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ARBITRAGE-BASED EXPLANATION**

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Why do convertible issuers simultaneously repurchase stock? An arbitrage-based explanation

ABE DE JONG, MARIE DUTORDOIR, and PATRICK VERWIJMEREN*

Abstract

We examine why firms combine convertible debt offerings with stock repurchases. In 2006, 33% of the convertible issuers in the US simultaneously repurchased stock. These combined transactions are inconsistent with traditional motivations for convertible issuance. We document that convertible arbitrage drives these stock repurchases. Convertible debt arbitrageurs simultaneously buy convertibles and short sell the issuer's common stock, resulting in downward pressure on the stock price. To prevent such short-selling activity, firms repurchase their stock directly from arbitrageurs. We show that combined transactions exhibit lower short-selling activity and that convertible arbitrage explains both the size and speed of the stock repurchases.

JEL classification: G32

Keywords: Convertible debt, convertible arbitrage, stock repurchases

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Over the last few years, firms have started to simultaneously repurchase common stock when issuing a convertible bond. An example is Equity Office Properties Trust, the largest office real estate investment trust in the US, which issued a \$1.5 billion convertible bond and simultaneously repurchased \$622 million of common stock (*Wall Street Journal*, July 5th, 2006). Of all the convertible bond issues in 2006, 33% were accompanied by a stock repurchase. On average, these stock repurchases account for 46% of the proceeds of the convertible bond issue. Our goal in this paper is to obtain more insight on what motivates firms to combine convertible debt offerings with stock repurchases.

The combinations of convertible debt offerings with stock repurchases (“combined offerings”) are a puzzle, because they are inconsistent with existing capital structure theories. According to Stein’s (1992) backdoor equity rationale for convertible debt issuance, firms with large equity-related financing costs use convertible bonds as delayed equity financing. In Stein’s framework, firms would not simultaneously repurchase equity, since this mitigates their indirect equity issue. Green (1984), Brennan and Kraus (1987), and Brennan and Schwartz (1988) in turn argue that firms with high debt-related financing costs use convertibles as sweetened debt financing. Combining a convertible debt offering with a stock repurchase is also not consistent with these models, because, *ceteris paribus*, repurchasing equity increases firms’ debt ratios and thus enhances the potential for debt-related financing problems.

Our main hypothesis is that the recent surge in combined convertible debt offerings and stock repurchases can be explained by the influence of hedge funds. Hedge funds are strongly involved in convertible issues: in the US, about 75% of the convertible bonds are bought by hedge funds (Arshanapalli et al. (2004), Lian (2006), and Mitchell, Pedersen, and Pulvino (2007)). To exploit underpriced convertible issues, hedge funds obtain arbitrage positions by buying the convertibles and shorting the common stock of the firms that issue convertibles. The increased short selling creates a downward pressure on the price of the convertible debt issuer’s common stock (Bechmann (2004), Mitchell, Pulvino, and Stafford (2004), and Loncarski, ter Horst, and Veld (2007)). Therefore, firms might want to mitigate the short-selling activity by repurchasing stock from the

hedge funds that buy the convertibles. The sale of the common stock then replaces the short positions that arbitrageurs usually obtain.

The International Finance Review (IFR)'s comments on the specific convertible offerings provide several examples of this strategy, e.g.: "United Therapeutics bought back 1.8m shares, about 8% of outstanding, for US\$112m, [...] enabling buyers to pre-hedge positions through sales of stock back to the company" (October 28th, 2006) and "AmeriCredit repurchased US \$254m of its stock on the convertible issue, providing a built-in hedge for convertible arbitrage funds" (September 16th, 2006).

We combine data from the Securities Data Company (SDC), Compustat, CRSP and the NYSE TAQ databases and obtain the following main findings. First, we document that the number of shares sold short (relative to trading volume) remains stable for convertible issuers that simultaneously repurchase stock, while short-selling activity increases from 20% to about 36% for issuers that do not repurchase stock. Second, we show that the number of stocks that a firm announces to repurchase strongly correlates with the number of shares expected to be shorted with the so-called delta-neutral hedge normally setup by convertible debt arbitrageurs (correlation coefficient of 0.88). Third, we document that firms engaged in a combined offering repurchase 85.5% (median) of the announced number of shares in the first quarter after the announcement. This percentage is much higher than the portion of normal (uncombined) stock repurchases that are immediately executed (median of 2.5%). The immediate execution of stock repurchases is consistent with hedge funds obtaining their arbitrage positions. Fourth, we find that in 77% of the cases at least one of the convertible buying institutions already owns common stock of the issuing firm. After the issue date of the convertible bonds, these stock positions generally decrease.

Together, these four pieces of evidence suggest that the avoidance of short selling by convertible arbitrageurs is indeed an important motivation for combinations of convertible bond issues and stock repurchases. In addition to the explanation related to convertible debt arbitrage, we examine several alternative reasons for the combination of a convertible debt issue with a stock repurchase. We analyze whether a firm engages in combined offerings to reduce earnings per share (EPS) dilution, to signal its true value to the market, to move closer to its target debt ratio, or to finance a stock repurchase

program. We do find some evidence for the signaling motivation, but fail to find evidence for the other alternative motivations. We conclude that the avoidance of short selling is the main driver behind combinations of convertible debt offerings and stock repurchases.

Our contributions to the literature are the following. To our knowledge, we are the first to empirically test the motivations for firms to combine a convertible debt offering with a stock repurchase. Moreover, we contribute to the growing literature on short-selling activity. Lamont (2004) studies battles between short sellers and firms, and describes a variety of methods that firms use to impede short selling, including legal threats and lawsuits. We show how expected short selling activity influences firms' financing decisions. Further, we contribute to the literature on stock repurchases. Prior studies have shown that stock repurchases tend to be used to signal good prospects (Bhattacharya (1979), and Vermaelen (1984)), and to reduce the amount of free cash flows at management's disposal (Jensen (1986)). We add another important motivation for repurchasing stock, being the avoidance of short-selling activity.

The remainder of this paper is organized as follows. Section I provides the theoretical background. Section II discusses the data and explanatory variables, and Section III shows the empirical results regarding the main hypothesis. Section IV investigates alternative explanations, and Section V concludes.

I. Theoretical Background

This section reviews the literature on the motivations for convertible debt offerings and stock repurchases, and develops the main hypothesis and testable predictions examined in our paper.

A. Motivations for convertible debt offerings

Studies on the motivations for convertible issuance represent two different viewpoints. According to Stein's (1992) delayed equity rationale, companies with high equity-related adverse selection costs use convertibles as a substitute for equity. These firms subsequently force conversion of the convertible into shares by calling them, and

thus obtain equity “through the backdoor”. Other authors argue that convertible debt is used as an alternative for straight debt by firms with high debt-related financing costs, e.g., asset substitution costs (Green (1984)), adverse selection costs resulting from uncertainty about firm risk (Brennan and Kraus (1987) and Brennan and Schwartz (1988)), issuance costs related to short term bonds (Mayers (1998)), and overinvestment costs related to long-term bonds (Mayers (1998)).

These traditional explanations for convertible debt cannot explain why, in recent years, firms tend to add stock repurchases to their convertible offerings. If a firm uses convertibles as an alternative to equity, it would be inconsistent to simultaneously repurchase common stock. On the other hand, if a firm uses convertibles to avoid debt-related financing costs, it would not repurchase equity since this repurchase increases its debt ratio.

Constantinides and Grundy (1989) develop a model that relates convertible issues to stock repurchases. They examine which claim a firm should issue when it has private information about its own value. They show that the firm can reveal its true value to the market by combining a convertible debt offering with a stock repurchase. The intuition is that, when issuing a convertible, firms have an incentive to overstate their true value. The stock repurchase provides a countervailing incentive. Until now, no paper has tried to empirically test the validity of the Constantinides and Grundy model, mainly because combined convertible issues and stock repurchases were scarce prior to 2003. One testable prediction that can be derived from this model is that combinations of stock repurchases and convertible debt offerings should be more favorably received by the market than uncombined convertible debt issues. We will test this prediction in Section IV.

B. Motivations for stock repurchases

Studies on stock repurchases come in various strands. One strand finds that repurchasing stock signals good prospects: payout decisions are explicit signals about future earnings, sent intentionally and at some cost by the managers of the firm to their stockholders (see, e.g., Bhattacharya (1979) and Vermaelen (1984)). A second strand

finds that buybacks reduce the amount of free cash flow at management's disposal, thus mitigating potential overinvestment (Jensen (1986)). Stock repurchases can also decrease earnings per share dilution resulting from, for example, stock option plans (Weisbenner (2000) and Bens et al. (2003)).

C. Main hypothesis and testable predictions

While previous studies mostly focus on the decision to issue convertibles or on the decision to repurchase stock, we examine the motivation for firms to combine these two transactions. In informal conversations with CFOs of firms that did the combined transaction, we learned that the main incentive is to mitigate the downward pressure of short-selling activity on the firm's stock price. In the US, hedge funds buy about three-quarters of the issues of convertible bonds (Arshanapalli et al. (2004), Lian (2006), Mitchell, Pedersen, and Pulvino (2007)). As convertibles tend to be underpriced (Ammann, Kind, and Wilde (2003), Calamos (2003), Loncarski, ter Horst, and Veld (2007)), these hedge funds generally buy the convertible and go short in common stock of the issuing firm to obtain their arbitrage positions.¹ Brent, Morse, and Stice (1990), Ackert and Athanassakos (2005), and Choi, Getmansky, and Tookes (2007) indeed document that firms with convertible debt outstanding report higher monthly short interest than other companies.

¹ A potential reason for the convertible debt undervaluation is the underestimation of the stock return volatility (Calamos (2003)). However, Agarwal, Fung, and Naik (2007) and Batta, Chacko, and Dharan (2007) argue that the excess returns from convertible arbitrage strategies are not mainly due to underpricing. Instead, the discounts on convertible bond issues represent a compensation for bearing liquidity risk, since convertible bonds are relatively illiquid. Of course, it could be questioned why firms issue convertibles in the first place, given that these securities are issued at a discount. One possible answer to this question is that these firms have both high debt- and equity-related financing costs, so that issuing straight debt or equity would be even more harmful to them (see empirical evidence provided by, e.g., Lewis, Rogalski, and Seward (2003)). While the motivation for firms to issue convertibles is an interesting question, our paper focuses on the motivation for convertible debt issuers to combine their offering with a stock repurchase rather than on the convertible debt issuance decision in itself.

A number of theoretical studies predict a negative impact of short-selling activity on stock prices. Miller (1977) argues that only informed traders with strong negative information will be willing to bear the cost of short selling, as short selling is costly. Diamond and Verrecchia (1987) argue that rational market participants should know that high levels of unexpected short sales are bad news, and incorporate this information into their trading decisions. Therefore, high levels of short selling should cause stock prices to drop.

The relation between short sales and stock prices has been tested by several papers. Senchack and Starks (1993) look at US firms' reported monthly stock interest in the period 1980-1986, and find weak support for the hypothesis that the market reaction to increased short interest is negative around the announcement date. Aitken et al. (1998) study the effect of short sales on instantaneous price changes by looking at the Australian stock market, in which short sales are disclosed immediately. They find that prices react negatively. Ackert and Athanassakos (2005) argue that stock prices may also react when disclosure is not immediate, as in the U.S. and Canada. In line with their expectations, they find negative contemporaneous price effects for Canadian stocks.

Brent, Morse, and Stice (1990) make a distinction between short selling based on private information and arbitrage-related short selling. Arbitrageurs that short sell shares of a convertible issuer are not directly trading on adverse information about the firm's stock. Instead, these arbitrageurs seek to exploit the fact that convertibles tend to be underpriced. Still, various studies show downward pressures for arbitrage-related short selling. Mitchell, Pulvino, and Stafford (2004) study stock price reactions to mergers, and find that nearly half of the negative price reaction for the acquirer reflects downward price pressure because of arbitrage-induced short selling. Bechmann (2004) examines why the announcement of an 'in-the-money' convertible bond call is associated with an average contemporaneous abnormal stock price decrease of 1.75%. He shows that the decrease is due to arbitrage-related short selling. Loncarski, ter Horst, and Veld (2007) show that short-selling activity by arbitrageurs has a negative impact on the stock price of Canadian convertible debt issuers.

Our main hypothesis is that, to avoid the adverse stock price impact of short selling, convertible debt issuers buy back their stock directly from arbitrageurs. That is,

convertible debt issuers deliberately select hedge fund arbitrageurs who already own the issuer's common stock, and repurchase stock from these hedge funds to prevent them (or alternative buyers that do not own the stock) from engaging in short selling. Firms are able to select these buyers since, by law, convertibles combined with stock repurchases are always privately placed under Rule 144A.² Without transaction costs, convertible arbitrageurs should be indifferent between short-selling common stock and selling the position they currently have, since both result in the same position. However, because short selling is costly (D'Avolio, 2002), arbitrageurs prefer to sell their long positions in common stock to the convertible debt issuing firm. The firm provides the liquidity for these arbitrageurs to sell their stocks.

From our main hypothesis, we derive four testable predictions. First, we predict that short-selling activity will be lower for convertible debt issuers who simultaneously repurchase stock than for normal convertible debt issuers. Second, we expect that the number of shares a firm announces to repurchase will closely match the expected short positions of arbitrageurs. Third, we predict that convertible debt issuers will repurchase their stock almost immediately after the repurchase announcement. Stephens and Weisbach (1998) find that firms on average buy back only 6.3% of the number of stocks announced to be repurchased in the first quarter after the announcement. When arbitrageurs want to hedge their positions, common stock has to be repurchased at the time of issue. We therefore expect the repurchases within the first quarter to be much higher than the percentage reported by Stephens and Weisbach. Fourth, we expect to find that the institutions that buy the convertible bonds own stock in the issuing firm. We predict that these stock positions decrease after the issue date of the convertible bonds, since the institutions sell back (part of) their stock positions to the issuing firm.

² Combinations of convertible issues and stock repurchases have been prohibited under Rule 10b-6 of the Securities Act of 1934 (see Lowenfels (1973)). The restrictions of trading during distributions are relaxed in Regulation M, which has replaced Rule 10b-6 since December 1996. Regulation M allows the combination of convertible issues and stock repurchases for issues under Rule 144A. Rule 144A was issued in 1990 to improve the liquidity and efficiency of the private placement market by giving more freedom to institutional investors to trade securities. Securities issued under Rule 144A do not require registration with the SEC, but can be traded without restriction in the secondary market among qualified institutional buyers (i.e., institutions that own over \$100 million in assets).

II. Data and Explanatory Variables

In this section, we describe our data and the explanatory variables included in our analysis.

A. Samples of convertibles, stock repurchases, and combined offerings

We acquire information on convertible issues and share repurchases in the US for the period 1997-2006. We start in 1997, because Regulation M, which made combined offerings legal, was introduced late 1996. We obtain issue and repurchase data from the Securities Data Company (SDC), company accounts data from Compustat, and stock price data from CRSP. We use Factiva to obtain announcement dates. We mark a convertible issue as a combined offering if the firm announces (either in SDC or in the announcement on Factiva) that it uses the proceeds to repurchase stock, or when both transactions are announced separately at the same date.

Panel A of Table I shows the number of convertible issues, stock repurchases, and combined offerings for the period 1997-2006.

[Please insert Table I here]

The number of convertible debt issues fluctuates over time. In the period 1997-2006, the convertible issuances peak in 2003 (256 issues), and the low point, 108 issues, occurs in 1999. After a decrease of convertible issuances in 2004 and 2005, the number of issues increases in 2006. However, over a longer time period, we do not observe a general trend. Korkeamaki and Moore (2004) report a sharp decrease in convertible debt offerings following the 1987 market crash. In the 1990s, they do not show a strong trend for convertible bond issues.

Table I further shows that the number of stock repurchases has been fairly constant since 2000. Before that year, the number of repurchases is substantially higher than it has been since then. The number of combined convertible debt issues and stock repurchases

has strongly increased over the years. Before 2003, these combined offerings are very scarce. In 2003 and 2004 the combined offerings account for about 5% of the total number of convertibles. The 13 combined offerings in 2005 comprised 12% of that year's convertible issues. The year 2006 is the most popular year, since 33% of the total number of convertible issues are combined with a stock repurchase that year. These findings indicate that there is an increasing trend to combine convertible issues with stock repurchases, and that this trend is not matched by a strong increase in the overall number of repurchases. Given the very low number of combined offerings prior to 2003, we will from now on limit our research window to the period 2003-2006.³

Panel B of Table I shows that the proceeds of the convertible issue are generally substantially larger than the funds used to repurchase shares. The average (median) size of the stock repurchase represents 43.2% (36.9%) of the proceeds of the convertible issue. Still, in five firms the value of the announced repurchase exceeds the proceeds of the convertible issue. The minimum percentage of the proceeds used to repurchase shares, given that a firm opts for a combined offering, is 5%. On average, the stock repurchases represent 7.2% of firms' market values.

Panel C of Table I breaks down the sample by the Fama and French 12-industry classification. Most convertibles are issued by firms in the business equipment industry and the healthcare sector. Firms that engage in combined offerings are spread among 10 of the 12 industries, although the wholesale and the healthcare sector are slightly overrepresented.

B. Short selling data

³ The gradual increase in combined offerings suggests that these transactions are a financial innovation: since the introduction of Regulation M, the possibility and benefits of using a simultaneous convertible issue and stock repurchase have become known to more and more firms. We have checked whether particular advisory firms are overrepresented in the sample of firms with combined offerings, because these advisors may drive the increase in combined offerings. We did not find a significant overrepresentation of any advisory firm in combined offerings, compared to the advisory firms involved in uncombined convertible issues.

We obtain all short sell flows for firms that issue convertibles in 2005 and 2006 from the NYSE TAQ database's REG SHO file. We start in 2005 as data is only available as of January 2005. Thus, in all analyses involving short-selling data, we limit our research window to the period 2005-2006. This limitation is not very large since the bulk of combined offerings (i.e., 60 out of 85 issues) are made during the years 2005 and 2006.

We compute the total short sales per firm on a specific day by summing all short sales for that firm on that day. We follow Ackert and Athanassakos (2005) by scaling the daily number of short sales by the firm's daily trading volume. We also compute the change in short sales, to capture the abnormal part of firms' short sales:

$$\text{change in short sales} = \frac{\text{short sales issue date} - \text{normal short sales}}{\text{normal trading volume}}. \quad (1)$$

We calculate normal short sales (trading volume) by taking the average short sales (trading volume) over the period from ten trading days before the issue date until four trading days before the issue date.

C. Control variables

We include the following control variables in the analysis of short-selling activity:

Delta: The delta of a convertible measures the convertible's sensitivity for small stock price changes (Calamos, 2003). The delta can be calculated as:

$$\Delta = e^{-\delta T} N(d_1) = e^{-\delta T} N \left\{ \frac{\ln\left(\frac{S}{X}\right) + \left(r - \delta + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \right\}, \quad (2)$$

where δ is the continuously compounded dividend yield, T is the maturity of the bond, $N(\cdot)$ is the cumulative standard normal probability distribution, S is the price of the underlying stock measured one week prior to the announcement date (so that we can abstract from the impact that the convertible debt announcement might have on the issuing firm's stock price), X is the conversion price, r is the yield on a 10-year U.S.

Treasury Bond, and σ is the stock return variance per annum, estimated as the standard deviation of the monthly returns. By construction, the delta is in between zero and one. A high delta means that the convertible bond value is sensitive to the common stock value, which makes the convertible equity-like in nature. Inversely, a low delta value indicates that the convertible is debt-like in nature. Loncarski, ter Horst, and Veld (2007) find that convertible arbitrageurs prefer convertible bonds with relatively high deltas, as these convertibles are more likely to be underpriced.

Log(assets): The logarithm of total assets at the beginning of the fiscal year. We expect that short selling is less expensive for larger firms.

Liquidity: The logarithm of the average trading volume divided by average shares outstanding in the year prior to the offering. Hedge funds prefer liquid stocks as a means to quickly establish or close a position (Calamos (2003)).

Dividend paying: A dummy variable that equals one when the firm has paid a dividend in the year preceding the convertible issue, and zero otherwise. Calamos (2003) argues that short sellers have a preference for stocks that pay no dividends, since the dividend represents a cash outflow for short sellers.

Stock price run-up: The firm-specific raw return calculated over the 75 trading days before the announcement date, as in Lewis, Rogalski, and Seward (2003). The stock price run-up serves as a proxy for the perceived overvaluation of the firm by the market. We expect a positive relation with short-selling activity, as overvalued stock is more likely to be sold short.

We also include control variables for which we have no strong prediction on the influence on short sales:

Book leverage: The long-term book leverage at the beginning of the fiscal year.

Market-to-book ratio: The market price per share of common stock divided by the book value per share.

Proceeds: The total amount of money that is raised by issuing the convertible bonds.

Private placement: A dummy variable that equals one when the convertible issue is privately placed under Rule 144A, and zero otherwise.

III. Do Convertible Issuers Repurchase Stock to Decrease Short-Selling Activity?

Here, we examine the four testable predictions. We also examine whether short selling indeed negatively influences stock prices for the convertible debt issuers in our sample, which is a crucial assumption underlying our main hypothesis.

A. Short-selling activity for convertible issuers

Table II reports the results of a univariate analysis comparing average short-selling activity for convertible issuers that simultaneously repurchase stock to short-selling activity of regular convertible debt issuers. Table II also shows whether the size of the control variables differs between firms that issue convertibles with and without a concurrent stock repurchase.

[Please insert Table II here]

For the total sample, short sales on convertible debt issue dates represent 31.6% of trading volume. The issue date ratio of short sales and trading volume is 20.7% for convertible debt issuers that simultaneously repurchase stock, and 35.5% for other convertible debt issuers. This difference is significant at the 1% level. Our findings are similar when we compute the percentage of short sales relative to the number of shares outstanding.

The ratio of trading volume to shares outstanding is not significantly different between both subsamples at the issue date. Short-selling activity prior to the convertible issue is also similar: both groups have a short ratio of about 20% over the trading days [-10, -4]. This percentage is relatively similar to findings of Diether, Lee, and Werner (2007), who report that short sales represent 24% of share volume for NYSE-listed stocks in 2005.

As expected, firms that issue convertible bonds in combination with a stock repurchase are significantly less likely to pay dividends. All combined offerings are

privately placed (which is normal given the legal restrictions), while 90% of the regular convertible issues in our sample are privately placed. The other control variables are not significantly different between the two groups.

In Table III we test the impact of a concurrent stock repurchase on short-selling activity by using an OLS regression analysis, in which we include a dummy variable that equals one for combined offerings and zero for other convertible issues. We also include the control variables described earlier, as well as industry dummy variables based on the Fama-French 12-industry classification. We take the normal level of short-selling activity into account by including the variable “normal short selling”, which registers average short-selling activity over the trading days [-10, -4].

[Please insert Table III here]

In line with our first prediction, Model 1 shows that, on average, the decision to repurchase stock decreases short-selling activity by 14.3 percentage points (significant at the 1% level). The R^2 of the regression is 56.4%. Model 2 shows that the results are similar when we use the change in short sales as the dependent variable. In this model, a concurrent stock repurchase decreases the change in short sales on average by 133 percentage points (significant at the 1% level).

We find that for the control variables, the equity-likeness (delta) of a convertible and the stock price run-up significantly increase short-selling activity, which is in line with our expectations. The size of the firm significantly decreases short-selling activity, which is not consistent with our prediction. Prior short-selling activity and book leverage have a significant positive impact on the issue date short-selling activity, while the market-to-book ratio has a significant negative impact. We do not find a significant effect for the dividend paying dummy variable and for the liquidity of the firm’s stock.

To check the robustness of our finding that short selling is significantly lower for combinations of convertible issues and stock repurchases, we perform the following additional analyses. First, we scale short sales by shares outstanding, and find similar results. Second, we allow for the possibility that the decision to repurchase stock is endogenous. That is, there could be (unobserved) characteristics that influence both

firms' decisions to repurchase stock and that influence expected short sales. We use Heckman's (1979) two-step selection model, and still find a significant positive impact of the "combined offering" dummy variable.⁴ Third, we re-estimate the analysis for short-selling activity in the period from one day prior to one day after the issue convertible, instead of focusing only on the issue date. We find similar results. Fourth, we measure normal short selling as the average short-selling activity in the whole year, but this change also does not alter our findings. Fifth, we look at the influence of single (uncombined) repurchase announcements on short selling. We relate the announcement dates of stock repurchases that are not combined with a convertible issue to changes in short selling. We find that short-selling activity at repurchase announcement dates does not significantly differ from short-selling activity in prior periods. This result indicates that the mitigation in short-selling activity is a characteristic of stock repurchases combined with convertible offerings, rather than a general feature of stock repurchases.

B. The number of shares announced to be repurchased

Convertible arbitrageurs use the delta as an estimation tool to determine the number of shares to short against the long position in the convertible (Calamos (2003)). With a so-called delta-neutral hedge, small movements of the stock price do not generate profits or losses. We compute the value of the common shares that will be shorted in a delta-neutral hedge as the product of the number of convertibles issued, the convertible price, and the delta. We then determine the number of common shares that are shorted by dividing this value by the stock price:

$$\#common\ shares\ short = \frac{\#convertibles\ issued * convertible\ price * delta}{stock\ price}. \quad (3)$$

⁴ The first step consists of estimating a probit regression with the dependent variable equal to one for combined offerings, and equal to zero for uncombined convertible debt issuers, and with the same explanatory variables as those included in Table III on the right-hand side. In the second step, we estimate the same models as those in Table III, except that we include the inverse Mills ratio obtained from the first-step analysis as an additional explanatory variable.

The IFR comments on various convertible bond issues effectively relate the simultaneous stock repurchases to the delta of the convertible, e.g.: “Proceeds from the offering [of Medimmune] were used [...] to repurchase US\$150m of stock on the deal; [...] the delta hedge is a common application to mitigate the impact of selling” (June 24th, 2006) and “Generally, when you model a convertible, you allow for some slippage on the stock, but by buying back the delta, you are guaranteeing the hedge” (convertible issue of Waste Connections, March 18th, 2006). Although some firms repurchase the full delta (“The buyback [of Americredit] represents the full delta on the convertible bond”, September 16th, 2006), other firms repurchase a portion of the delta (“To mitigate the impact on the common stock, Safenet agreed to purchase US\$50m of stock, providing a delta hedge of 70% of the entire deal”, October 12th, 2005), according to the IFR comments.

If the repurchase behavior is indeed influenced by hedge fund activities for the firms in our sample, we expect that the correlation between the number of shares that should be repurchased according to the delta-neutral technique and the number of shares the firm announces to repurchase is close to one. For 50 of the firms engaging in a combined offering, we have all the necessary information to calculate the expected number of shares sold short. We find that the correlation coefficient between the common stock expected to be shorted and the common stock the firm announces to repurchase is 0.88. Firms repurchase fewer shares than we would expect based on the delta-neutral technique: the average ratio between shares announced to be repurchased and shares predicted to be repurchased is 72.6%. This percentage is close to the percentage of convertible bonds generally bought by hedge funds (Arshanapalli et al. (2004), Lian (2006), Mitchell, Pedersen, and Pulvino (2007)). Hence, we interpret the findings in this section as evidence in favor of an influence of arbitrageurs.

C. The speed with which common stock is repurchased

A third test relates to the speed with which shares are actually repurchased. An announcement of a stock repurchase does not precommit firms to acquire a specified

number of shares. If convertible debt issuers buy back shares to help arbitrageurs obtain their arbitrage positions, then we expect the stock repurchases to be executed very quickly after their announcement. Stephens and Weisbach (1998) study a sample of 450 repurchase programs from 1981 to 1990. Employing CRSP data, they find that firms on average acquire only 6.3% of the number of stocks announced to be repurchased in the same quarter, 46.2% within a year, and 73.9% within three years of the repurchase announcement.

Similar to Stephens and Weisbach (1998), we examine changes in shares outstanding obtained from the CRSP database. Among the combined issuers, we have 48 observations with sufficient data to determine the changes in shares outstanding for the first quarter. We also re-estimate the percentage of shares that is repurchased for normal (uncombined) stock repurchases. We have 1,701 observations with sufficient data. We reset observations in which the number of shares increases to zero, since we are only interested in decreases. Figure 1 shows the actual shares repurchased in normal stock repurchases and in combined offerings.

[Please insert Figure 1 here]

The dotted line represents the percentage of stock repurchased in uncombined stock repurchases. Most firms do not repurchase any stock in the first quarter, and only a small percentage repurchases close to 100% of the shares announced to be repurchased. For calculating the average percentage of shares to be repurchased, we reset observations in which the number of shares repurchased exceeds the announced number to 100%. We find that 18.5% of the announced shares are repurchased in the first quarter after the announcement for a normal stock repurchase (the median value equals 2.5%). This percentage is higher than the 6.3% found by Stephens and Weisbach (1998), indicating that firms have increased their actual stock repurchases over time.

The solid line represents the percentage of stock repurchased in a combined offering. A relatively large number of firms (29 firms or 60%) repurchase more than 75% of the announced stock repurchase in the first quarter after the announcement. The average (median) percentage of shares repurchased is 63.6% (85.5%). Due to potential

simultaneous increases in shares outstanding (e.g., due to stock option exercises), the real percentages that are repurchased are even higher. Apparently, firms in a combined offering repurchase shares much faster than in normal repurchases, which is consistent with arbitrageurs obtaining their positions.

D. Stock ownership of the institutions that buy the convertible bonds

Firms that issue convertible debt in a private placement often issue a prospectus after the initial placement, to allow for re-sales of the convertible bonds to other qualified institutional buyers. Typically, this prospectus contains the names of the original buyers of the convertible bonds, in the section “Selling Securityholders”. We will employ this list of buyers to check whether the buying institutions already own common stock of the issuing firm at the time of issue. The stock ownership data are obtained from 13F filings: institutions with more than \$100 million in assets are obliged by the Securities Exchange Act to file a list of their equity holdings on a quarterly basis.

We collect prospectuses and stock ownership filings from SEC Edgar for all combined offerings in the period 2003-2006. We find 52 prospectuses, and select the institutions that buy more than 5% of the convertible bonds in the offering. We find 209 observations for which an institution buys more than 5% of the offered convertible bonds. These observations are spread over 90 different institutions, which implies that some institutions are involved in multiple deals. In fact, we find that Citadel Equity Fund, Highbridge Capital Management, DBAG (Deutsche Bank), and Calamos Asset Management are involved in more than ten of the convertible bond offerings.

We match the 209 observations from the issue prospectuses with institutions that file 13F reports.⁵ We delete 28 institutions that we could not match with an institution in 13F filings, which leaves 156 observations.

[Please insert Table IV here]

⁵ Perfect matches are however rare. We recode buying institutions like Calamos Convertible and High Income Fund, Calamos Convertible Opportunities and Income Fund, Calamos Global Total Return Fund, Calamos High Yield Fund, and Calamos Market Neutral Fund to Calamos Asset Management.

Table IV shows that 77% of the firms that issue convertible bonds in a combined offering sell these bonds to at least one institution that already owns their common stock. When we focus on this sub-sample of firms, we find that 65% of the buying institutions report common stock holdings in the firm. Most of these institutions have owned the shares for a longer period: 37% has a stock position more than four years before the offering, and 44% has a stock position between one and four years before the offering.

We expect the common stock holdings to decrease after the convertible debt issue. We therefore compare the stock holdings in the quarter after the convertible issue to the holdings in the quarter before the convertible issue. Table IV shows that 79% of the institutions with a stock position decrease their stock holdings when buying the convertible bonds of the firm. These results are in line with the conjecture that convertible issuers select institutions with common stock holdings.

E. Downward pressure of short sales on stock prices

All four tests in this section provide evidence that is in line with our hypothesis that firms repurchase stock to mitigate short-selling activity. A crucial assumption underlying this hypothesis is that short-selling activity effectively has a negative effect on the stock price of convertible debt issuers. We will now examine whether this assumption is confirmed in our data.

We measure the cumulative abnormal price effects on the issue date of the convertibles. Our observation window is $[0, 1]$, and we estimate the normal stock return over the window $[-200, -30]$. The market return is the CRSP equally-weighted market index. In line with Choi, Getmansky, and Tookes (2007), we look at changes in short sales. We include the control variables described earlier in our multivariate analysis. We also interact the changes in short sales with the liquidity of common stock, because liquidity is an important aspect of the influence on stock prices (see, e.g., Cohen, Diether, and Malloy (2007), and Choi, Getmansky, and Tookes (2007)). Table V shows the results.

[Please insert Table V here]

In line with our expectation, we find that larger increases of short sales result in significantly lower cumulative abnormal returns at the issue date (coefficient is significant at the 1% level). The control variables show that a concurrent stock repurchase significantly increases abnormal issue date returns. We will return to this issue in Section IV. Liquid stocks have significantly higher abnormal returns. Interestingly, the downward pressure of short sales on stock prices is higher for more liquid stock, as can be seen from the interaction term.

The fact that repurchasing stock mitigates the short sales might have an effect on our results. Therefore, we perform a similar test on only those firms that do not repurchase stock. Model 2 shows that the effect of short sales is still negative and significant at the 5% level. The somewhat smaller effect than in Model 1 could be explained by the fact that the firms with the highest expected correlation between short sales and stock prices repurchase shares to mitigate these short sales.

IV. Alternative Explanations for Combining Convertible Issues and Stock Repurchases

In this section, we examine which other factors induce firms to opt for a combined offering. We also discuss the alternative explanation that the firm might use the convertible debt offering to finance a stock repurchase.

A. Mitigate earnings per share dilution

Combining convertible issues and stock repurchases mitigates the short-term earnings per share dilution that occurs because of the convertible issue. Under the “if-converted” method, the denominator of the diluted earnings per share incorporates the shares that can be issued upon conversion of the convertible bonds even though these convertibles are not (yet) converted into stock. Therefore, a convertible issue without a stock repurchase increases the potential number of shares and on a short-term basis decreases firms’

reported diluted earnings per share. When stock is repurchased, the number of outstanding shares decreases and dilution is mitigated.

The importance of EPS dilution for convertible issuance is illustrated by the popularity of contingent convertibles or COCOs in the period 2000-2004. In this period contingent convertibles were not taken into account when calculating diluted earnings per share (Marquardt and Wiedman (2005, 2007)).⁶ After the elimination of the favorable treatment of COCOs in 2004, these instruments became much less popular.

We test the influence of earnings per share dilution on the decision to combine a convertible issue with a stock repurchase. To do so, we use a multivariate probit model in which the dependent variable is equal to one for convertible debt issuers that add a stock repurchase, and equal to zero for other convertible debt issuers. We use the following variables that relate to diluted earnings per share (both of which are based on variables in Marquardt and Wiedman (2005)):

Change in diluted earnings per share (“decrease EPS”): The change in diluted earnings per share that would occur without a stock repurchase. We calculate this change as one minus (diluted EPS_{t-1} adjusted for the convertible issue / diluted EPS_{t-1}), in which $t-1$ refers to the fiscal year-end preceding the announcement. The higher the dilution, the larger *decrease EPS* becomes.

Bonus: The correlation between the change in the annual CEO cash bonus and the change in the diluted EPS by 2-digit SIC code for the year before the offering (only if the number of observations for each industry-year is larger than five). We obtain CEO cash bonus data from Execucomp. We expect that managers are more concerned with diluted earnings per share when their bonus plans relate to this measure, i.e. when *Bonus* is high.

[Please insert Table VI here]

Table VI reports the results of the probit analysis. The decrease of the diluted earnings per share does not play a statistically significant role in the decision to combine

⁶ COCOs are convertible securities that cannot be converted into shares of common stock until a pre-specified stock price is reached.

a convertible debt issue with a stock repurchase. The relation of the bonus plan of the executive officer to the diluted EPS, as captured in the variable *Bonus*, also does not significantly influence firms' decisions to use a combined offering. Hence, we do not find that the avoidance of EPS dilution is an important motivation in the decision to combine a convertible debt issue with a stock repurchase. The results are robust to excluding the five observations in which the stock repurchase is larger in size than the convertible issue. With the exception of the stock return volatility (which is significantly smaller for firms engaging in combined offerings), the control variables are not significant.

B. Signal firm value

Although we have already tested stock price effects on the issue date, we also expect to find an impact of concurrent stock repurchases on the announcement dates of convertible issues. A convertible issue announcement generally has a significantly negative stock price effect (see, e.g., Davidson, Glascock, and Schwartz (1995), Lewis, Rogalski, and Seward (2003), and Marquardt and Wiedman (2005)). This result is consistent with Myers (1984), who argues that equity(-linked) offerings might signal firm overvaluation.

By contrast, various studies argue that repurchasing stock signals good prospects for the firm (see, e.g., Bhattacharya (1979), Vermaelen (1984)). Most empirical studies effectively find significantly positive abnormal returns at stock repurchase announcements (see, e.g., Ikenberry, Lakonishok, and Vermaelen (1995)).

Based on the model of Constantinides and Grundy (1989), we predict that convertible debt issuers might add a stock repurchase to signal to the market that they are not overvalued. Hence, this model implies that the stock price reaction at announcements of combined offerings should be more favorable than the stock price reaction at announcements of uncombined convertible issues.

To test this prediction, we calculate cumulative abnormal returns at the announcement date of convertible issues and stock repurchases. We obtain the announcement dates from the Factiva database. For most private placements, the announcement date is either the issue date or one day prior to the issue date. Our primary observation window is $[-1, 0]$,

and we estimate the normal return over the window [-200, -30]. The market return is the CRSP equally-weighted market index. The results are presented in Panel A of Table VII.

[Please insert Table VII here]

In line with the literature, we find that uncombined convertible offerings induce a significantly negative abnormal stock return of -4.09%, and that uncombined stock repurchases induce a significantly positive stock price effect of 0.60%. The abnormal return at combined offerings is not significantly different from zero. We thus obtain evidence that combinations of a convertible debt offering and a stock repurchase are indeed more favorably received by the market than single convertible debt offerings (t-statistic for difference in means equals 5.58).

An interesting question is whether the combining issuers realize a synergy effect by simultaneously announcing the two transactions. That is, is the abnormal return at combined announcements of convertible debt offerings and stock repurchases significantly different from the sum of the abnormal returns that these same firms would have realized if they would have announced the two transactions at two different points in time?

To examine this question, we use the samples of uncombined convertible bond issues and uncombined stock repurchases to estimate the effects of various characteristics on the announcement effects of convertible debt issues and stock repurchases. Model 1 of Panel B shows the effects of various firm and bond characteristics on the cumulative announcement window returns of uncombined convertible debt issues. In line with Lewis, Rogalski, and Seward (1999), we find that convertibles with a larger delta induce significantly lower abnormal returns. Also consistent with prior studies, we find that larger firms and firms with higher market-to-book ratios have on average higher convertible debt announcement returns. Model 2 shows the effects of various firm and repurchase characteristics on the abnormal returns at stock repurchase announcements. The abnormal returns are significantly higher for smaller firms and firms with lower leverage, and significantly lower for firms with high market-to-book ratios and higher stock price run-ups.

We subsequently use the resulting regression coefficients to calculate expected abnormal returns for combined issuers had they issued an uncombined convertible instead, and had they announced an uncombined stock repurchase instead. In Panel C of Table VII, we present the results of this counterfactual analysis. We find that, had the combined issuers announced an uncombined convertible debt offering instead, the announcement effect would have been -3.48% on average. Had these firms only announced a stock repurchase, the announcement effect would have been 1.16%.

We sum these two expected abnormal returns for a comparison with the observed joint announcement effect. The difference between the joint announcement effect (-0.58%) and the expected sum of separate effects (-2.32%) is significant at the 5% level (t-statistic for difference in means equals 2.17). Hence, combined issuers seem to realize more favorable announcement effects by combining the announcements of convertible debt issues and stock repurchases.

C. Optimize capital structure

The decision to add a stock repurchase to a convertible issue could be due to the fact that firms want to move towards their optimal debt ratios. Repurchasing stock increases firms' debt ratios, which could bring them closer to their optimal debt ratios if they were previously underlevered. A prediction of this reasoning would be that, *ceteris paribus*, firms that combine their convertible issue with a stock repurchase have significantly lower leverage ratios and/or higher debt targets. However, Table VI shows that the impact of leverage on the decision to repurchase stock is not significant, and Table I shows that convertible issuers are from similar industries, irrespective of their decision to simultaneously repurchase stock.

To further examine the possibility that the combined offerings are motivated by the wish to reach a target debt ratio, we extend the probit analysis reported in Table VI with two variables. The first variable captures the difference between firms' leverage and the industry median leverage, in which the industries are based on the Fama-French 12 industries classification. The second variable is the marginal tax rate of firms (before interest expenses), which can be downloaded from John Graham's website. Graham

(1999) uses these marginal tax rates to show that firms with higher marginal tax rates have significantly higher leverage: interest deductibility encourages higher debt ratios. We find that none of these two variables is significant (detailed results are not reported for parsimony). We therefore conclude that the adjustment of firms' leverage towards a target debt ratio does probably not drive the decision to combine a convertible debt offering with a stock repurchase.

D. Combined offerings from the perspective of stock repurchasers

Throughout the paper, we have assumed that firms that engage in a combined offering add a stock repurchase to a convertible issue. One argument for this reasoning is that on average, the convertible issue is about twice the size of the stock repurchase. However, the possibility exists that the initial decision is to repurchase stock, and that the convertible issue is added simply to obtain funds for the repurchase. Therefore, we examine the differences between pure stock repurchasers and firms that combine stock repurchases with convertible issues.

If the main motivation for the combined offerings is to repurchase stock, we predict that firms engaging in combined offerings have less slack than normal stock repurchasers – otherwise, the former firms would not have to issue convertibles in order to obtain the necessary funding. We do not find significant differences in the amount of slack (cash and short-term investments as a percentage of total assets) between firms in combined offerings and uncombined stock repurchasers (t-test statistic for difference in means equals -0.32). Also, we have checked whether firms engaging in a combined offering are the firms that regularly announce stock repurchases and are therefore expected to do so again. We find that, for the combined issuers, the number of announced stock repurchases over the five years preceding the convertible debt announcement does not significantly differ from normal stock repurchasers or from normal convertible issuers.

V. Conclusion

In this study, we examine the motivations for U.S. firms to add a stock repurchase to a convertible debt offering. The main focus is thus not on the motivations to issue convertible debt, which are investigated in for example Lewis, Rogalski, and Seward (2003). Instead, we focus on the way in which recent convertible issues are structured, like for example Korkeamaki and Moore (2004), who examine call provisions in convertible bonds.

We argue that the combination of convertible debt offerings and stock repurchases is linked with convertible arbitrage: convertible arbitrageurs generally short the firms' common stock, which for firms is an undesired side effect, as short selling creates a downward pressure on the stock price. The stock repurchase serves to avoid short-selling activity.

We obtain strong evidence consistent with this hypothesis. First, the announced stock repurchase lowers short-selling activity at the issue date. Second, the number of shares that a firm announces to repurchase correlates strongly with the expected short positions of convertible arbitrageurs. Third, the speed with which stock is repurchased is substantially higher in the combined transactions than in pure stock repurchases, which is consistent with arbitrage activity. Fourth, the majority of firms sell convertible bonds to at least one institution that holds their common stock. Combined, this evidence indicates that convertible arbitrage provides an important reason for convertible debt issuers to repurchase stock. We also show that the stock market reacts significantly more positive to convertibles combined with a stock repurchase than to uncombined convertible offerings.

Our study provides various contributions to the literature. We contribute to the literature on convertible bonds by describing a recent characteristic of convertible issues. We further contribute to the literature on stock repurchases by adding an important motivation for repurchasing stock, being the avoidance of short-selling activity. We also contribute to the growing literature on short-selling activity. More specifically, our paper shows that expected short selling activity influences firms' financing decisions.

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Figure 1

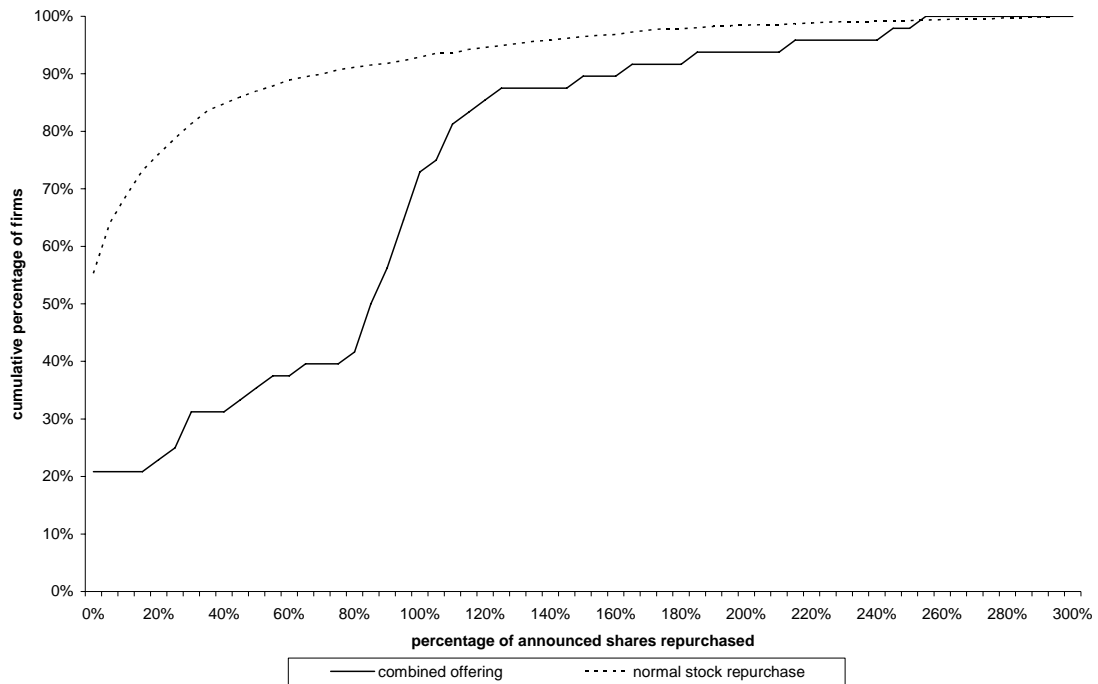


Figure 1. Percentages of actual repurchases in the first quarter after the announcement of a stock repurchase. This figure shows which percentage of an announced stock repurchase is actually repurchased within the first three months after the announcement. The sample period is 2003-2006. The solid line represents stock repurchases that are announced in combination with convertible bond issues. The dotted line represents stock repurchases that are announced without a simultaneous convertible bond issue.

Table I
Dispersion of Issues and Repurchases over Time, Value of the Transactions, and Industrial Dispersion.

This table presents summary statistics. The sample period in Panel A is 1997-2006, the sample period in Panels B and C is 2003-2006. Panel A reports the number of convertible issues, stock repurchases, and combined offerings of convertible issues and stock repurchases per year. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. Panel B compares the proceeds of the convertible issue with the size of the announced stock repurchase. The proceeds of the convertible issue are obtained from SDC; the size of the stock repurchase is obtained from SDC or from the repurchase announcement. We also compare the announced size of the repurchase to the firms' market values. We calculate a firm's market value by multiplying Compustat Item 25 with Item 199. In Panel C, we show the distribution of convertible issues over the Fama-French 12 industries classification.

Panel A: Dispersion over time				
Year	Number of convertibles issued	Number of repurchases announced	Number of combined offerings	Percentage combined offerings of total convertible issues
1997	237	1,286	0	0%
1998	145	1,934	0	0%
1999	108	1,515	0	0%
2000	153	806	1	1%
2001	207	659	3	1%
2002	117	469	2	2%
2003	256	470	10	4%
2004	181	563	9	5%
2005	113	638	13	12%
2006	142	586	47	33%

Panel B: Value of the announced stock repurchases compared to the proceeds of the convertible issue and firms' market values

	Mean	Median	Minimum	Maximum	Standard deviation
Value repurchase / proceeds convertible issue	0.432	0.369	0.050	1.111	0.276
Value repurchase / market value	0.072	0.054	0.004	0.489	0.070

Panel C: Industry classification

Fama-French 12- industry classification	Firms that issue a convertible and repurchase shares		Firms that issue a convertible without repurchasing shares	
	N	%	N	%
Consumer nondurables	1	1%	6	1%
Consumer durables	2	3%	7	1%
Manufacturing	4	5%	40	7%
Energy	0	0%	31	6%
Chemicals	0	0%	8	1%
Business equipment	15	20%	122	22%
Telephone	1	1%	25	5%
Utility	1	1%	20	4%
Wholesale	9	12%	42	8%
Healthcare	16	21%	96	17%
Financial	13	17%	84	15%
Other	13	17%	69	13%
Total	75	100%	550	100%

Table II.

Univariate Analysis of the Differences between Issuers of Combined and Uncombined Convertibles

This table presents the results of univariate tests on the impact of adding a stock repurchase to a convertible issue. The sample period is 2005-2006, and we only include convertible issuers for which we have short sell data available. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. Short sales at the issue date are the sum of all short sales for that specific firm that day, as reported in the NYSE TAQ database's REG SHO file. We compute the change in short sales by dividing the difference between short sales at the issue date and short sales over the period [-10 trading days; -4 trading days] by the trading volume over the period [-10 trading days; -4 trading days]. Daily trading volume and the number of shares outstanding are from CRSP. Delta is the convertible's sensitivity for small stock price changes. Eq. 2 shows the formula for computing delta. Total assets correspond to Compustat Item 6 and are reported in millions of dollars. Stock liquidity is the average trading volume divided by the average shares outstanding in the year prior to the offering. Dividend paying is a dummy variable registering whether a firm paid a dividend in the year prior to the offering, which can be established with Compustat Item 21. The stock price run-up is the firm-specific raw return over a period of 75 trading days before the announcement date, and is computed with CRSP Item RETX. Book leverage is Compustat Item 9 divided by Item 6. The market-to-book ratio is computed as $(\text{Item 25} * \text{Item 199} - \text{Item 60} - \text{Item 6}) / \text{Item 6}$. Proceeds represent the total amount of money raised by the convertible issue in millions of dollars, as reported in SDC. Private placement is a dummy variable that is one when the bond is privately placed (as indicated in SDC), and zero otherwise. *, **, *** indicate significance at the 10%, 5%, and 1% significance level, respectively.

	Total convertible debt sample		Combined offerings		Uncombined offerings		Difference of means <i>t</i> - statistics
	N	Mean	N	Mean	N	Mean	
Short sales / trading volume at issue date	112	0.316	29	0.207	83	0.355	-5.000***
Change in short sales	112	1.329	29	0.227	83	1.714	-5.330***
Short sales / shares outstanding at issue date	112	0.012	29	0.007	83	0.013	-3.011***
Trading volume / shares outstanding at issue date	112	0.036	29	0.039	83	0.035	0.500
Normal short sales / trading volume	112	0.199	29	0.198	83	0.199	-0.060
Delta	78	0.893	25	0.874	53	0.902	-0.569
Total assets	112	33,706	29	17,565	83	39,345	-1.078
Stock liquidity	112	0.010	29	0.010	83	0.010	0.013
Dividend paying	110	0.527	28	0.393	82	0.573	-1.656*
Stock price run-up	112	0.001	29	0.001	83	0.001	0.990
Book leverage	112	0.495	29	0.494	83	0.496	-0.023
Market-to-book ratio	112	1.633	29	1.660	83	1.623	0.193
Proceeds	112	395	29	480	83	366	1.074
Private placement	110	0.927	29	1	81	0.901	2.961***

Table III.

Impact of Combining a Convertible Bond with a Stock Repurchase on Short Selling Activity around the Issue Date

This table presents the results of an OLS regression analysis on the impact of adding a stock repurchase to a convertible issue on short-selling activity. The sample period is 2005-2006. Short sales at the issue date are the sum of all short sales for that specific firm that day, as reported in the NYSE TAQ database's REG SHO file. We compute the change in short sales by dividing the difference between short sales at the issue date and short sales over the period [-10 trading days; -4 trading days] by the trading volume over the period [-10 trading days; -4 trading days]. Daily trading volume is obtained from CRSP. Combined offering is equal to one for combined offerings, and zero otherwise. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. Delta is the convertible's sensitivity for small stock price changes. Eq. 2 shows the formula for computing delta. Log(assets) corresponds to the natural logarithm of Compustat Item 6. Stock liquidity is the average trading volume divided by the average shares outstanding in the year prior to the offering. We take the natural logarithm for stock liquidity. Dividend paying is a dummy variable registering whether a firm paid a dividend in the year prior to the offering, which can be established with Compustat Item 21. The stock price run-up is the firm-specific raw return over a period of 75 trading days before the announcement date, and is computed with CRSP Item RETX. Book leverage is Compustat Item 9 divided by Item 6. The market-to-book ratio is computed as (Item 25 * Item 199 - Item 60 - Item 6) / Item 6. Log(proceeds) represents the natural logarithm of the total amount of money raised by the convertible issue. Normal short selling is a firm's daily short sales over the period [-10 trading days; -4 trading days] divided by the trading volume over the period [-10 trading days; -4 trading days]. Industries are based on the Fama-French 12 industries classification. We report t-statistics calculated with Huber-White standard errors, to control for heteroscedasticity. *, **, *** indicate significance at the 10%, 5%, and 1% significance level, respectively.

	Short sales at issue date / trading volume at issue date (1)	Change in short sales (2)
Combined offering	-0.143*** (-4.371)	-1.333*** (-2.708)
Delta	0.173** (2.521)	3.242*** (3.674)
Log(assets)	-0.125*** (-3.744)	-1.703*** (-2.696)
Stock liquidity	-0.055 (-1.223)	-1.275 (-1.477)
Dividend paying	-0.009 (-0.272)	-0.674 (-1.040)
Stock price run-up	12.398** (2.081)	150.913 (1.384)
Book leverage	0.146** (2.030)	2.392 (1.227)
Market-to-book ratio	-0.031* (-1.829)	-0.610** (-2.130)
Log(proceeds)	0.036 (1.446)	0.764 (1.654)
Normal short selling	0.551** (2.171)	
Industry dummies	Yes	Yes
N	76	76
R ²	56.4%	30.7%

Table IV
Stock Ownership of Buying Institutions

This table presents the stock ownership of the institutions that buy the convertible bonds of combined offerings. The sample period is 2003-2006. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. We obtain the buying institutions from the convertible debt prospectuses. Institutional ownership is obtained from the 13F filings in SEC Edgar. We only select institutions that buy more than 5% of the convertible bonds being offered. The sample for the first analysis consists of 53 firms that engage in a combined offering. The sample for the second analysis consists of 129 institutions that buy convertible bonds from firms in which at least one institution holds a stock position. The sample in the third and fourth analysis consists of 84 institutions that buy convertible bonds from a firm in which they have a stock position.

	N	%
<u>Firms engaged in combined offerings</u>		
At least one of the buying institutions owns common stock	41	77%
None of the buying institutions owns common stock	<u>12</u>	<u>23%</u>
	53	100%
<u>At least one of the buying institutions owns common stock</u>		
Buying institutions owning common stock	84	65%
Buying institutions owning no common stock	<u>45</u>	<u>35%</u>
	129	100%
<u>Buying institutions owning common stock: holding period</u>		
Position less than a year	16	19%
Position between 1 and 2 years	7	8%
Position between 2 and 3 years	20	24%
Position between 3 and 4 years	10	12%
Position more than 4 years	<u>31</u>	<u>37%</u>
	84	100%
<u>Buying institutions owning common stock: changes in stock holdings</u>		
Decrease in stock holdings after convertible issue	66	79%
Stock holdings constant after convertible issue	2	2%
Increase in stock holdings after convertible issue	<u>16</u>	<u>19%</u>
	84	100%

Table V
Stock Price Effect of Short Sales

This table presents the results of an OLS regression analysis of the impact of short-selling activity on cumulative abnormal returns of convertible debt issuers at the issue date. The sample period is 2005-2006. The dependent variable is the cumulative abnormal return measured over the window [0, 1] relative to the issue date. In Model 1 we include all convertible issuers for which we have data on short sales. Model 2 solely focuses on firms that issue a convertible bond without repurchasing stock. We compute the change in short sales by dividing the difference between the short sales at the issue date and short sales over the period [-10 trading days; -4 trading days] by the trading volume over the period [-10 trading days; -4 trading days]. Combined offering is equal to one for combined offerings, and zero otherwise. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. Delta is the convertible's sensitivity for small stock price changes. Eq. 2 shows the formula for computing delta. $\text{Log}(\text{assets})$ corresponds to the natural logarithm of Compustat Item 6. Stock liquidity is the average trading volume divided by the average shares outstanding in the year prior to the offering. We take the natural logarithm for stock liquidity. Dividend yield is Compustat Item 21 divided by the market value, calculated as $\text{Item 25} * \text{Item 199}$. The stock price run-up is the firm-specific raw return over a period of 75 trading days before the announcement date, and is computed with CRSP Item RETX. Book leverage is Compustat Item 9 divided by Item 6. The market-to-book ratio is computed as $(\text{Item 25} * \text{Item 199} - \text{Item 60} - \text{Item 6}) / \text{Item 6}$. $\text{Log}(\text{proceeds})$ represents the natural logarithm of the total amount of money raised by the convertible issue. Industries are based on the Fama-French 12 industries classification. We report t-statistics based on Huber-White standard errors, to control for heteroscedasticity. *, **, *** indicate significance at the 10%, 5%, and 1% significance level, respectively.

	Cumulative abnormal returns	
	(1)	(2)
Change in short sales	-0.177*** (-2.664)	-0.160** (-2.423)
Combined offering	0.037** (2.560)	
Delta	-0.039 (-1.500)	-0.033 (-1.104)
Log(assets)	0.035 (1.384)	0.047 (1.533)
Stock liquidity	0.036* (1.914)	0.041 (1.623)
Dividend yield firm	-0.139 (-0.594)	0.125 (0.714)
Stock price run-up.	1.253 (0.345)	6.126 (1.629)
Book leverage	0.019 (0.647)	0.050 (1.265)
Market-to-book ratio	0.002 (0.286)	0.005 (0.623)
Log(proceeds)	-0.011 (-0.815)	-0.015 (-0.877)
Change in short sales * Stock liquidity	-0.036*** (-2.752)	-0.033** (-2.531)
Industry dummies	Yes	Yes
N	74	50
R ²	42.3%	48.7%

Table VI

Impact of Firm and Bond Characteristics on the Decision to Combine a Convertible Issue with a Stock Repurchase

This table presents the results of the estimation of a probit model. The sample period is 2003-2006. The dependent variable is a dummy that equals one for combined offerings and zero for uncombined offerings. We label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date. Decrease EPS is the change in diluted earnings per share that would occur without a stock repurchase. Bonus is the correlation between the change in annual CEO cash bonus (reported in Execucomp) and the change in diluted EPS by 2-digit SIC code for the year before the offering. Both Decrease EPS and Bonus are calculated as in Marquardt and Wiedman (2005). Delta is the convertible's sensitivity for small stock price changes. Eq. 2 shows the formula for computing delta. $\text{Log}(\text{assets})$ corresponds to the natural logarithm of Compustat Item 6. The stock price run-up is the firm-specific raw return over a period of 75 trading days before the announcement date, and is computed with CRSP Item RETX. Book leverage is Compustat Item 9 divided by Item 6. The market-to-book ratio is computed with Compustat data as $(\text{Item 25} * \text{Item 199} - \text{Item 60} - \text{Item 6}) / \text{Item 6}$. Volatility is the stock return variance in the year prior to the offering, estimated as the standard deviation of the monthly returns (reported in CRSP). Industries are based on the Fama-French 12 industries classification. t-statistics appear in parentheses and are calculated using Huber-White standard errors to control for heteroscedasticity. *, **, *** indicate significance at the 10%, 5%, and 1% significance level, respectively.

	Combined offering
Decrease EPS	2.236 (1.305)
Bonus	-0.385 (-0.902)
Delta	-0.328 (-0.751)
Log (assets)	-0.028 (-0.192)
Stock price run-up	-26.383 (-0.867)
Book leverage	-0.034 (-0.120)
Market-to-book ratio	0.099 (1.593)
Volatility	-3.063* (-1.956)
Industry dummies	Yes
Year dummies	Yes
N	425
Pseudo R ²	23.1%

Table VII:
Cumulative Abnormal Returns at the Announcement date

This table presents the results of the estimation of the cumulative abnormal returns. The sample period is 2003-2006. Panel A reports the observed cumulative abnormal returns. The estimation window for determining the abnormal returns is $[-1, 0]$; with day zero representing the announcement date. For the observed CARs, Patell Z statistics are reported in parentheses. For the difference of means test we report t-statistics in parentheses. Panel B shows the results of OLS regression analyses examining the effects of various characteristics on the announcement effects of uncombined convertible debt issues (Model 1) and uncombined stock repurchases (Model 2). We exclude combined offerings from the sample in Panel B (we label a convertible issue as a combined offering when the firm announces (either in SDC or Factiva) to use part of the proceeds of the convertible debt offering to repurchase stock, or when both transactions are announced on the same date). Delta is the convertible's sensitivity to small stock price changes. Eq. 2 shows the formula for computing delta. $\text{Log}(\text{assets})$ corresponds to the natural logarithm of Compustat Item 6. Stock liquidity is the average trading volume divided by the average shares outstanding in the year prior to the offering. We take the natural logarithm for stock liquidity. Dividend yield is Compustat Item 21 divided by the market value, calculated as $\text{Item 25} * \text{Item 199}$. The stock price run-up is the firm-specific raw return over a period of 75 trading days before the announcement date, and is computed with CRSP Item RETX. Book leverage is Compustat Item 9 divided by Item 6. The market-to-book ratio is computed as $(\text{Item 25} * \text{Item 199} - \text{Item 60} - \text{Item 6}) / \text{Item 6}$. $\text{Log}(\text{proceeds})$ in Model 1 represents the natural logarithm of the total amount of money raised by the convertible issue. $\text{Log}(\text{proceeds})$ in Model 2 is the natural logarithm of the size of the announced repurchase. Industries are based on the Fama-French 12 industries classification. t-statistics appear in parentheses and are calculated with Huber-White standard errors to control for heteroscedasticity. Panel C reports the expected cumulative abnormal returns for firms in combined offerings if they had announced the offerings separately. The estimations of the expected cumulative abnormal returns are based on the regression outcomes in Panel B. For the difference of means test we report t-statistics, which appear in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% significance level, respectively.

Panel A: Observed cumulative abnormal returns			
	N	Average	Median
	(1)	(2)	(3)
<u>Observed CARs</u>			
Combined offerings	54	-0.58% (-0.201)	-0.34%
Uncombined convertible issues	413	-4.09%*** (-24.419)	-3.82%
Uncombined stock repurchases	1,610	0.60%*** (9.108)	0.31%
<u>Difference of means</u>			
Observed CAR at combined offering versus observed CAR at uncombined convertible issue		3.51%*** (5.584)	
Observed CAR at combined offering versus observed CAR at uncombined stock repurchase		-1.18*** (3.368)	

Panel B: Impact of various characteristics on cumulative abnormal returns at the announcement date of uncombined convertible issues and stock repurchases

	Cumulative abnormal returns	
	Uncombined convertible issue	Uncombined stock repurchase
	(1)	(2)
Delta	-0.033** (-2.327)	
Log(assets)	0.020** (2.058)	-0.002** (-2.180)
Stock liquidity	0.005 (0.942)	-0.001 (-0.995)
Dividend yield	-0.078 (-0.701)	0.014 (0.289)
Stock price run-up	0.114 (0.135)	-0.853* (-1.827)
Book leverage	-0.013 (-1.261)	-0.007* (-1.797)
Market-to-book ratio	0.010*** (3.335)	-0.004*** (-3.895)
Log(proceeds)	0.006 (0.938)	0.001 (0.998)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
N	413	1,610
R ²	13.9%	4.3%

Panel C: Expected cumulative abnormal returns

	N	Average	Median
	(1)	(2)	(3)
<u>Expected CARs for firms that combine offerings...</u>			
if they had done a uncombined convertible issue instead	54	-3.48%	-3.73%
if they had done a uncombined stock repurchase instead	54	1.16%	1.40%
Sum	54	-2.32%	-2.43%
<u>Difference of means</u>			
Observed CAR at combined offering versus sum of expected CARs		1.74%** (2.165)	

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