Security Issue Timing:
What Do Managers Know, and When Do They Know It?

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ABSTRACT

We study put option sales on company stock by large firms. An often cited motivation for these transactions is market timing, and managers' decision to issue puts should be sensitive to whether the stock is undervalued. We provide new evidence that large firms successfully time their security sales. In the 100 days following put option issues, there is roughly a 5% abnormal stock price return, with much of the abnormal return following the first earnings release date after the put sale. Direct evidence on put option exercises reinforces these findings and shows that exercise frequencies and payoffs to put holders are abnormally low.

Introduction

During the 1991 to 2004 period, large U.S. firms, including Bank of America, Boeing, IBM, McDonald's and Microsoft, sold puts on their own stock. Our study is the first large-scale empirical analysis of these transactions. A put sale is a levered bet that the stock price will not drop, and, as we argue below, put options offer a unique setting to study market timing by corporations. Our main contribution is to provide strong evidence that large firms successfully time the market with security sales.

Managers can alter investment, financing, and other corporate decisions when they believe their firms' securities are mispriced. While there is an extensive literature on market timing (see Eckbo, Masulis, and Norli, 2006, and Baker, Ruback, and Wurgler, 2008, for surveys), its importance for corporate behavior is hotly debated and still unresolved. Most of the evidence in support of market timing comes from long-horizon event studies that document abnormal returns following equity issues and repurchases. The evidence is difficult to interpret, however. First, there are many motives for these transactions other than market timing, and it is often difficult to distinguish among alternative explanations. Second, measuring abnormal returns over long horizons is problematic, especially given that firm risk may change around equity issues and repurchases because of contemporaneous changes in asset structures.

The put option sale setting helps address the issues of both motivation and measurement, and thus provides cleaner tests. Management's desire to exploit perceived mispricing represents a highly plausible motive for put sales, whereas other motives seem suspect. For example, put sellers tend to be highly profitable and appear to have no need to raise outside funds. Firms do not announce their put sales and hence do not seem to use them to signal information to the market. Selling put options increases rather than reduces firm risk, and hence does not serve as a hedge. Though market timing motives seem highly plausible, we cannot rule out the existence of other reasons to sell puts. Our empirical tests examine whether managers use private information to time put sales, and the tests do not require that market timing be the only motivation.

The put option setting allows for more precise measurement of abnormal price behavior following the sales. A typical put in our sample has a maturity of only 6 months.

The short maturity allows us to focus on short-term stock price effects, reducing the difficulties associated with long-horizon event studies (see Fama, 1998, and Kothari and Warner, 2006, for overviews). In addition, since put sale programs typically extend over multiple fiscal quarters, we can examine stock returns subsequent to quarters in which firms skip put sales. Finding no abnormal returns after such quarters is further evidence on timing, and alleviates concerns that the return benchmarks are misspecified. Finally, put sale proceeds are small relative to typical debt or equity issues. With smaller asset changes around the transactions, it is unlikely that the abnormal stock returns subsequent to put sales can be attributed to changes in asset risk.

Because the securities are puts, we are able to investigate their exercises and expirations directly. Successful timing implies that fewer puts are exercised and payoffs are smaller than would be expected in the absence of private information. To estimate abnormal exercises and payoffs, we compare the actual puts to similar hypothetical securities issued by comparable firms. This pseudo-issuance approach provides a comprehensive measure of the puts' overall abnormal performance.

Our tests show that managers are able to identify undervalued equity and successfully time the market with their put option sales. In the 100 trading days following put option issues, there is roughly a 5% abnormal stock return, and the results are robust to variations in benchmarks and test methods. Much of the abnormal return follows the first earnings release date after the put sale. This suggests that managers' private information includes – but is not limited to – information about one-quarter ahead earnings. No abnormal returns are observed subsequent to quarters in which a firm skips put sales, consistent with timing. Examining put option exercises reinforces our conclusions. Both exercise frequencies and payoffs to option holders are substantially lower than in a matched control sample. For example, payoffs to option holders are approximately thirty percent below the payoffs in the control group.

We also find that stock return volatility declines after a firm's initial put sale and increases after a put sale program terminates, so that put sale programs coincide with periods of unusually low volatility. One interpretation is that there is volatility timing by put issuers. Little managerial sophistication is required for volatility timing to be feasible.

It is sufficient that managers are more likely to sell puts when they perceive the likelihood of extreme news events to be lower than outsiders do. Finally, we find no evidence that firms manipulate share prices before put expirations: there are no stock price reversals after put options mature, and we detect no increase in (potentially manipulative) share repurchases in quarters when puts expire or are exercised.

The majority of the put sellers in our sample (75 out of 137) are in the S&P 500. The issuers are, on average, unusually profitable, and have high market-to-book ratios compared to the overall market. Documenting successful bets on stock prices by a group of large growth firms is new to the market timing literature. In marked contrast, the literature on market timing with share repurchases finds positive excess returns predominantly for small, neglected firms with low valuations (Ikenberry, Lakonishok, and Vermaelen (1995), Peyer and Vermaelen (2005)).

The result that put option sales reflect timing ability shifts our priors and increases our confidence in the potential relevance of timing considerations for a broader cross-section of firms and a wider range of transactions. Survey evidence shows that CFOs feel that they can time the market (Graham and Harvey, 2001), but this may simply reflect managers' overconfidence. Recent studies of insider trading raise doubts about whether managers of large firms have significant timing ability (see Lakonishok and Lee, 2001, Jenter, 2005). Many papers examine the implications of managerial overconfidence, and recent empirical work suggests that there is an association between managerial overconfidence and aggressive corporate policies (Ben-David, Graham, and Harvey, 2007). Put sales do represent an aggressive bet, but our results show that managers use valid inside information in making that bet. This finding constitutes no evidence against managerial overconfidence, but shows that overconfidence is not the only driver behind attempts to time security sales.

Put option sales are private transactions with major investment banks or brokerages as counterparties. The data do not allow us to explore investment banks' motives to engage in these transactions, or to determine how the trading profits were split and whether sample firms profited. Our discussions with market participants indicate that put sales were proposed by the investment banks to the issuing firms (see also Investment Dealers'

Digest, March 1991). Given the sophistication of the put buyers and the non-anonymous setting, we do not expect that investment banks lost money trading against better informed issuers. Instead, it appears that banks hedged their put positions by buying shares or exchange-traded options (McDonald, 2004).

Section 1 gives background and discusses institutional features of put option issues. Section 2 describes the data. Section 3 discusses the stock return performance, operating performance, and volatility patterns around put option issues and examines put option outcomes. Section 4 concludes.

1 Background

1.1 Institutional Features

Put option programs are a financial innovation characterized by a dramatic rise, and an equally dramatic fall. A 1991 SEC ruling allows firms to issue puts on their own stock as long as they have announced a share repurchase program. The ruling, in the form of a "no action" letter, states that the SEC will take no enforcement action against put issuers for manipulation of stock prices under the Securities Exchange Acts of 1933 and 1934. Few specific restrictions apply to the put issues, but they must be out of the money at issue and must adhere to the trading-volume limits under Rule 10b-18 of the 1934 Securities Exchange Act.[1] Put option sales must be reported in the subsequent quarterly or annual report.

The use of put options in conjunction with share repurchase programs surged in the 1990s. Although the impetus for the 1991 ruling came from the CBOE, the put sales were generally structured as privately negotiated transactions. Announced by neither the issuers nor the counterparties, the transactions were nevertheless highly touted in the financial press.[2] Advantages cited include the general profitability, the tax-free

[1] The SEC ruling was requested by the CBOE and explicitly concerned exchange-traded options only. The put sales in our sample are privately negotiated, and according to market participants there is some uncertainty as to how the SEC rules apply to private put transactions. For further details of the history, see Posell and Eades (1992a, b). Regulatory issues are further discussed in CBOE Investor Series Paper #2 "Corporate Stock Repurchase Programs and Listed Options" (2001).

[2] For example, a Business Week headline on February 23, 1998 stated that "Hedging techniques are earning millions in tax free income for savvy companies" (Laderman, 1998).

proceeds[3], and the minimal disclosure requirements. The counterparty was typically an investment bank, who hedged the purchase by buying shares. Players in this market included Citibank, Goldman Sachs, Merrill Lynch, Morgan Stanley, Salomon Brothers, and UBS. We do not know how many firms were approached by banks with offers to purchase puts. Discussions with market participants suggest that such offers were extended to all large firms with share repurchase programs and high stock market liquidity.

Since 2002, however, put sale transactions have largely dried up. A complete analysis of the reasons is beyond the scope of this paper, but two factors seem to be important. First, many issuers lost money in the bursting of the Internet bubble, with Microsoft taking a reported loss of 1.3 billion (McDonald, 2004). Second, discussions with market participants and the practitioner literature suggest that a change in accounting rules in 2003 that required puts to be marked to market had a highly damaging effect. We examine both developments in Section 3.6. In response to the new accounting regime, investment banks have developed new option strategies that avoid mark-to-market accounting while allowing firms to continue selling puts on their own stock.[4] These transactions are reported as part of the broad category "structured repurchase transactions" in firm's financial statements, making it difficult to ascertain how popular they are.

1.2 Firms' motives for selling puts

The practitioner and academic literature on put option sales is a mix of description, theory, and small sample or case analyses.[5] The literature offers many possible explanations for firms' put sales. As discussed below, explanations based on signaling or

[3] Sale proceeds are tax free under Section 1032 of the Internal Revenue Code. Proceeds are directly booked into permanent equity on the issuer's balance sheet and do not increase accounting earnings.

[4] In these transactions, the issuer pre-pays the strike price to the put buyer at the beginning of the contract. At maturity, if the issuer's stock price is above the strike price, the put buyer refunds the strike price plus an additional premium to the seller. If the issuer's stock price is below the strike price, the put is exercised and the issuer receives shares of its own stock. By pre-paying the strike price, the put seller avoids having to record and mark-to-market the put liability on its balance sheet. An early example of such a modified put is UBS Warburg's proprietary "DRAGONs" strategy (UBS Warburg, 2003). Issuers of modified puts include Activision, Applied Micro Circuits, Monster Worldwide, and Yahoo!.

[5] A Darden School case and teaching note provide an analysis of IBM's 1992 put sales (Posell and Eades, 1992a, b); the empirical analysis in McDonald (2004) focuses on Dell and Microsoft.

hedging are problematic. However, market timing appears more plausible, and our research design provides evidence on its relevance.

Gibson, Povel, and Singh (2006) suggest that firms issue puts to signal positive information to the market (see also Gyoshev, 2001, for a similar argument). McDonald (2004) and Atanasov et al. (2007) dismiss the signaling explanation because firms do not pre-announce their put sales nor subsequently publicize the use of such contracts.

Put options are also an unlikely means of raising capital. Most put sellers are highly profitable, and all of them are actively repurchasing shares at the same time as they sell puts, suggesting that they have no need to raise capital. Moreover, McDonald (2004) shows that selling a put contract is tax disadvantaged compared to raising the same funds through the equivalent synthetic put position.

Practitioners sometimes refer to put option sales as a hedge for an ongoing share repurchase program.[6] This seems incorrect. Since the return to the put selling firm is positively correlated with the return on the firm's shares, firm risk is increased, not reduced, by a put option sale. Framing put sales as a hedge is consistent with the recent literature on corporate hedging, which suggests that some activities labeled as hedging are actually attempts to exploit information and make directional bets (see Baker, Ruback, Wurgler, 2008).[7]

Market participants have told us in numerous conversations that put option sales were considered profitable by both investment banks and put issuers. In particular, investment banks purchased the puts, hedged their exposure, and claim to have made a net profit. At the same time, the firms issuing the puts viewed the transactions as a means to lower the cost of their share repurchase programs.[8] Taken at face value, these statements raise the question of where the value creation originates. A put sale is a purely financial

[6] For examples see Posell and Eades (1992a, b), Salomon Brothers (1994), Browning and Lucchetti (1997), and Teach (1999).

[7] This possibility is supported by statements made in a 1999 interview by the CFO of Microsoft, one of the most aggressive put sellers in our sample, in which he reported that "the vast majority of (hedging) programs are straight hedges…I expect they will continue to make money" (Teach, 1999).

[8] See the Darden School case by Posell and Eades (1992a, b) for a detailed discussion of IBM's interest in put sales, as well as Salomon Brothers (1994), Maffei (1998), and Teach (1999). In the Darden case, IBM's Assistant Treasurer, Jesse Greene, Jr., is concerned about the net profitability of put issues and comparing cash proceeds to likely payouts, given the probability distribution of IBM's stock price.

transaction and should, in the absence of market frictions or private information, have zero net present value.

Some of the prior literature proposes market timing by put issuers as a mechanism through which put sales can create value. For example, Angel, Gastineau, and Weber (1997, p. 111) argue that the main rationale for using puts "is surprisingly simple…the underlying common stock is cheap" (see also Grullon and Ikenberry, 2000). Angel et al. further propose that put sales are profitable if management has private information that future volatility will be lower than put buyers expect. McDonald (2004) points out that put sales are inferior to stock repurchases when betting on a rising stock price, but that puts may seem attractive to issuers because they generate explicit gains and involve off-balance sheet borrowing. Consistent with market timing, Gyoshev (2001) and Atanasov et al. (2007) find abnormal positive stock price performance following firms' initial put sales in samples of 38 and 17 issuers, respectively.

Practitioners offer two additional explanations that point toward market timing. The first is that firms earn money by selling volatility (Salomon Brothers, 1994, Teach, 1999), and the second is that firms are paid for their willingness to repurchase shares at prices below the current stock price (Salomon Brothers, 1994, Laderman, 1998). Without private information, neither transaction should have positive NPV. If issuers use private information, the explanations amount to volatility timing and stock price timing, respectively.

In sum, prior analysis and evidence suggests that market timing is relevant for put sale decisions, and the literature offers little insight into other reasons for the sales. An interesting alternative hypothesis is that put sales are simply mistakes made by overconfident or ignorant managers, or that the put programs resulted from agency conflicts between corporate treasuries and their firms. For example, it is possible that the sales increased bonuses for the treasuries, even though they were not in the best interest of shareholders. Our paper can shed some light on timing versus these alternatives. However, we cannot rule out the existence of other reasons for selling puts, and our empirical strategy does not require market timing to be the only (or even the main)

motivation. Instead, our goal is to test whether managers successfully use private information to time put option sales.

2 Data collection and descriptive statistics

We identify firms that sold put options on their own stock by searching annual and quarterly reports available on the Lexis-Nexis, Factiva, and Edgar databases. We eliminate put issues which are sold in conjunction with other equity or debt securities by the same firm, and retain only stand-alone put sales. We match put sellers with data on firm characteristics from Compustat and data on stock returns from CRSP. The final sample contains 137 firms and 802 distinct put issues. Fig. 1 shows that the put sales start in 1991 (with two issues by Intel) and increase in number throughout the 1990s. Put issues peak at 122 sales by 52 firms in 2000 before declining to 48 issues in 2002 and finally dropping to just two issues in 2004.

2.1 Firm characteristics

Table 1 reports characteristics of (i) put selling firms, (ii) all Compustat firms, and (iii) firms with ongoing share repurchase programs. Put sale programs are framed and announced as part of share repurchase programs, and it is interesting to see whether put sellers differ from other repurchasing firms. We define a share repurchase program as ongoing in a fiscal quarter when a firm repurchases shares worth at least 0.5% of its prior-quarter book assets.

Table 1 shows that, on average, put issuers are larger than Compustat firms or firms with standard share repurchase programs. For example, the average book value of assets is $10.0 billion for put issuers, compared to $2.3 billion for both Compustat firms and repurchasing firms. Put issuers are more profitable than other Compustat firms or repurchasers, with median ROA of 12%, compared to 5% and 10%, respectively. They also have higher market valuations relative to book values: Put sellers have an average book-to-market ratio of 0.38, compared to 0.74 for Compustat firms and 0.63 for share repurchasers.

The sample firms are scattered across 33 two-digit SIC industry groups, with no industry dominating the sample (untabulated). The three industries represented most

strongly are “Chemicals and allied products”, “Industrial and commercial machinery and computer equipment”, and “Electronic and other electrical equipment and components, except computer”. However, these are also some of the largest industry groups on Compustat during the sample period.

2.2 Put characteristics

Table 2 presents descriptive statistics on the put options. Typically, put sellers make no pre- or post-sale announcements of specific put sale transactions, and all our data are collected from subsequent financial statements. The quality of the reported information varies greatly across firms and is sometimes not highly detailed. For this reason the summary statistics are based on fewer observations than the total number of 802 put sales. The purchaser of the options is typically described as a financial investor or an investment bank, and the identity is disclosed in only a small number of cases. None of the puts appears to have been issued on a public exchange. The options are described as European whenever that information is provided, which is the case for only a minority of the sales. Some of the puts have non-standard features, such as allowing the issuer to settle the options before expiration, but the information on these features is again incomplete.

Panel A of Table 2 reports statistics on individual put sale transactions. The exact date at which the put sale occurs is usually not reported, and we know only the month or quarter (or occasionally an even longer time period) during which the sale takes place, with most sales reported as quarterly aggregates. This implies that a sale may reflect a single put issue if there was only one issue during the quarter, or the sale may be the aggregate of multiple issues that are reported together.

The average sale transaction creates put options on 4.9 million shares, corresponding to 0.88% of shares outstanding. The puts have an average face value, defined as the number of puts times the average strike price, of $67.0 million, and the issuing firm collects an average premium of $10.5 million per sale. The size distribution of the put sales is right-skewed, with the largest face value of a single sale equal to $2.6 billion and the largest premium collected equal to $402 million. The median put sale has a maturity of six months, with a mean maturity of 212 calendar days. Information on final put

outcomes is provided for 448 of the 802 put sales, and, for this sub-sample, 36% of the put issues are exercised and 64% expire out of the money. (Section 3.5 shows that the observed frequency of exercises is abnormally low.)

The 1991 SEC "no action" letter permits only the sale of out-of-the-money puts, and, consistent with this requirement, the estimated strike-to-price ratio is less than one for a large majority of puts in the sample. From Panel A, the average strike-to-price ratio is 0.95 (the median is 0.96) and hence close to the money. Because we do not know the precise transaction date for most puts, each put's strike-to-price ratio is estimated by averaging across all days on which the transaction could have taken place (usually a quarter). This procedure inevitably introduces positive measurement error for a subset of puts, which causes some puts to appear in the money at issue.[9]

Panel B of Table 2 reports summary information on the overall put sale programs. The average program consists of 5.9 put sales that occur over a period of 2.1 years. If we restrict the sample to the 103 firms that allow us to pinpoint each sale to (at most) a quarter, we find that the majority of programs are concentrated in only a few quarters: 29 firms issue puts in a single quarter, 21 in two quarters, 11 firms in three quarters, and 5 firms in four quarters. Only 12 firms issue puts in ten or more quarters. The average put issuer in the full sample sells options on 21.1 million shares or 4.2% of shares outstanding in total, and receives proceeds of $53.4 million. (By comparison, put sellers share repurchases average net 2% of total equity per year in fiscal years with put sales.) The total face value, which is the total dollar amount put at risk through put sales, has a mean of $223.4 million. The highest proceeds collected by a single firm are $2.1 billion by Microsoft, and the highest face value is $7.7 billion by Intel.

3 Can managers time the market with put option sales?

We argue in Section 1 that market timing is a plausible explanation for put option sales, and in this section we test whether managers timed the market successfully.

[9] The "no action" letter explicitly deals only with exchange traded options. The over-the-counter options analyzed here are issued in a regulatory gray area, but apparently most firms felt bound by the restriction against in-the-money puts. However, in a small number of cases it appears that puts are in fact issued in the money because the strike price exceeds the stock price on all days of the put sale period.

3.1 Stock price performance after put option sales

Our first tests focus on detecting abnormal stock returns after put option sales. As explained in Section 2, we typically do not know the precise date at which the puts are sold. In most cases, we only know a time interval during which the sale occurs, usually a fiscal quarter, a calendar month, or sometimes multiple fiscal quarters. We call this time interval a "sale period" and we define an "event" as the last day of the sale period. If more than one put transaction occurs within the same sale period, we treat these transactions as one event in the subsequent analysis. In the following, we use the terms event and put sale interchangeably.

3.1.1 Basic findings

Fig. 2 shows average cumulative abnormal returns starting from trading day -100 to day 150 after the event. We have 651 events with abnormal returns available on day -100. To compute daily abnormal returns for each stock, we subtract the daily return on a benchmark portfolio from the corresponding stock return. In Fig. 2, we use as benchmarks 49 industry portfolios and 100 size and book-to-market portfolios.[10] The cumulative return from day –100 to t is then the sum of the daily abnormal returns during that period.

Fig. 2 is striking. The average cumulative abnormal return is close to zero during the 100 trading days leading up to the put sale, but increases immediately thereafter. For example, the mean industry-adjusted return is –0.55% on day 0, increases to 1.87% during the first 50 trading days after the sale, and reaches 3.75% by day 100. The cumulative return appears flat during the following 50 days.

Table 3 tests whether the abnormal post-sale returns are statistically significant. We divide the event horizon into six 50-day intervals: from trading day -100 to -50, from trading day -50 to 0, etc., and report average cumulative returns and t-statistics for each of the 50-day intervals. If a given interval (e.g. -50 to 0) overlaps for different events of the same firm, we keep only the earlier event. Benchmark adjusted returns are positive and statistically significant for the first two intervals following the put sale. For example,

[10] The portfolios are from Ken French's website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/ (see also Fama and French, 1993 and 1997).

the size and book-to-market adjusted return is 2.78% for the first 50 days after the put sale (t-statistic, 3.74), and it is 1.88% for the subsequent 50 days (t-statistic, 2.44). Benchmark adjusted returns are negative and not significant for the two time intervals before the put sale.[11]

These findings suggest that managers are able to use private information to time put option sales. Moreover, managers' private information is relatively short lived: it affects returns shortly after the event and seems to be incorporated into prices within the following 100 trading days. This is much shorter than the long-run under- or overperformance associated with other corporate events, such as stock issues or repurchases.[12] Interestingly, returns are zero or negative during the last fiscal quarter before the event, even though in most cases the actual put sales occur during that quarter. As we show in Section 3.2, however, most of the post-sale abnormal returns are realized within a short window around the first post-sale earnings announcement, which is consistent with the return pattern in Fig. 2.

The positive abnormal returns after put option sales could be caused by price manipulation. Market participants suggested to us that issuers might increase open market share repurchases when puts approach maturity in order to inflate stock prices and prevent put option exercises. We find no evidence of price support or price manipulation in the data. First, there are no price reversals following the post-sale price run-up. The cumulative abnormal returns in Table 3 are consistently positive for days 150 to 200 after put sales, and we find no negative abnormal returns for subsequent time periods. Second, we find no evidence that share repurchases increase in quarters in which put options mature.

3.1.2 Robustness tests

The t-statistics in Table 3 could be overstated because event horizons overlap across firms. To address this issue, we use the rolling portfolio approach suggested by Fama

[11] The return patterns are similar for puts sold in the beginning and at the end of a put sale program, as well as for the intermediate puts. The one exception is that the subsample of 29 firms with only one issue quarter exhibits significantly negative pre-issue abnormal returns, and negative (but statistically insignificant) post-issue performance.

[12] See, for example, the survey articles by Fama (1998), Mitchell and Stafford (2000), Eckbo, Masulis, and Norli (2006), and Baker, Ruback, and Wurgler (2008).

(1998). Specifically, for each day in the sample period, we construct a backward-looking portfolio consisting of firms that have an event during the past 70 calendar days (we also look at the 140-day horizon; we choose the calendar-time horizons to match the horizons in Table 3). We then regress the portfolio excess returns on the excess returns on the market portfolio and the Fama and French (1993) size and book-to-market factors, and test whether the regression intercepts (alphas) are different from zero. We find that the daily alphas are positive and significant for both horizons and using both equal-weighted and value-weighted portfolios, and the magnitudes are consistent with the returns reported in Table 3.

Put issuers are required to have a share repurchase program, and several studies document positive abnormal returns following the announcements of repurchase programs (e.g., Ikenberry, Lakonishok, and Vermaelen (1995), Peyer and Vermaelen (2005)). We find that the put sale effect is distinct from the repurchase announcement effect. Specifically, we re-run the results in Table 3 using size and book-to-market portfolio benchmarks formed only from firms with share repurchase programs. [13] We find that abnormal returns obtained using these modified benchmarks are similar to those reported in Table 3. This is consistent with a casual comparison of the results in Table 3 with those in Payer and Vermaelen. For example, Peyer and Vermaelen find no abnormal returns at the five months horizon for either the largest size quintile or the lowest book-to-market quintile of all Compustat firms, which are the quintiles to which most put sellers belong.

3.2 Stock price reaction to earnings announcements after put option sales

The positive excess returns after put sales raise the question of what kind of inside information managers have. The literature on share repurchases examines whether managers have information about future changes in profitability at the announcement of a share repurchase program and finds mixed results. Grullon and Michaely (2004) find no

[13] We define a firm-quarter as a "repurchase quarter" if the firm repurchases shares worth at least 0.5% (or at least 0.1%) of prior-quarter book assets. We then form the repurchaser sample from all firms with at least one repurchase quarter. Each firm enters the sample on the first day after its first repurchase quarter and exits the sample two years after its last repurchase quarter. Finally, we form 25 size and book-to-market portfolios from the repurchaser sample, again using breakpoints from Ken French's website and we re-run the tests in Table 3.

evidence that operating performance improves after repurchase announcements, while Lie (2005) reports some improvement. Lie also finds positive abnormal returns around earnings releases following repurchase announcements.[14] If managers use private information about future cash flows when they sell put options, then investors should be positively surprised by earnings announcements following put sales. To test this hypothesis, we examine abnormal stock price reactions around the first, second, and third quarterly earnings announcement after a sale.

Fig. 3 shows the average benchmark adjusted cumulative returns for trading days -40 to 40 around the first earnings announcement after a put sale. Similar to Fig. 2, we use 49 industry portfolios and 100 size and book-to-market portfolios as benchmarks. Interestingly, the cumulative returns are almost zero up to 5 days before the announcement and increase sharply during the subsequent 35 trading days. For example, the industry-adjusted return is 0.1% on day -6 and reaches 2.75% on day 30. More than 30% of the 100-day abnormal return documented in Table 3 occurs during the 10-day window around the first earnings announcement after a put sale.[15]

Interestingly, we do not observe a jump in the stock price on the earnings announcement date. Instead, the price on average increases steadily for several weeks following the announcement. This suggests that managers' private information is not limited to the next quarterly earnings figure. It is plausible that the quarterly or annual filings subsequent to the earnings announcement reveal additional positive information. For example, the disclosure of put option sales could itself signal insiders' optimism to the market, causing the stock price to rise. Further, it is unlikely that the post-announcement price run-up merely reflects slow market reaction to earnings news. In the accounting literature, any such post-announcement drift is less likely for large firms, and

[14] Other studies document negative earnings announcement returns after seasoned equity offerings (see, for example, Cornett et al. (1998), Rangan (1998), Shivakumar (2000), Brous et al. (2001), and Denis and Sarin (2001)).

[15] Frazzini and Lamont (2006) argue that in general there is a positive, volume-related average earnings announcement premium. Their estimates are too small (e.g., 30 basis points for the 10 days following the earnings announcement) to explain our quarter 1 results, and we find no evidence of an average positive return for quarters 2 and 3.

would be evidenced in the stock price response at subsequent quarters' earnings announcements; from Table 4, we find no such effect for quarters 2 and 3.[16]

Table 4 shows the average cumulative returns and t-statistics for various windows around the first, second, and third earnings announcement after the sale. The bottom panel focuses on the 5-day, 11-day, and 21-day windows centered at the announcement. Consistent with the results in Fig. 3, the cumulative abnormal returns are positive and statistically significant for all three windows around the first announcement. For the second announcement, the returns are still positive but – except in one case – not statistically significant, and there is no evidence of abnormal returns around the third announcement. Thus any mispricing disappears relatively quickly after investors learn the most recent earnings results.

Overall, the return analysis suggests that managers use both information about future profitability and other inside information to time corporate transactions, and that they do so successfully. We have also directly examined the put issuers' operating profitability before and after the put sales. We find that issuers' operating return on assets declines slightly after put sales, but that the decline is much smaller than that of control firms with similar pre-sale performance. This result, combined with the earnings announcements evidence in Table 4, suggests that investors may have expected larger earnings reversals for the (highly profitable) put issuers and were positively surprised by their realized post-sale performance.[17]

3.3 Stock price performance during breaks in the put sale programs

If managers use inside information to time their put sales, then positive excess returns are more likely to occur subsequent to put issues, and less likely to occur during quarters in which no puts are outstanding. Such a comparison exploits time-series variation in a

[16] The post-earnings announcement drift was first documented in Ball and Brown (1968) and further analyzed in Bernard and Thomas (1989, 1990), among many others. Bernard and Thomas (1990) show that a disproportionately large part of the drift occurs at subsequent earnings announcements, in contrast to our results in Table 4. The literature also finds much less post-earnings announcement drift for large firms (Foster, Olsen, and Shevlin, 1984, and Bhushan, 1994) and for firms with high institutional ownership (Bartov, Radhakrishnan, and Krinsky, 2000), i.e., for categories of firms that include most of the put sellers in our sample.

[17] The detailed analysis of put issuers' operating performance is available in an online appendix at http://www.afajof.org/supplements.asp.

firm's put sale intensity, and also provides a good specification check against the possibility that our models for benchmark returns systematically misprice put issuers throughout the sample period. Put selling firms tend to be large and profitable growth firms, and it is conceivable that this fairly homogeneous group of firms outperformed standard characteristics-based benchmarks during the relevant time period.

Fig. 4 shows benchmark adjusted cumulative returns for quarters in which an ongoing put option program is interrupted. We define these "break" quarters as periods in which no options are issued or outstanding, but which are preceded and followed by put option sales. In Fig. 4.A, returns are cumulated starting from the end of the first break quarter until the next put sale or until trading day 150. In contrast to the previous findings, there is no evidence of positive excess returns for either industry- or size- and book-to-market adjusted returns. Fig. 4.B shows benchmark adjusted cumulative returns around the break quarters' earnings announcements, and similarly shows no evidence of positive abnormal performance. The finding of positive excess returns subsequent to put sales in Fig. 2 and 3 and the absence of positive excess returns during break quarters in Fig. 4 reinforces the conclusion that managers use inside information to time their put sales.

3.4 Do managers time volatility?

The value of a put option increases with the volatility of the underlying stock, so it is possible that managers sell put options when they expect future volatility to be lower than predicted by the market. In this section, we examine volatility changes around the initiations and terminations of put sale programs, as well as around intermediate sales. Finding that volatility declines after programs are initiated, stays low or declines further after subsequent sales, and finally increases after programs are terminated would be consistent with volatility timing. One limitation of this analysis is, however, that we do not know investors' actual volatility forecasts and have to rely on changes in realized volatility instead. In addition, finding that volatility is unusually low during put option programs does not necessarily imply that managers consciously time volatility. For example, it is possible that managers simply prefer to issue puts when they perceive the likelihood of major value-relevant news as low. Alternatively, they could be selling puts

when they believe that put prices are high, without fully understanding the reason for the overvaluation.

Fig. 5 shows volatility around the firms' first, last and all other put sales. Volatility on a given day is estimated as the standard deviation of daily stock returns over the prior 50 trading days. The figure shows that average volatility declines around the start of put option programs: it is 3.1% on day -20, drops to 2.8% on day 20, and stays close to this level for the subsequent 180 trading days. Consistent with this pattern, there are no significant volatility changes around the intermediate sales: it appears that volatility remains low – compared to the pre-initiation level – throughout the duration of the programs. Interestingly, volatility increases again around the time of the final sale: it is 3.0% on day -20, and rises to 3.3% on day 20 after the last sale. This suggests that private information about volatility may influence both the initiation and the termination decisions. The pattern of volatility shifts in Figure 4 is similar if instead of using mean volatility we examine the median (cross-sectional) volatility. This suggests that the results are not driven by a small subsample of firms.

In Table 5 we test whether the volatility changes documented in Fig. 5 are statistically significant. Panel A shows average changes in volatility from before to after put option sales. We estimate volatility as the standard deviation of daily stock returns over 50, 100, and 200 trading days before and after the put sale. We control for changes in market volatility in two ways, either by subtracting a benchmark portfolio return from the raw returns before computing volatility (Panel A), or by subtracting a benchmark portfolio volatility from the volatility of the raw returns (Panel B). We use the same benchmark portfolios as in Table 3, and the results are similar across the different specifications.

Consistent with the results in Fig. 5, we find that, on average, volatility declines after initiations and increases after terminations, and that there are no significant volatility changes around all other put sales. The volatility declines around the initial sales are statistically significant for the 100-day and the 200-day horizons (t-statistics from -1.99 to -4.26) and are not significant for the 50-day horizon (t-statistics from -1.00 to -1.65). Similarly, the volatility increases around the final sales are statistically significant for the 50-day and the 100-day horizons (t-statistics from 1.88 to 3.15) and are not significant for

the 200-day horizon (t-statistics from 0.47 to 1.79). We conclude that put option programs coincide with periods of relatively low volatility, which is consistent with market timing.

3.5 Direct evidence on put option outcomes

This section examines the put option outcomes directly. If management has timing ability and can predict either returns or the volatility of returns, then puts issued should have fewer exercises and receive smaller payoffs than would be expected in the absence of private information. Examining put outcomes provides an additional perspective that captures the combined effect of both the high returns and lower volatility after put sales found in Sections 3.1 and 3.4. The option outcome tests are thus potentially better able to detect and illustrate any timing that exists. The results reinforce the paper's conclusions.

3.5.1 Measuring abnormal outcomes

To study abnormal put option outcomes, we compare put exercises and payoffs to a benchmark that reflects the outcomes we would expect if management had no private information. We benchmark by matching each put sale with a hypothetical put sale by a control firm selling an equivalent option (e.g., same issue date, maturity, and ratio of stock price to strike price). We then track both the actual and the hypothetical put sale to maturity, and compare the put outcomes. We infer the final outcome for each put by comparing the seller's stock price at maturity to the strike price. This procedure allows us to include put sales for which the actual outcomes are not reported (349 out of the 796 put sales) and thus avoid concerns about reporting bias. Excluding put sales with unreported outcomes yields qualitatively similar results.

We use two sets of control firms. For the first set, control firms are chosen based on industry, market-to-book, and firm size. Controlling for these factors is important because unusual ex-post exercise frequencies and payoffs can be driven by unusual market, industry, or style returns during the sample period, rather than private information. The realized returns of the control firms incorporate this information and permit more precise identification of abnormal exercises and payoffs. The matching

procedure starts with all firms from the same Fama-French industry as the put seller and sorts them into market-to-book quintiles. It then selects the five firms that are closest to the put seller in market capitalization from the same market-to-book quintile. The second set of control firms is chosen based on industry, size, and stock return volatility. Matching on volatility controls for volatility shifts unrelated to private information, and helps assure that the benchmark firms' shares have similar underlying risk as the sample firms.[18] The procedure sorts all firms from the same Fama-French industry as the put seller into size quintiles. It then selects the five firms that are closest to the put seller in stock return volatility from the same size quintile. Volatility is measured over the previous six months. For both sets of control firms, the matching is done at the end of the calendar quarter preceding the put sale date.

3.5.2 Results

The put outcomes for the sample and the control firms are presented in Table 6. For a substantial number of put sales, the issue dates, strike prices, and maturity dates are not reported or reported imprecisely. Table 6 includes all such cases. We replace the missing data by estimates that correspond to the sample averages reported in Table 2. In particular, if a strike price is not reported (n=230 out of 802), we use a strike price that is 5 percent below the stock price on the put sale date for both the put seller and the control firm. If the maturity date is not reported (n=219 out of 802), we use a time to maturity of 6 months for both firms.[19] The results are not sensitive to how we estimate these parameters or whether we exclude cases with missing data. From Table 6, the put sellers have both a significantly lower frequency of put exercises and significantly smaller put payoffs than the control firms. Panel A compares the exercise frequencies. Put sellers experience exercises on 33.3% of the puts they have written. Control firms experience

[18] There is no difference in the skewness of returns between put sellers and controls, which suggests that our benchmarking by volatility (and ignoring higher order moments) is appropriate.

[19] If the maturity date is not known precisely (e.g., we only know the quarter), exercises and payoffs for the sample and control firm are deduced by comparing the stock price to the strike price on every day during the maturity period and taking an equal-weighted average (i.e., we estimate the percentage of trading days the put is in the money). If a put seller or control firm delist between the put sale and the maturity date, the last available stock price is used to calculate the payoff to put holders. If we do not know the precise date on which puts are sold, we assume, both for the issuer and the benchmark firm, that the sale is evenly spread across all days in the sale period (usually a quarter).

exercises on 41.5% and 38.3% of their puts, depending on the set of control firms chosen. The differences between the groups are highly statistically significant.

Panel B compares the payoffs to put holders. All cases where puts expire out of the money are included, and the dollar payoff at maturity is scaled by the put's strike price.[20] Payouts on puts issued by control firms are fifty percent higher than for actual put sellers: the scaled payoffs on puts written by put sellers average 6.3%, compared to 10.1% and 9.0% for the two sets of control firms. The differences are again highly significant and, together with the results in Panel A, provide further support for the hypothesis that put sellers used private information in the timing of their put sales.

3.6 The demise of put option sales

Put option sales were at their peak popularity from 1997 to 2000 and rapidly declined over the following three years. By early 2004, put option sales, at least in the form analyzed in this paper, had essentially vanished. As discussed in Section 1.1, there are two likely reasons for the demise of put option sales: First, many issuers lost money in the stock market decline starting in the second half of 2000. Second, a change in accounting rules in 2003 reduced the attractiveness of put option sales to managers who dislike earnings volatility.

Fig. 6 shows the time series of put option sales juxtaposed with the six-months lagged percentage of puts that are exercised and the associated put payoffs from 1991 to 2005. Put sales rose rapidly throughout the 1990s, while put exercises, even though volatile, remained at moderate levels. In the second half of 2000, however, the stock market started to fall. As a result, put exercises and payoffs shot up in the first half of 2001, remained high for the next two years, and reached their highest levels in the last six months of 2002. Over the same time span, put sales fell from 68 sales in the first half of 2000 to 22 sales in the second half of 2002. The financial press, which had given almost uniformly positive coverage to put sales in prior years, turned strongly negative in 2001

[20] Alternatively, we have scaled the put payoffs by an estimate of each put's Black-Scholes value at the time of the put sale. We do not know all necessary option parameters for many put sales. The results using Black-Scholes are similar but statistically less significant.

and 2002, with Microsoft, Dell, and Electronic Data Systems bearing the brunt of the criticism for their large losses.[21]

Market participants and the practitioner literature strongly suggest that a change in accounting rules introduced in May 2003 also made put option sales unattractive. FAS No. 150 mandates that outstanding put options have to be marked to market and changes in their fair value recorded through accounting earnings. Given that put values are a function of stock prices, and stock prices positively correlated with earnings, any put options outstanding after May 2003 are likely to increase earnings volatility. In light of managers' well-documented aversion to earnings volatility, it is not surprising that the new accounting rule rendered put sales much less attractive.[22] One former investment banker familiar with the transactions stated that FAS 150 made put options "completely toxic".[23] There were only six put option sales in the first half of 2003, and none in the second half.

4 Conclusions

The relevance of market timing explanations for corporate behavior continues to be an unresolved issue. We provide new evidence that taking advantage of mispriced equity is a consideration in security issue decisions. Prior literature on market timing examines equity issues, equity repurchases, and debt issues, all of which can be motivated by reasons other than mispricing. Put sales, on the other hand, have no obvious motivation in investment activity or capital structure, and management's belief that it can time the market is a highly plausible rationale.

We find strong evidence that managers successfully time the market with their put option sales. Put issuers outperform their risk-based benchmarks by 4.66% in the 100

[21] See, for example, "Options put giants in a jam" by Sparks (Business Week, Jan. 15, 2001), "EDS made losing bet on its stock" by Spagat and McWilliams (Wall Street Journal, Sept. 25, 2002), and "Dell, Eli Lilly join EDS in risky options game", by Sidel, McWilliams and Burton (Wall Street Journal, Sept. 27, 2002).

[22] There is an extensive literature documenting and explaining managers' preference for smooth accounting earnings. See Ronen and Sadan (1981), Gaver, Gaver and Austin (1995), and DeFond and Park (1997) for examples.

[23] In a similar vein, Bear Stearns, "Accounting Issues" January 2006, p. 6, reports that "FAS 150 makes written puts…unattractive", and the UBS Warburg Shareholder Distributions Handbook, May 1, 2003, p.1, states that "changes in accounting and public opinion have made … option-based repurchase programs much less attractive".

trading days after a put sale. Much of the outperformance is realized around and following the first earnings release date after the put sale, suggesting that managers may base their put sale decisions at least partly on private information about future profitability. We also find suggestive evidence that managers successfully time the volatility of their stock returns. Realized volatility declines significantly after the first put sale and increases following the last sale.

Our results provide support for the idea that managers can identify mispriced equity and use securities issues to time the market. This is consistent with managers' self-professed belief in their ability to market time, but shows that this belief is based on more than overconfidence. While our study does not provide direct evidence that market timing is a factor behind equity issues and repurchases, the results shift our priors on the potential importance of timing explanations for a broader set of securities transactions than examined here.

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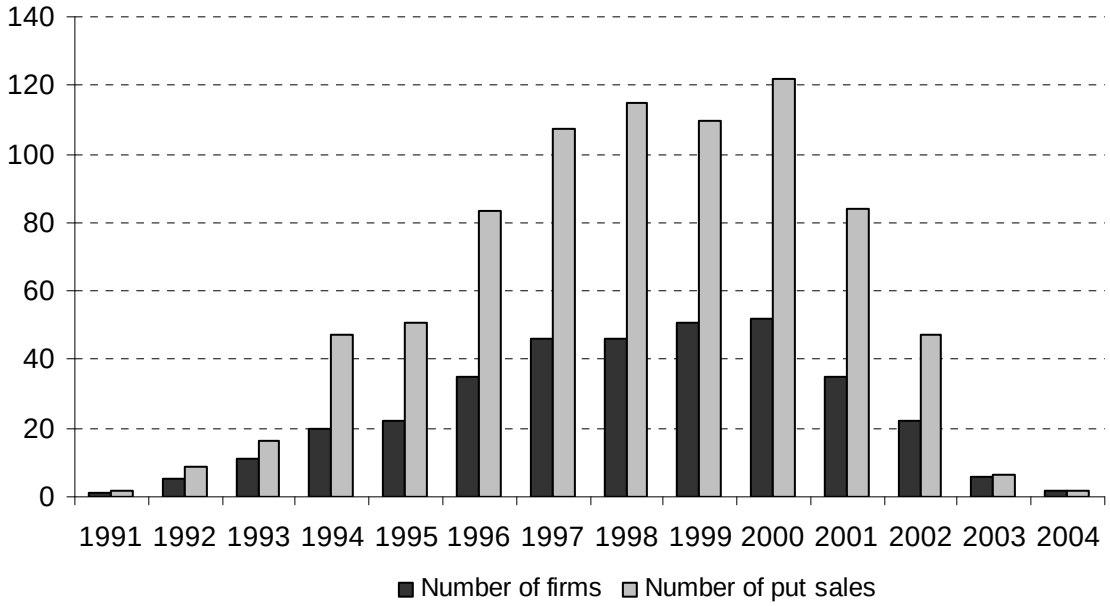


Fig. 1. Number of put sales and put issuing firms by year. There are 137 put issuing firms and 802 put sales from 1991-2004. Depending on available data, a put sale represents either an individual transaction or several transactions occurring within one reporting period, usually a fiscal quarter. The precise date of the put sale is usually not reported, and the figure is based on the last day of the "sale period", which is usually again the fiscal quarter during which the sale takes place.

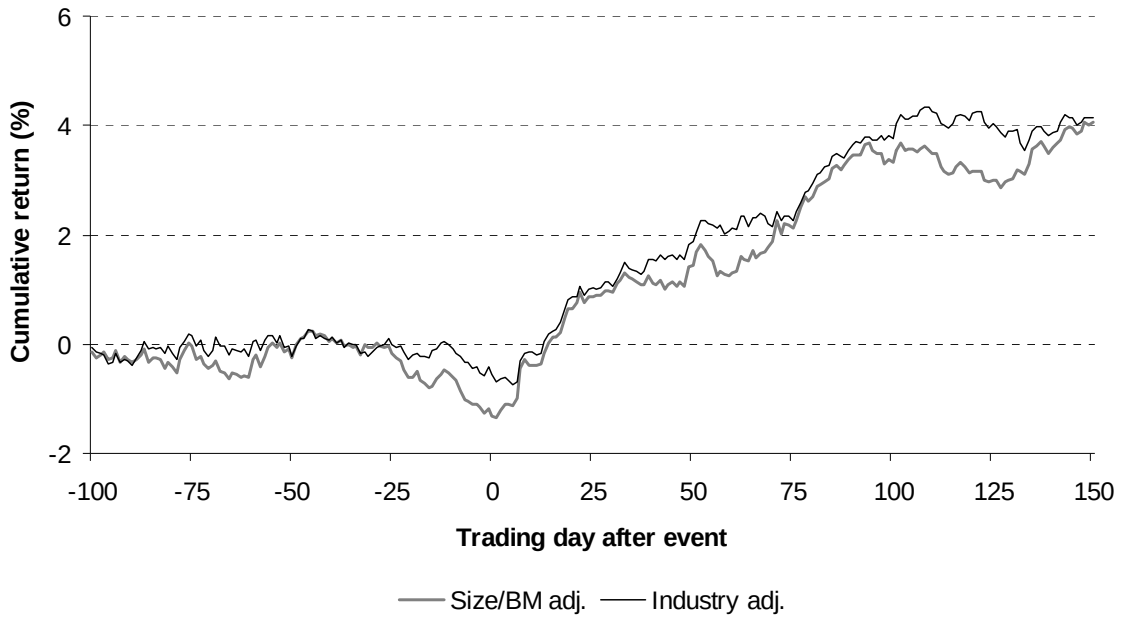


Fig. 2. Cumulative abnormal returns around put option sales. The figure shows average benchmark adjusted cumulative returns from trading day –100 to 150 after the put sale event (as defined in Table 3). There are 137 put selling firms and 651 put sale events from 1991-2004 with available return data on day –100. The cumulative return for trading day t is the sum of daily returns from trading day –100 to t. Daily abnormal returns are computed by subtracting the daily return on a benchmark portfolio from the corresponding stock return. We use two benchmarks: the 49 industry portfolios and the 100 size and book-to-market portfolios from Ken French's website (see Fama and French, 1993 and 1997).

Fig. 3. Cumulative abnormal returns around the first earnings announcement after a put option sale. The figure shows average benchmark adjusted cumulative returns from trading day –40 to 40 after the first earnings announcement following a put sale event (as defined in Table 3). There are 137 put selling firms and 631 put sale events from 1991-2004 with available announcement and return data. The cumulative return for trading day t is the sum of daily returns from trading day –40 to t. Daily abnormal returns are computed by subtracting the daily return on a benchmark portfolio from the corresponding stock return. We use two benchmarks: the 49 industry portfolios and the 100 size and book-to-market portfolios from Ken French's website (see Fama and French, 1993 and 1997).

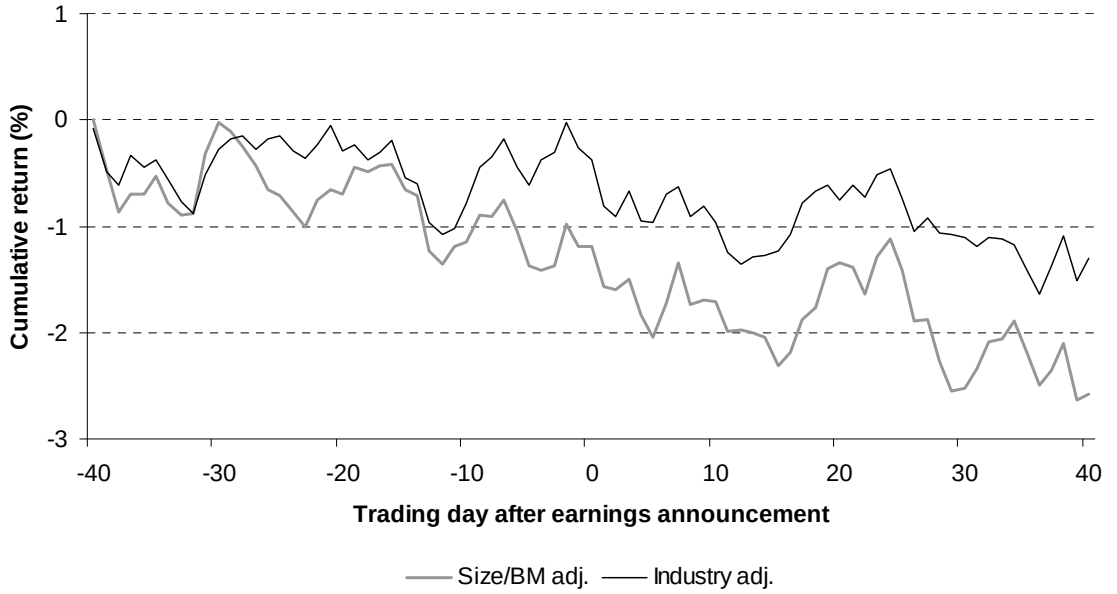


Fig. 4. Abnormal returns during breaks in put option programs. The figure shows abnormal returns for quarters in which an ongoing put option program is interrupted and subsequently resumed. We define these "break" quarters as quarters in which no options are issued or outstanding, but which are preceded and followed by put option sales. In Fig. A, returns are cumulated started from the end of the first break quarter until the beginning of the next issue period (or up to trading day 150, whichever comes first). There are 107 quarters (28 firms) with returns available on day one, and 62 quarters with returns available on day 150. Fig. B shows cumulative returns around earnings announcements for the 99 break quarters depicted in Fig. A for which earnings announcement dates are available. Returns are cumulated from day -40 through day 40 after the earnings announcement.

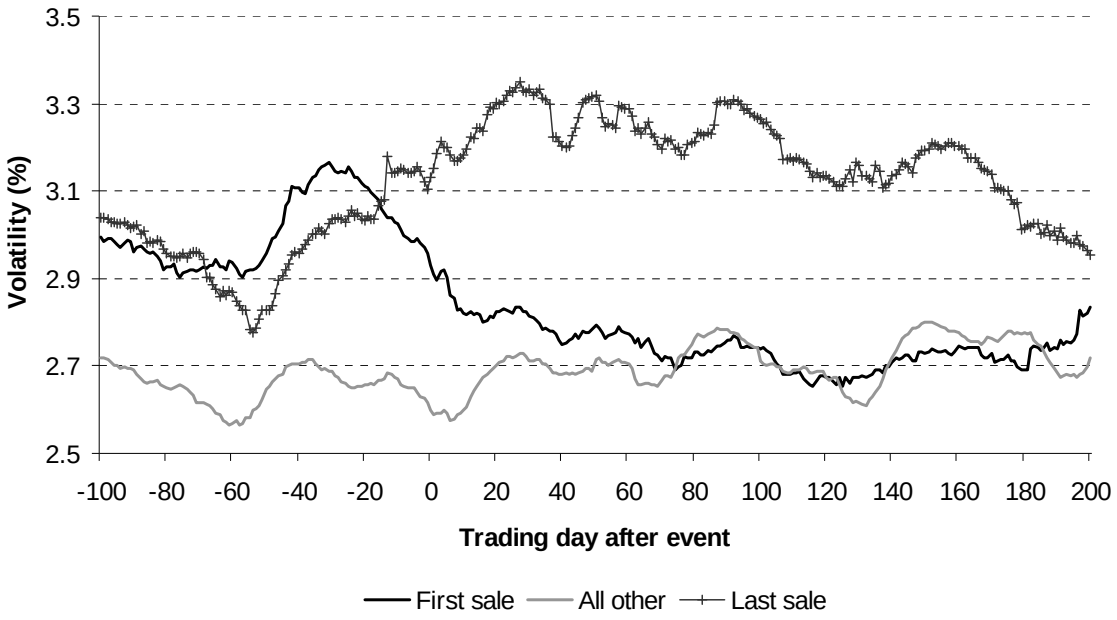
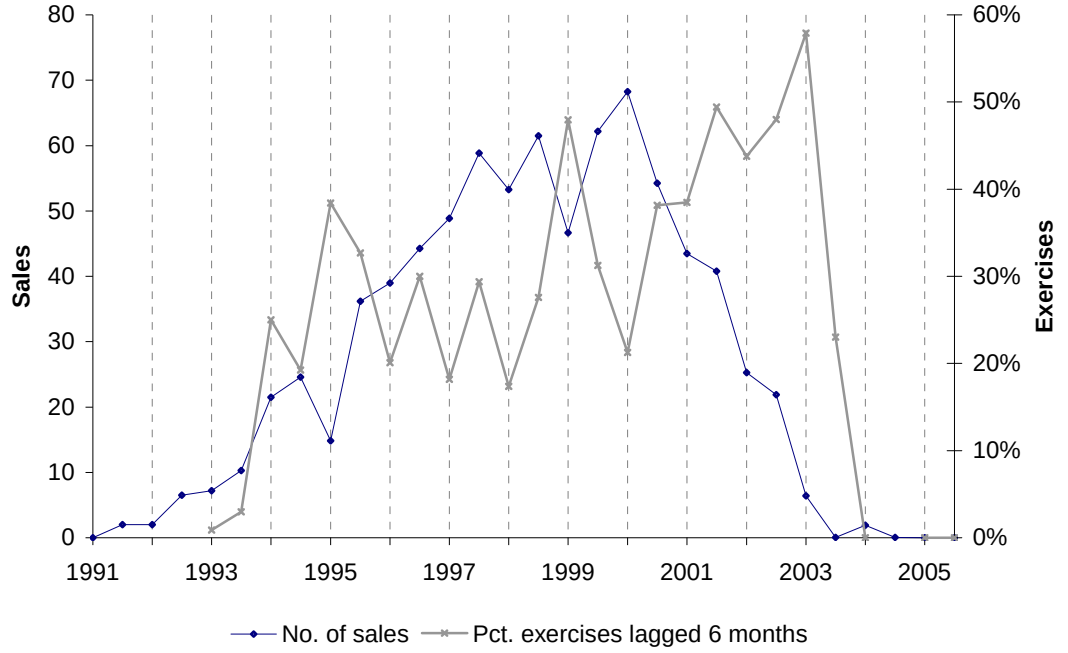


Fig. 5. Stock return volatility around put option sales. The figure shows average stock return volatility estimated for rolling windows around the put sale event (as defined in Table 3). Volatility on trading day t is the standard deviation of daily stock returns from t-50 to t-1. We require that returns are available for 50 trading days for each estimate. The figure shows estimates for windows ending on day –100 to 200 after the put sale event. The mean volatility is computed separately for the firms' first, last, and all other put option sales. There are 129 first sales, 124 last sales, and 426 intermediate sales with available volatility estimates for day 0.



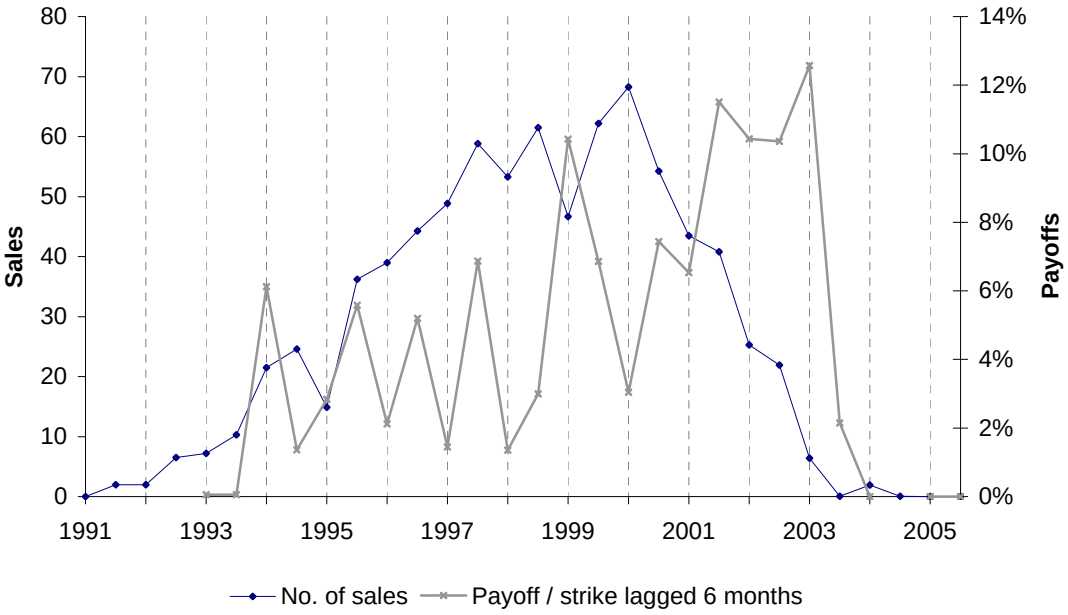


Fig. 6. Aggregate put sales, lagged exercises, and lagged payoffs from 1991 to 2005. The figure shows the number of put sales, the lagged percentage of puts exercised, and the associated put payoffs for the first and the last half of each calendar year. Put exercises and payoffs are lagged by 6 months. Exercises and payoffs are deduced by comparing the issuer's stock price to the put's strike price at maturity. Put payoffs are scaled by the strike price.

Table 1

Descriptive statistics for put issuers, repurchasing firms, and all Compustat firms during 1991-2004. The samples consist of 137 put issuers (355 firm-years), 5,523 repurchasing firms (13,087 firm-years), and 14,263 Compustat firms (99,546 firm-years). A firm-year is included in the put issuer sample if the firm has at least one put option sale in the fiscal year. A firm-year is included in the repurchaser sample if the firm repurchases shares worth at least 0.5% of the prior-quarter book assets in at least one quarter of the fiscal year. ASSETS and SALES are book assets and sales ($billions). B/M is the ratio of the book value to the market value of common stock. R&D, PPE, and CASH are R&D expense, PP&E plus inventory, and cash plus short-term investments, respectively, all scaled by book assets. R&D and PPE are set to zero if they are missing on Compustat. ROA is operating income after depreciation scaled by book assets. Dividend is a dummy variable equal to one if the firm pays a dividend. Leverage equals total debt divided by the sum of total debt and the book value of common stock. Net repurchase is the difference between the purchase and sale of common and preferred stock scaled by the sum of the market value of common stock and the book value of preferred stock. Some variables are not available for the full samples. All variables are winsorized at the 1st and the 99th percentile in the Compustat sample.

	Put issuers			Repurchasing firms			All Compustat firms		
	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std
Assets	10.01	2.58	15.61	2.31	0.26	7.00	2.32	0.18	8.01
Sales	6.06	2.11	7.83	1.83	0.25	4.49	1.19	0.10	3.70
B/M	0.38	0.31	0.30	0.62	0.47	0.54	0.72	0.56	0.65
R&D	0.05	0.02	0.06	0.04	0.00	0.08	0.04	0.00	0.10
PPE	0.40	0.39	0.25	0.37	0.36	0.25	0.36	0.34	0.28
Cash	0.16	0.09	0.18	0.18	0.10	0.21	0.17	0.07	0.22
ROA	0.12	0.12	0.12	0.06	0.10	0.21	-0.01	0.05	0.25
Dividend	0.61	1.00	0.49	0.47	0.00	0.50	0.39	0.00	0.49
Leverage	0.33	0.33	0.26	0.25	0.20	0.24	0.32	0.29	0.27
Net repurchase	0.02	0.02	0.06	0.01	0.02	0.12	-0.04	-0.00	0.12

Table 2
Summary statistics for put option sales and programs. The total number of firms with put sales programs is 137, and the total number of put sales is 802. This excludes 32 maturity extensions of previously sold puts. The number of observations is reduced further because of missing data. The face value of a put issue is the number of puts sold times the average strike price. The estimated moneyness of a put issue is the ratio of the average strike price to the issuer's stock price on the put sale date. If put sale date is unavailable, we use the average price during the sale period (usually the fiscal quarter of the sale). The maturity of a put issue is the number of days between the put sale date (or the midpoint of the sale period) and the maturity date (or the midpoint of the maturity period). The fraction of all put issues exercised or settled is reported only for issues that can be traced from sale to maturity and for which the final outcome is reported by the issuer.

Panel A: Individual put sales, n=802

	Mean	10th Pctile	Median	90th Pctile	Obs.
Number of puts sold (mil. of shares)	4.9	0.10	0.8	8.0	659
… scaled by number of shares outstanding	0.88%	0.08%	0.40%	2.05%	659
Face value ($ mil.)	67.0	2.70	17.7	131.0	465
… scaled by equity market capitalization	0.82%	0.07%	0.42%	1.58%	465
Proceeds ($ mil.)	10.5	0.25	2.1	20.0	475
… scaled by equity market capitalization	0.09%	0.01%	0.04%	0.22%	475
Estimated moneyness (strike price / stock price)	95%	81%	96%	108%	572
Maturity (days)	212	81	182	367	583
Fraction of put sales that are exercised or settled	36%	-	-	-	448

Panel B: Put sale programs, n=137

	Mean	10th Pctile	Median	90th Pctile	Obs.
Number of put sales	5.9	1	4	13	137
Number of puts sold (mil. of shares)	21.1	0.40	2.7	25.2	108
… scaled by number of shares outstanding	4.15%	0.52%	1.84%	9.37%	108
Face value ($ mil.)	223.4	5.20	43.7	286.0	68
… scaled by equity market capitalization	3.47%	0.56%	1.84%	7.99%	68
Proceeds ($ mil.)	53.4	0.43	5.8	85.1	84
… scaled by equity market capitalization	0.42%	0.03%	0.14%	1.18%	84
Program length (years)					
… from the first to the last put sale	2.1	0.08	1.3	5.3	137
… from the first put sale to the last exercise or expiration	2.8	0.59	2.0	6.3	137
Number of quarters with a put sale	5.7	1	4	14	137

Table 3

Abnormal returns around put option sales. The table shows average cumulative returns and t statistics for various windows around the put sale events. The precise date of a put sale is usually not reported, and we define an event as the last day of the "sale period", which is usually the fiscal quarter during which the sale takes place. If multiple sales occur during one sale period, we treat these sales as one event. There are 137 put selling firms and 664 put sale events from 1991-2004 with available return data on the event day. Cumulative returns are computed for six 50-day intervals: from trading day –100 to –50, from trading day –50 to 0, etc. If a given interval (e.g. –50 to 0) overlaps for different events of the same firm, we keep only the earlier event. The cumulative return is the sum of daily returns during the 50-day interval. Daily abnormal returns are computed by subtracting the daily return on a benchmark portfolio from the corresponding stock return. We use three benchmarks: the value-weighted CRSP index, the 49 industry portfolios and the 100 size and book-to-market portfolios from Ken French's website (see Fama and French, 1993 and 1997).

Trading days	Mean returns				T-statistics				
after event	Raw returns	Market adj.	Size/BM adj.	Industry adj.	Raw returns	Market adj.	Size/BM adj.	Industry adj.	N
-100 to –50	2.01	-0.07	-0.22	-0.22	**2.44**	-0.09	-0.29	-0.30	601
-50 to 0	0.58	-1.15	-1.02	-0.34	0.65	-1.48	-1.37	-0.48	605
0 to 50	4.91	3.04	2.78	2.47	**5.72**	**3.98**	**3.74**	**3.66**	603
50 to 100	4.68	2.26	1.88	1.88	**5.60**	**2.89**	**2.44**	**2.61**	602
100 to 150	3.57	1.71	1.32	1.04	**4.23**	**2.20**	1.68	1.42	596
150 to 200	2.01	0.48	0.34	0.59	**2.38**	0.62	0.44	0.83	593

Table 4
Abnormal returns around earnings announcements following put option sales. The table shows average cumulative returns and t-statistics around the first three earnings announcements (EA) following a put sale event (as defined in Table 3). The sample consists of 137 put selling firms and 631 earnings announcements from 1991-2004. Panel A shows cumulative returns from trading day –5 to 40 after the first announcement; Panel B shows cumulative returns for shorter windows centered around the first, second, and third announcement. In Panel B, the sample of 338 second announcements does not include announcements that are also first announcements for subsequent sales by the same firm. Similarly, the sample of 242 third announcements does not include announcements that are also first or second announcements for later sales. The cumulative return is the sum of daily returns during the event window. Daily abnormal returns are computed by subtracting the daily return on a benchmark portfolio from the corresponding stock return (the benchmarks are described in Table 3).

EA# after event	Trading days	Mean cumulative returns			T-statistics			N
		Market adj.	Size/BM adj.	Industry adj.	Market adj.	Size/BM adj.	Industry adj.	
Panel A: Cumulative returns from trading day –5 after the earnings announcement								
1	-5	0.10	0.05	0.10	0.74	0.42	0.83	631
	-4	0.35	0.26	0.24	**2.08**	1.60	1.61	631
	-3	0.47	0.35	0.36	**2.43**	**1.85**	**2.00**	631
	-2	0.72	0.61	0.53	**3.36**	**2.87**	**2.69**	631
	-1	0.99	0.88	0.74	**4.12**	**3.73**	**3.45**	631
	0	1.16	1.02	0.83	**3.98**	**3.58**	**3.21**	631
	1	1.40	1.22	1.02	**4.11**	**3.70**	**3.43**	631
	2	1.50	1.31	1.04	**4.27**	**3.87**	**3.37**	631
	3	1.64	1.44	1.17	**4.56**	**4.16**	**3.64**	631
	4	1.72	1.46	1.24	**4.47**	**3.93**	**3.61**	631
	5	1.94	1.66	1.44	**4.79**	**4.24**	**4.04**	631
	10	2.17	1.87	1.64	**4.69**	**4.19**	**4.10**	631
	20	3.10	2.72	2.20	**5.78**	**5.22**	**4.61**	631
	30	3.42	2.93	2.68	**5.34**	**4.78**	**4.73**	630
	40	3.36	2.84	2.96	**4.69**	**4.17**	**4.69**	629
Panel B: Cumulative returns around earnings announcements for the period in column 2								
1	-2, 2	1.03	0.96	0.67	**3.20**	**3.06**	**2.41**	631
	-5, 5	1.94	1.66	1.44	**4.79**	**4.24**	**4.04**	631
	-10, 10	2.15	1.84	1.69	**4.26**	**3.73**	**3.74**	631
2	-2, 2	0.42	0.54	0.23	1.00	1.31	0.59	338
	-5, 5	0.92	0.92	0.44	1.65	1.64	0.85	338
	-10, 10	1.13	1.28	0.52	1.62	1.82	0.83	338
3	-2, 2	-0.28	-0.35	-0.72	-0.48	-0.62	-1.35	242
	-5, 5	0.14	0.10	-0.40	0.21	0.14	-0.63	242
	-10, 10	0.89	0.60	-0.04	1.01	0.68	-0.06	242

Table 5
Changes in stock return volatility from before to after put option sales. The table shows the average change in volatility from before to after a put sale event (as defined in Table 3) and the corresponding t-statistics. All statistics are shown separately for the firms' first, last, and all other put sale events. In Panel A, volatility is the daily standard deviation of benchmark adjusted stock returns; in Panel B, volatility is the daily standard deviation of raw returns minus the daily standard deviation of a benchmark portfolio return computed over the same period. We use three benchmarks: the value-weighted CRSP index, the 49 industry portfolios and the 100 size and book-to-market portfolios from Ken French's website. Volatility is computed over 50, 100, and 200 trading days before and after the event, and we require that returns are available for at least 50 trading days for each estimate. For "all other" sales, if a given horizon (e.g. 50-day after sale) overlaps for different sales of the same firm, we drop the overlapping days before computing volatility. More precisely, for each volatility estimate after (before) the sale, we drop days that overlap with the same-length horizon for the subsequent (previous) sale. There are 129 first sales, 122 last sales, and 361 all other sales with available estimates of volatility changes.

Event	Tr. days	Changes in volatility before to after				T-statistics for changes			
		Raw returns	Market adj.	Size B/M adj.	Indust. adj.	Raw	Market adj.	Size B/M adj.	Indust. adj.
Panel A: Volatility = daily std of benchmark adjusted returns (%)									
First sale	50	-0.15	-0.11	-0.09	-0.09	-1.42	-1.12	-1.00	-0.96
	100	-0.20	-0.17	-0.15	-0.18	**-2.36**	**-2.10**	**-1.99**	**-2.31**
	200	-0.19	-0.17	-0.15	-0.16	**-2.56**	**-2.31**	**-2.19**	**-2.43**
All other	50	0.10	0.08	0.09	0.07	1.96	1.62	1.80	1.55
	100	0.05	0.03	0.05	0.04	1.02	0.74	0.99	0.86
	200	0.06	0.05	0.06	0.05	1.35	1.04	1.27	1.11
Last sale	50	0.24	0.21	0.23	0.19	**2.34**	**2.24**	**2.53**	**2.12**
	100	0.32	0.30	0.30	0.26	**3.11**	**3.15**	**3.05**	**2.75**
	200	0.17	0.13	0.12	0.12	1.79	1.42	1.28	1.25
Panel B: Volatility = daily std of raw returns minus daily std of benchmark portfolio returns (%)									
First sale	50	-0.15	-0.17	-0.13	-0.14	-1.42	-1.65	-1.34	-1.49
	100	-0.20	-0.23	-0.22	-0.26	**-2.36**	**-2.96**	**-2.79**	**-3.45**
	200	-0.19	-0.27	-0.25	-0.31	**-2.56**	**-3.89**	**-3.45**	**-4.26**
All other	50	0.10	0.03	0.03	-0.02	1.96	0.70	0.67	-0.35
	100	0.05	0.01	0.01	-0.03	1.02	0.24	0.22	-0.63
	200	0.06	0.02	0.02	-0.01	1.35	0.40	0.50	-0.31
Last sale	50	0.24	0.18	0.21	0.15	**2.34**	1.88	**2.28**	1.61
	100	0.32	0.27	0.26	0.21	**3.11**	**2.94**	**2.82**	**2.38**
	200	0.17	0.08	0.07	0.04	1.79	0.92	0.81	0.47

Table 6

Put outcomes for put issuers and control firms. The table shows the percentage of puts exercised and the put payoffs for put sellers and matched control firms. Put exercises and payoffs are deduced by comparing the seller's and control's stock prices to the strike price at maturity. Put payoffs are scaled by the strike price. If a strike price is not reported (n=230), we assume a strike price 5 percent below the stock price on the put sale date. If the maturity date is not reported (n=219), we use a time to maturity of 6 months. Control firms are from the same industry as the put seller (based on 49 Fama-French industries). The first set of controls are the five firms that are closest to the sample firm in market capitalization from the same market-to-book quintile. The second set of controls are the five firms that are closest to the sample firm in stock return volatility from the same market capitalization quintile. Volatility is measured over the previous six months. The matching is done at the end of the calendar quarter preceding (or equaling) the put sale date. There are 758 successfully matched put sales with the first set of control firms, and 759 successful matches with the second one. The missing observations are caused by missing information on book equity, stock returns, or market capitalization before the put sale date. T-tests for differences between put issuers and control firms are based on robust standard errors with clustering at the issuer-quarter level.

Panel A: Percentage of puts exercised

Put issuer	Control firms matched by industry - market/book - size			Control firms matched by industry - size - volatility		
Percentage exercised		Percentage exercised	T-test for difference		Percentage exercised	T-test for difference
33.33%	Control firm 1	37.57%	1.93*	Control firm 1	39.20%	2.66***
	Control firm 2	40.45%	3.07***	Control firm 2	38.67%	2.39**
	Control firm 3	41.06%	3.57***	Control firm 3	39.51%	2.96***
	Control firm 4	43.77%	4.58***	Control firm 4	38.38%	2.25**
	Control firm 5	44.46%	4.66***	Control firm 5	35.89%	1.15
	Avg. of 1 - 3	39.69%	3.48***	Avg. of 1 - 3	39.12%	3.28***
	Avg. of 1 - 5	41.46%	4.61***	Avg. of 1 - 5	38.33%	2.95***

Panel B: Payoffs to put holders

Put issuer	Control firms matched by industry - market/book - size			Control firms matched by industry - size - volatility		
Average put payoff		Average put payoff	T-test for difference		Average put payoff	T-test for difference
6.28%	Control firm 1	8.37%	3.10***	Control firm 1	9.33%	3.91***
	Control firm 2	10.17%	4.91***	Control firm 2	8.77%	3.16***
	Control firm 3	9.14%	3.94***	Control firm 3	9.56%	4.00***
	Control firm 4	11.31%	6.19***	Control firm 4	8.94%	3.32***
	Control firm 5	11.51%	6.03***	Control firm 5	8.27%	2.60***
	Avg. of 1 - 3	9.23%	5.33***	Avg. of 1 - 3	9.22%	4.55***
	Avg. of 1 - 5	10.10%	7.12***	Avg. of 1 - 5	8.97%	4.64***