empirical literature that analyzes the "focus factor" effect uses spinoffs that were undertaken in the U.S *before the year of 1992*. These studies (*e.g.*, Daley et al., 1997; Desai & Jain, 1999; Krishnaswami & Subramaniam, 1999) find that spinoffs which involve splitting up an unrelated subsidiary (*i.e.*, improvement in industrial focus or focus-increasing spinoff) earns larger announcement abnormal returns than non-focus-increasing spinoffs. Moreover, this wealth gain is confined to focus-increasing spinoffs. However, a recent study by Veld and Veld-Merkoulova (2008) examines the U. S. spinoff experience from *1995 to 2002* and does not find an association between wealth gain and either focus factor or information asymmetry.

The apparent contradictory findings on *information asymmetry effects* and the inconsistency of findings related to *the effect of focus factor* on wealth gain warrant the examination of these variables individually. Given the breadth and scope of our dataset[1], it is our hope that we might shed some new light on these important empirical issues. First, our analysis of *information asymmetry* shows a significant deterioration in all proxies employed from the pre- to the post-spinoff period. Moreover, the observed deterioration displays two important characteristics; first, it is observed only in focus-increasing firms, and second, it is observed to a high degree. These findings serve as a fundamental challenge to the underlying intuition of the information hypothesis, which clearly would expect that focus-increasing firms would experience diametrically opposite results. In other words, under the hypothesis, focus-increasing firms would achieve greater improvement in information asymmetry.

For the effect of *focus factor*, we find that spin-off type (*i.e.*, focus increasing or non-focus increasing spinoff) had no effect on announcement abnormal returns for the entire 41-year study period. However, for the first study period that include spinoff announcements made from 1964 to 1991, we find that only focus-increasing firms earn significantly positive abnormal returns, while non-focus increasing firms' abnormal returns are, on average, not statistically different from zero. This finding corroborates the result of the prior studies that cover a similar time period. But, in the second study period from 1992 to 2005, we find no statistically significant differences in abnormal returns between focus-increasing and non-focus-increasing firms. Investors' responses appear to be equally positive to both types of spinoff.

[1] The dataset (*i.e.*, the sample size) which we use is approximately twice as large as those previously used in the literature. Further, our dataset covers a longer study period from 1964 and 2005 as compared to any other published studies to date.

In a multiple regression analysis covering the entire study period, we find that announcement abnormal returns are strongly inversely related to disagreement factor after controlling for the known determinants for these returns. Moreover, disagreement factor adds explanatory power as large as that provided by all the control variables combined. This result confirms the significance of disagreement factor as our bivariate analysis in Part 1 indicates that this factor could serve as a potent explanatory variable for the abnormal returns. The economic effect of the relationship between disagreement factor and the abnormal return is substantial. For instance, when there is one standard deviation increase (from the mean) in disagreement factor, the abnormal return decreases roughly by 1.11%. Moreover, confirming the results of the preliminary analyses of information asymmetry and focus factor, we find that these determinants are no longer significantly correlated with the abnormal returns.

Further, when disagreement shock is included in a regression, the coefficients of relative size and focus factor decrease monotonically. This indicates a dependence relationship between disagreement shock and these two variables. Analyzing relationships between disagreement shock and the other determinants (disagreement factor, information asymmetry, focus factor, and relative size), we find that disagreement shock is significantly negatively associated with disagreement factor. This result confirms our bivariate test result of Hypothesis 2 in Part 1. Furthermore, we find that disagreement shock is larger for a firm that has a lower level of information asymmetry, that engages in focus-increasing spinoff, and that splits up a larger portion of its assets to its spun-off subsidiary. In other words, if investors perceive that a firm is mired by a higher level of information asymmetry (*i.e.,* a firm with high information asymmetry prior to its spinoff announcement), they seem to inhibit expression of their disagreement about its spinoff decision and refrain from trading based on their own interpretations. Consequently, trading is less intensive compared to a firm with a lower level of information asymmetry. However, a firm implementing a focus-increasing spinoff and assigning a large fraction of its assets to its spun-off subsidiary incur a high degree of disagreement among investors.

Finally, in the sub-period analysis, our regression results are considered in the light of previous studies' findings that focus factor and relative size jointly explain the cross-sectional variation in announcement abnormal returns. Our regression results for the first study period from 1964 to 1991 did indeed support these earlier results. However, conducting the same analyses on the data from the period 1992-2005 produced results which disagree with the first period (and earlier studies) findings. When analyzing the data from the later study period, we find that both focus factor and relative size become insignificant. More importantly, information asymmetry is not associated with the abnormal returns in both study periods. Across both study periods, only disagreement factor is consistently negatively related to the abnormal returns, and thus account for a significant faction of the cross-sectional variation in these returns.

Control Variables: the Known Determinant of Spinoff Abnormal Returns

A. *Information Asymmetry.* Based on the theoretical work of Nanda and Narayana (1997),[2] Krishnaswami and Subramaniam (1999) argue that for firms with multiple

[2] Similarly, Habib, Johnsen, and Naik (1997) show that the informativeness of price can be improved through a spinoff (i.e., splitting a parent firm into separately traded firms). In turn, it

business units, information asymmetry between managers and investors arises because investors observe an aggregate cash flow to the entire firm while managers discern actual cash flows to individual divisions. Hence, if a firm is undervalued due to information asymmetry problem, then the management has an incentive to split up the firm into independently traded units through a spinoff to attain a fair market value. Krishnaswami and Subramaniam propose the information hypothesis that there should a decline in information asymmetry after the completion of a spinoff, and abnormal returns during the spinoff-announcement period should be greater the higher the level of information asymmetry since investors anticipate a higher valuation of a firm as a result of reduction in information asymmetry.

Using several proxies for information asymmetry based on analysts' earnings forecasts, Krishnaswami and Subramaniam document a significant decrease in those proxies from the pre-spinoff (*i.e.*, the year-end month prior to the year in which a spinoff announced) to the post-spinoff period (*i.e.*, a month after the ex-date of a spinoff). They also find that their sample firms have significantly larger values in those proxies than the control samples do. These results seem to clearly show that information asymmetry problem is motivation behind a decision to implement a spinoff. Furthermore, they find a significantly positive relationship between the level of information asymmetry and announcement abnormal returns.

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improves the quality of managers' investment decisions and reducing uninformed investors' uncertainty about asset values. An implication of their theoretical work is that a greater diversification of a firm's business exacerbates information asymmetry between managers and outsiders.

However, Huson and MacKinnon (2003) offer an opposite view. They argue that corporate spinoff will not improve information asymmetry problem, but rather to exacerbate it. They contend that a spin-off can provide an informational advantage to informed investors who possess superior knowledge about either a parent firm or its subsidiary. For the parent firm prior to spinoff, there is no informational edge for the informed over the uninformed because the complexity of the parent's operations may be equally daunting to both groups of investors. But a spinoff creates an opportunity to capitalize on the informed investors' specialized knowledge on the parent or the subsidiary.[3] This exposition contrasts the information hypothesis of Krishnaswami and Subramaniam (1999).

Huson and MacKinnon (2003) use the residual standard deviation of stock returns as an indicator of information environment, and document a significant increase in the indicator from the pre-spinoff to the post-spinoff period.[4] Interestingly, they find that the significant increase in the indicator is only observed for the firms that engage in focus-increasing spinoff. This evidence further supports their contention that the exploitation of informational advantage by the informed investors would be greater for focus-increasing spinoffs. Huson and MacKinnon characterize this evidence for the deterioration in information asymmetry as "reduction in any diversification effect." In other words, a spinoff reduces the inherent diversification benefit, or the mitigation in the information

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[3] Gorton and Pennacchi (1993) and Subrahmanya (1991) present models in which a basket security is less subject to information asymmetry than individual securities that constitute the basket security because aggregation cash flows for the basket security have an effect of diversifying information asymmetry across those individual securities.

[4] In contrast, Krishnaswami and Subramaniam (1999) document a significant decrease from the pre-spinoff to the post-spinoff period for a sample of spinoffs from 1973 to 1993.

asymmetry engendered by having multiple business units within a firm (*i.e*. conglomerate). The authors also present the evidence for the deterioration in information asymmetry from the pre- to the post-spinoff using proxies derived from market microstructure theories (*i.e.*, the effective spread and price impact), and show that the increase is restricted to focus-increasing firms.

An out-of-sample test of the information hypothesis comes from Veld and Veld-Merkoulova (2004). For a sample of 156 spinoffs which occurred in 15 different European countries for the period 1987-2000, they find no evidence of a significant relationship between announcement abnormal returns and the levels of information asymmetry though they employ the same proxies for information asymmetry as Krishnaswami and Subramaniam (1999) use.

With the conflicting evidence on the effect of information asymmetry on spinoff, we investigate whether the information hypothesis holds with our spinoff sample, which is larger in size and covers a longer period as compared to the studies by Krishnaswami and Subramaniam (1999) and Huson and MacKinnon (2003).[5] We use the following four proxies for information asymmetry which are measured in Part One: *DISP1*, *DISP2*, *CSSPRD*, and *SIGMA* (see Section 8 and 9 for the estimation details for these proxies). In addition, we include a measure of liquidity developed by Amihud (2002). It is defined as the daily ratio of absolute stock return to its dollar trading volume, or *ILLIQ*. Since it measures a daily price change per dollar trading volume, it is in fact a measure of price impact or market illiquidity for a stock.

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[5]Krishnaswami and Subramaniam (1999) analyze 118 spinoffs from 1979 to 1993, while Huson and MacKinnon (2003) do 84 spinoffs from 1984 to 1994.

First, we test statistical significances of the differences in changes in those five proxies for information asymmetry from the pre-spinoff to the post-spinoff period. Note that we examine changes in information asymmetry for the parent firms. To measure the proxies (*DISP1*, *DISP2*, $\overline{CSSPRD}$, $\overline{ILLIQ}$ and *SIGMA*) in the post-spinoff period, we use the same length of the estimation period as the pre-spinoff (or pre-event) period. The post-spinoff period begins on the day following the ex-date and ends on the 250th-trading day or (ED+1, ED+250) in which ED stands for the ex-date of a spinoff. In this time window, we also calculate the mean of daily estimates of *CSSPRD* and *ILLIQ*, and estimate *SIGMA* for each sample firm. For *DISP1* and *DISP2*, we compute the mean of monthly estimates of *DISP1* and *DISP2* based on the standard deviation of analysts' earnings forecasts from the Unadjusted Summary File in the Institutional Broker Estimate System (IBES) database for a 12-month period, starting from a month after the ex-date month.

Table 15 shows the sample mean and the median of each liquidity measures in the pre- and post-spinoff periods. In Panel 1, we group *CSSPRD*, *ILLIQ*, and *SIGMA* together, and label them as market-based liquidity. In Panel 2, we put *DISP1* and *DISP2* together since these measures are derived from the analysts' earnings forecasts. Note that *DISP1* and *DISP2* capture information asymmetry between insiders of a firm and analysts who follow the firm. It means that *DISP1* and *DISP2* reflect information asymmetry among a subset of market participants. However, the market-based liquidity proxies estimated with

Table 15. Changes in Information Asymmetry from the Pre-Spinoff to the Post-Spinoff Period

This table presents the means and the medians of the market-based proxies for information asymmetry and the proxies based on the analysts' earnings forecasts in the pre-spinoff and the post-spinoff period. The sample consists of the U.S firms that engaged in a corporate spinoff during the period 1964-2005. The sample firms are required to have at least 80% of daily returns during the pre-event period. The pre-spinoff period is defined as a 250-trading day ending 10 days prior to the announcement date of a spinoff, (AD-260, AD-11). The post-spinoff period is defined as a 250-trading-day starting a day after the ex-date, (ED+1, ED+250). The market-based proxies are as follows: *CSSPRD* is the bid-ask (effective) spread estimated by the method proposed by Corwin and Schultz (2011). *SIGMA* is the standard deviation of the residuals from the market model of daily stock returns. *ILLIQ* is the ratio of absolute stock return to its dollar trading volume. In the pre- and post-spinoff period, daily estimates of *CSSPRD* and *ILLIQ* is measured and averaged over the respective period. For the proxies based on analysts' forecasts, *DISP1* is the standard deviation of analysts' forecasts on the current year's earnings divided by the average of forecast. *DISP2* is the standard deviation of analysts' forecasts on the current fiscal year's earnings scaled by the average of the current and the previous month-end stock price. Over the pre-and the post-spinoff period (i.e., 12 months), monthly estimates of *DISP1*and *DISP2* are averaged to calculate these proxies. A sample firm (i.e., parent) is classified as focus-increasing spinoff if its two-digit primary SIC code is different from that of its subsidiary. Otherwise, it is classified as non-focus-increasing spinoff. The statistical significances are estimated using the parametric paired *t*-tests for the differences in the means and the non-parametric Wilcoxon signed rank tests for the differences in the medians. [a, b,and c] indicate the significance at the 1, 5, and 10% respectively.

	Mean				Median		
	Obs	Pre	Post	Diff	Pre	Post	Diff
Panel 1. Market-based liquidity							
$\overline{CSSPRD}$	202	0.775	0.968	-0.193[a]	0.650	0.709	-0.058[a]
SIGMA	202	0.023	0.025	-0.002[a]	0.020	0.021	-0.001[b]
$\overline{ILLIQ}$ (x 10^6)	202	0.145	0.311	-0.166[a]	0.008	0.009	-0.001[a]
Panel 2. Analysts' earnings forecasts							
DISP1	163	0.227	0.192	0.035	0.051	0.074	-0.024[a]
DISP2	163	0.007	0.013	-0.005[b]	0.003	0.005	-0.001[a]

Table 15. Changes in Information Asymmetry from the Pre-Spinoff to the Post-Spinoff Period, Continued

		Mean			Median		
	Obs	Pre	Post	Diff	Pre	Post	Diff
Panel 3. Focus-increasing and Non-Focus-increasing sample (market-based liquidity)							
Focus	134						
$\overline{CSSPRD}$		0.725	0.939	-0.214[a]	0.600	0.658	-0.058[a]
SIGMA		0.022	0.025	-0.003[a]	0.019	0.020	-0.001[a]
$\overline{ILLIQ}$ (x 10^6)		0.133	0.344	-0.211[b]	0.015	0.015	0.000[a]
Non-Focus	68						
$\overline{CSSPRD}$		0.875	1.027	-0.152[b]	0.690	0.822	-0.133[a]
SIGMA		0.024	0.025	-0.001	0.021	0.022	0.000
$\overline{ILLIQ}$ (x 10^6)		0.168	0.245	-0.077	0.005	0.005	0.000
Panel 4. Focus-increasing and Non-Focus-increasing sample (analysts' earnings forecasts)							
Focus	106						
DISP1		0.095	0.143	-0.047[a]	0.049	0.071	-0.021[a]
DISP2		0.007	0.013	-0.005[c]	0.003	0.005	-0.002[a]
Non-Focus	57						
DISP1		0.471	0.282	0.189	0.054	0.081	-0.027[c]
DISP2		0.007	0.012	-0.005[c]	0.003	0.004	-0.001

the data generated from the market seem to be a better proxy for information asymmetry, since they reflect information asymmetry between the informed and the uninformed more broadly.

As shown on Table 15, for all the proxies for information asymmetry, there is a significant deterioration from the pre-spinoff period to the post-spinoff period. The differences in the means (except *DISP1*) and the medians of all market-based liquidity measures are negative and significant at the 1% level. The cost of trading shares (*CSSPRD*) on average increases by 0.19% and the price impact of trading volume is also larger in the post-event period. The presence of the informed traders seems to be more intensified as it is indicated by the greater mean value of *SIGMA* in the post-spinoff period. In particular, even in *DISP1* and *DISP2*, the worsening information environment after the completion of a spinoff is evident. Though *DISP1* decreases in the post-event period, it is not significant.[6] Yet, because of the high non-normality of *DISP1* and *DISP2*, the test of the difference in the median of *DISP1* and *DISP2* is more reliable. We find the differences in the medians are significantly negative for both measures at the 1% level.

Therefore, we find no support for the information hypothesis related to corporate spinoff. As our results show, there is no enhancement, but rather deterioration in information asymmetry. It also implies that a positive relation between spinoff announcement returns and information asymmetry might not be due to investors' recognitions of expected improvement in a firm's value through a spinoff. Perhaps, there is no relation at all between these two variables. In fact, none of the Spearman correlations between the liquidity proxies and announcement abnormal returns are significant except *ILLIQ*.

In Panel 3, we examine whether the exacerbation of information asymmetry is confined to the sample firms that spin off unrelated subsidiaries (*i.e.*, focus-increasing spinoff). We define a focus-increasing spinoff as a firm that creates a subsidiary whose two-digit Standard Industrial Classification (SIC) code is different from that of the parent (Desai & Jain, 1999). Otherwise, we classify a firm as a non-focus-increasing spinoff.

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[6] *DIPS1* and *DISP2* are not the exact replications of Krishnaswami and Subramaniam (1999)'s measures. They use the standard deviation of the analysts' earnings forecast as of the last month of the fiscal year prior to the announcement of a spinoff. Moreover, they do not scale those forecasts as we do either by stock price or the mean of forecasts. Scaling the dispersion by either the mean of forecasts or the price of a stock gives comparability of a measure based on analysts' earnings forecasts across a sample of stocks.

Consistent with Huson and MacKinnon (2003), we find that all measures of market-based liquidity in the focus-increasing sample decreases significantly in the post-spinoff period, while those of the non-focus-increasing sample experiences no significant change from the pre-spinoff to the post-spinoff period (except *CSSPRD*, which increase on average by 0.15%). For the focus-increasing firm, the differences in the means and the medians of all the market-based liquidity proxies between the pre-spinoff and the post-spinoff period are significant at the 1% level.

In addition, in Panel 4 the same inference can be drawn from *DISP1* and *DISP2*. A significant increase in both measures is consistently observed only in the focus-increasing firms. Thus, the results in Panel 3 and 4 reinforce the finding in the Panel 1 and 2. If the information hypothesis is valid, we should observe a greater improvement in information asymmetry for focus-increasing spinoffs than for non-focus-increasing spinoffs. Our findings here contradict the hypothesis.

B. *Industrial Focus*. A conventional view in corporate finance is that the diversification of a firm's business portfolio destroys shareholders' value (see Martin & Sayrak, 2003 for a review on the topic). Under this view, the stocks of diversified firms are traded at a discount, which is commonly known as a conglomerate (diversification) discount. Originally, Berger and Ofek (1995) document that diversified firms (compared to the sum of imputed stand-alone values of their segments) are, on average, valued at a discount of 13% to 15% and that the extent of loss in value is less severe for a diversified firm composed of related business units. John and Ofek (1995) study the effect of corporate divesture in the form of sales of assets. They show that disposition of assets leads to an increase in profitability of the remaining assets, and document that the improvement in profitability is generally limited to firms that sold off assets unrelated to their core business.

Corporate spinoffs offer a relative simple way to eliminate diversification discount by providing a demonstrable mean for a firm to improve its business focus. Daley et al. (1997) initially find that significantly positive announcement abnormal returns are limited to focus-increasing spinoffs because investors rationally expect performance improvement only from these spinoffs. Desai and Jain (1999) examine the long-term performance of a sample of spinoffs from 1975 to 1991, and document that only focus-increasing firms earn significantly positive announcement and long-term abnormal returns.

If one believes in the existence of diversification discount, the decision to reduce diversification obviously signals positive news to the market. Furthermore, the decision to divest non-core or unrelated business units will logically attract a more positive response from investors. Nevertheless, our result in the previous section may provide a somewhat nuanced view on the role of "focus factor" (*i.e.*, whether a spinoff is focus-increasing or not). As we show in the previous section, there are significant deteriorations across all the measures of information asymmetry only for focus-increasing firms. This result suggests that if investors expect reduction in information asymmetry only for focus-increasing spinoff, then this expectation might have a negative effect on the announcement returns of firms which implement a focus-increasing spinoff. However, given our strong evidence for the positive effect of focus factor on announcement returns, we consider that the effect of focus factor dominates any negative effect of exacerbated information problem involving a spinoff.

We also note that virtually all previous empirical works on the determinants of announcement abnormal returns study the corporate spinoffs undertaken in the United States before the year of 2000. In fact, a majority of these works collect a sample of spinoffs occurred prior to 1992.[7] Moreover, a recent study of Veld and Veld-Merkoulova (2008) provide an interesting result: focus factor and information asymmetry do not have the expected significant positive relation with abnormal announcement returns for a sample of U.S. spinoffs from 1995 to 2002.

Therefore, we reexamine the validity of the stylized fact: Only focus-increasing firms experience positive abnormal returns. Our analysis has the benefit of a sample that is both larger in number of spin-off events and also captures information from a longer time period, compared to the prior literature on this topic. To do so, we divide the entire study period (1964-2005) into two sub-periods: the first study period from 1964 to 1991 and the second study period from 1992 to 2005. We intentionally segment the entire sample period into the two sub-periods around 1991 because, as we pointed out above, a majority of the evidence for a positive relation between focus factor and announcement abnormal return comes from this period.

We define a focus-increasing spinoff as a firm that creates a subsidiary whose two-digit SIC code is different from that of its parent. Otherwise, we classify a firm as a non-focus-increasing spinoff. In Table 16, we report the mean and the median of the

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[7]See Table 1 of Veld and Veld-Merkoulova (2009). It documents the lists of empirical papers on the wealth effect of spinoff announcement including such information as research period and sample size, etc.

Table 16. Raw and Abnormal Returns During the Spinoff Announcements: the Entire Period and Two Sub-Periods

This table reports the cumulative raw returns and the cumulative abnormal returns in the announcement period, (AD-1, AD+1), for a sample of spinoff. The sample consists of the U.S firms that engaged in a corporate spinoff during the period 1964-2005. The sample firms are required to have at least 80% of daily returns during the pre-event period. The pre-event period is defined as a 250-trading day ending 10 days prior to the announcement date of a spinoff, (AD-260, AD-11). A market model for daily returns is estimated over the pre-event period to compute a market-model adjusted abnormal return. The market returns are the CRSP value-weighted portfolio of returns of all NYSE/AMEX/NASDAQ stocks. A mean-adjusted abnormal return is calculated by subtracting the mean of daily returns during the pre-event period from a daily return. Each sample firm is classified as focus-increasing spinoff if a parent firm's primary two digit of SIC code is identical to that of its subsidiary. Otherwise, it is classified as non-focus-increasing spinoff. The means and the medians are tested against the null of zero cumulative raw and abnormal return, using the *t*-tests and the Wilcoxon sign rank tests respectively. Difference is the mean (the median) of the focus-increasing minus that of the non-focus-increasing sample. The statistical significances are estimated using the parametric *t*-tests for the differences in the means and the non-parametric Wilcoxon rank sum tests for the differences in the medians. [a, b,and c] indicate the significance at the 1, 5, and 10% respectively.

		Raw return (RAW)		Market-model adjusted (CAR1)		Mean adjusted (CAR2)	
	Obs	Mean	Median	Mean	Median	Mean	Median
Panel 1. The entire study period, 1964 to 2005							
All sample	218	3.93[a]	2.76[a]	3.36[a]	2.58[a]	3.52[a]	2.59[a]
Focus	146	4.37[a]	2.76[a]	4.08[a]	2.50[a]	3.97[a]	2.69[a]
Non-focus	72	3.03[a]	2.76[a]	1.89[b]	2.72[a]	2.62[a]	2.39[a]
Difference		1.34	0.00	2.19[c]	-0.22	1.35	0.30
Panel 2. The first study period, 1964 to 1991							
All sample	109	2.89[a]	2.53[a]	2.40[a]	2.46[a]	2.50[a]	2.37[a]
Focus	79	3.52[a]	2.67[a]	3.42[a]	2.71[a]	3.11[a]	2.52[a]
Non-focus	30	1.23	0.84	-0.30	0.19	0.89	0.78
Difference		2.29[c]	1.83[c]	3.72[a]	2.52[a]	2.22[c]	1.74[c]
Panel 3. The second study period, 1992 to 2005							
All sample	109	4.97[a]	3.10[a]	4.32[a]	2.66[a]	4.55[a]	2.97[a]
Focus	67	5.38[a]	3.10[a]	4.86[a]	2.22[a]	4.98[a]	2.87[a]
Non-focus	42	4.31[a]	4.70[a]	3.46[b]	3.70[a]	3.86[a]	4.14[a]
Difference		1.07	-1.60	1.41	-1.48	1.12	-1.27

cumulated raw returns (RAW) and the cumulated abnormal returns (CAR) over the three-day event period, (AD-1, AD+1) for the entire study period (Panel1), for the first study period (Panel 2) and for the second study period (Panel 3). AD stands for the announcement date of a spinoff. In addition, in each panel we also report the mean and the median of the focus-increasing and the non-focus-increasing samples (See Section 10 for the estimation details of announcement abnormal returns).

In Panel 1 of Table 16, for the entire sample period, both the mean and the median of RAW and CAR are significantly different from zero at the 1% level. However, notice that for the focus-increasing as well as for the non-focus-increasing firms, the means and the medians are positive and significantly different from zero mostly at the 1% level, which indicates that abnormally positive price reaction is not merely confined to the focus-increasing samples. Furthermore, we find that the means and the medians of RAW and CAR for the non-focus-increasing sample do not differ significantly from those of the focus-increasing sample, except the mean of market-adjusted abnormal returns (significant at the 10% level). This result does not corroborate the stylized fact documented in the literature that the market reacts more positively to focus-increasing spinoffs or the notion that significantly positive abnormal returns are restricted to focus-increasing spinoffs. Though in general the focus-increasing sample earns higher abnormal returns during the announcement period, there is no statistically significant differences in CAR between the focus-increasing and non-focus-increasing spinoffs.

However, in Panel 2, for the first study period from 1964 to 1991, the result is consistent with the literature: The mean and the median CAR of the focus-increasing sample are significantly positive, while those of the non-focus-increasing sample are not statistically different from zero. Moreover, the differences in RAW and CAR between the focus-increasing and non-focus-increasing firms are also statistically significant. Hence, the results in Panel 2 confirm the differential market reaction to the announcement of a spinoff in which abnormal announcement return is much larger for the focus-increasing than the non-focus-increasing firms.

Interestingly, in Panel 3, for the second study period from 1992 to 2005, the results found from the first study period do not hold. First, the sample firms in this period on average earn greater raw returns and abnormal returns in the announcement period than do those in the first study period. For instance, the firms in the second study period earn on average 1.92% of additional market-adjusted abnormal return (CAR 1) compared to the firms in the first study period. Second, observe that there is overall increase in abnormal returns both for the focus-increasing and the non-focus-increasing firms, yet the increase is larger for the latter. For the focus-increasing firm, the mean CAR1 (CAR2) in the second study period increases by 1.44% (1.87%) from the first study period. Likewise, the mean CAR1 (CAR2) of the non-focus-increasing group rises by 3.76% (2.97%). Thus, our results show that market reactions to spinoff announcement are positively larger in the second study period, but this increase in the announcement abnormal return is much larger for the non-focus-increasing group. Consequently, in the second study period the mean and the median RAW, CAR1, and CAR2 of the non-focus-increasing firms are all positive and significantly different from zero at the 1% level, which is not the case in the first study period. Furthermore, even the tests for the difference in the mean and the median RAW, CAR1, and CAR2 between the focus-increasing and the non-focus-increasing groups give no statistical significance in the second study period.

Therefore, a reason for no statistically significant difference in the abnormal announcement return between the two focus groups for the entire study period in Panel 1can be attributed to the fact that the non-focus-increasing firms in the second study period receives as large positive market reactions as the focus-increasing firms do. At first glance, we suspect a possible effect of the bull market period from the late 1990s to the early 2000 for no difference in the announcement abnormal returns between the two focus groups. Perhaps, investors during the bull market might have reacted to the announcement of a non-focus-increasing spinoff as positively as for that of a focus-increasing spinoff. But, we do not find a pattern such as a clustering of positive and large abnormal returns either for the focus-increasing or the non-focus-increasing firms during the bull market. At this point, we can only conjecture about possible explanations for overall increase in the wealth gain for both focus groups, especially for the non-focus-increasing spinoffs. A further investigation of this result is beyond the scope of this paper. We leave it for a future research.

C. *Size of Spun-off Subsidiary*. In corporate spinoffs, the proportion of a parent firm's assets split to its subsidiary has been shown to be a strong explanatory variable for wealth effect *(i.e.*, an on-average positive abnormal return) from spinoff announcements. We refer the variable as the relative size of a subsidiary (henceforth ***relative size***), which is the ratio of the size of a parent to that of its spun-off unit. Miles and Rosenfeld (1983) show that large spinoffs (*i.e*., large values in relative size) earn significantly larger positive abnormal returns than small-size spinoffs. Krishnaswami and Subramaniam (1999) with a sample of spinoffs in the U.S and Veld and Veld-Merkoulova (2004) with a similar sample in Europe confirm that relative size is an important determinant for the cross-sectional variation in abnormal returns associated with spinoff.

However, we note that the effect of relative size is a unique empirical phenomenon rather than a validation of a theoretical prediction. It lacks a prior reasoning as to why there is a negative correlation between relative size and announcement abnormal return. One possible link is advanced by Maxwell and Rao (2003).That link is the transfer of wealth from bondholders to stock holders, or the *wealth transfer hypothesis*. They note that while the prior literature on this topic (Hite & Owers, 1983; Schipper & Smith, 1983) finds no evidence for the hypothesis, these studies are constrained by the limited sample size and access to bond price data. They posit a specific source of the wealth transfer, namely collateral loss. The idea is that since a spinoff involves a transfer of a portion of a (parent) firm's assets, the spinoff leads to a loss in collateral to the bondholders (Galai & Masulis, 1976). This is because the firm's assets are served as collateral to current bondholders. An empirical implication of this theory is that the greater is the size of a subsidiary relative to its parent, the returns to the stockholders would be greater, but those to the bondholders would be lower.

Using comprehensive bond price data for a sample of spinoffs from 1974 to 1997, Maxwell and Rao (2003) find that, on average, stockholders earn a positive abnormal return while bondholders earn a negative abnormal return. More importantly, using relative size as a proxy for the collateral loss, they find that stockholders in large spinoffs—the percentage of the parent's assets assigned to its spun-off subsidiary is greater than 20%—gain 2.06% more in abnormal stock returns than do those in small spinoffs, while bondholders in large spinoffs suffer 1.23% more loss in abnormal bond returns than those in small spinoffs. More importantly, in a pooled regression for bond and stock abnormal returns, they show that relative size enters negatively for bond abnormal returns, but positively for stock abnormal returns. Hence, the effect of relative size on announcement abnormal returns can be *partially* attributable to a transfer of wealth from bondholders to stock holders.

Accordingly, we include "relative size" as a control variable in the regression analyses in the sections to follow. We define the relative size of a subsidiary as the ratio of its market capitalization at the end of the month in which the ex-date occurs to the market capitalization of its parent firm at the end of the month prior to a spinoff announcement month (Krishnaswami & Subramaniam, 1999). We also add a proxy for financial risk[8] to control variables. We measure a leverage ratio by dividing total debt with the market value of equity. For each sample, the data for the leverage ratio is collected from COMPUSTAT as of the fiscal year end prior to a spinoff announcement year. In addition, in Section 5.D, we find a negative correlation between firm size and announcement abnormal return, which is implied by the fact that small firms tend to split a larger percentage of their assets than large firms do. We referred to it as firm size effect.

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[8] Maxwell and Rao (2003) hypothesize that the riskier a firm's debt, the greater the importance of collateral to bondholders. It implies that for a firm with greater financial risk, a spinoff will renders a larger loss to its bondholders, but a greater gain to stock holders. Accordingly, they find that a leverage ratio, which reflects financial risk of a sample firm, is negatively correlated to bond abnormal returns, but it is positively related to abnormal stock returns.

Thus, we include the natural log of the market capitalization of a parent firm at the month end prior to the announcement month as an additional control variable in the expectation that it might add incremental explanatory power for the abnormal returns over relative size.

Cross-Sectional Analysis

A. *Confirmation of the Prior Literature***.** In this section, before we evaluate disagreement factor and disagreement shock in multiple regressions, we examine whether the results reported in the literature on the relationship between each of the control variables (information asymmetry, focus factor, relative size, and leverage) and announcement abnormal returns hold with our extended sample of spinoffs. In Section 14.A, we show that there is a statistically significant deterioration from the pre-spinoff to the post-spinoff period in all the measures of *information asymmetry* and that the deterioration is observed only for the focus-increasing spinoffs. This evidence is in direct contrast with *the information asymmetry hypothesis*, and hence casts doubt on a positive relation between announcement abnormal returns and the pre-spinoff level of *information asymmetry*. In addition, we show that the positive effect of focus factor on the announcement returns vanishes in the second study period from 1992 to 2005.

Thus, we test the information hypothesis and the effect of focus factor with multiple regression analysis for our full-study period from 1964 to 2005. We begin by regressing CAR on a constant, a proxy for the pre-spinoff level of information (*IA*), a dummy variable for focus factor (*Focus*), and the relative size of a subsidiary (*Relative size*): Model 1. Because of extreme values in some of independent variables, we

Table 17. Cross-Sectional Regressions with Information Asymmetry for the Full Sample of Spinoffs, 1964-2005

This table presents the estimates of the OLS regressions on the abnormal announcement returns. The sample consists of the U.S firms that engaged in a corporate spinoff during the period 1964-2005. The sample firms are required to have at least 80% of daily returns and trading volume during the pre-event period. The pre-event period is defined as a 250-trading -day period over AD-260 to AD-11 (AD is the announcement date). The dependent variable is the abnormal return cumulated over the three days surrounding the date of a spinoff announcement, (AD-1, AD+1).A market model for daily returns is estimated over the pre-event period to compute abnormal returns. The market returns are the CRSP value-weighted portfolio of returns of all NYSE/AMEX/NASDAQ stocks. $\overline{CSSPRD}$ is the mean of daily bid-ask spreads (*CSSPRD*), which are measured by the estimation method proposed by Corwin and Schultz (2011), in the pre-event period. *DISP2* is the standard deviation of analysts' forecasts on the current fiscal year's earnings scaled by the average of the current and the previous month-end stock price. Over the pre-event period (i.e., 12 months), monthly estimates of *DISP2* are averaged to calculate the proxy for information asymmetry. The value of 1 is assigned to a sample firm if its two-digit primary SIC code is different from that of its subsidiary (i.e., focus-increasing spinoff). Otherwise, zero is assigned to the firm (i.e., non-focus-increasing spinoff). The relative size of a subsidiary (*Relative Size*) as the ratio of the market capitalization of the subsidiary measured by the end of the month in which the ex-date occurs to the market capitalization of the parent firm by the end of the month prior to a spinoff announcement month (*Size*). *Leverage* is total debt divided by the market value of equity as of the end of fiscal-year end prior to a spinoff announcement year. *Size*, *Relative size*, and $\overline{CSSPRD}$ are transformed by taking the natural logarithm. The *p*-values for the significance of the coefficients are adjusted for heteroskedasticity and shown in parenthesis. The adjusted R^2 and the model *F*-statistic probability in parenthesis are reported in the last row. A coefficient with its *p*-values in bold indicate the significance at the minimum of the 10% level.

	Panel 1. Information Asymmetry: $\overline{CSSPRD}$				**Panel 2. Information Asymmetry: *DISP2***			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Constant	0.078	**0.158**	**0.125**	**0.090**	0.017	**0.098**	0.074	0.082
	(0.202)	**(0.035)**	**(0.085)**	**(0.100)**	(0.490)	**(0.029)**	(0.114)	(0.145)
IA	0.007	0.006	0.004	0.004	-0.004	-0.007	-0.008	-0.011
	(0.551)	(0.624)	(0.701)	(0.382)	(0.363)	(0.135)	(0.106)	(0.067)
Focus	**0.023**	**0.020**	**0.021**	0.017	0.020	0.017	0.019	0.019
	(0.060)	**(0.100)**	**(0.072)**	(0.157)	(0.105)	(0.155)	(0.120)	(0.201)

Table 17. Cross-Sectional Regressions with Information Asymmetry for the Full Sample of Spinoffs, 1964-2005, Continued

	Panel 1. Information Asymmetry: $\overline{CSSPRD}$				**Panel 2. Information Asymmetry: *DISP2***			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Relative size	**0.015**		**0.012**	**0.010**	**0.012**		**0.009**	0.006
	(0.001)		**(0.009)**	**(0.077)**	**(0.005)**		**(0.036)**	(0.205)
Size		**-0.008**	-0.004	-0.003		**-0.008**	-0.006	-0.008
		(0.024)	(0.204)	(0.845)		**(0.030)**	(0.153)	(0.112)
Leverage				0.009				0.000
				(0.489)				0.995
Obs	202	202	202	168	173	173	173	139
Adjusted R^2	**0.054**	**0.036**	**0.058**	**0.064**	**0.034**	**0.026**	**0.040**	0.023
	(0.003)	**(0.016)**	**(0.003)**	**(0.007)**	**(0.033)**	**(0.060)**	**(0.027)**	(0.152)

transform *IA* and *Relative size* by taking the natural logarithm. We run the same regression for the various proxies of *IA* (market –based proxies: $\overline{CSSPRD}, \overline{ILLIQ}$ and *SIGMA*; analysts' earnings forecasts-based measure:$\overline{DISP1}$and $\overline{DISP2}$). Table 3 present the parameter estimates for $\overline{CSSPRD}$and $\overline{DISP2}$ with their heteroskedasticity adjusted *p*-values in parenthesis. For the other proxies for *IA*, we omit their regression results since there is no material difference in the parameter estimates.

As can be seen in Panel 1 of Table 3, none of the coefficient of $\overline{CSSPRD}$ is significant in all regression models. In line with our findings in the bivariate analysis of information asymmetry in Section 14.A, we find no evidence for the information hypothesis. Our finding suggests that abnormal returns are not related to the pre-spinoff levels of information asymmetry of the sample firms. However, consistent with the prior literature, we find that the coefficient of *Focus* is significant at 10% level for all models except Model 4. Similarly, *Relative size* is significant at least at the 10% level for Model 1, 3 and 4. In Model 2, we drop *Relative size* from Model 1 and include the pre-spinoff size of a parent firm (*Size*). In Section 5.D, we find that *Size* is negatively correlated with *Relative size*, which implies that smaller firms tend to spin off a larger fraction of assets to their subsidiaries. Because *Relative size* is positively correlated with CAR, we would expect the coefficient of *Size* to be negative. As expected, the coefficient is negative and significant at the 5 % level.

In Model 3, we include both *Relative size* and *Size* to see whether *Size* can provide incremental power in explaining the cross-sectional variation in CARs. Regardless of a proxy of *IA, Size* still enters negatively, but its coefficient becomes insignificant. Hence, a firm-size related variation in CARs seems to be captured by *Relative size*. Finally, in Model 4 we add *Leverage*[9] to Model 3 to evaluate how financial risk affects the abnormal returns. According to Maxwell and Rao (2003), financial risk should be positively related to abnormal returns since there is a greater wealth transfer from bondholders from stock holders for a firm with greater financial risk. However, we do not find such relationship for our sample of spinoff firms.

Therefore, the results of the regression analysis in Table 3 suggest that only *Relative size* and *Focus* are the significant determinants for the announcement abnormal returns. But, note that this is the case for the models with the market-based *AI* proxy for which the sample size is 202. Though our inference drawn from *DISP2* (the *IA* proxy based on analysts' earnings forecasts: Panel 2) are similar to those from $\overline{CSSPRD}$ (the market-based *IA* proxies: Panel 1), in Panel 2 *Focus* is consistently insignificant for all the regression models. In fact, *Focus* also enters insignificantly in Model 4 in Panel.

Notice that the sample firms included in Model 4 in Panel 1 requires COMPUSTAT data for the calculation of *Leverage*, which reduces the sample size from 202 to 168. Likewise, for Panel 2 the sample firms must have analysts' earnings forecasts data from IBES database to compute *DISP2*, which reduces the sample size further to 173. This may suggest that the effect of an approximate 15% reduction in the sample size is large enough to make the coefficient of *Focus* insignificant. It further casts doubt on the generality of the effect of *Focus* on the abnormal announcement returns or the notion that

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[9]We also use a different definition of leverage as in Maxwell and Rao (2003); the ratio of total debt to the book value of equity. But, the result is identical.

concentrating on a firm's core business by spinning off unrelated business increases the wealth of shareholders.

B. *Analysis of Outliers*. In Section 11.C (Table 14), forming the quintile based on the *ex-ante* level of DO or disagreement factor, the difference in the mean CAR between the top and the bottom quintile is insignificant, though we find a significant correlation between disagreement factor and CAR. This suggests an extremely large CAR in the top quintile, which might weaken the strength of a negative relationship between disagreement factor and CAR. Thus, to confirm our bivariate results in Table 14 in which we find a negative correlation between disagreement factor and CAR, we regress disagreement factor ($\overline{LNTO}, \overline{Detrend}, \overline{UV}, \overline{RESD}, or\ \overline{SUV}$) on CAR without controlling for the other determinants: Model 0.

Recall that the disagreement factor of a firm is the mean of daily estimates of a volume-based measure of DO (VDO*)* for the pre-event period, which is 250 trading days prior to the announcement of a spinoff. We estimate five different VDO*s* (*LNT*O, *Detrend*, *UV*, *RESD*, and *SUV*) on each day in the pre-event period. As we show in Section 7, disagreement factor is measured as a proxy for the (normal or representative) level of disagreement among investors about a firm on the typical trading day, which thus can be reasonably considered as a firm characteristic prior to a spinoff announcement. In Table 18, we report the result for Model 0. To our surprise, we find that none of the proxies for disagreement factor except $\overline{LNTO}$ and $\overline{SUV}$ is significantly related to CAR.

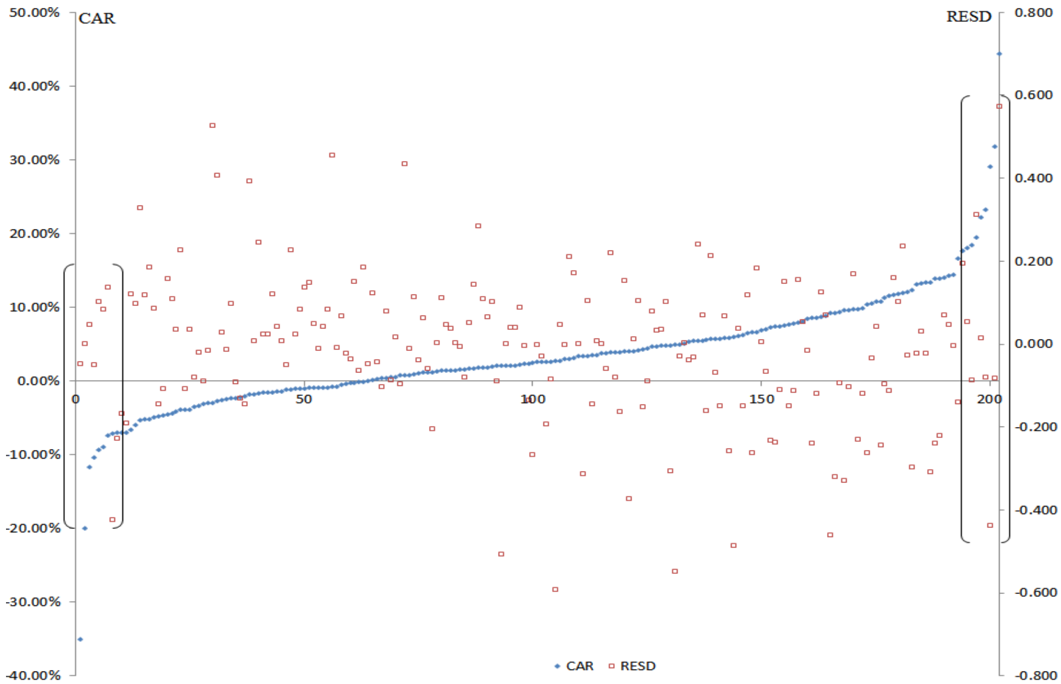

Figure 2. Abnormal Return and Disagreement factor
The three-day cumulative abnormal returns (CAR) around the spinoff announcement dates are sorted in ascending order, and plot them with their corresponding values of the *ex-ante* level of DO ($\overline{RESD}$) or the disagreement factors for the U.S firms that engaged in corporate spinoff from 1964 to 2005. The bracket in both ends is set for observations below the 5th percentile of and above the 95th percentile of CAR.

This result confirms our concern about a possible weakening effect of extreme announcement returns on the relation between disagreement factor and CAR. In Figure 2, we present the scatter plot of CAR and $\overline{RESD}$.[10] In particular, we plot CARs sorted in an ascending order and the corresponding $\overline{RESD}$. At first glance, a negative relation between CAR and $\overline{RESD}$ is quite visible. However, observe CAR and $\overline{RESD}$ within two bracketed areas that are set for observations below the 5th percentile and above the 95th

[10]We choose $\overline{RESD}$ among five proxies for disagreement factor ($\overline{LNTO}, \overline{Detrend}, \overline{UV}, \overline{RESD}, or\ \overline{SUV}$) since there is no material difference in the plot with the other proxies for disagreement factor except $\overline{LNTO}$.

percentile of CAR (10 firms in each bracket). Some of CARs with an extremely high (low) value are associated with an extremely high (low) value of $\overline{RESD}$.

Thus, it appears that the effect of a positive relationship between outliers of CAR and large values of $\overline{RESD}$ is disproportionally large so as to reduce a negative relationship between CAR and $\overline{RESD}$ observed for a majority of the sample, hence resulting in an insignificant coefficient in Model 0. Moreover, our inspection of the sample firms in the brackets reveals that among the firms above the 95th percentile of CAR, 9 out of 10 firms are focus-increasing spinoffs. Interestingly, all nine firms come from the second study period from 1992 to 2005 for which period we find no differences in the mean and median of CAR between focus-increasing and non-focus-increasing spinoffs, shown in Table 16. For those below the 5th percentile of CAR, 5 out of 10 firms are non-focus-increasing spinoffs in which two firms have the lowest values of CAR (-35% and -20% respectively). These observations suggest that a positive correlation between *Focus* and CAR reported in Panel 1 of Table 17 with the full sample might merely reflect a disproportionally strong effect of these outliers of CAR rather than that of a majority of the sample. In fact, these outliers explain why the coefficient of *Focus* in Panel 2 of Table 17 is insignificant, as some of them are dropped from the sample due to the unavailability of analysts' earnings forecasts data. Moreover, notice that the distribution of CAR, though symmetrically distributed, has a heavy fat tails with the kurtosis of 6.30. But, excluding the outliers of CARs, the kurtosis reduces to -0.53.

In sum, the outliers of CAR in Figure 2 have the following properties: i) the outliers of CAR are positively associated with disagreement factor, while the majority of

CAR exhibits a negative relationship; ii) They tend to belong to focus-increasing (at the positive-end of distribution of CAR) and non-focus-increasing (at the negative-end of distribution of CAR) spinoffs; iii) Their existence results in a highly non-normal distribution of CAR. Hence, to make sure that result in the following regression analyses are not driven by these outliers and in order to draw robust inferences, we exclude these outliers from the sample or include sample firms that lie between the 5^{th} and the 95^{th} percentiles of CAR.

Cross-Sectional Tests for Disagreement Factor

A. *Full Study Period from 1964 to 2005.* We evaluate the effect of disagreement factor on price reactions around the announcement of a spinoff by multiple regressions. In all regressions, we include entire control variables that are used in the estimation of a regression in Table 17 while excluding the proxy for financial risk.[11] Including these variables in a regression sets a stage for a stringent test for the explanatory power of disagreement factor for announcement abnormal returns. Thus, we regress CAR on a constant, disagreement factor ($\overline{LNTO}, \overline{Detrend}, \overline{UV}, \overline{RESD}, or\ \overline{SUV}$) and control variables (*IA*, *Focus*, *Relative size* and *Size*).For a proxy for information asymmetry (*IA*), we choose $\overline{CSSPRD}$ among the *IA* proxies we analyzed previously.[12] In addition, as we discussed in the preceding section, we estimate a regression model with the sample firms

[11] An incremental explanatory power gained by leverage is minimal or negative. Moreover, due to an issue of data availability for calculation of leverage, including this variable reduces the sample size from 187 to 135.

[12]We estimate all OLS models in Table 4 with five different proxies for information asymmetry employed in Table 15 and find that there is no material differences in regression estimates regardless of the choice of a proxy for information asymmetry.

Table 18. Determinants of Announcement Abnormal Returns

This table presents the estimates of the OLS regressions on the abnormal announcement returns with the trimmed sample. The sample firms between the 95 and the 5 percentile of CAR are removed from the sample. The pre-event period is defined as a 250-trading -day period over AD-260 to AD-11 (AD is the announcement date). The dependent variable (CAR) is the abnormal return cumulated over the three days surrounding the date of a spinoff announcement, (AD-1, AD+1). A market model for daily returns is estimated over the pre-event period to compute abnormal returns. The market returns are the CRSP value-weighted portfolio of returns of all NYSE/AMEX/NASDAQ stocks. The *ex-ante* level of DO ($D_i^{ex-ante}$) or disagreement factor is measured by averaging daily estimates of a volume-based measure of DO (VDO = *LNTO*, *Detrend*, *UV*, *RESD* and *SUV*)† over the pre-event period. Similarly, the event level of DO (D_i^{event}) is the mean of daily VDO estimates in the announcement period from AD-1 to AD+1. Disagreement Shock (*Shock*) is calculated by D_i^{event} minus $D_i^{ex-ante}$. $\overline{CSSPRD}$ is the mean of daily bid-ask spreads (*CSSPRD*), which are measured by the estimation method proposed by Corwin and Schultz (2011), in the pre-event period. A dummy variable equal to 1 is assigned to a parent firm (i.e., focus-increasing spinoff) if its two-digit primary SIC code is different from that of its subsidiary. Otherwise, zero is assigned (i.e., non-focus-increasing spinoff). The relative size of a subsidiary (*Relative Size*) is the ratio of the market capitalization of the subsidiary measured by the end of the month in which the ex-date occurs to the market capitalization of the parent firm by the end of the month prior to a spinoff announcement month (*Size*). *Size*, *Relative size*, and $\overline{CSSPRD}$ are transformed by taking the natural logarithm. The *p*-values for the significance of the coefficients are adjusted for heteroskedasticity and shown in parenthesis. The adjusted R^2 and the model *F*-statistic probability in parenthesis are reported in the last row. A coefficient with its *p*-values in bold indicates the significance at the minimum of the 10% level.

	$\overline{RESD}$				$\overline{Detrend}$				$\overline{UV}$			
	Model 0	Model 1	Model 2	Model 3	Model 0	Model 1	Model 2	Model 3	Model 0	Model 1	Model 2	Model 3
Constant	**0.034**	**0.030**	0.049	0.052	0.035	0.031	0.048	0.056	0.034	0.030	0.046	0.052
	(0.000)	**(0.000)**	(0.280)	(0.236)	(0.000)	(0.000)	(0.285)	(0.210)	(0.000)	(0.000)	(0.309)	(0.242)
Dis. Factor	-0.04	**-0.082**	**-0.063**	**-0.058**	-0.026	**-0.068**	**-0.052**	**-0.038**	-0.035	**-0.078**	**-0.059**	**-0.050**
	(0.408)	**(0.000)**	**(0.002)**	**(0.006)**	(0.555)	**(0.000)**	**(0.003)**	**(0.053)**	(0.483)	**(0.000)**	**(0.003)**	**(0.016)**
Shock				**0.021**				**0.020**				**0.021**
				(0.003)				**(0.003)**				**(0.003)**

Table 18. Determinants of Announcement Abnormal Returns, Continued

	$\overline{RESD}$				$\overline{Detrend}$				$\overline{UV}$			
	Model 0	Model 1	Model 2	Model 3	Model 0	Model 1	Model 2	Model 3	Model 0	Model 1	Model 2	Model 3
$\overline{CSSPRD}$			0.003	0.006			0.003	0.008			0.002	0.007
			(0.724)	(0.392)			(0.687)	(0.231)			(0.781)	(0.344)
Focus			0.010	0.005			0.010	0.006			0.009	0.005
			(0.214)	(0.465)			(0.191)	(0.419)			(0.238)	(0.531)
Relative size			**0.009**	0.004			**0.010**	0.005			**0.009**	0.004
			(0.012)	(0.265)			**(0.007)**	(0.149)			**(0.010)**	(0.248)
Size			0.000	0.000			0.001	0.001			0.000	0.000
			(0.917)	(0.994)			(0.824)	(0.772)			(0.911)	(0.934)
Obs	202	183	183	183	202	183	183	183	202	183	183	183
Adjusted R^2	0.004	**0.076**	**0.107**	**0.169**	-0.001	**0.064**	**0.100**	**0.167**	0.002	**0.072**	**0.102**	**0.168**
	(0.193)	**(0.000)**	**(0.000)**	**(0.000)**	(0.360)	**(0.000)**	**(0.000)**	**(0.000)**	(0.241)	**(0.000)**	**(0.000)**	**(0.000)**

Table 18. Determinants of Announcement Abnormal Returns, Continued

	$\overline{SUV}$				$\overline{LNTO}$			
	Model 0	Model 1	Model 2	Model 3	Model 0	Model 1	Model 2	Model 3
Constant	**0.035**	**0.031**	0.043	0.051	-0.06	0.020	0.059	0.067
	(0.000)	**(0.000)**	(0.340)	(0.273)	(0.251)	(0.477)	(0.283)	(0.240)
Dis. Factor	**-0.039**	**-0.050**	**-0.035**	**-0.030**	**-0.015**	-0.002	0.000	0.001
	(0.058)	**(0.000)**	**(0.011)**	**(0.035)**	**(0.072)**	(0.673)	(0.949)	(0.865)
Shock				0.006				**0.019**
				(0.257)				**(0.008)**
$\overline{CSSPRD}$			0.002	0.002			0.006	0.012
			(0.786)	(0.765)			(0.586)	(0.236)
Focus			0.010	0.009			0.010	0.007
			(0.217)	(0.248)			(0.203)	(0.393)
Relative size			**0.010**	**0.009**			**0.012**	**0.008**
			(0.006)	**(0.023)**			**(0.001)**	**(0.035)**
Size			0.001	0.000			0.001	0.001
			(0.804)	(0.906)			(0.805)	(0.693)
Obs	202	183	183	183	202	183	183	183
Adjusted R^2	0.008	**0.051**	**0.086**	**0.090**	**0.025**	-0.005	**0.062**	**0.120**
	(0.107)	**(0.001)**	**(0.001)**	**(0.001)**	**(0.015)**	(0.679)	**(0.006)**	**(0.000)**

whose CAR is between the 5^{th} and the 95^{th} percentile. This reduces the size of the sample to 183 firms (the trimmed sample).

Table 18 presents the parameter estimates for different OLS models and their heteroskedasticity adjusted p-values in parenthesis. First, to confirm the effect of the removal of the outliers from the full sample, we regress CAR on a constant and disagreement factor: Model 1. Note that Model 0 is estimated with the full sample (202 firms). As can be seen in Table 18, for any proxy for disagreement factor (except $\overline{LNTO}$), it is significantly negatively related to CAR at the 1% level of significance. The insignificant relation between $\overline{LNTO}$ and CAR can be attributed to an upward secular trend in trading activity in the U.S. stock market over the study period. Such trend is not observed for the other proxies for disagreement factor (See Section 6.A for a detailed discussion). Thus, it seems that the effect of a secular trend in $\overline{LNTO}$ confounds the relationship between $\overline{LNTO}$ and CAR. However, the coefficient of $\overline{LNTO}$ is still negative, though insignificant. Given the effect of a secular trend in $\overline{LNTO},$ our discussion will focus on the interpretation of the result from the other four proxies for disagreement factor ($\overline{Detrend}, \overline{UV}, \overline{RESD}, or\ \overline{SUV}$).

In Model 2, controlling for the known determinants of CAR, we find that the coefficient of disagreement factor, regardless of its proxy, is negative and significant at the 1% level though its magnitude declines slightly from Model 1. For instance, the coefficient of $\overline{RESD}$ is -0.063. To gauge the economic impact of $\overline{RESD}$, we estimate the change in CAR when we increase $\overline{RESD}$ by one standard deviation (from the mean of $\overline{RESD}$). Given that the standard deviation of $\overline{RESD}$ is 0.176, one standard deviation increase in $\overline{RESD}$ roughly corresponds to a decrease of 1.11% of CAR. In other words, the difference of one standard deviation in $\overline{RESD}$ is translated to the difference of 1.45% in CAR.

For the information asymmetry proxy ($\overline{CSSPRD}$), inconsistent with the information hypothesis, we do not find evidence for a positive association between CAR and $\overline{CSSPRD}$ for all regressions in Table 18. As suggested by the results of the bivariate analysis of the information asymmetry in which we find a significant deterioration in the information asymmetry of the sample after the completion of a spinoff, there is no connection between the levels of information asymmetry *ex ante* and CARs. Under the information hypothesis as we discussed previously, firms with higher levels of information asymmetry is expected to earn higher abnormal returns because investors would rationally anticipate greater reductions in information asymmetry, hence higher valuations for these firms.[13]This evidence suggests further that there might be no empirical ground for the notion that it is undervalued firms with severe information problem that engage in a corporate spinoff.

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[13]In a similar vein, Thomas (2002) takes an issue with the notion that corporate diversification strictly aggravates information asymmetry. He notes that if errors in forecasting segment cash flows are not perfectly correlated, consolidated forecasts for a diversified firm's cash flow can be more accurate than forecasts for a focused firm, effectively a diversification of information asymmetry across business divisions. Empirically, he finds that firms with greater diversification are not associated with greater errors and dispersion of analysts' earnings forecasts (i.e., information asymmetry). If diversification does exacerbate information problem, a reverse-diversification should mitigate the problem, which is consistent with the information hypothesis for corporate spinoffs. However, if diversification does not lead to greater information asymmetry problem, then it is not clear how a reverse-diversification would affect the information environment of a firm. Though our study of corporate spinoff is a subset of corporate reverse-diversification, at least in the case of spinoffs the problem of information asymmetry appears to become more severe after the completion of spinoff.

In all the regressions in Table 18, inconsistent with the prior literature we find that focus factor is not significantly related to CAR. This result provides a support for the outlier analysis in the preceding section. That is, a significantly positive coefficient of *Focus* reported in Table 17 for the full sample (before trimming the outliers) seem to reflect the fact that extremely positive (negative) abnormal returns tend to be observed for focus-increasing (non-focus-increasing) firms. However, given that there is strong empirical support for the effect of *Focus* in the literature for the first study period from 1964 to 1991, and that a majority of the outliers are observed in the second study period, we will implement a sub-period analysis to examine the stability of focus factor over the entire study period in the final section of Part Two.

In Model 3, we add disagreement shock (*Shock*) to Model 2. In Section 11.B of Part one, our bivariate analysis shows that there is a strong positive correlation between *Shock* and announcement abnormal return. Recall that *Shock* is the magnitude of a change in the degree of disagreement from a normal level in the pre-event period ($D_i^{ex-ante}$ or disagreement factor) to an event level in the announcement period (D_i^{event}). This surge in the level of disagreement is caused by differential interpretation about the information content of a spinoff announcement among investors. Based on Miller (1977)'s model in which disagreement induces a downward-sloping demand curve, we interpret a change in the level of disagreement as a change in the slope of the demand curve of a firm. Thus, a firm with a greater change in the slope (or disagreement shock) should earn a higher abnormal return. On Model 3 in Table 18, we find that in all measure of *Shock* ($= D_i^{event} - D_i^{ex-ante}$) except $\overline{SUV}$, the coefficient of *Shock* is positive and significant at the1% level, which confirms a positive relation between *Shock* and CAR found in the bivariate analysis in Part One.

Notice that the coefficient of disagreement factor is still negatively significant while its size decreases slightly from Model 2. The relative size of a subsidiary (*Relative size*) is positively and significantly related to CAR in Model 2, consistent with the prior literature. But, when *Shock* is included (Model 3), it is no longer significant except $\overline{SUV}$. It appears that the effect of *Relative size* on CAR is captured by *Shock*. Moreover, the coefficient of *Focus* and *Relative size* also monotonically declines from Model 2 to Model 3in all measures of *Shock*. This suggests that disagreement shock itself might depend on these factors. Thus, we investigate possible linkages between *Shock* and these variables in the next section.

B. *Determinants of Disagreement Shock*. In our model, disagreement shock (*Shock*) represents the magnitude of a change in the degree of disagreement, which is triggered by the announcement of a spinoff, from the normal level in the pre-event period to the event level. Then, such questions might follow: What do cause the change in the level of disagreement? To answer the question, we hypothesize that the information content in relative size (*i.e.*, the portion of assets that a firm split up to its spun-off subsidiary) and focus factor (*i.e.*, the type of a division that the firm spins off) could be sources of disagreement. We also hypothesize that investors' perception regarding the level of information asymmetry about the firm would affect the degree of differential interpretations about the announcement. Therefore, we investigate how *Shock* is related to these variables. More specifically we want to examine the extent to which *Shock* is

Table 19. Determinants of Disagreement Shock

This table presents the estimates of the OLS regressions on the disagreement shocks of the trimmed sample. The sample firms between the 95 and the 5 percentile of CAR are removed from the sample. The pre-event period is defined as a 250-trading -day period over AD-260 to AD-11 (AD is the announcement date). The dependent variable Disagreement Shock (*Shock*) is calculated by D_i^{event} minus $D_i^{ex-ante}$. The *ex-ante* level of DO ($D_i^{ex-ante}$) or disagreement factor is measured by averaging daily estimates of a volume-based measure of DO (VDO = *LNTO*, *Detrend*, *UV*, *RESD* and *SUV*) over the pre-event period. Similarly, the event level of DO (D_i^{event}) is the mean of daily VDO estimates in the announcement period from AD-1 to AD+1. $\overline{CSSPRD}$ is the mean of daily bid-ask spreads (*CSSPRD*), which are measured by the estimation method proposed by Corwin and Schultz (2011), in the pre-event period. A dummy variable equal to 1 is assigned to a parent firm (i.e., focus-increasing spinoff) if its two-digit primary SIC code is different from that of its subsidiary. Otherwise, zero is assigned (i.e., non-focus-increasing spinoff). The relative size of a subsidiary (*Relative Size*) is the ratio of the market capitalization of the subsidiary measured by the end of the month in which the ex-date occurs to the market capitalization of the parent firm by the end of the month prior to a spinoff announcement month (*Size*). *Size*, *Relative size*, and $\overline{CSSPRD}$ are transformed by taking the natural logarithm. The *p*-values for the significance of the coefficients are adjusted for heteroskedasticity and shown in parenthesis. The adjusted R^2 and the model *F*-statistic probability in parenthesis are reported in the last row. A coefficient with its *p*-values in bold indicates the significance at the minimum of the 10% level.

	$\overline{RESD}$		$\overline{Detrend}$		$\overline{UV}$		$\overline{SUV}$		$\overline{LNTO}$	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	**0.586**	-0.148	**0.619**	-0.373	**0.596**	-0.261	**0.655**	**-1.348**	-0.189	-0.541
	(0.000)	(0.775)	**(0.000)**	(0.494)	**(0.000)**	(0.612)	**(0.000)**	**(0.052)**	(0.640)	(0.457)
Dis. Factor	**-0.781**	-0.263	**-1.125**	**-0.708**	**-0.889**	-0.390	**-0.979**	**-0.792**	**-0.128**	-0.016
	(0.008)	(0.352)	**(0.000)**	**(0.008)**	**(0.002)**	(0.153)	**(0.001)**	**(0.005)**	**(0.042)**	(0.836)
$\overline{CSSPRD}$		**-0.173**		**-0.262**		**-0.214**		-0.029		**-0.254**
		(0.048)		**(0.005)**		**(0.013)**		(0.799)		**(0.016)**
Focus		**0.202**		**0.199**		**0.212**		0.136		0.170
		(0.049)		**(0.064)**		**(0.037)**		(0.317)		(0.119)

Table 19. Determinants of Disagreement Shock, Continued

	$\overline{RESD}$		$\overline{Detrend}$		$\overline{UV}$		$\overline{SUV}$		$\overline{LNTO}$	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Relative size		**0.250**		**0.223**		**0.243**		**0.256**		**0.205**
		(0.000)		**(0.000)**		**(0.000)**		**(0.000)**		**(0.000)**
Size		0.011		-0.007		0.003		**0.154**		0.001
		(0.706)		(0.822)		(0.907)		**(0.000)**		(0.981)
Obs		183		183		183		183		183
Adjusted R^2	**0.033**	**0.192**	**0.080**	**0.218**	**0.046**	**0.211**	**0.058**	**0.167**	**0.017**	**0.131**
	(0.008)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.042)**	**(0.000)**

capturing the information in these determinants for announcement abnormal returns. We regress Shock against disagreement factor and the control variables ((CSSPRD), Focus, Relative size, and Size).

We present the results of regressions in Table 19. First, regressing Shock on a constant and disagreement factor: Model 1, we find that all the proxies for disagreement factor are negatively related to Shock at the 1% level of significance, confirming the result in Part One, specifically Hypothesis 2. In Part 1, we postulated that firms characterized by lower disagreement factor prior to spinoff announcements are expected to incur larger disagreement shock than firms with higher disagreement factor. We argue that this relationship occurs due to limited attention of investors. Because cognitively overloaded investors pay attention to only a subset of information most of time, a firm that is not frequently covered by the media would have a low value of disagreement factor. In other words, it is less susceptible to heterogeneous interpretations by investors. However, when a corporate spinoff is announced (*i.e.*, a material news), which is very likely to receive a wide media coverage, the firm becomes susceptible to a high degree of differential interpretation among investors relative to its disagreement factor (*i.e*. the normal level of disagreement).

Recall that the methodology in measuring any volume-based measure of DO (VDO) from which *Shock* is measured is essentially structured to estimate a portion of trading volume after controlling for the market-wide trading volume and the average level of firm-specific trading volume (*i.e.*, idiosyncratic liquidity). Hence, one interpretation is that firms with a lower level of information asymmetry seem to be more exposed to a higher level of disagreement triggered by spinoff announcements. Alternatively, trading activity is more intensive for these firms as compared to those with greater information asymmetry. Thus, investors' perception about a firm's information asymmetry problem appears to reduce or perhaps, inhibit differential interpretation among investors about the announcement, and consequently abates trading activity in the market in the announcement period.

On the other hand, a firm's decision to split an unrelated subsidiary from its main business (*Focus*) has a significantly positive effect on *Shock*. The coefficient of *Shock* is positive for all measures of *Shock* and significant for $\overline{Detrend}, \overline{UV},$ and $\overline{RESD}$.Thus, a firm engaging in focus-increasing spinoff invites a greater level of disagreement about the prospect of the firm following a spinoff compared to a firm engaging in non-focus-increasing spinoff. This result lends some support for the prediction of the dynamic disagreement model developed by Scheinkman and Xiong (2003). Specifically, they present a case in which the respective value of two subsidiaries—whose cash flows are perfectly negatively correlated— can exceed the value of a hypothetical parent firm, which consists of these two subsidiaries in the presence of heterogeneous belief among investors about these subsidiaries' values. Moreover, their model predicts more intensive trading in a subsidiary than in the parent. While their model would be suitable for testing a case of corporate carve-outs rather than a corporate spinoff, the implication of their model can be applied to our analysis of corporate spinoff dealing with the announcement effect of a spinoff. That is, the announcement itself incurs excessive trading volume and positive price reaction, which are shown to be more pronounced for focus-increasing spinoffs.

C. *Sub-Period Analysis.* In Section 16.A, the cross-sectional regression (Model 3 in Table 18) for the determinant of spinoff abnormal returns shows that the extant determinants found in the literature enters insignificantly for our full study period from 1964 to 2005. We find that only disagreement factor and disagreement shock explain the variation in abnormal returns. Nevertheless, this finding does not necessarily refute the previous findings. As we addressed in Section 14.B, the majority of the literature on corporate spinoffs draw a sample of spinoffs (announcements) occurred in the U.S before the year of 1992.

Thus, we examine the stability of the determinants for spinoff abnormal returns over the whole study period by segmenting the sample into two sub-periods: The first study period from 1964 to 1991 and the second study period from 1992 to 2005. Then, we estimate Model 3 in Table 18 for each study period. We omit disagreement shock from the regression because in this analysis we intend to confirm the findings in the previous literature. It should be recalled that we show in the preceding section that disagreement shock absorbs the variability in some of the determinants, namely, *information asymmetry*, *Focus*, and *Relative size*.

In Table 20, we present the result of the regression for the first study period (Panel 1) and for the second study period (Panel 2). First, notice that consistent with the prior literature, the coefficient of *Focus* and *Relative size* is positive and significant for the sample firms in the first study period. For example, on average, focus-increasing

Table 20. Determinants of Announcement Abnormal Returns: Two Sub-Periods Analysis
This table presents the estimates of the OLS regressions on the abnormal announcement returns with the trimmed sample for the first and the second sample period. The sample firms between the 95 and the 5 percentile of CAR are removed from the sample. The pre-event period is defined as a 250-trading -day period over AD-260 to AD-11 (AD is the announcement date). The dependent variable (CAR) is the abnormal return cumulated over the three days surrounding the date of a spinoff announcement, (AD-1, AD+1). A market model for daily returns is estimated over the pre-event period to compute abnormal returns. The market returns are the CRSP value-weighted portfolio of returns of all NYSE/AMEX/NASDAQ stocks. The *ex-ante* level of DO ($D_i^{ex-ante}$) or disagreement factor is measured by averaging daily estimates of a volume-based measure of DO (VDO = *LNTO*, *Detrend*, *UV*, *RESD* and *SUV*) over the pre-event period. $\overline{CSSPRD}$ is the mean of daily bid-ask spreads (*CSSPRD*), which are measured by the estimation method proposed by Corwin and Schultz (2011), in the pre-event period. A dummy variable equal to 1 is assigned to a parent firm (i.e., focus-increasing spinoff) if its two-digit primary SIC code is different from that of its subsidiary. Otherwise, zero is assigned (i.e., non-focus-increasing spinoff). The relative size of a subsidiary (*Relative Size*) is the ratio of the market capitalization of the subsidiary measured by the end of the month in which the ex-date occurs to the market capitalization of the parent firm by the end of the month prior to a spinoff announcement month (*Size*). *Size*, *Relative size*, and $\overline{CSSPRD}$ are transformed by taking the natural logarithm. The *p*-values for the significance of the coefficients are adjusted for heteroskedasticity and shown in parenthesis. The adjusted R^2 and the model *F*-statistic probability in parenthesis are reported in the last row. A coefficient with its *p*-values in bold indicates the significance at the minimum of the 10% level.

	Panel 1. The first sample period, 1964 to 1991					**Panel 2. The second sample period, 1992 to 2005**				
	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$
Constant	-0.039	0.009	0.012	0.013	0.002	0.086	0.057	0.053	0.058	0.056
	(0.670)	(0.901)	(0.866)	(0.854)	(0.972)	(0.231)	(0.369)	(0.407)	(0.362)	(0.385)
Dis. Factor	-0.006	**-0.036**	**-0.044**	**-0.051**	-0.030	0.003	**-0.072**	**-0.067**	**-0.070**	**-0.042**
	(0.434)	**(0.092)**	**(0.073)**	**(0.045)**	(0.117)	(0.675)	**(0.028)**	**(0.053)**	**(0.048)**	**(0.042)**
$\overline{CSSPRD}$	0.001	0.000	-0.001	0.000	-0.001	-0.010	-0.004	-0.005	-0.005	-0.006
	(0.949)	(0.975)	(0.940)	(0.967)	(0.930)	(0.485)	(0.707)	(0.652)	(0.700)	(0.573)

Table 20. Determinants of Announcement Abnormal Returns: Two Sub-Periods Analysis, Continued

	Panel 1. The first sample period, 1964 to 1991					**Panel 2. The second sample period, 1992 to 2005**				
	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$	$\overline{LNTO}$	$\overline{Detrend}$	$\overline{UV}$	$\overline{RESD}$	$\overline{SUV}$
Focus	**0.024**	**0.027**	**0.026**	**0.027**	**0.027**	-0.002	-0.005	-0.005	-0.005	-0.005
	(0.018)	**(0.007)**	**(0.008)**	**(0.006)**	**(0.006)**	(0.895)	(0.688)	(0.681)	(0.707)	(0.687)
Relative size	**0.011**	**0.010**	**0.009**	**0.009**	**0.010**	**0.010**	0.007	0.007	0.007	0.007
	(0.016)	**(0.046)**	**(0.056)**	**(0.067)**	**(0.051)**	**(0.082)**	(0.213)	(0.199)	(0.196)	(0.203)
Size	0.002	0.001	0.000	0.000	0.001	-0.004	-0.002	-0.002	-0.002	-0.002
	(0.630)	(0.840)	(0.925)	(0.925)	(0.802)	(0.302)	(0.575)	(0.560)	(0.553)	(0.494)
Obs	88	88	88	88	88	95	95	95	95	95
Adjusted R^2	**0.106**	**0.124**	**0.126**	**0.133**	**0.119**	0.031	**0.081**	**0.074**	**0.076**	**0.062**
	(0.014)	**(0.007)**	**(0.006)**	**(0.005)**	**(0.009)**	(0.167)	**(0.027)**	**(0.037)**	**(0.033)**	**(0.057)**

firms earns about 2.6% more announcement abnormal return than a non-focus-increasing firms. However, in the second study period, as can be seen from Panel 2, these factors become insignificant. Though the insignificance of *Focus* in the second study period as expected, given the result in the bivariate analysis of this variable in Section 14.B, the insignificance of *Relative size* is unexpected and striking. In the second study period, investors seem not to take these factors into consideration in their re- valuation of the sample firms upon the spinoff announcements as they did in the first study period. Furthermore, as we showed previously, there is no relationship between information asymmetry and abnormal returns in both sub-study periods. The only factor that remains significant in both sub-periods is disagreement factor. Consistent with the result for the full sample, it is significantly negatively associated with the abnormal returns in both sub-study periods.

Therefore, the rationales that are hypothesized and tested by the prior literature for the implementation of a spinoff seem to lack generality, and these rational motivations apply for only a subset of corporate spinoffs, especially those occurred before 1992 for which period most of empirical studies on the wealth effect of spinoffs are done. However, our result shows that only the disagreement factor of a firm, or a firm's characteristic inferred from the behaviors of investors who have heterogeneous beliefs and interpret public information differently, can consistently explain the abnormal returns from the spinoff announcements in both sub-study periods.

Conclusions

In Part 2, we examine the significance of disagreement factor as the determinant for the cross-sectional variation of abnormal returns days surrounding the announcement of a corporate spinoff. The disagreement factor (*i.e.,* the *ex-ante* level of DO in Part One) of a firm is defined as the level of disagreement among investors about its value in a normal trading day prior to a spinoff announcement. Therefore, it is reasonably considered as a firm-specific characteristic defined by investors who have heterogeneous beliefs and interpret information differently. In Part 1, given a precipitous increase in the level of DO induced by the announcement of a spinoff, we show that firms with lower disagreement factors provoke more heterogeneous interpretations about their spinoff announcements (*i.e.,* disagreement shock) than do firms with higher disagreement factors do. This result is consistent with the notion of limited attention hypothesis in the literature. Furthermore, the implication of this result is a negative correlation between abnormal announcement returns and disagreement factor. This implication renders disagreement factor as a potent variable that can be helpful in understanding price changes effected by spinoff announcements. Therefore, we intend to confirm that whether the negative relationship between disagreement factor and the announcement abnormal returns still remain significant after controlling for the known determinants identified in the extant literature for these returns.

Among these determinants, or the sources of the abnormal returns, we choose *information asymmetry ex ante*, change in industrial focus (*focus factor*), and the ratio of the size of a spun-off to that of its parent (*relative size*), all of which have received strong empirical supports in the prior studies. However, our review of the literature reveals that there is conflicting evidence for the effect of information asymmetry and that a majority of empirical papers that studied focus factor are concentrated on spinoff announcements occurred in the U.S before year 1992. Thus, we reexamine the validity of the information (asymmetry) hypothesis and the role of focus factor because our sample data is larger in size and cover a longer study period compared to the prior literature that examine these variables.

Using a sample of spinoffs that were undertaken by the U.S publicly-traded firms from 1964 to 2005, we find that information asymmetry problem, regardless of a proxy for information asymmetry used, is aggravated after the completion of a spinoff. This is inconsistent with the information hypothesis, which states that information asymmetry should be improved following spinoff. Under this hypothesis, the undervaluation of a firm due to information asymmetry between outside investors and managers is the motivation for spinoff to gain a fair valuation by reducing information asymmetry. Moreover, the deterioration in information asymmetry is much larger for and limited to the sample firms engaged in focus-increasing spinoff. This result invalidates the information hypothesis further because the focus-increasing samples should achieve a greater improvement in information asymmetry according to the hypothesis.

Regarding the effect of focus factor, we show that the focus-increasing firms earn significantly positively larger abnormal returns than the non-focus increasing firms only in our first study period from 1964 to 1991. This confirms the result of the extant literature that covered a similar time period. However, in our second study period from

1992 to 2005 there is no statistically significant difference in the abnormal returns between these two focus groups, and both groups, on average, earn significantly positive abnormal returns.

In multiple regression analyses of the full sample, we find that disagreement factor explains a significant portion of the cross-sectional variation in announcement abnormal returns after controlling for the other known determinants. This finding confirms the result of a bivariate test in Part 1 that firms with lower disagreement factors earn higher abnormal returns. However, information asymmetry and focus factor are not significantly related to the abnormal returns. Thus our full sample supports neither the information asymmetry nor the industrial-focus hypotheses.

Furthermore, including disagreement shock in regression analyses, we find that while disagreement factor remains significant, disagreement shock also is significantly positively correlated to the abnormal returns. This result confirms Hypothesis 2 in Part 1. However, all the other determinants (*i.e.*, focus factor and information asymmetry) including relative size become insignificant. This result suggests that the variations in these determinants are captured by disagreement shock. This implication is reasonable because the information content of these variables, which is known at the time of a spinoff announcement, is potentially a source for investor disagreement. Thus, relating these determinants with disagreement shock, we find that disagreement shock is smaller if a firm has higher level of information asymmetry *ex ante*, but the shock is larger if the firm implements a focus-increasing spinoff, and splits up a larger portion of its assets to its subsidiary. Given that our proxies for disagreement shock in effect represent abnormal trading activity resulting from disagreement triggered by a spinoff announcement, investors refrain from trading based on their own interpretation for firms that they perceive to have high information asymmetry.

Regarding our sub-period analyses, we confirm the finding in the literature that focus factor and relative size are indeed the sources of abnormal returns produced from spinoff announcements in the first study period from 1964 to 1991. However, in the second study period, we find that both focus factor and relative size no longer explain these returns. Moreover, the effect of information asymmetry remains insignificant for both sub-study periods. The only variable that can consistently explain the abnormal returns in both sub-periods is disagreement factor.

In conclusion, we have combined Miller (1977)'s static DO model with Banerjee and Kremer (2010)'s dynamic DO model and investigated the effects of investor's differential interpretations of spinoff announcements on price changes with the data on 221 corporate spinoffs in the U.S from 1964 to 2005. Investors' differential interpretation of corporate spinoff divestures is not a readily observable variable. Thus we have transformed trading volume into two comparative statistics (the *ex-ante* level of DO, or disagreement factor, and the *event* level of DO), and used them as the principal analytical variables for the examination of contradictory evidence centered on the validity of the three hypotheses for wealth gains prominently reported on the spinoff literature. The three hypotheses are (i) the information asymmetry, (ii) the industrial focus (focus-increasing vs. non-focus increasing spinoffs), (iii) the wealth transfer (from bond holders to stockholders) hypothesis.

In Part 2, we have shown that when abnormal returns from spinoff (*i.e.*, wealth gains) are analyzed in multiple regressions along with disagreement factor, the explanatory power of the four hypotheses is almost completely eclipsed by the robustness of disagreement factor. This finding sheds light to why there is the contradictory evidence from prior studies on the three hypotheses reported in the literature.

Together with Part 1, we have validated the analytical properties of the combined models of Miller (1977) and Banerjee and Kremer (2010): Namely, Miller's DO proposition that under short-sale constraints, optimistic investors overprice stock, which gives rise to a fleeting window of market anomaly, and Banerjee and Kremer's model specifications that impound a surge in trading volume which peaks at the announcement date and then levels off after five to seven days. We have demonstrated how the differential interpretation of firm-specific spinoff announcement by investors can be transformed from time-series of daily stock trading volume series into the two principal investigative variables: Disagreement factor and disagreement shock. By doing so, we have elucidated the unique and potent attributes that are intrinsic to these volume raw statistics.

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