Are Corporate Spin-offs Prone to Insider Trading?*

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Abstract

Recent research has documented empirical evidence of informed trading ahead of major corporate events, including earnings announcements, mergers and acquisitions and corporate bankruptcies. However, no such evidence exists ahead of corporate spinoffs (SP). Using a sample of 426 corporate SPs from 1996 to 2013, we document pervasive informed activity in options of the parent company, but not in stocks. About 13% of all deals exhibit significant abnormal options volume in the pre-announcement period. The odds of abnormal options volume being greater in a control sample are about one in 4,000.

Keywords: Asymmetric Information, CDS, Corporate Bonds, Insider Trading, Spinoffs, Market Microstructure, Options, SEC, TRACE

JEL Classification: C1, C4, G13, G14, G34, G38, K22, K41

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Recent research has documented empirical evidence of informed trading ahead of major corporate events such as earnings announcements, mergers and acquisitions and corporate bankruptcies. However, no such evidence exists ahead of corporate spinoffs (SP). Using a sample of 426 corporate SPs from 1996 to 2013, we document pervasive activity in options of the parent company, but not in stocks, that could yield very high returns to informed traders. Quantitatively, about 13% of all deals exhibit significant abnormal options volume in the pre-announcement period. The odds of abnormal options volume being greater in a control sample are about one in 4,000.

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1 Introduction

Insider trading before major corporate events is currently a topic of intense public debate.[1] While there is recent empirical evidence of informed trading ahead of corporate announcements such as earnings announcements (Kaniel, Liu, Saar, and Titman, 2012; Jin, Livnat, and Zhang, 2012; Kadan, Michaely, and Moulton, 2014; Goyenko, Ornthanalai, and Tang, 2014), mergers and acquisitions (M&A) (Cao, Chen, and Griffin, 2005; Chan, Ge, and Lin, 2015; Augustin, Brenner, and Subrahmanyam, 2014), and bankruptcies (Ge, Humphrey-Jenner, and Lin, 2014), no such evidence exists for the period preceding corporate spinoff (SP) announcements, which pertain to the sale of a subsidiary or the division of a company as a separate entity. This is surprising since SPs are supposed to be publicly unexpected, and largely unpredictable, and the parent firm's stock price typically rises after the deal announcement (Maxwell and Rao, 2003; Ahn and Denis, 2004). A case in point is the recent sale by General Electric of GE Capital on April 10, 2015, which lead to a jump in the parent's share price of nearly 11%.[2] In other words, the benefit of private information is clearly economically significant before SP announcements.

Some anecdotal evidence of insider trading ahead of SP announcements is available, based on the publicly disclosed litigation reports on the Securities and Exchange Commission's (SEC) website going back to 1995, even though there are only two prosecuted cases, thus far.[3] Galleon hedge fund manager Raj Rajaratnam was sentenced to 11 years in prison

[1]See, e.g., "Options Activity Questioned Again," *The Wall Street Journal*, February 18, 2013; "Study asserts startling numbers of insider trading rogues," *The New York Times*, June 16, 2014; "Are all insiders rogue traders?," *CNBC Commentary*, June 23, 2014; "Hillshire Options Bring in the Bacon," *The Wall Street Journal*, June 21, 2014.

[2]See "GE Seeks Exit from Banking Business," *Wall Street Journal*, April 10, 2015.

[3]See https://www.sec.gov/litigation/litreleases.shtml. We systematically searched the public litigation

for, among other trades, an illicit purchase of 3.25 million shares of AMD securities prior to the SP of its manufacturing business on October 7, 2008. The other publicly disclosed civil litigation relates to a psychiatrist, who misappropriated information from his patient regarding an upcoming spin-off in which Penril DataComm Networks planned to spin off a business unit, and sell off a portion to Bay Networks, on June 17, 1996. Interestingly, in both situations, the insiders purchased the parent's stock, even though options are potentially more profitable for informed traders.[4]

The objective of our study is to investigate and quantify the pervasiveness of informed trading, some of it possibly based on inside information, in the context of SP activity in the United States (US). In the context of this broad objective, we examine trading in both stocks and equity options. Thus, we use SPs as a complementary laboratory to test for the preferred venue of informed traders. In addition to documenting positive abnormal announcement returns of the parent's stock, we also show that SPs are typically also associated with negative abnormal announcement returns of the parent's bonds, giving rise to profitable capital structure arbitrage opportunities for investors in possession of material non-public information. We, therefore, extend our analysis to test for the presence of informed trading in corporate bonds and credit default swaps (CDS). This allows us to examine the preferred venue of informed traders *across* cash and derivative markets. We provide the first examination of the presence of abnormal trading activity ahead of announcements of corporate SPs in the US, in both the equity (stock and equity options) and the fixed income (bonds

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reports for matches using the keywords "spin", "options", "spinoff", "divestment" and "spun". We manually screened the flagged litigation documents and found only two cases involving insider trading in stocks, but no case of insider trading in options, ahead of SP announcements.

[4]See, among others, Easley, O'Hara, and Srinivas (1998), John, Koticha, Narayanan, and Subrahmanyam (2003), Cao and Ou-Yang (2009), or Johnson and So (2012), for the reasoning behind this.

and CDS) markets. We believe this analysis is of importance in light of significant SP deal activity, current initiatives by the SEC to make the pursuit of illegal insider trading activity a key priority, and the possibility that SPs may represent a "blind spot for insider trading regulators."[5]

The study of informed trading is only relevant if there are economic gains from trading on private information. The first step in our research is, therefore, to revisit the evidence on abnormal stock announcement returns for SP companies. Using a fairly large sample of 426 unique SP-days, almost double the size of the usual samples that have hitherto been employed, we find an average cumulative abnormal announcement return of approximately 2%. This is similar in magnitude to the price reaction around earnings announcements, which is indeed economically meaningful. The distribution of cumulative abnormal announcement returns is strongly right-skewed and is mostly bounded at zero. We further find that the average cumulative abnormal announcement returns are relatively larger if a divested subsidiary is in a different industry than the parent company, if its value represents a greater fraction of the parent's market capitalization, or if it is incorporated in the same state as the parent company.

Given that companies may self-select into SPs, our tests may be biased, due to this potential endogeneity. We, therefore, build a SP prediction model and construct a propensity-matched control sample in order to compare abnormal activity in the treatment group with that of a control group that is optimally matched based on company and industry charac-

[5]See "Spinmania! Europe is the next stop for the spinoff boom as activists cross the Atlantic," *Bloomberg Business*, December 17, 2014, and "Insider Trading Investigators Have a Blind Spot," *Bloomberg Business*, March 5, 2015.

teristics and financial performance. We construct two measures of informed trading that closely follow Acharya and Johnson (2010), the so-called *Sum* and *Max* measures. Using various benchmark regression models in a three-month pre-announcement-day estimation window to capture "normal" volumes and returns, these measures are computed using the sum of all positive (*Sum*) or the maximum of all (*Max*) standardized residuals over the five days immediately preceding the announcement day. In other words, *Sum* and *Max* reflect abnormal activity in both the stock and the options market, arising either from unusual spikes in trading activity on individual days, or from large cumulative abnormal returns and volumes that stand out in the pre-event window.

Irrespective of the particular measure used, and the construction of the control sample, we find robust evidence of informed trading in the equity options, but not in the stocks, of parent companies, in the five-day window preceding corporate SP announcements. This trading activity is reflected in abnormal options volume and excess implied volatility, whereas we find no evidence of abnormal stock volume or abnormal stock returns. This suggests that the options market, as expected, is a preferred venue of informed investors in the context of SPs. In addition, we find that the abnormal options volume is relatively larger for call options than for put options, in particular for out-of-the-money (OTM) and at-the-money (ATM) call options. Quantitatively, approximately 13% of all deals in our sample exhibit statistically significant abnormal options activity in the pre-announcement period at the 5% significance level. This is the case for 9% of all deals, using our most conservative benchmark model. The odds of abnormal options activity being greater in the propensity-matched control sample than that in the SP sample range between one in 66 to one in 7,533.

We further find that abnormal options activity in the pre-announcement period is more pronounced in subsamples of divestitures that are, ex ante, expected to have greater abnormal announcement returns. Thus, we find a greater degree of unusual options volume, for example, for SPs that are eventually completed, for those where the divested company is operating in a different industry than the parent, and for those where the deal value reflects a greater fraction of the market capitalization of the parent firm. The evidence that it is only abnormal pre-announcement options activity that positively and robustly predicts abnormal announcement returns offers strong support for informed trading in the options market, but not in the stock market. This result is also confirmed using high-frequency tick-by-tick data in both markets: we find that net buying activity in the options market, measured as the net difference between buyer- and seller-initiated option exposures to the underlying stock price (order flow imbalance), is significantly greater in the SP sample than in the propensity-matched control group, while this is not the case for stock order imbalance.

In the last part of our analysis, we investigate whether the positive abnormal announcement returns earned by the parent's shareholders represent a wealth expropriation from the parent's bondholders (Maxwell and Rao, 2003). Using corporate bond transactions data and CDS pricing information, we document negative abnormal announcement returns in the fixed income market that range between -0.12% and -6.24%, depending on the data (TRACE, Datastream, Bloomberg, or Markit) and market (CDS or bonds). The joint positive and negative announcement effects in the equity and fixed income markets plausibly give rise to profitable capital structure arbitrage opportunities for informed investors with material non-public information. We reject this hypothesis as we find no statistically significant difference in the measures of informed trading, computed for the bond and CDS markets, between the SP sample and the propensity-matched control group. This leads us to conclude that the ultimate preferred venue for informed trading is the equity options market, which can be rationalized using a back-of-the-envelope calculation, as being due to the trade-off between leverage and transactions costs (liquidity), relative to other venues.

Our work relates primarily to the immense literature on informed trading around corporate announcements, which is too voluminous to be fully summarized here. To provide just a few examples, there is abundant recent empirical evidence on informed trading ahead of earnings announcements (Kaniel, Liu, Saar, and Titman, 2012; Jin, Livnat, and Zhang, 2012; Kadan, Michaely, and Moulton, 2014; Goyenko, Ornthanalai, and Tang, 2014), M&As (Cao, Chen, and Griffin, 2005; Chan, Ge, and Lin, 2015; Augustin, Brenner, and Subrahmanyam, 2014), bankruptcies (Ge, Humphrey-Jenner, and Lin, 2014), the 9/11 terrorist attack (Poteshman, 2006), leveraged buyouts (Acharya and Johnson, 2010), analyst recommendations (Hayunga and Lung, 2014), stock splits (Gharghori, Maberly, and Nguyen, 2015), and stock trades by registered insiders (Li and Hao, 2015).[6] The question of where informed investors trade has also been studied extensively, from a theoretical perspective, taking into consideration asymmetric information (Easley, O'Hara, and Srinivas, 1998), differences in opinion (Cao and Ou-Yang, 2009), short-sale constraints (Johnson and So, 2012), and margin requirements and wealth constraints (John, Koticha, Narayanan, and Subrahmanyam, 2003). We provide three main contributions to the literature on informed trading. First, evidence of informed trading ahead of SPs has hitherto been unexplored. We, thereby, provide

[6] See also Bhattacharya (2014) for a recent survey on insider trading.

another natural setting for testing the existence of informed trading and the preferred venue for such trading. The SEC believes it is important to spot instances of informed trading. Thus, we find it relevant and important to examine and inform about potential blind spots. Second, we examine informed trading *across* different asset classes, whereas most studies typically study one asset class in isolation, Acharya and Johnson (2010) being a rare exception. Third, a methodological contribution is that we extend the informed trading measures *Sum* and *Max* of Acharya and Johnson (2010) and formally show under what assumptions they can be used for statistical inference.

We do also contribute to the literature that examines a parent's short-term stock price reaction to corporate SP announcements, as we review the evidence using a much larger sample of 426 events, which is almost double the size of the largest sample previously employed. Moreover, earlier studies based on evidence in the US are somewhat dated, and rely on samples that are typically fewer than 200 companies.[7] In addition, we develop a prediction model for SPs in order to verify our evidence against a matched control sample based on SP propensity scores. Table 1 of Veld and Veld-Merkoulova (2009) and Dasilas, Leventis, Sismanidou, and Koulikidou (2011) summarize the evidence on stock price performance around SP announcements. Out of the 26 studies between 1983 and 2008 reviewed in Veld and Veld-Merkoulova (2009), the average abnormal return on the announcement day is estimated to be positive and equal to 3.01%, ranging between 1.32% and 5.56% (Hite and Owers, 1983; Schipper and Smith, 1983). Multiple reasons have been put forth to rationalize such positive excess returns, including enhanced investment efficiency of the parent

[7]An exception is McConnell and Ovtchinnikov (2004), who use a sample of 311 companies.

(Ahn and Denis, 2004), an improvement in operating performance (John and Ofek, 1995), a wealth transfer from bondholders to shareholders (Maxwell and Rao, 2003; Veld and Veld-Merkoulova, 2008), an improved allocation of capital (Gertner, Powers, and Scharfstein, 2002), reversals of value destruction from earlier acquisitions (Miles and Rosenfeld, 1983; Allen, Lummer, McConnell, and Reed, 1995), industry focus (John and Ofek, 1995; Daley, Mehrotra, and Sivakumar, 1997), reduced information asymmetry (Habib, Johnsen, and Naik, 1997; Krishnaswami and Subramaniam, 1999; Martin and Sayrak, 2003), and tax and regulatory considerations (Schipper and Smith, 1983; Copeland and Mayers, 1987). Across these studies, the results tend to be stronger for larger deals (Klein, 1986) and deals that ultimately get consummated. The argument for industry focus is closely tied to the conclusion of a conglomerate discount (Berger and Ofek, 1995), which has been confirmed by several researchers (Burch and Nanda, 2003; Laeven and Levine, 2007; Hoechle, Schmid, Walter, and Yermack, 2012; Lamont and Polk, 2002), but also challenged (Custodio, 2014).[8]

2 Data and Spinoff Announcement Returns: Evidence Revisited

We start by revisiting the evidence on the abnormal returns around announcements of corporate SPs in the US. This empirical evidence, guided by theoretical predictions, sets the basis for all hypotheses related to informed trading, which is the main focus of our analysis.

We obtain the SP sample from the Thomson Reuters Securities Data Company Platinum

[8]See Martin and Sayrak (2003) for an early survey.

Database (SDC) from January 1, 1996, to December 31, 2013. The starting date is dictated by the availability of options data in OptionMetrics, which initiated its reporting on January 1, 1996. We source all corporate SPs with a US parent company from the domestic M&A dataset in SDC, yielding a total of 1,165 SP announcements that correspond to 1,105 unique event days.[9] After dropping deals that are flagged with a pending or unknown status, we retain only public parent companies with matching stock price information in the Center for Research in Securities Prices (CRSP) database. In order to avoid the confounding effects of multiple events for the same parent company, we also require that no other SP divestiture announcement occurred within a three-month window prior to the event; if this was the case, we only keep the first occurrence within our sample. The combination of these selection criteria generates a sample of 446 corporate SP transactions, reflecting 426 unique event days. This represents a fairly large sample compared to earlier studies, which, as mentioned, typically analyze smaller samples.

Table 1, Panel A, summarizes the number of corporate SP announcements by calendar year and reports statistics on the transaction values of the spun-off companies. Specific information on the deal value is only available for approximately half the sample. The number of deals varies through time, with a greater number of divestitures in the late nineties, ranging between a low of 39 deals in 1999 and a high of 52 deals in 1996. After a peak of 54 deals in the year 2000, the last decade has experienced more muted SP activity, peaking at

[9] A company may spin off several subsidiaries/divisions on the same day. If there are multiple deals announced on the same day by the same parent company, they are counted as one event. The reported deal values, if available, are aggregated for each event. For events with multiple deals, the subsidiary industry is coded to be different from the parent if any of the subsidiaries is in a different industry from the parent. The physical distance associated with the event is assigned the largest distance between the parent and any of its subsidiaries.

23 deals per year in 2007 and 2008, with another spike of 23 deals in 2011. Out of the 446 deals, we have information on the transaction value for only 280 corporate announcements. For this subsample, the size, measured by market volume, of the average divestiture is approximately \$3.2 billion. However, there is a large degree of cross-sectional variation, which we will later exploit in our analysis, reflected through an average sample standard deviation of \$9.7 billion. The smallest divestiture has a value of \$60,000 and corresponds to the SP of a 10% stake of Millennia's Omni Doors unit to its shareholders.[10] The largest deal in the sample is undertaken by Altria Group Inc. of Kraft Foods Inc. on August 29, 2007 and is valued at \$107.6 billion. Out of the 446 deals, about half of them, or 219 deals have the divested subsidiary in the same industry as the parent company, as characterized by the two-digit SIC code. This number goes down to 125 deals, when we use the four-digit SIC code to classify industries. There are 178 deals whose divested subsidiary is in a different state from the parent company's headquarter.

For our subsequent analysis of informed trading activity, we also need information about the stock and option prices, volumes, and order flows, and we require firm characteristics to construct a propensity-matched control sample. Therefore, we extract daily price and volume information for stocks from CRSP and for options from OptionMetrics, tick-by-tick price and volume information for stocks from NYSE Trade and Quote (TAQ) and for options from the Option Price Reporting Authority (OPRA), and balance sheet information from COMPUSTAT.[11] The additional requirements reduce the sample size to 94 deals from 2006

[10]Another fairly small transaction in the sample is the corporate SP by Applied Biometrics (ABIO), announced on December 4, 1998, for a total valuation of \$375,000.

[11]We obtain OPRA data from Trade Alert LLC., whose data-set only began in April 2006. Hence, we have such detailed data only for part of our overall sample period.

to 2013. We emphasize that we use this smaller sample only for the order imbalance tests, while our main analysis of informed trading is based on a larger sample of 280 SPs whose parents have traded options. In Panel B, we show the deal statistics for this restricted sample, which contains only those deals that have valid information from *all* the required databases. The stocks in this restricted sample have all exchange-traded options available at the time of the deal announcement. The somewhat higher average deal value of $6 billion reflects the higher deal values in later years. The year-by-year statistics nevertheless show that the sample composition is very similar in both panels. Tables A-1 to A-3 in the appendix explicitly describe our data selection process and provide additional summary statistics for subsamples at intermediate stages of that process.

2.1 Abnormal announcement returns

As a first pass, we compute, for the parent companies, cumulative abnormal announcement returns (CARs) for the 426 unique SP event days in our sample. We present results for three different expected return models based on (1) a simple constant α (constant return model), (2) a constant and the market return R_m (market model), and (3) the Fama and French (1993) three-factor model (FF3F) that includes the market return as well as the market-to-book factor (MB) and the high-minus low size factor (HML).[12] The latter model nests the two former ones. More specifically, for each SP, we first compute abnormal returns ($AR_{i,t}$) as the regression residuals from the projection of realized returns $R_{i,t}$ on expected normal returns, i.e., $AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t} - \hat{\gamma}_i MB_t - \hat{\delta}_i HML_t$. All parameters of the expected

[12] We have also experimented with a four-factor model that includes the Carhart (1997) momentum factor. The results hardly change and are available from the authors upon request.

return model (α, β, γ, δ) are estimated over an estimation window $[T_1, T_2]$ running from $t = -31$ to $t = 31$ relative to the announcement day, which is defined as day $\tau = 0$.[13] Parent-specific ARs are then aggregated over different event windows $[\tau_1, \tau_2]$ to obtain CARs defined as $CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{it}$. Specifically, we examine the CARs on the announcement day, as well as the following event windows, [-1,0], [-1,1], [-1,2], [-1,5], and [-1,10]. Inference is based on the cross-sectional average CAR, defined as $\overline{CAR}(\tau_1, \tau_2) = \sum_{i=1}^{N} CAR_i(\tau_1, \tau_2)/N$, where N denotes the number of unique SP event days in the sample.[14]

Table 2 presents the results for the unconditional $\overline{CAR}$s. Irrespective of the model, the results are always statistically significant at the 1% significance level, except for the five- and ten-day abnormal return using the FF3F model. Apart from the latter two longer-horizon announcement returns, the lowest $\overline{CAR}$ is 1.82% for the announcement day itself using the FF3F adjusted returns, but it is as high as 3.37% in the three-day window [-1,1] using the constant mean model. It is interesting to note that the results of the constant return model and the market model are almost identical. Although these values are not as large in magnitude as for targets of tender offers in M&A, they are sizable and economically similar to numbers reported for average abnormal announcement returns surrounding even strongly positive earnings announcements (Foster, Olsen, and Shevlin, 1984). Looking at the distribution of the FF3F abnormal returns on the announcement day in Figure 1, it becomes apparent that the distribution is right-skewed with a substantial fraction of deals having positive abnormal announcement returns of 5% or higher. Most deals, however, have

[13]The short-term abnormal announcement returns are robust to alternative estimation windows.

[14]As a robustness check, we verify our results using an out-of sample version of CARs that are computed following the methodology in Brown and Warner (1985). We use an estimation window equal to $t = [-93, -2]$ and different event windows ranging from $t = 0$ to $t = [-1, -10]$. The expected return model is the Fama-French Three-Factor model ($FF3F$). All results are reported in the internet appendix in Table A-4.

positive abnormal announcement returns between 1% and 2%. Importantly though, only a very small proportion of deals (17.14% of all deals and 13.75% of deals with values reported) have negative abnormal announcement returns. The subsample for which we have deal value information, plotted in Panel Figure 1b, shows a similar pattern, but is comparatively more right-skewed. The results of the completed deals subsample, reported in panel B of the internet appendix Table A-5, are even stronger. They show larger average returns and are more significant. It is apparent, from panel C, that the uncompleted deals "drag" down the average return and its significance.[15]

2.2 Sub-sample results

We have confirmed the evidence of positive economic gains earned by the shareholders of parent companies upon the announcement of a corporate divestiture. While the average CAR lies in the ballpark of 2%-3%, there are also wide cross-sectional differences in short-term abnormal announcement returns associated with company characteristics that we can exploit for the tests of informed trading. As these tests are the focus of the paper, for the sake of brevity, we relegate a detailed discussion of the results on cross-sectional differences to the internet appendix section A.1.

Consistent with the evidence on conglomerate discounts (Burch and Nanda, 2003; Laeven and Levine, 2007), we find that abnormal announcement returns are higher for cross-industry SPs, i.e., when the divestiture is of a subsidiary in a different industry from the parent company, although the statistical significance is weak. We further find that abnormal announce-

[15] The faith of the uncompleted spinoffs is in many cases probably known shortly after the announcement, judging by the CARs after 5 and 10 days following the announcement.

ment returns are greater for completed than for withdrawn deals. Furthermore, CARs are greater when the company value of the subsidiary represents a larger fraction of the parent (Hite and Owers, 1983), the average (median) SP reflecting approximately 35% (25%) of the parent's market capitalization. We also examine whether co-location in the same state and geographical distance play a role in impacting the announcement returns, following the ideas that proximity facilitates information acquisition and reduces monitoring costs, which has been confirmed for mutual fund managers (Coval and Moskowitz, 1999, 2001), for banks (Petersen and Rajan, 1994; Mian, 2006; Sufi, 2007), venture capitalists (Lerner, 1995), and for manufacturing firms (Giroud, 2012). We find that the CARs are greater for geographically closer SPs, the differences between the bottom and top distance quintiles ranging between 1.74% and 3.84%. Similarly, average CARs are smaller when the subsidiary is incorporated in a different state, but these differences are not statistically significant.

3 Research Questions and Hypotheses

The primary goal of our study is to examine whether stock and equity options markets exhibit unusual activity that reflects informed trading prior to corporate SP announcements. We pursue this goal for two reasons. For one, an SP announcement, akin to an M&A announcement, should have a positive effect on the value of the parent, and will typically be unexpected. Hence, the stock price of the parent should go up after the announcement, just as the price of the target goes up in the M&A case, though by lower magnitude, and with somewhat less certainty. For another, while there is substantial anecdotal evidence of informed trading in financial markets prior to M&A announcements, hardly any evidence exists for corporate divestitures. In addition, we are aware of no other academic study that empirically examines trading in financial markets prior to SPs.

Beyond the unconditional examination of informed trading ahead of SP announcements, we are interested in investigating *where* informed investors trade. Easley, O'Hara, and Srinivas (1998) model informed traders' choice between the stock and the options market. They obtain a result that reflects a separating equilibrium, in which informed traders choose to trade only the stock and not the options. This model, however, ignores margin requirements. John, Koticha, Narayanan, and Subrahmanyam (2003) show that, in addition to information asymmetry, the presence of margin requirements and leverage constraints leads to optimal mixed strategies, involving trading in both the stock and options markets. Another constraint that should be considered is the effect of position limits that affect the availability of options. According to Cao and Ou-Yang (2009) and Johnson and So (2012), trading in options should be concentrated around information events. Finally, Cao, Chen, and Griffin (2005) show empirically that the options market displaces the stock market as a venue for informed trading ahead of M&As. In the context of SPs, the question of where informed investors trade is primarily an empirical one. On the one hand, given the comparatively smaller positive abnormal returns in the SP case than in the M&A case, we expect to observe stronger evidence of informed trading in the options market due to the leverage effect for the informed agent. On the other hand, compared to the M&A case, the informed trader faces more uncertainty regarding the outcome of the SP, which will cause him to adopt a lower-risk strategy. Thus, he will buy call options, or use a replicating strategy, but not in the same quantity or depth OTM that he would buy, were he is certain about the SP outcome. In both cases, the informed trader will mostly use options to take advantage of his information. This leads to our first hypothesis:

- H1: *Prior to corporate spinoff announcements, there is positive abnormal trading volume in equity options written on the parent firms.*

Given that the stock prices of parents consistently rise after SP announcements (just as for the target upon a takeover disclosure), we expect to observe evidence consistent with directional trading in the options market.[16] The simplest way to implement a levered directional trading strategy is to purchase plain vanilla call options. Alternatively, an informed trader could sell in-the-money (ITM) puts, expecting them to expire worthless when the stock price rises, or could go to an even greater extreme by selling them simultaneously with the purchase of the calls, mimicking a long position in the underlying. In either case, the transactions involved in the trading of the informed agent result in abnormal activity in the options market.

We test whether there is unusual activity in the options market for both call and put options. Hence, we expect to see a relatively greater amount of abnormal trading volume in OTM call options than ATM or ITM options, given that OTM call options provide greater leverage than an equal dollar investment in either ATM or ITM call options. Likewise, an informed trader could, as we previously mentioned, sell ITM put options, or replicate the OTM call by buying the stock and an ITM put, which he would do if he was not as certain about the outcome of the SP. Therefore, we also expect a relatively greater amount of abnormal trading volume in ITM put options than in ATM or OTM put options.

[16] See Augustin, Brenner, and Subrahmanyam (2014).

- H2: *Prior to corporate spinoff announcements, for parent companies there are relatively greater abnormal trading volumes in (a) OTM call options compared to ATM and ITM call options, and (b) ITM put options compared to ATM and OTM put options.*

In section 2, we discussed evidence of cross-sectional differences in abnormal announcement returns that are linked to parent and subsidiary characteristics. More specifically, we have shown that abnormal announcement returns are greater if a parent spins off a subsidiary in a different industry segment, if the deal value represents a greater fraction of the parent's market capitalization, or if the divestiture is carried out in the same state (or, respectively, if the geographical distance between the parent and the subsidiary is smaller). Given these patterns, we also expect to observe cross-sectional differences in abnormal options activity along the same dimensions. Prior to corporate SP announcements:

- H3: *we expect that there is greater positive abnormal options trading volume for parents that spin off a company in a different industry segment, larger subsidiaries (SP deal value relative to the parent's market capitalization), and subsidiaries incorporated in the same state.*

We refer to the three individual tests of hypothesis H3 as the conglomerate discount, the size, and the distance hypothesis, respectively.

4 Predicting Spinoffs

There are often waves in financial markets, in which specific financial strategies gain popularity, e.g., takeovers, leveraged buyouts, or similar corporate activities.[17] Similarly, there are time trends in corporate divestitures. These waves in corporate divestitures make it challenging to unmask truly informed trading and separate it from random speculation. In addition, some investors may have superior forecasting ability, which will allow them to better predict an upcoming SP announcement than other market participants. In such a case, we may naturally expect a higher level of trading activity that could be amplified through herding behavior and momentum trading without any *direct* evidence of informed trading. In other words, there is a possibility that certain companies select themselves into undertaking SPs, based on particular characteristics, which would introduce a selection bias into our analysis. While it is reasonable to conjecture that some investors may be accurate forecasters of corporate sell-offs in the future, we do not envision them being able to perfectly predict the *timing* of such announcements. Thus, as we are examining *abnormal* trading activity in a short period immediately preceding public announcements, such a possibility would effectively make it more difficult for us to conclude that our results were due to informed trading, as we would measure abnormal activity relative to a higher benchmark. In other words, such leakage of information would bias us *against* confirming our hypothesis of informed trading.

In order to address the above selection and endogeneity concerns, we construct a control sample of firms that would be likely to implement a SP, but that did not effectively sell a subsidiary or division in the relevant period. More precisely, we construct a propensity-

[17] See Andrade, Mitchell, and Stafford (2001) for a discussion of industry-specific takeover waves.

matched control sample based on a SP prediction model. Roberts and Whited (2012) explain how the propensity-score matching technique conditions the estimation on the probability of receiving treatment, i.e., being part of the SP sample, conditional on the observable covariates. This effectively results in randomization, whereby the potential outcomes are assumed to be independent of the assignment into the treatment and control groups. If we then find evidence of significantly different abnormal trading activity in the treatment and control groups, we will be able to rule out the selection bias that certain companies select themselves into SP activity.

To construct the SP prediction model, we use the universe of Compustat firms from 1996 to 2013 that have complete information for the balance sheet items *total assets*, *total liabilities*, and *market capitalization*.[18] We further require all companies to have valid stock price information in CRSP. This results in a total of 18,402 companies with an equivalent of 577,466 firm-quarter observations. We construct the variable $SPIN$, which takes on the value one in a quarter in which the parent spins off a subsidiary, and zero in all other quarters. Using a vector of observable covariates X containing detailed information on firms' balance sheets, corporate governance, industry characteristics, and stock and options trading, we predict SPs with a logistic regression specified as

$$Prob\,(SPIN = 1) = \frac{1}{1 + \exp\left(-\alpha - X\beta\right)}. \tag{1}$$

We describe more details, report the predictability results, and verify alternative specifications that account for the presence of anti-SP bond covenants in the capital structure of the

[18]More precisely, we use the quarterly North American Compustat data file.

parents, in Internet Appendix Section B, as they are not central to the analysis of informed trading. In all tests, we will compare the outcomes of informed trading activity between the treatment and control groups, where the treatment group is based on our sample of SP events, and the control group is constructed based on non-SP firm-quarter observations that have the closest match to the treatment group in terms of their propensity scores. Given our focus on the abnormal activity in both the stock and options markets, we require both treatment and control observations to have valid stock and options price and volume information, at the time of the announcement, although the predictive logistic regression is estimated over the full sample. This reduces the treatment sample size from 426 to 280 events. As an alternative matching procedure, we also estimate the logistic model over the subsample of companies that have both stock and options information, and construct control samples based on the propensity scores obtained from this restricted sample. The logistic regression results are are not qualitatively different from the benchmark models. We will use both the closest, and the two closest, matches for both the full sample and the restricted options sample, resulting in a total of four differently constructed control groups.

Table A-13 in the internet appendix compares the sample characteristics of the treatment group, $PS0$, and the propensity-matched control groups, $PS1$ if the control group includes only the first best match, and $PS2$ if it includes the two best matches. The sample statistics in each group resemble each other closely, and the differences are never statistically significant, except in the case of the measure of retained earnings divided by total assets. This descriptive evidence underscores that the propensity-matched control samples are closely matched to the treatment group, based on the observable characteristics.[19]

5 Measuring Informed Trading

Similar to M&A announcements, SPs present an excellent laboratory to test for insider trading, as the announcements are unexpected and the nature of private information is clearly identified, i.e., a rise in the parent's stock price. Despite this convenient experimental setting, it is close to impossible to perfectly pin down whether abnormal trading activity ahead of the announcements is undeniable evidence of *insider* trading. Hence, we will focus our attention on *informed* trading, and the plausible conjecture that at least some of it may be based on inside information, depending on the strength of the evidence.

To measure informed trading activity in stock and options markets ahead of corporate SP announcements, we closely follow Acharya and Johnson (2010), and construct the *Sum* and *Max* measures, two empirical measures of informed trading that are meant to capture unusual and suspect activity in the stock and options markets. The *Sum* and *Max* measures are, intuitively speaking, metrics of abnormal volume and returns computed relative to a benchmark model that predicts expected returns and volume. To capture unusual price effects in the options market, and to study excess implied volatility, in particular, we use the average implied volatility of 30-day ATM call and put options from OptionMetrics. More precisely, for each variable that we are interested in, we fit three normal regression models over the 90-day pre-announcement window to compute normal returns, similarly to what

[19] Table A-13 in the appendix presents the results of the robustness test in which we also account for bond covenants in the prediction of SP probabilities.

we did for abnormal returns as described in Section 2.1: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and lagged returns and volume, and contemporaneous returns and volume of the S&P500 market index, the *AJ* model;[20] (3) and the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index.[21]

We use only pre-announcement information in order not to confound the measures of informed trading with activity arising from the announcement effect itself. In a second stage, we standardize the residuals using the standard deviation of all residuals. The standardized residuals from the five-day period immediately preceding the announcement day are used to compute the *Sum* and *Max* measures. The deal-specific *Sum* measure is constructed by aggregating all positive standardized residuals over the five days, while the deal-specific *Max* measure uses only the maximum of all standardized residuals over the same time period. As discussed by Acharya and Johnson (2010), both measures are sensitive to different types of informed trading. *Max* will pick up "spikes," i.e., days with unusually large abnormal trading and/or returns, and implied volatility, respectively. *Sum*, on the other hand, is more sensitive to "sustained unusual activity," i.e., large cumulative abnormal returns and volumes that stand out in the pre-event window. In the empirical analysis, we use the *Sum* and *Max* measures to test for the presence of informed trading in stock and options markets ahead of SPs. In Figure 2, we report the distribution of, respectively, the *Sum* and *Max* measures

[20]It is possible that option volumes, prices and bid-ask spreads behave differently in the week before expiration. To explore this question, we redo our analysis by including dummy variables for each week, and find that our results are robust to the inclusion of these dummies.

[21]Acharya and Johnson (2010) show that the unconditional measures are not significantly different from the conditional measures obtained from the residuals of a model conditioned on day-of-the-week dummies, and both contemporaneous and lagged market returns and volume, which we proxy for using the returns and volumes of the S&P500 market index. We similarly find only minor differences across models.

derived from the information on options volume, using the ABHS model. The distribution is far from normal, and more closely resembles a heavy tailed distribution with a substantial amount of weight in the far right tail of the distribution.[22]

6 Empirical Evidence of Informed Trading

6.1 Stock or options - Where do informed investors trade?

We report the results for the measures of informed trading in Table 3 (and robustness results in Table A-15). All our conclusions are based on the treatment effects, i.e., we conclude in favor of informed activity if the measures of informed trading are greater in the SP sample than in the propensity-matched control sample. The key result is that we find significant evidence of informed activity in the options market, but not in the stock market. These results are robust for both price and volume measures, across the different control samples, and for both the *Sum* and *Max* measures that proxy for informed trading. Comparing abnormal volume or returns relative to a propensity-matched control sample is conceptually akin to a difference-in-difference specification, where we control for both firm characteristics and time.[23]

Panel A of Table 3 reports the results for abnormal stock returns. The difference in

[22]We also computed the *Sum* and *Max* metrics based on a simulation of standard (mean zero, unit standard deviation) normally distributed random variables. These simulations, which are available upon request, confirm that the in-sample *Sum* and *Max* metrics for our case have many more observations in the right tail of the distribution, compared to the random, independently and identically distributed benchmark.

[23]We formally show in Internet Appendix Section B.1 that the treatment effects on Max_i and Sum_i, i.e., the differences of these measures between the treatment and control groups, converge toward a normal distribution with zero mean under the Lindeberg-Levy Central Limit Theoreom, because the treatment effect has zero mean and finite variance. This allows the use of the student t-test for statistical inference.

the *Sum* and *Max* measures between the treatment and control group ranges between 0.065 and 0.38 standardized deviations, and the statistical significance is stronger for the one best match and the ABHS model and less so for the other matches.[24] Some differences are not significant at all, while others are significant at the 1% level. In other words, the evidence that parent companies have larger abnormal announcement returns that are significantly higher than those of a propensity-matched control sample is not robust. The evidence for abnormal stock trading volume in Panel B is non-existent. Abnormal stock trading volume in the SP sample is not significantly different from that in the control sample.

In contrast to the results for stocks, we find substantial evidence of informed activity in options ahead of SP announcements. Panel C reports the results for excess implied volatility and Panel D for the options volume. Both panels clearly show that, in the SP sample, there is abnormal options volume and excess implied volatility that is significantly greater than in the propensity-matched control sample. The results are consistently significant at the 1% level, and are not dependent on the sample involved, or the method used for constructing the control group. The average difference in the *Sum* and *Max* measures between the treatment and control groups ranges between 0.15 and 0.60 standard deviations for implied volatility, and between 0.21 and 0.70 standard deviations for options volume. Judging by the t-values, the abnormal volume of options trading provides much stronger evidence than the excess implied volatility which is also true in the M&A case (as documented by Augustin, Brenner, and Subrahmanyam (2014)). The fact that we find evidence of informed trading activity in options, but not in stocks, in the five-day window preceding the announcements, confirms the

[24]It should be recalled that *Sum* and *Max* are constructed using standardized residuals. They can, therefore, be interpreted in units of standard deviations.

conjecture made in hypothesis H1. A plausible explanation for the difference could actually be the limited risk feature of options rather than the leverage argument. As we argued before, in the case of SPs even a well-informed trader will be uncertain about the precise effect on the stock price, specifically as to whether it will increase at all, and if so, by how much. Depending on his judgment, the trader would buy call options rather than stocks (but not at a high leverage ratio, i.e., closer to ITM), if he were sure about the magnitude and sign of the increase in the stock price. Unlike the M&A case, where a well-informed trader can pick the option strike and maturity that provide a high leverage, in the SP case, the trader's choice of the option series is risky, and, hence, a risk-averse agent will probably pick one with a high probability of ending up ITM, assuming that he wants to play it safe.

In Panels A and B of Table 5, we report the results separately for call and put options (the related robustness checks are provided in Table A-16). As we have previously mentioned, informed investors may exploit the leverage of options in subtle ways. While the most straightforward way to bet on a rise in the parent's stock price is to buy a plain vanilla call option, an investor could also replicate this strategy by buying the stock and a put. Alternatively, he could sell ITM puts to earn the option premium for options that he knows are likely to expire worthless. While the results indicate greater unusual activity in both call and put options, the magnitudes of the differences between the treatment and control groups are consistently larger for call options. The average differences in the *Sum* (*Max*) measures between the treatment and control groups range between 0.27 and 0.73 (0.15 and 0.34) standard deviations for call volume across the three models, and between 0.12 and 0.55 (0.06 and 0.31) standard deviations for put volume, and the differences are mostly insignificant.

This confirms our prior of greater abnormal volume in call options, which was what we expected, given the greater leverage provided by call options for some informed traders, and the downside protection for the more conservative informed traders. The unsigned volume data do not allow us to perform a deeper study of the precise trading patterns. The results are, nevertheless, sufficient to validate hypothesis H1.[25]

6.2 Quantifying informed trading

In the previous subsection, we have documented evidence of informed trading in options, but not in stocks. This begs the question of whether we can quantify *how many* SP events are prone to insider trading, and *how likely* it is that the unusual options volume of the control group would be greater than that of the treatment group, i.e., the SP sample. In other words, what are the odds of our findings being spurious?

In Panel A of Table 4, we report the fraction of the sample, in percentage terms, that exhibits statistically significant abnormal trading volume at the 1%, 5% and 10% significance level, respectively. Using a more conservative out-of-sample test, and the AJ model, we find that approximately 13% of all SP deals exhibit suspicious trading activity in the pre-announcement period at the 5% statistical significance level. Even with the most conservative ABHS model, we find evidence of suspicious trading activity in approximately 9% of all SP deals.[26] For the sake of being even more cautious with our interpretation, we report

[25]We note that we have also verified all our results using delta-adjusted stock volume, as well as the component of stock volume that is orthogonal to the contemporaneous options volume, i.e., the regression residual of the stock volume on the options volume. These robustness checks were meant to separate out the influences of options trading from the volume of stock trading. Our conclusion of informed trading in options, but not in stocks, does not change. All results are reported in the Internet Appendix in Tables A-21 and A-22.

[26]By out-of-sample test, we mean that we calculate abnormal options volume in event days -5 to -1 in

in panel B the number of treatment firms with abnormal options volume in excess of a randomly matched control group, expressed as a percentage of the total sample, and using both the *Sum* and *Max* measures. At the 5% significance level, and using the ABHS model as the benchmark, we find that the treatment effect suggests that about 5% of all SP events appear to be prone to insider trading. Finally, we report in Panel C the p-values of the null hypothesis *H0* that the abnormal options volume in the control group is greater than that in the treatment group. We find that, depending on the model and the measure used, the p-values for this one-sided test range between 0.0001 and 0.015. This translates into odds of one in 7,553 to one in 66 that our results of unusually high options volume arose by chance, i.e., that they would be greater in the propensity-matched control group. We believe that the right comparison to be made is between the treatment group and the control group that has options, and using the first best match. Given this criterion, the odds are approximately one in 4,000 (4,192 to be exact).

6.3 Leverage vs. liquidity

We further partition the options sample by moneyness to better understand where informed investors trade. A priori, OTM call options provide relatively greater leverage than ATM and ITM call options. However, in addition to choosing between the stock and the options markets to express his views, an investor must also trade off greater leverage for lower liquidity and the uncertainty of the outcome. As deep OTM (DOTM) options are typically less liquid, an unusual size may alert the market maker (and the regulators, if illegal), and, if

excess of the average options volume from event days -63 to -6 (three months). The cumulative abnormal options volume is the sum of the abnormal volumes in days -5 to -1.

traded, may be more easily detected. Furthermore, we have provided evidence that, although the parent's stock price consistently rises upon the SP announcement, the magnitude of the price increase is not as strong as in the case of targets in a tender offer. Thus, the further OTM the option, the less likely it is that the gain will be pocketed. Given this dilemma, we expect to observe a relatively greater abnormal trading volume in OTM and ATM call options than in DOTM and ITM call options.

We classify call and put options into different moneyness/depth categories, following Augustin, Brenner, and Subrahmanyam (2014). Moneyness is defined as S/K, the ratio of the stock price S to the strike price K. DOTM corresponds to $S/K \in [0, 0.80]$ for calls ($[1.20, \infty)$ for puts), OTM corresponds to $S/K \in (0.80, 0.95]$ for calls ($[1.05, 1.20)$ for puts), ATM is defined by $S/K \in (0.95, 1.05)$ for calls ($(0.95, 1.05)$ for puts), ITM is defined by $S/K \in [1.05, 1.20)$ for calls ($(0.80, 0.95]$ for puts), and DITM corresponds to $S/K \in [1.20, \infty)$ for calls ($[0, 0.80]$ for puts). All results are reported in Table 6 for call options and in Table 7 for put options. (The corresponding robustness Tables A-17 for call options and A-18 for put options are available in the appendix). Due to insufficient liquidity, we do not report results for DITM calls and DOTM puts.

Consistent with our conjecture, we find that abnormal call options volume is consistently statistically greater in the treatment than in the control sample only for the OTM and ATM categories, as suggested by the figures in Panels B and C of Table 6. Irrespective of the specification, the t-test for the difference in means is statistically significant at the 1% level. Examining only the treatment group for the unconditional benchmark model, the (unreported) *Sum* and *Max* measures are, respectively, 2.16 and 1.39 for ATM call volume, and 2.02 and 1.36 for OTM call volume. These are significantly greater than the values of 1.43 and 0.97 for DOTM call volume, and 1.63 and 1.17 for ITM call volume. The statistical insignificance for DOTM call options and comparatively weaker statistical significance (results depend on the nature of the control sample and the model) for ITM call options, as reported in Panels A and D respectively, stands in stark contrast to the former results. This confirms our conjecture that informed investors do prefer to trade in "out but near-the-money" call options. Again, this is in contrast to the M&A case, where there is much more trading in DOTM and OTM options than in ATM and ITM options, due to the greater potential jump in price and the certainty that informed traders would have regarding the outcome (Augustin, Brenner, and Subrahmanyam, 2014).

We further examine the cross-sectional differences for put options in Table 7. For put options, there is no evidence of unusual activity in either ATM or ITM options. We have conjectured that informed investors may also sell ITM puts on the parent, as they expect these options to expire worthless, and so they exploit their superior information to cash in the option premia. Given that the potential payoff from such a strategy will be limited to the sales proceeds, with lower leverage than for a simple call strategy, it would be optimal to sell DITM puts rather than ITM puts. However, we do not observe statistically significant differences between the treatment and control groups for the DITM put option category, which is summarized in Panel D. To our surprise, we observe the highest amount of unusual activity, as measured by the *Sum* and *Max* measures, in OTM put options, as can be seen in Panel A. We have only reported the treatment effects, but the unreported results, which are available upon request, indicate that the highest abnormal put volume for OTM options in the five pre-announcement days ranges between 1.41 and 1.48 standard deviations of the abnormal volume distribution. The cumulative sum of positive abnormal option volume for OTM puts ranges between 1.92 and 1.99 standard deviations, which is an economically meaningful magnitude. These results could be explained by the uncertainty of the outcome, i.e., the possibility that the stock price will decline after the announcement. An informed trader, therefore, would prefer a low-risk strategy and rather sell OTM than ITM puts, which carry a higher exercise risk that is at the discretion of the counterparty.

6.4 Informed trading and deal characteristics

Hypothesis H3 conjectures that informed trading should be more pronounced ahead of SP announcements that are expected to have higher abnormal announcement returns. In Section 2, we discussed that CARs tend to be greater in the case of cross-industry SPs or completed and larger deals. Accordingly, we verify whether there is evidence of greater unusual options activity within subsamples that are split along the various dimensions of deal characteristics. The results in Table 8 (and the robustness results in Tables A-19 and A-20 in the appendix) provide reassuring evidence of our conjecture. We report the treatment effects for the six measures of abnormal options volume, conditioning on deal characteristics in the table and the difference between the treatment effects in the subgroups. Independently of the model or the control sample used, we find consistently statistically significant and greater measures of unusual options trading activity in the samples of completed deals (Panel A), diversified SPs (Panel B), larger deals (Panel C), and deals that are ex ante considered to have a lower conglomerate discount (Panel E). On the other hand, the informed trading measures are statistically insignificant, and of a much smaller magnitude, in the samples of withdrawn deals (Panel A), focused SPs (Panel B), smaller deals (Panel C), and deals that are ex ante considered to have a high conglomerate discount (Panel E). Only the results in Panel D, which exhibit greater magnitudes for the *Sum* and *Max* measures are, to some extent, inconsistent with the findings of greater abnormal announcement returns for divested companies that are incorporated at a lesser distance from the parent's headquarters.

6.5 Order-flow imbalances and high-frequency trading data

The previous evidence underscores the presence of substantial unusual activity in the options market, but not in the stock market. This evidence is entirely based on the price and volume information that is available only at daily frequencies. However, the abnormal options implied volatility and volume could be caused by volatility-based trading or directional betting on either side. We expect that there will be more transactions initiated by traders seeking positive stock exposure than those seeking negative exposure prior to the announcement if informed traders actively capitalize their private information. To ensure that the abnormal activity is in the direction of advance information about the forthcoming deals, we complement our analysis using high-frequency trading data to examine order-flows in both stocks and options ahead of the SP announcements. While this has the benefit of providing more microscopic evidence on the existence of unusual trading activity, we only have this information for a shorter time period and, therefore, have a more restricted sample size (90 events) after merging the sample with options tick data from OPRA between 2005 and 2013. We follow Hu (2014) and construct two measures for options order imbalance (OOI) and stock order imbalance (SOI). We assume that options market makers consistently delta hedge their stock exposures fully, and that customers actively seek delta exposure, and thus, that they do not hedge. Intuitively speaking, our measure of option order flow imbalance reflects the net difference between customer buy and sell delta-adjusted option volumes. More formally, for each stock i on day t, we construct OOI as

$$OOI_{i,t} = \frac{\sum_{j=1}^{n} 100 Dir_{i,t,j} \cdot \delta_{i,t,j} \cdot size_{i,t,j}}{Num\_shares\_outstanding_i}, \tag{2}$$

where $Dir_{i,t,j}$ is an indicator variable equal to one (minus one), if the jth option trade is a buyer-initiated (seller-initiated) initiated trade. The direction of the trade is based on the Lee and Ready (1991) algorithm without applying any delay for quotes. The option's delta $\delta_{i,t,j}$ defines the sensitivity of the option price to a change in the underlying stock price, and $size_{i,t,j}$ defines the number of contracts for each trade. We scale the numerator by the total number of shares outstanding, and we multiply it by 100, given that each option contract is for a lot of 100 shares.

In order to obtain a measure of net SOI that is independent of OOI, we subtract OOI from the total order imbalance (TOI) in the stock market. Formally, we calculate

$$SOI_{i,t} = TOI_{i,t} - OOI_{i,t} = \frac{\sum_{j=1}^{n} Dir_{i,t,j} \cdot size_{i,t,j}}{Num\_shares\_outstanding_i} - OOI_{i,t}, \tag{3}$$

where, in this case, $Dir_{i,t,j}$ and $size_{i,t,j}$ refer to the direction and size of the jth stock trade.[27]

[27]We apply a five-second delay in quote prices until 1998, and no delay afterward when assigning trade directions, because the recording lag is not observed in the recent sample period as noted by Madhavan, Porter, and Weaver (2005) and Chordia, Roll, and Subrahmanyam (2005). See also Lee and Ready (1991)

Thus, SOI is the stock order imbalance that is caused purely by stock market investors, and not the result of possible hedging demand due to order imbalance in the options market. Intuitively, SOI measures the net difference between buyer- and seller-initiated stock volumes, scaled by the number of shares outstanding.

Table 9 (and Table A-23 in the appendix for robustness) reports the statistics on the measures of informed trading, calculated using abnormal SOI and OOI, for the differences between the treatment and control groups and the three different benchmark models. The results are largely consistent with our previous evidence of greater unusual activity in the options market than in the stock market. Unconditionally, the (unreported) values for *Sum* and *Max* are similar for SOI and OOI (note that abnormal OOI is delta-adjusted). For example, using the unconditional model, *Sum* (*Max*) is, respectively, 1.76 and 1.86 (1.12 and 1.13) in the stock and options market. However, SOI in the treatment group is never statistically different from that in any of the propensity-matched control groups based on observable firm characteristics. On the other hand, the difference in abnormal OOI between the treatment and control groups is always statistically significant at either the 5% or 1% significance level, with differences ranging between 0.24 and 0.39 standard deviations for the *Max* measure and between 0.25 and 0.56 standard deviations for the *Sum* measure. To conclude, the options market exhibits convincingly unusual buying activity, even on an intra-day basis, while the stock market does not.

on this matter.

6.6 Does informed trading predict abnormal announcement returns?

If the options market exhibits a significant amount of informed trading that is not detected in the stock market, we should also observe a relationship between the measures of informed trading extracted from the options market and the abnormal announcement stock returns, which does not seem to be valid for the measures of informed trading extracted from the stock market. To test this conjecture, we regress the announcement day abnormal stock returns on the *Sum* and *Max* measures computed from the options and stock markets. To save space, we only report the results using the abnormal measures calculated from the ABHS model because the other two (AJ and unconditional) models generate largely similar results. Columns 1 and 5 in Table 10 show that only abnormal options volume positively predicts abnormal announcement returns with a coefficient that is statistically significant at the 1% level.[28] The economic magnitude is also substantial, as the coefficient of 0.02 implies that a one standard deviation increase in the *Max* measure for options volume is associated with a 2% greater abnormal announcement return. All other measures are statistically insignificant. The explanatory power of the regression is a modest 2% and 3% in Columns 1 and 5 respectively. In Columns 2 and 6, we add OOI to the regression, which raises the R^2 to 3% and 5% respectively, while not introducing any major change to the coefficient on options volume. This suggests that the OOI, a measure of net buying activity, may contain additional information for announcement returns beyond what is captured by abnormal options volume, although this could potentially also arise because of a smaller sample. In

[28]Qualitatively similar robustness tests are available in Table A-24.

Columns 3-4 and 7-8, we replicate the previous results and add several control variables related to corporate governance, firm and industry characteristics. Importantly, none of the measures reduces the statistical significance of the coefficient for options volume, nor do they fundamentally change the economic magnitude. Overall, these results suggest that abnormal options volume in the pre-announcement period contains valuable information on the abnormal announcement stock return of the parent company.

6.7 A case study - Alberto-Cluver vs. Sally Beauty Supply

To end our discussion on informed trading activity in the options market, we provide evidence from the SP of Sally Beauty Supply Co (SBS), a manufacturer and wholesaler of health and beauty aids, by Alberto-Cluver Co (AC) on June 19, 2006. On that day, AC announced that it would spin off its remaining 52.5% in SBS in a transaction valued at $3 billion. In Figure 3, we plot the total daily stock and options trading volumes for AC from April 30, 2006, to the announcement day. Both stock and options volumes exhibit a clear announcement effect on June 19, with a spike in trading volume compared to past trading activity. However, only the options market exhibits a substantial spike in trading volume on June 15 that is more than double the trading volume of the announcement day itself. Such a "red flag" is clearly not visible for stock trading volume. Surprisingly, there is no publicly available information of any civil litigation on the SEC's website relating to insider trading in this instance.

7 The "Pecking Order of Informed Trading"

We have shown that the announcement of corporate divestitures leads to positive economic gains for the shareholders of parent companies in the order of magnitude of 2%-3%. Maxwell and Rao (2003) argue that this abnormal announcement return reflects an expropriation of bondholders, which is reflected in the negative performance of corporate bonds. Recent anecdotal evidence supports this view, as Moodys Investors Services, one of the main rating agencies, cut the rating on the GE's debt by one notch to A1, arguing that "the moves favor equity shareholders at the expense of creditors."[29] If this were the case, then informed investors could benefit not only from *long* directional strategies on the parent company's stock, but also from *short* directional trading strategies on the parent company's bonds. In other words, a so-called "insider" would be able to leverage his information by implementing informed capital structure arbitrage trades. We explore this conjecture in this section.

First, we examine whether the SP announcements are associated with significant negative abnormal bond returns. This is an essential prerequisite to our analysis of informed trading in the fixed income market, as the presence of informed trading can only be justified if we are able to confirm the conjecture that parent shareholders gain at the expense of bondholders, and that this expropriation in wealth is sufficiently large to justify economic gains from trading. Second, we examine informed trading ahead of the corporate divestiture announcements in both the cash and derivative fixed income markets. By using both the cash bond and CDS markets, we are able to expand the depth of the question relating to "where informed investors trade." The analysis allows us to move beyond the typically studied trade-off of

[29]See "GE Seeks Exit from Banking Business," *Wall Street Journal*, April 10, 2015.

informed trading between the equity cash and derivative markets. In fact, it allows us to examine the preferred venue of informed traders *across* asset classes. This choice is naturally affected by the ability to exploit leverage and each market's relative liquidity. As a third piece of analysis, we, therefore, compare our results against leverage-adjusted transaction costs in each market in order to propose a plausible "Pecking Order of Informed Trading."

7.1 Abnormal announcement returns in the fixed income market

We review the evidence on negative abnormal announcement returns on the parent company's debt. This analysis is motivated by the results of Maxwell and Rao (2003), who show that bondholders suffer, on average, a negative abnormal return of 88 basis points during the month of the announcement, a wealth loss that appears to be transferred to the stockholders. Anticipation of these joint announcement effects in the equity and fixed income markets could plausibly lead to profitable capital structure arbitrage strategies ahead of the announcement, if an investor is in possession of material non-public information.

We verify our results using both the cash and the derivative fixed income markets. For the cash market, we obtain company identifiers from Mergent FISD, which allow us to match all parent companies in our sample with bond transactions information from the Trade Reporting and Compliance Engine (TRACE). TRACE is the leading data source for US corporate bond transactions and captures more than 99% of the total secondary market trading volume given that the Financial Industry Regulatory Authority (FINRA) legally requires the reporting of all over-the-counter trades in TRACE-eligible securities within a time frame of 15 minutes.[30]

Given that liquidity in the corporate bond market is comparatively much lower than in the stock market, we identify only 49 parent firms with active bond issues in the estimation window around the announcements. While this is seemingly a modest sample, we should emphasize that it is not that bad, given that Kedia and Zhou (2014) only have a sample of 329 bonds issued by 123 firms in the context of M&As, which arguably occur more frequently, and Acharya and Johnson (2010) examine 34 private-equity buyouts. Since bonds trade only infrequently, we follow Acharya and Johnson (2010) and form bond portfolios using all outstanding bonds of the same firm, weighted by issue size, in order to compute their daily bond returns. All returns include accrued coupon interest, where the information on coupon structures is obtained from FISD. Because of the modest size of our sample, size, we run two robustness tests using daily bond quote data taken from either Bloomberg or Datastream. We hand match the company identifiers and find that the former data yield a slightly larger sample with 52 parents, while the latter contain 37 announcements. Finally, we also verify our results using CDS data from Markit, given that corporate CDS often incorporate information more quickly and lead in terms of price discovery (see Augustin, Subrahmanyam, Tang, and Wang (2014) for a detailed survey).

We use the most liquid 5-year senior unsecured CDS spreads and report results based on the modified restructuring (MR) clause, given that it used to be the standard North American contract by convention prior to the Big Bang Protocol.[31] In total, we identify 54

[30] See Friewald, Jankowitsch, and Subrahmanyam (2012), among many others, for a more detailed discussion of TRACE.

[31] See Augustin, Subrahmanyam, Tang, and Wang (2014) for details. Results using the no-restructuring (XR) clause, which became the standard North American contract after the Big Bang Protocol, are quantitatively similar and available upon request.

firms with valid CDS quote information around the announcements. We report our tests using an approximation of CDS returns, computed as the simple difference in logs, i.e., $RET^{CDS}_{t,t+1} = \ln(CDS)_{t+1} - \ln(CDS)_t$, given that these are used to provide a reasonably good approximation (Hilscher, Pollet, and Wilson, 2015). In addition, we follow Lee, Naranjo, and Sirmans (2014) and also compute the daily holding period excess returns (henceforth simply CDS returns).[32] This CDS return, from the perspective of a protection buyer, is calculated as the change in CDS spreads multiplied by the risky present value of a basis point,

$$RET^{CDS}_{t,t+1} = (CDS_{t+1} - CDS_t) \cdot RPV01_{t,t+1}, \tag{4}$$

where $RPV01_{t,t+1}$ fully incorporates all accrued premium payments. For all of the following tests, given that the previous results for stocks were largely consistent across different models, we report abnormal announcement returns for bonds using only the benchmark constant mean return model. All results are presented in Table 11.

Panel A in Table 11 reports the results for cash bonds using TRACE. The average abnormal announcement return is indeed negative and equal to -0.12%. This number is, however, not statistically significant. The numbers change across event windows from -0.26% to 0.22%, but they are never statistically significant. The average abnormal announcement return is 0.02% if we use quotes from Datastream (in Panel B), and -0.19% if we use Bloomberg data (in Panel C). The latter sample, which is slightly larger with 52 parents, exhibits abnormal returns that are consistently negative and increasing in absolute value with the size of the

[32]See also Berndt and Obreja (2010) and Hilscher, Pollet, and Wilson (2015) for descriptions of how to calculate "clean" CDS returns.

event window, although none of the test statistics indicate statistically significant results. The theoretically equivalent counterpart of a corporate bond spread is a CDS spread (Duffie, 1999), which is often based on a more liquid market and generally leads the cash market in price discovery. We, thus, compare our cash bond results with those obtained using simple log CDS returns in Panel D of Table 11. The average abnormal announcement return is 6.24%, is statistically significant at the 5% significance level, and ranges between 4.98% and 6.21% across the different event windows. We note that, in the case of CDS, a positive return indicates an increase in credit risk, which is consistent with a decrease in bond prices, and hence a negative return to bond-holders. These results are, thus, largely consistent with the conflict of interests between shareholders and bondholders. In Panel E, we repeat the same analysis using the clean CDS price returns, rather than the approximation with simple log returns. Qualitatively, the results remain unchanged, although the magnitude decreases slightly to 4.74% on the announcement day, and fluctuates between 4.01% and 4.97% throughout the other event windows. The test statistics are statistically significant at either the 5% or the 10% level.

To summarize, we do find evidence of negative abnormal announcement returns in the fixed income market, which is consistent with the hypothesis of Maxwell and Rao (2003), suggesting that the economic gains from the divestiture accruing to shareholders represent an expropriation of shareholder wealth. This finding motivates us to study the preferred venue for informed trading *across* cash and derivative markets. We conjecture that prior to corporate SP announcements:

- H4 - Fixed Income Hypothesis: ... *there are negative (positive) abnormal returns in* *bonds (CDS) issued by (written on the debt of) the parent firms.*

7.2 Informed trading in the CDS and corporate bond markets

In order to maintain comparability, we adopt the same general approach as for the equity market. Thus, we report the results for the measures of informed trading, *Sum* and *Max*, as well as the difference, for each of these measures, between those computed in our treatment sample and in our propensity-matched control sample, for bond and CDS returns. We fit both an unconditional constant mean return model and a conditional model using a constant, day-of-week dummies, lagged returns and volume, and contemporaneous returns and volume of the market index, i.e., the AJ model, over the 90-day pre-announcement window to compute normal returns. All results are reported in Table A-25 of the internet appendix for brevity.

Within each panel, we guide the reader's attention to the columns that highlight the differences in measures of informed trading between the actual and propensity-matched control samples. The key take-away is that, irrespective of which test statistic we consider, the difference between the treatment and control groups is not statistically significant. There appears to be no significant abnormal activity in either the bond or CDS market before the announcement. After the announcement, there is a significant price response in the CDS market. The bond prices also drop post announcement, but the price drops are statistically insignificant. Thus, we reject hypothesis H4 based on the notion that there is a "dog that did not bark."

To summarize, we find evidence of informed activity in the options market, but not in the stock market, nor in the bond or the CDS market. These results are robust for both price and volume measures, across the different control samples, and for both the *Sum* and *Max* measures that proxy for informed trading in the equity market. For the fixed income market, the limited sample size makes it impossible to study volumes (there is practically little volume in bonds), and impossible to examine trading volume in CDS.[33]

7.3 "Where do informed investors trade", revisited

We find no evidence of informed trading activity in the fixed income market, whether cash or derivatives. Despite the limited sample sizes used for our fixed income analysis, this result may be reasonable given that these markets are too illiquid. TRACE captures more than 99% of all the secondary market trading activity in the US corporate bond market. Even if we could construct a larger sample using price quotes, the simple fact that TRACE contains active bond transactions for only 49 events in our sample strongly suggests that there is simply little trading in corporate bonds ahead of corporate divestiture announcements. The conclusion that options are ultimately the preferred avenue for informed traders may be rationally explained based on two arguments: for one thing, an informed investor anticipating a decrease in bond prices would need to short-sell the bond in order to implement a bearish trade. It is well known that shorting bonds can be prohibitively costly, especially if bonds are "special" (see Nashikkar and Pedersen (2007) and Nashikkar, Subrahmanyam, and Mahanti (2011) for details), and even prevents the elimination of apparent arbitrage opportunities at

[33] The Depository Trust & Clearing Corporation (DTCC) reports weekly trading activity in the CDS market for the 1,000 most liquid reference entities from October 31, 2008 onward. From that date to the end of our sample, we identify 16 announcements with valid CDS price information. Thus, we could, at best, get weekly trading volumes for a maximum of 16 announcements, and then only if these 16 parent firms were consistently represented among the sample of the 1,000 most liquid firms. Even such an optimal scenario would pave the way for only a case study, and would lead to a statistically meaningless result with little external validity. We thus refrain from this type of analysis.

times (Blanco, Brennan, and Marsh, 2005). For another, given the smaller price increase in the parent's stock price compared to that in a target's stock price upon the announcement of a M&A, the leverage argument becomes much more important. Hence, in the case of SPs, a "pure" option strategy may dominate a "mixed" strategy, as is theoretically suggested by John, Koticha, Narayanan, and Subrahmanyam (2003), in the case of M&A announcements.

Ultimately, both leverage and liquidity matter for the choice of preferred trading venue, as an informed investor wants to maximize the "bang for their buck," and minimize the risk of falling under the radar of the SEC. To throw some additional light on these conjectures, we present rough summary statistics on comparable transaction cost measures in all four markets in Table 12. The corporate bond market appears to be the most illiquid, with an average transaction cost of 185 basis points. This value is taken from Friewald, Jankowitsch, and Subrahmanyam (2012), who approximate the round-trip cost using Roll's effective measure of bid-ask spreads (Roll, 1984).[34] Comparing this with the effective yield spread of 2.87%, the average bid-ask spread as a percentage of the average spread is equal to 64%. Bongaerts, De Jong, and Driessen (2011) provide estimates of corporate CDS bid-ask spreads for portfolios sorted on the size of transaction costs and credit risk. The expected transaction cost ranges from 12 basis point for Aaa to Aa rated companies in the low transaction cost group, to 1,120 basis points for the B to Caa rated companies in the high transaction cost group. Using their Table II, and averaging across rating groups and portfolio groups, our own calculations indicate that the average CDS bid-ask spread is 34 basis points. Comparing this with an average 5-year CDS spread level of 327 basis points (Lando and Mortensen, 2005)

[34] The estimates range from 24 bps at the 5th percentile of the distribution to 421 bps at the 95th percentile of the distribution. The standard deviation is 145 bps.

yields a relative bid-ask spread of 10 percent.[35] Although the estimated transaction costs in the CDS market are, on average, substantially lower than in the bond market, they are still quite high relative to the equity market. For equity options, the sample in Muravyev and Pearson (2014) has an effective bid-ask spread of 8.4 cents per share on average. Comparing this with the average option price in their sample of \$1.70, this implies a relative bid-ask spread of 5%. In fact, this estimate is likely too high, given that the authors propose a correction of the effective bid-ask spread that implies lower transaction costs. In addition, they show that transaction costs in the options market have declined over time. These numbers are also consistent with Goyenko, Ornthanalai, and Tang (2014), who report relative bid-ask spreads in the equity options market ranging from 3.2% for ITM calls to 7.9% for OTM calls. Transaction costs are also reported to be higher for calls than for puts. In comparison, the average effective spread in the stock market is 8 basis points, representing an average relative effective spread of 1.54%.

These rough estimates arguably change across time periods and across samples. Thus, the exact magnitude is admittedly debatable. Yet, they represent a clear ranking of the magnitudes of transaction costs, which is less questionable. As we have mentioned, in the context of SPs, leverage is comparatively more important. In order to obtain enough "bang for one's buck," one needs to take advantage of the leverage embedded in equity options. Leverage may also be implemented in the fixed income market, although at a smaller magnitude, while involving transaction costs that are substantially larger. Although the stock market is

[35] Lando and Mortensen (2005) report average CDS spreads across rating categories ranging from 26 basis points for Aaa ratings to 1,349 basis points for Caa-C ratings. The value of 327 basis points is a simple average, based on our own calculations.

the most liquid, it only provides a linear payoff and is therefore not able to "compete" with the options market on a "leverage-adjusted transaction cost" basis. We, therefore, believe that our findings of informed trading activity in the options market ahead of corporate SP announcements may empirically be explained by the tradeoff between leverage and liquidity. This implies that there is a "pecking order of informed trading," which suggests that the options market is the preferred venue for insiders.

8 Conclusion

There is widespread anecdotal and academic evidence of insider trading in financial markets, in particular ahead of M&A announcements. SPs share many characteristics with M&As, which makes them likely to be susceptible to insider trading. SPs are unexpected corporate announcements that consistently produce positive abnormal announcement returns for the parent companies' stock, and negative abnormal announcement returns for their bonds. As the nature of information is clearly identified, corporate divestitures provide an alternative experimental setting to test for the prevalence of informed trading. We conjecture that the existence of opposing announcement effects for stocks and bonds may plausibly lead to informed capital structure arbitrage.

Despite little academic and virtually no regulatory evidence on informed trading ahead of corporate divestitures, we find substantial evidence of informed trading in options, but not in stocks, bonds or CDS, during the five days preceding SP announcements. Even on a conservative basis, about 9% of all deals in our sample exhibit abnormal options activity in the pre-announcement period. This evidence shows up in measures of abnormal options volume and excess implied volatility that are either unusually large or persistently abnormal. By comparing abnormal activity in the treatment group and a propensity-matched control sample, we effectively apply a difference-in-difference test and address sample selection and endogeneity concerns. More granular tests show that the unusual activity in options is relatively greater for call options than for put options, and that it arises primarily in OTM and ATM call options. This evidence is confirmed using tick-by-tick data in both the stock and options markets. Measures of informed activity are also more pronounced for divestitures that, ex ante, are expected to generate greater abnormal announcement returns. Abnormal options volume in the pre-announcement period positively and robustly predicts abnormal announcement returns. We find no evidence of unusual activity ahead of the announcements in the fixed income market, suggesting that there is a "dog that did not bark." Overall, our findings document that days ahead of SP announcements are previously unidentified blind spots for informed trading, in which the options market is the preferred venue.

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Table 1: Summary Statistics of Corporate Spinoffs

Panel A in this table summarizes all corporate SP announcements in the Thomson Reuters SDC Platinum database with a US public parent company for which we could identify matching stock prices (from CRSP) from January 1996 through December 2013. The column *SP* indicates the number of announcements per calendar year, while the column *SP w.Val.* indicates the subsample for which there exists information on the transaction value in SDC Platinum. For this subsample, we report the mean, standard deviation, minimum and maximum of the SP transaction value (in millions of USD). We also report the number of deals in the same industry, based on the two-digit (*N (SIC2)*) and 4-digit (*N (SIC4)*) SIC codes, the number of divestitures with a parent incorporated in a different state (*N (interstate)*), and the number of unique SP announcement days. Panel B provides the same information for a restricted sample in which all deals have matching daily price and volume information for stocks (CRSP) and options (OptionMetrics), tick-by-tick price and volume information for stocks (TAQ) and options (OPRA), and balance sheet information (COMPUSTAT). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics, TAQ, OPRA, Compustat.

Panel A: Full Sample										
Year	SP	SP w. Val.	Mean	Std.Dev.	Min	Max	N (SIC2)	N (SIC4)	N (interstate)	Unique SP
1996	52	29	731	1,107	0.13	5,363	22	15	23	50
1997	42	28	2,546	6,248	0.06	26,625	24	10	19	38
1998	48	32	1,244	2,440	0.38	9,670	27	20	17	44
1999	39	26	5,070	13,478	5.44	62,156	11	4	14	37
2000	54	32	1,990	3,764	4.48	18,816	26	12	18	51
2001	20	14	2,657	3,925	10.60	12,213	12	7	7	20
2002	21	14	260	298	0.90	1,068	12	6	7	21
2003	20	15	1,428	2,165	1.51	6,809	9	3	8	19
2004	10	5	1,383	2,288	84.18	5,433	6	2	2	10
2005	16	8	1,998	3,070	6.79	8,761	4	3	8	16
2006	16	12	5,670	6,324	400.79	17,963	10	8	7	16
2007	23	17	10,715	27,740	13.96	107,650	11	6	14	20
2008	23	15	3,700	8,917	3.74	34,569	10	7	9	23
2009	10	7	477	966	2.39	2,661	5	3	1	10
2010	11	6	1,579	1,959	1.53	5,132	9	6	3	11
2011	23	11	12,694	16,655	289.52	55,513	12	9	11	22
2012	10	5	1,483	1,535	287.09	4,056	5	3	6	10
2013	8	4	989	837	121.54	1,753	4	1	4	8
Total	446	280	3,152	9,665	0.06	107,650	219	125	178	426
Panel B: Restricted Sample										
2006	8	7	6,075	7,227	1,026.41	17,963	4	3	4	8
2007	18	15	11,845	29,446	69.53	107,650	8	5	11	15
2008	18	11	4,950	10,239	3.74	34,569	7	5	7	18
2009	8	5	667	1,115	143.98	2,661	4	2	1	8
2010	9	4	2,289	2,089	461.98	5,132	7	4	3	9
2011	20	10	13,934	17,012	1,174.36	55,513	9	7	11	19
2012	8	5	1,483	1,535	287.09	4,056	3	2	4	8
2013	5	4	989	837	121.54	1,753	2	0	3	5
Total	94	61	7,178	17,129	3.74	107,650	44	28	44	90

Table 2: Spinoff Average Cumulative Abnormal Announcement Returns

This table presents average cumulative abnormal announcement returns ($\overline{CARs}$) for different expected return models and six different event windows $[\tau_1, \tau_2]$. The number of observations in each panel is denoted by N. The three different expected return models are the constant mean return model (*Constant Mean*), the market model (*Market Model*), and the Fama-French Three-Factor model (*FF3F*). The associated t-statistics, presented in brackets, are adjusted for both cross-sectional and time-series correlation. The estimation window ($[T_1, T_2]$) runs from -31 to 31 calendar days relative to the announcement day that is defined as day $\tau = 0$. Panel A presents $\overline{CARs}$ for the entire sample. Panel B (C) presents results for the subsample of deals that were (not) completed. Source: Thomson Reuters SDC Platinum, CRSP, Kenneth French.

Panel A: Average CARs (N = 426)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean	2.04%	2.31%	3.37%	3.11%	2.63%	2.39%
(t-stat)	(4.48)	(4.39)	(4.18)	(3.78)	(3.22)	(3.06)
Market Model	2.05%	2.34%	3.37%	3.02%	2.50%	2.14%
(t-stat)	(4.60)	(4.56)	(4.27)	(3.75)	(3.12)	(2.79)
FF3F	1.82%	1.99%	2.74%	2.03%	1.27%	0.41%
(t-stat)	(4.59)	(4.25)	(4.05)	(3.14)	(2.18)	(0.71)

Table 3: Empirical Evidence of Informed Trading - Abnormal Volume, Returns and Excess Implied Volatility

This table reports the results for the measures of informed trading activity *Sum* and *Max*. For each of the dependent variables (stock returns and volume, option volume, implied volatility), we fit three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ* model; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. Standardized residuals are used to compute the *Sum* and *Max* measures. *Sum* (*Max*) is measured as the sum (maximum) of all positive standardized residuals over the five pre-event days. For each test, we report the average difference in values between the treatment and control groups, and the t-test for differences in means. The four control groups are constructed using the propensity-score matching technique based on the spinoff probability. We choose the best ($PS1$), respectively the two best ($PS2$) matches, for both the full sample (*All*) and the sample with options only (*Options*). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

	Unconditional Treat-Control		AJ Treat-Control		ABHS Treat-Control	
	Max	Sum	Max	Sum	Max	Sum
Panel A: Stock Return						
PS1-All	0.12	0.31	0.23	0.34	0.23	0.38
(t-stat)	1.83	2.67	3.52	3.04	3.62	3.57
PS2-All	0.08	0.25	0.15	0.24	0.14	0.26
(t-stat)	1.32	2.37	2.31	2.26	2.34	2.62
PS1-Options	0.12	0.22	0.15	0.18	0.12	0.16
(t-stat)	1.89	2.03	2.44	1.69	1.92	1.60
PS2-Options	0.06	0.13	0.11	0.10	0.10	0.11
(t-stat)	1.10	1.28	1.92	0.97	1.69	1.11
Panel B: Stock Volume						
PS1-All	-0.06	-0.04	-0.03	0.02	-0.10	-0.06
(t-stat)	-0.50	-0.20	-0.27	0.11	-0.88	-0.42
PS2-All	-0.10	-0.15	-0.06	-0.06	-0.10	-0.11
(t-stat)	-1.05	-0.83	-0.64	-0.46	-1.16	-0.9
PS1-Options	0.05	0.14	0.09	0.11	0.03	0.06
(t-stat)	0.44	0.76	0.87	0.76	0.31	0.41
PS2-Options	0.01	0.03	0.04	0.03	0.01	0.01
(t-stat)	0.14	0.15	0.45	0.23	0.07	0.09
Panel C: Implied Volatility						
PS1-All	0.18	0.57	0.19	0.60	0.17	0.59
(t-stat)	1.97	2.32	2.22	2.59	2.00	2.70
PS2-All	0.2	0.5	0.20	0.52	0.18	0.48
(t-stat)	2.44	2.26	2.57	2.46	2.25	2.36
PS1-Options	0.15	0.50	0.16	0.48	0.12	0.29
(t-stat)	1.52	2.08	1.72	2.06	1.37	1.27
PS2-Options	0.18	0.55	0.2	0.59	0.15	0.39
(t-stat)	2.10	2.52	2.51	2.88	1.94	1.97
Panel D: Option Volume						
PS1-All	0.36	0.66	0.35	0.61	0.3	0.44
(t-stat)	2.61	3.15	2.86	3.31	2.56	2.71
PS2-All	0.22	0.48	0.21	0.43	0.19	0.29
(t-stat)	2.18	2.52	2.20	2.50	2.18	2.40
PS1-Options	0.35	0.70	0.34	0.68	0.33	0.57
(t-stat)	2.44	3.35	2.63	3.69	2.70	3.54
PS2-Options	0.28	0.55	0.29	0.53	0.26	0.41
(t-stat)	2.27	2.88	2.53	3.12	2.40	2.76

Table 4: Quantification of Informed Trading

This table reports the fraction of the sample, in percentage terms, that exhibits statistically significant abnormal trading volume at the 1%, respectively 5% and 10% significance level. Panel A reports the number of treatment firms with abnormal options volume, expressed as a percentage of the total sample. We first calculate the abnormal options volume in event days -5 to -1 in excess of the average options volume from event days -63 to -6 (three months). The cumulative abnormal options volume is the sum of the abnormal volumes in days -5 to -1. Assuming no serial correlation, the standard deviation of the cumulative abnormal volume is then $5^{0.5}\sigma$, where σ is the standard deviation of options volume between days -63 and -6. Panel B reports the number of treatment firms with abnormal options volume in excess of a randomly matched control group, expressed as a percentage of the total sample, using both the *Sum* and *Max* measures. We report the results for the three normal regression models, computed over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ* model; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. Standardized residuals are used to compute the *Sum* and *Max* measures. *Sum* (*Max*) is measured as the sum (maximum) of all positive standardized residuals over the five pre-event days. The four control groups are constructed using the propensity-score matching technique based on the spinoff probability. We choose the best (*PS*1), respectively the two best (*PS*2) matches, for both the full sample (*All*) and the sample with options only (*Options*). Panel C reports the p-value of the null hypothesis *H0* that the abnormal options volume in the control group is greater than that in the treatment group. Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

Panel A: Number of Treatment Firms with Abnormal Options Volume, Expressed as a Percentage of the Total Sample.

	10% significance level			5% significance level			1% significance level		
	Unconditional	AJ	ABHS	Unconditional	AJ	ABHS	Unconditional	AJ	ABHS
	19.29	16.43	12.14	15.71	13.21	8.93	11.79	8.57	3.93

Panel B: Number of Treatment Firms with Abnormal Options Volume in Excess of a Randomly Matched Control Group (% of sample).

	10% significance level						5% significance level						1% significance level					
	Unconditional		AJ		ABHS		Unconditional		AJ		ABHS		Unconditional		AJ		ABHS	
	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum
PS1-All	5.71	9.64	6.79	7.50	6.79	8.57	4.29	5.71	3.93	6.07	4.29	4.64	1.43	1.43	1.43	1.43	1.79	1.79
PS2-All	5.89	8.39	6.79	6.96	6.07	7.32	4.29	4.64	3.75	4.82	3.93	3.93	0.71	1.43	1.25	1.07	1.61	1.61
PS1-Options	6.07	5.36	6.43	6.07	5.36	4.64	4.29	4.29	4.29	3.21	4.29	3.57	1.07	2.14	1.79	0.71	1.43	0.71
PS2-Options	5.54	8.04	6.43	7.32	6.43	6.43	3.21	5.00	3.57	5.18	3.57	3.93	1.07	1.43	1.07	0.71	1.61	1.07

Panel C: p-value of the Null Hypothesis H0 that the Abnormal Options Volume in the Control group is greater than that in the Treatment Group.

	Unconditional		AJ		ABHS	
	Max	Sum	Max	Sum	Max	Sum
PS1-All	0.005	0.001	0.002	0.001	0.005	0.004
PS2-All	0.015	0.006	0.014	0.007	0.015	0.009
PS1-Options	0.008	0.000	0.005	0.000	0.004	0.000
PS2-Options	0.012	0.002	0.006	0.001	0.008	0.003

Table 5: Empirical Evidence of Informed Trading - Abnormal Call and Put Options Volume

This table reports the results for the measures of informed trading activity, *Sum* and *Max*, for call and put options volume. We fit three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and the lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ*; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. Standardized residuals are used to compute the *Sum* and *Max* measures. *Sum* (*Max*) is measured as the sum (maximum) of all positive standardized residuals over the five pre-event days. For each test, we report the average difference in values between the treatment and control groups, and the t-test for differences in means. The four control groups are constructed using the propensity-score matching technique based on the spinoff probability. We choose the best ($PS1$), respectively the two best ($PS2$) matches, for both the full sample (*All*) and the sample with options only (*Options*). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

	Unconditional		AJ		ABHS	
	Treat-Control		Treat-Control		Treat-Control	
	Max	Sum	Max	Sum	Max	Sum
Panel A: Call Volume						
PS1-All	0.32	0.64	0.31	0.60	0.26	0.40
(t-stat)	2.12	2.88	2.35	3.06	2.00	2.32
PS2-All	0.18	0.48	0.19	0.44	0.15	0.27
(t-stat)	1.88	2.39	1.95	2.45	1.81	2.18
PS1-Options	0.34	0.73	0.31	0.70	0.28	0.53
(t-stat)	2.34	3.49	2.41	3.79	2.29	3.28
PS2-Options	0.24	0.55	0.23	0.52	0.20	0.36
(t-stat)	2.08	2.74	2.40	2.97	2.18	2.37
Panel B: Put Volume						
PS1-All	0.09	0.23	0.10	0.22	0.06	0.12
(t-stat)	0.60	1.10	0.76	1.21	0.46	0.69
PS2-All	0.08	0.22	0.08	0.19	0.06	0.12
(t-stat)	0.66	1.20	0.74	1.14	0.51	0.82
PS1-Options	0.29	0.55	0.24	0.45	0.22	0.37
(t-stat)	1.97	2.65	1.81	2.40	1.72	2.17
PS2-Options	0.31	0.52	0.27	0.44	0.24	0.37
(t-stat)	2.46	2.87	2.34	2.70	2.12	2.45

Table 6: Empirical Evidence of Informed Trading - Abnormal Call Options Volume by Moneyness

This table reports the Sum and Max of informed trading activity for abnormal call options volume, stratified by moneyness. We fit three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and the lagged returns and volume and contemporaneous returns and volume of the market index, the AJ model; (3) the $ABHS$ model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. Sum (Max) is the sum (maximum) of all positive standardized residuals over the five pre-event days. Moneyness is defined as S/K, the ratio of the stock price S to the strike price K. DOTM corresponds to $S/K \in [0, 0.80]$ for calls ($[1.20, \infty)$ for puts), OTM corresponds to $S/K \in (0.80, 0.95]$ for calls ($[1.05, 1.20)$ for puts), ATM is defined by $S/K \in (0.95, 1.05)$ for calls ($(0.95, 1.05)$ for puts), ITM is defined by $S/K \in [1.05, 1.20)$ for calls ($(0.80, 0.95]$ for puts), and DITM corresponds to $S/K \in [1.20, \infty)$ for calls ($[0, 0.80]$ for puts). We report the difference in average values between the treatment and control groups, and the t-statistics below. The four control groups are constructed using the propensity-score matched spinoff probability. We choose the best ($PS1$), respectively the two best ($PS2$) matches, for both the full sample (All) and the sample with options only ($Options$). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

	Unconditional		AJ		ABHS	
	Treat-Control		Treat-Control		Treat-Control	
	Max	Sum	Max	Sum	Max	Sum
Panel A: DOTM Call						
PS1-All	-0.04	-0.01	0.00	0.05	0.00	0.05
(t-stat)	-0.18	-0.05	0.02	0.20	-0.03	0.24
PS2-All	0.01	0.04	0.01	0.07	0	0.05
(t-stat)	0.03	0.18	0.04	0.32	0.00	0.29
PS1-Options	0.05	0.21	0.06	0.22	0.05	0.18
(t-stat)	0.27	0.87	0.39	1.03	0.29	0.93
PS2-Options	0.13	0.22	0.12	0.26	0.10	0.23
(t-stat)	0.89	1.16	1.00	1.68	0.89	1.69
Panel B: OTM Call						
PS1-All	0.33	0.52	0.30	0.45	0.27	0.35
(t-stat)	2.06	2.40	2.08	2.36	1.98	2.01
PS2-All	0.30	0.45	0.27	0.40	0.23	0.29
(t-stat)	2.15	2.32	2.18	2.35	1.93	1.95
PS1-Options	0.33	0.60	0.35	0.60	0.27	0.46
(t-stat)	2.07	2.84	2.46	3.19	1.95	2.68
PS2-Options	0.19	0.37	0.19	0.34	0.12	0.23
(t-stat)	1.67	1.93	1.67	1.97	1.00	1.48
Panel C: ATM Call						
PS1-All	0.38	0.68	0.36	0.60	0.32	0.48
(t-stat)	2.52	3.04	2.65	2.98	2.53	2.63
PS2-All	0.25	0.48	0.24	0.42	0.22	0.33
(t-stat)	2.08	2.28	2.09	2.16	1.98	1.93
PS1-Options	0.36	0.72	0.34	0.64	0.29	0.51
(t-stat)	2.22	3.38	2.38	3.35	2.19	2.92
PS2-Options	0.31	0.63	0.32	0.58	0.28	0.46
(t-stat)	2.23	3.24	2.57	3.27	2.39	2.91
Panel D: ITM Call						
PS1-All	0.27	0.35	0.21	0.37	0.19	0.25
(t-stat)	1.56	1.72	1.38	2.00	1.28	1.44
PS2-All	0.2	0.31	0.17	0.33	0.16	0.26
(t-stat)	1.31	1.67	1.24	1.96	1.25	1.64
PS1-Options	0.52	0.69	0.43	0.63	0.39	0.51
(t-stat)	3.37	3.80	3.14	3.71	2.98	3.12
PS2-Options	0.35	0.50	0.3	0.49	0.25	0.35
(t-stat)	2.50	2.84	2.38	3.09	2.10	2.33

Table 7: Empirical Evidence of Informed Trading - Abnormal Put Options Volume by Moneyness

This table reports the *Sum* and *Max* of informed trading activity for abnormal put options volume, stratified by moneyness. We fit three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and the lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ*; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. *Sum* (*Max*) is the sum (maximum) of all positive standardized residuals over the five pre-event days. Moneyness is defined as S/K, the ratio of the stock price S to the strike price K. DOTM corresponds to $S/K \in [0, 0.80]$ for calls ($[1.20, \infty)$ for puts), OTM corresponds to $S/K \in (0.80, 0.95]$ for calls ($[1.05, 1.20)$ for puts), ATM is defined by $S/K \in (0.95, 1.05)$ for calls ($(0.95, 1.05)$ for puts), ITM is defined by $S/K \in [1.05, 1.20)$ for calls ($(0.80, 0.95]$ for puts), and DITM corresponds to $S/K \in [1.20, \infty)$ for calls ($[0, 0.80]$ for puts). We report the difference in average values between the treatment and control groups, and the t-statistics below. The four control groups are constructed using the propensity-score matched spinoff probability. We choose the best ($PS1$), and the two best ($PS2$) matches respectively, for both the full sample (*All*) and the sample with options only (*Options*). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

	Unconditional		AJ		ABHS	
	Treat-Control		Treat-Control		Treat-Control	
	Max	Sum	Max	Sum	Max	Sum
Panel A: OTM Put Volume						
PS1-All	0.55	0.70	0.55	0.77	0.49	0.64
(t-stat)	3.42	3.57	3.88	4.21	3.70	3.87
PS2-All	0.43	0.56	0.41	0.57	0.36	0.49
(t-stat)	2.99	3.09	3.12	3.33	2.97	3.20
PS1-Options	0.52	0.60	0.46	0.59	0.38	0.45
(t-stat)	2.95	2.96	2.99	3.14	2.59	2.64
PS2-Options	0.61	0.74	0.54	0.70	0.49	0.60
(t-stat)	4.02	4.26	4.00	4.26	3.79	3.93
Panel B: ATM Put Volume						
PS1-All	0.09	0.25	0.14	0.24	0.14	0.19
(t-stat)	0.58	1.13	0.97	1.22	1.00	1.04
PS2-All	0.05	0.19	0.08	0.17	0.08	0.14
(t-stat)	0.37	0.95	0.59	0.97	0.63	0.86
PS1-Options	0.18	0.39	0.17	0.38	0.14	0.29
(t-stat)	1.05	1.66	1.08	1.80	0.91	1.53
PS2-Options	0.12	0.30	0.12	0.30	0.08	0.23
(t-stat)	0.82	1.50	0.90	1.67	0.65	1.35
Panel C: ITM Put Volume						
PS1-All	0.18	0.28	0.09	0.19	0.06	0.13
(t-stat)	0.98	1.26	0.56	0.94	0.41	0.73
PS2-All	0.12	0.18	0.05	0.08	0.05	0.08
(t-stat)	0.80	0.95	0.39	0.51	0.38	0.51
PS1-Options	0.31	0.51	0.26	0.44	0.23	0.36
(t-stat)	1.81	2.43	1.72	2.36	1.66	2.11
PS2-Options	0.22	0.34	0.20	0.29	0.17	0.23
(t-stat)	1.45	1.74	1.45	1.66	1.32	1.45
Panel D: DITM Put Volume						
PS1-All	-0.18	-0.09	-0.17	-0.06	-0.21	-0.17
(t-stat)	-0.64	-0.27	-0.69	-0.20	-0.88	-0.66
PS2-All	0.05	0.10	0.03	0.11	0.00	0.03
(t-stat)	0.21	0.37	0.15	0.48	-0.01	0.15
PS1-Options	0.31	0.34	0.31	0.37	0.32	0.33
(t-stat)	1.30	1.19	1.48	1.42	1.57	1.37
PS2-Options	0.29	0.26	0.28	0.30	0.26	0.29
(t-stat)	1.42	1.06	1.58	1.37	1.58	1.42

Table 8: Empirical Evidence of Informed Trading - Abnormal Options Volume by Deal Characteristics

This table reports the results for the treatment effect, i.e., the differences in measures of informed trading between the treatment and control groups, using the *Sum* and *Max* measures for aggregate options volume and subsamples stratified by deal characteristics, using three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and the lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ* model; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. For each test, we report the average values separately for the treatment and control groups, their differences, and the results for the t-test for differences in means. The four control groups are constructed using the propensity-score matching technique based on the spinoff probability. We report the best ($PS1$) matche for the full sample (*All*). Panel A separates completed and withdrawn deals. Panel B separates the results for focused and diversified deals, where a deal is classified as diversified if the parent has a different two-digit SIC code than the divested firm. Panel C reports results for the bottom and top quintiles of deal size, measured as the transaction value relative to the parent's market value of common equity. Panel D separates results for the bottom and top quintiles of geographical distance between the parent and the subsidiary using the parent and subsidiary zip codes. Panel E separates the results for the bottom and top terciles of the conglomerate discount, where the conglomerate discount is measured as the logarithm of the ratio of the sales-weighted average of the Tobin's q values (ratio of market value of assets to book value of assets), computed for all industry segments of the parent firm, to the parent's observed Tobin's q. T-test statistics are reported below the measures of informed trading and are based on standard errors that are corrected for both cross-sectional and time-series correlation. Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

	Unconditional		AJ		ABHS		Unconditional		AJ		ABHS		Unconditional		AJ		ABHS	
	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum	Max	Sum
Panel A: Deal Type																		
	Completed (N=214)						Withdrawn (N=62)						Completed-Withdrawn					
PS1-All	0.413	0.647	0.413	0.657	0.383	0.505	0.155	0.693	0.147	0.448	0.035	0.199	0.258	-0.046	0.265	0.209	0.348	0.306
(t-stat)	2.77	2.82	3.06	3.29	2.91	2.82	0.48	1.41	0.51	1.01	0.13	0.55	0.73	-0.09	0.83	0.43	1.16	0.76
Panel B: Diversified vs. Focused Deals																		
	Same Industry (N=128)						Different Industry (N=148)						Same-Different Industry					
PS1-All	0.216	0.548	0.251	0.489	0.136	0.170	0.475	0.753	0.441	0.715	0.451	0.667	-0.259	-0.205	-0.190	-0.226	-0.314	-0.498
(t-stat)	1.08	1.94	1.35	1.87	0.75	0.75	2.56	2.48	2.67	2.76	2.86	2.93	-0.95	-0.49	-0.76	-0.61	-1.31	-1.55
Panel C: Deal Value																		
	Low Deal Value (N=59)						High Deal Value (N=58)						Low-High Deal Value					
PS1-All	0.280	0.258	0.315	0.381	0.266	0.200	0.631	1.135	0.555	1.042	0.514	0.870	-0.351	-0.876	-0.239	-0.660	-0.249	-0.669
(t-stat)	0.84	0.48	1.09	0.91	0.93	0.52	2.41	2.94	2.32	2.92	2.37	2.74	-0.83	-1.33	-0.64	-1.20	-0.69	-1.34
Panel D: Deal Distance																		
	Low Distance (N=59)						High Distance (N=58)						Low-High Distance					
PS1-All	0.156	0.755	0.072	0.433	0.063	0.345	0.862	1.262	0.870	1.177	0.820	1.024	-0.705	-0.507	-0.798	-0.744	-0.756	-0.679
(t-stat)	0.59	1.64	0.31	1.08	0.28	1.00	2.96	2.68	3.16	2.58	3.11	2.87	-1.79	-0.77	-2.21	-1.23	-2.18	-1.37
Panel E: Conglomerate Discount																		
	Low Discount (N=46)						High Discount (N=46)						Low-High Discount					
PS1-All	1.005	1.394	0.945	1.414	0.903	1.273	0.338	0.531	0.568	0.854	0.473	0.588	0.667	0.863	0.377	0.560	0.430	0.685
(t-stat)	3.24	3.46	3.27	3.53	3.17	3.56	1.19	1.09	2.02	1.99	1.68	1.53	1.59	1.37	0.93	0.95	1.07	1.30

Table 9: Empirical Evidence of Informed Trading - Abnormal Order Flow

This table reports the results for the measures of informed trading activity *Sum* and *Max* for the order-flow imbalances in both stock and option volumes. Stock (option) order-flow imbalance is measured as the net difference between customer buy- and sell-initiated stock (delta-adjusted option) volume, scaled by the number of shares outstanding. We fit three normal regression models over the 90-day pre-announcement window to compute normal returns: (1) an unconditional model using only a constant; (2) a conditional model using a constant, day-of-week dummies, and the lagged returns and volume and contemporaneous returns and volume of the market index, the *AJ* model; (3) the *ABHS* model that augments the AJ model with lagged values of the dependent and all independent variables and the VIX price index. Standardized residuals are used to compute the *Sum* and *Max* measures. *Sum* (*Max*) is measured as the sum (maximum) of all positive standardized residuals over the five pre-event days. For each test, we report the difference in average values between the treatment and control groups, and the results of a *t*-test for differences in means. The four control groups are constructed using the propensity-score matching technique based on the spinoff probability. We choose the best ($PS1$), and the two best ($PS2$) matches respectively, for both the full sample (*All*) and the sample with options only (*Options*). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics, TAQ, OPRA.

	Unconditional		AJ		ABHS	
	Treat-Control		Treat-Control		Treat-Control	
	Max	Sum	Max	Sum	Max	Sum
Panel A: Stock Order-Flow Imbalance						
PS1-All	0.10	0.20	0.10	0.18	0.13	0.21
(*t*-stat)	1.22	1.46	1.28	1.37	1.75	1.73
PS2-All	0.09	0.15	0.09	0.17	0.12	0.20
(*t*-stat)	1.21	1.22	1.25	1.44	1.72	1.80
PS1-Options	0.10	0.12	0.11	0.15	0.12	0.15
(*t*-stat)	1.21	0.94	1.49	1.17	1.68	1.25
PS2-Options	0.06	0.09	0.05	0.10	0.06	0.07
(*t*-stat)	0.78	0.71	0.77	0.89	0.85	0.69
Panel B: Option Order-Flow Imbalance						
PS1-All	0.39	0.56	0.34	0.42	0.29	0.31
(*t*-stat)	2.65	3.00	2.51	2.38	2.10	1.87
PS2-All	0.29	0.40	0.29	0.35	0.24	0.28
(*t*-stat)	1.97	2.42	2.24	2.26	2.10	2.19
PS1-Options	0.39	0.53	0.37	0.51	0.32	0.38
(*t*-stat)	2.09	2.24	2.17	2.32	1.87	1.88
PS2-Options	0.31	0.43	0.26	0.35	0.22	0.25
(*t*-stat)	1.99	2.15	1.98	2.19	1.85	1.74

Table 10: Announcement Return Predictability

This table presents the estimates of the regression of abnormal spinoff announcement stock returns on a constant and the different measures of informed trading obtained from the stock and the options market using either the Max (Panel A) or the Sum (Panel B) methodology. Sum (Max) is measured as the sum (maximum) of all positive standardized abnormal returns over the five pre-event days, where the normal returns are calculated over the three-month pre-announcement window based on a benchmark model that includes a constant, day-of-week dummies, the lagged returns and volume of the market index, and contemporaneous returns and volume of the market index, lagged values of the dependent and all independent variables, and the VIX price index. $RETURN$ refers to the Sum and Max measures obtained from abnormal stock returns, $STOCKVOLUME$ from abnormal stock trading volume, $IMPL.VOL$ from excess implied volatility, and $O-VOLUME$ from abnormal aggregate options volume. SOI and OOI denote, respectively, the stock and options order-flow imbalances. $SAME-SIC2$ is an indicator variable that takes the value one if the parent has the same two-digit SIC code as the divested company. $INTERSTATE$ is equal to one if the company being spun off is incorporated in a different state to the parent company. $VALUE$ controls for the market value of the divestiture relative to the market capitalization of the parent firm. The other control variables are as follows: $DISCOUNT$ denotes the conglomerate discount, measured as the logarithm of the ratio of the sales-weighted average of the Tobin's q values (ratio of market value of assets to book value of assets), computed for all industry segments of the parent firm, to the parent's observed Tobin's q; $CONGLOMERATE$ is a dummy variable equal to one if the parent has multiple business segments of which at least one has a different two-digit SIC code to that of the parent company; $GOVERNANCE$ is the E-index of Bebchuk, Cohen, and Ferrell (2009), computed based on six corporate governance provisions: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments; $BLOCK$ is an indicator variable equal to one if there exists at least one institutional shareholder that holds more than 5% of the parent's stock; $WAVE$ is a dummy variable that equals one if a spinoff occurred in the same two-digit SIC code in the previous quarter; $ASSETS$ denotes the natural logarithm of total assets; MB is the ratio of market-to-book equity; $LEVERAGE$ is firm leverage; $PPENT$ is defined as total net property, plant, and equipment divided by total assets; EPS denotes earnings-per-share; $WCAP$ is the ratio of working capital to total assets; RE is retained earnings divided by total assets; $CASH$) is the ratio of cash to total assets; $CAPX$ is the ratio of capital expenditure to total assets; EMP is the natural logarithm of the number of employees (measured in thousands). N denotes the number of observations used in each regression, and $R2$ is the R-squared of the model. Models (1)-(4) are based on the Max measure of informed trading. Models (5)-(8) are based on the Sum measure of informed trading. All specifications include industry and quarter fixed effects (FE). Source: Thomson Reuters SDC Platinum, Compustat, CRSP, OptionMetrics, TAQ, OPRA.

	Panel A: *Max* Measure				**Panel A: *Sum* Measure**			
	1	2	3	4	5	6	7	8
Intercept	-0.02	0.02	-0.12	0.01	-0.02	0.02	-0.09	0.15
	(-1.06)	(0.90)	(-0.92)	(0.05)	(-1.26)	(1.03)	(-0.71)	(0.61)
RETURN	0.00	-0.02	-0.01	-0.05	0.00	-0.02	-0.01	-0.04
	(-0.22)	(-0.65)	(-0.45)	(-1.43)	(-0.33)	(-1.73)	(-0.70)	(-2.56)
STOCK VOLUME	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01
	(0.91)	(0.38)	(0.62)	(0.29)	(0.51)	(0.87)	(0.19)	(0.74)
IMPL.VOL	0.01	0.00	0.02	-0.01	0.01	-0.01	0.01	-0.01

Continued on next page

Table 10 – *Continued from previous page*

	Panel A: ***Max*** Measure				Panel B: ***Sum*** Measure			
	1	2	3	4	5	6	7	8
	(0.67)	(-0.16)	(1.35)	(-0.41)	(1.29)	(-1.01)	(1.94)	(-1.02)
O-VOLUME	0.02	0.02	0.02	0.04	0.01	0.03	0.02	0.03
	(2.47)	(2.19)	(2.82)	(2.07)	(2.30)	(2.75)	(2.70)	(2.01)
SOI	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	-0.03
	(0.04)	(0.16)	(-0.21)	(-0.63)	(0.59)	(0.11)	(0.08)	(-1.61)
OOI		0.01		-0.01		0.00		-0.01
		(0.34)		(-0.15)		(0.01)		(-0.08)
SAME-SIC2			-0.05	-0.04			-0.05	0.00
			(-1.47)	(-0.62)			(-1.31)	(-0.05)
INTERSTATE			0.02	0.04			0.01	0.03
			(0.43)	(0.58)			(0.38)	(0.63)
VALUE			0.04	-0.06			0.05	-0.12
			(0.72)	(-0.52)			(0.79)	(-1.16)
DISCOUNT			0.02	0.00			0.02	0.10
			(0.32)	(0.01)			(0.39)	(0.89)
CONGLOMERATE			-0.07	-0.02			-0.07	-0.02
			(-1.90)	(-0.20)			(-1.82)	(-0.24)
GOVERNANCE			0.00	-0.01			0.00	-0.02
			(-0.03)	(-0.92)			(0.20)	(-1.75)
BLOCK			0.04	-0.03			0.03	-0.02
			(0.98)	(-0.30)			(0.83)	(-0.24)
WAVE			-0.06	0.01			-0.06	0.02
			(-1.53)	(0.11)			(-1.65)	(0.27)
ASSETS			-0.01	0.00			-0.01	-0.02
			(-0.40)	(-0.09)			(-0.48)	(-0.62)
MB			0.01	0.05			0.01	0.04
			(0.80)	(1.35)			(0.75)	(1.11)
LEVERAGE			0.04	0.03			0.03	0.00
			(0.44)	(0.21)			(0.34)	(-0.01)
PPENT			0.10	0.03			0.11	0.02
			(1.05)	(0.18)			(1.20)	(0.10)
EPS			0.01	0.01			0.02	0.01
			(0.80)	(0.49)			(0.95)	(0.44)
WCAP			0.11	0.04			0.11	0.05
			(0.87)	(0.13)			(0.88)	(0.20)
RE			0.06	-0.01			0.06	0.01
			(1.44)	(-0.07)			(1.41)	(0.07)
CASH			-0.06	-0.35			-0.08	-0.31
			(-0.25)	(-1.05)			(-0.34)	(-1.09)
CAPX			-2.02	0.65			-2.17	0.84
			(-1.31)	(0.15)			(-1.43)	(0.21)
EMP			0.01	-0.01			0.01	0.00
			(0.91)	(-0.21)			(0.79)	(-0.06)
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
N	280	90	165	49	280	90	165	49
Adj. R2	0.02	0.03	0.08	0.17	0.03	0.05	0.09	0.18

Table 11: Spinoff Average Cumulative Abnormal Announcement Returns - Fixed Income Market

This table presents average cumulative abnormal announcement returns ($\overline{CARs}$) using the constant mean return model (*Constant Mean Return*) for five different event windows $[\tau_1, \tau_2]$. The number of observations in each panel is denoted by N. The associated t-statistics, presented below the average returns, are adjusted for both cross-sectional and time-series correlation. The estimation window ($[T_1, T_2]$) runs from -31 to 31 calendar days relative to the announcement day. Panel A (B, C) presents $\overline{CARs}$ for bonds using the TRACE (Datastream, Bloomberg) database. Panel D (E) presents $\overline{CARs}$ for CDS based on simple CDS returns (clean price CDS returns) using the Markit database. Source: Thomson Reuters SDC Platinum, CRSP, FISD, TRACE, Datastream, Bloomberg, Markit.

Panel A: Average Bond CARs Using TRACE Data (N = 49)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean Return	-0.12%	0.22%	0.21%	0.05%	0.13%	-0.26%
(t-stat)	(-0.53)	(0.67)	(0.48)	(0.09)	(0.22)	(-0.31)
Panel B: Average Bond CARs Using Datastream Data (N = 37)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean Return	0.02%	0.18%	0.36%	0.44%	-0.27%	-0.28%
(t-stat)	(0.07)	(0.67)	(1.22)	(1.17)	(-0.41)	(-0.42)
Panel C: Average Bond CARs Using Bloomberg Data (N = 52)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean Return	-0.19%	-0.10%	-0.19%	-1.05%	-0.97%	-2.10%
(t-stat)	(-0.96)	(-0.65)	(-1.10)	(-1.08)	(-1.13)	(-1.23)
Panel D: Average CDS CARs Using Markit Data, Simple Return (N = 54)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean Return	6.24%	6.20%	5.88%	4.98%	6.21%	6.19%
(t-stat)	(2.16)	(2.19)	(1.92)	(1.49)	(1.81)	(1.78)
Panel E: Average CDS CARs Using Markit Data, Clean Price Return (N = 54)						
Event Window	τ=0	[-1,0]	[-1,1]	[-1,3]	[-1,5]	[-1,10]
Constant Mean Return	4.74%	4.68%	4.48%	4.01%	4.97%	4.73%
(t-stat)	(1.98)	(1.99)	(1.79)	(1.48)	(1.86)	(1.76)

Table 12: Transaction Costs

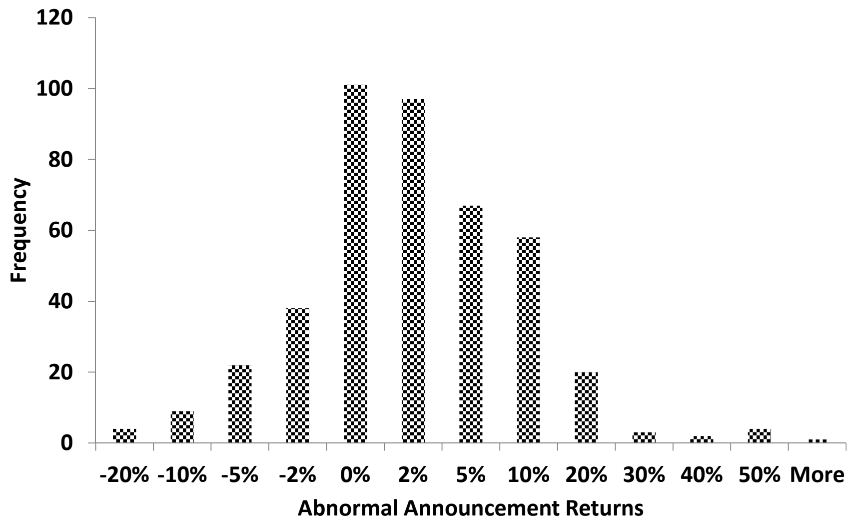
This table summarizes the average transaction costs on an absolute (either in basis points or in cents) and on a relative (as a percentage of the underlying) basis for the stock, options, CDS and corporate bond markets. Values for the corporate bond market are taken from Friewald, Jankowitsch, and Subrahmanyam (2012). We use values for the CDS market from Bongaerts, De Jong, and Driessen (2011) and Lando and Mortensen (2005). Metrics for the equity options and stock markets are taken from Muravyev and Pearson (2014) and Goyenko, Ornthanalai, and Tang (2014). Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics, TAQ, OPRA, Compustat.

Market	Transaction Costs (bps/cents)	Relative Transaction Costs (%)
Bond	185	64
CDS	34	10
Options	8.4	5
Stock	8	1.54

Figure 1: Distribution of Abnormal Announcement Returns

Figure 1a plots the distribution of FF3F abnormal announcement day returns for the sample of 426 unique spinoff events. Figure 1b plots the distribution of abnormal announcement returns for the subsample of 269 unique spinoff events for which we have deal value information. Source: Thomson Reuters SDC Platinum, CRSP, Kenneth French.

(a)



(b)

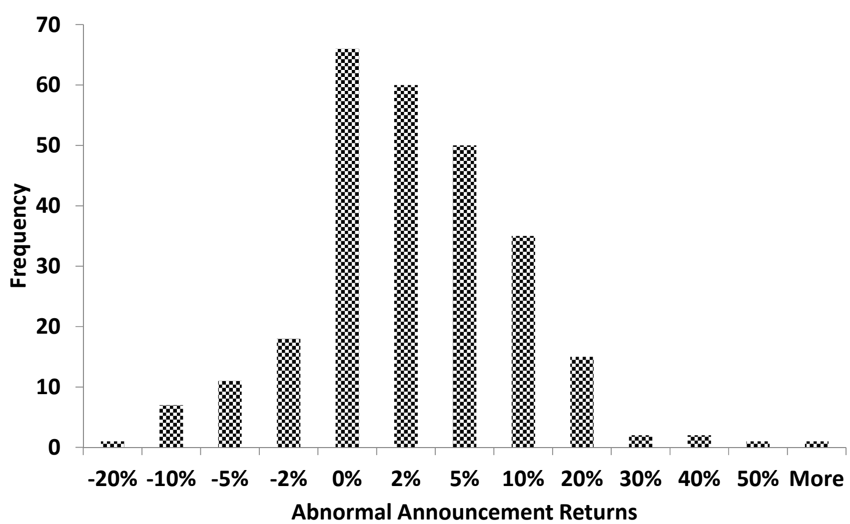
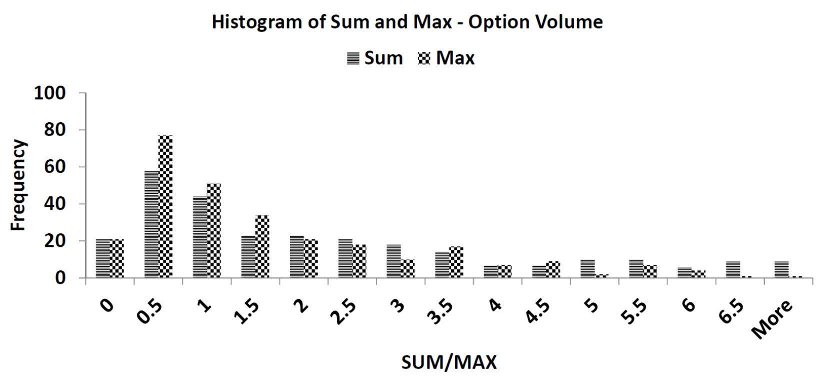


Figure 2: Distribution of Informed Trading Measures - *Max* and *Sum*

This figure illustrates the distribution of the *Sum* and *Max* measures for options volume. *Sum* (*Max*) is measured as the sum (maximum) of all positive standardized abnormal returns over the five pre-event days, where the normal returns are calculated over the three-month pre-announcement window based on the benchmark VAR model that includes a constant, day-of-week dummies, lagged returns and volume, contemporaneous returns and volume of the market index, lagged values of the dependent and all independent variables, and the VIX price index. The residuals are then standardized and the *Sum* measure is computed as the sum of all positive standardized residuals in the five-day pre-event window. Figure 2a reports the measures for aggregate option volume, Figure 2b for call options, and Figure 2c for put options. Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

(a)



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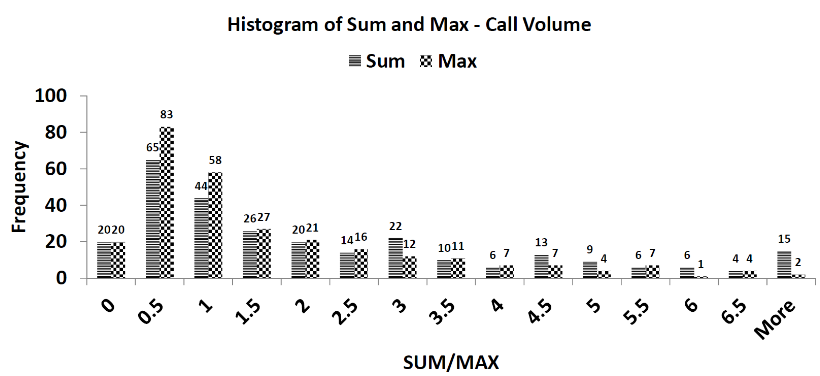


(c)

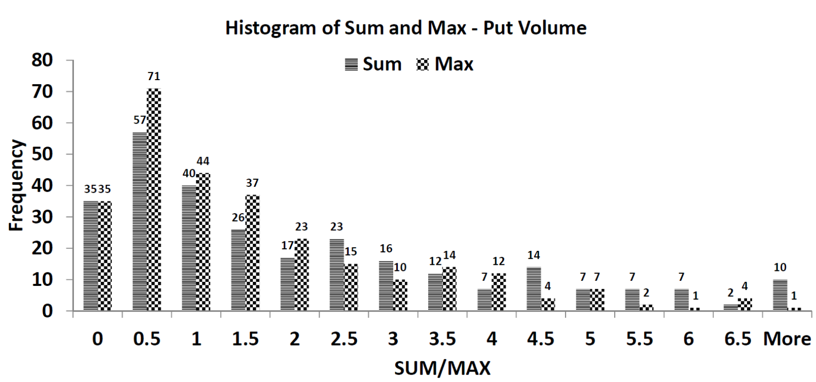
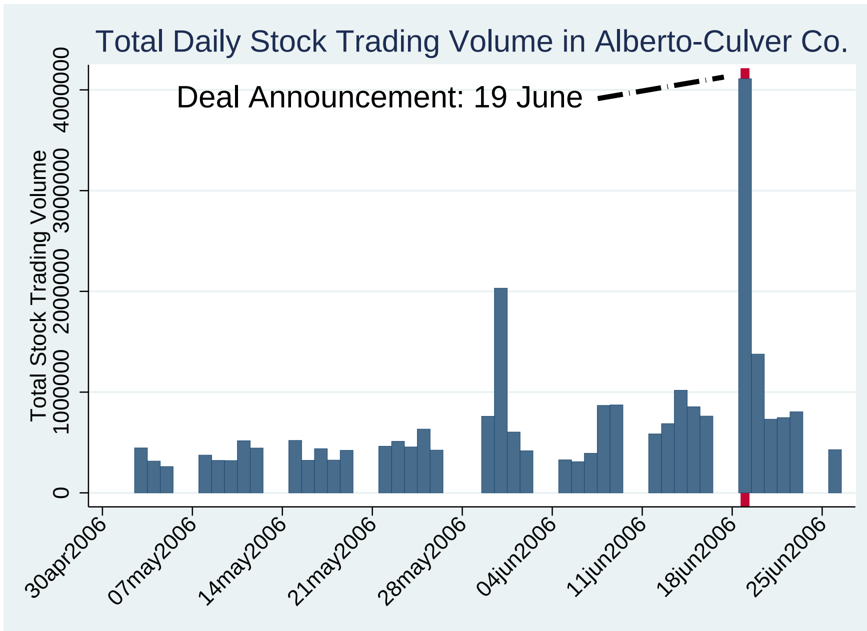


Figure 3: Alberto-Cluver Spinoff of Sally Beauty Supply

Figures 3a and 3b plot, respectively, the total daily stock and options trading volumes for Alberto-Cluver Co ahead of its announcement on June 19, 2006 of the spinoff of its remaining 52.5% interest in Sally Beauty Supply Co, a manufacturer and wholesaler of health and beauty aids. The transaction was valued at $3 billion. Source: Thomson Reuters SDC Platinum, CRSP, OptionMetrics.

(a)



(b)