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Convertible bond arbitrage, liquidity externalities, and stock prices ☆

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ABSTRACT

In the context of convertible bond issuance, we examine the impact of arbitrage activity on underlying equity markets. In particular, we use changes in equity short interest following convertible bond issuance to identify convertible bond arbitrage activity and analyze its impact on stock market liquidity and prices for the period 1993 to 2006. There is considerable evidence of arbitrage-induced short selling resulting from issuance. Moreover, we find strong evidence that this activity is systematically related to liquidity improvements in the stock. These results are robust to controlling for the potential endogeneity of arbitrage activity.

1. Introduction

Does arbitrage activity impact market quality? Although this question is not new, the proliferation of hedge funds in recent years has brought increasing attention to important questions regarding their impact on both liquidity and market efficiency (see, e.g., Securities and Exchange Commission (SEC) Staff Report, 2003). In this paper, we focus on one particular strategy: convertible bond arbitrage. The growth in the issuance of the equity-linked debt securities can be attributed, at least in part, to the growing supply of capital provided by hedging strategies. Convertible bond issuance has increased more than sixfold in the past 15 years, from $7.8 billion in 1992 to $50.2 billion in 2006 (Securities Data Corporation (SDC), Global New Issues database). In fact, the widespread belief among Wall Street practitioners is that convertible bond arbitrage hedge funds purchase 70% to 80% of the convertible debt offered in primary markets.[1]

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[1] While they do not constitute the entire universe of convertible bond arbitrageurs, hedge funds are an important subset. Mitchell, Pedersen, and Pulvino (2007), report that convertible arbitrage funds account for 75% of the market. Similar estimates can be found in the popular press. See, e.g., a *Wall Street Journal* article (Pulliam, 2004) on convertible bond issuance in 2004: "As much as 80% of those issues were bought by hedge funds, according to brokers who work on

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In order to clarify the intuition as to why convertible bond arbitrage might impact liquidity in underlying equity markets, it is useful to outline the basics of the strategy. The aim of convertible bond arbitrage is to exploit mispricing in convertible bonds, usually by buying an undervalued convertible bond (Henderson, 2005) and taking a short position in the equity.[2] A typical convertible bond arbitrage strategy employs delta-neutral hedging, in which an arbitrageur buys the convertible bond and sells short the underlying equity at the current delta. There are two important components of the strategy (shown in Fig. 1). The first is the initial position, which is set up so that no profit or loss is generated from very small movements in the underlying stock price and where cash flows are captured from both the convertible bond's yield and the short position's interest rebate. The second is dynamic hedging activity that follows the initial short position. If the price of the stock increases, the arbitrageur adds to the short position because the delta has increased. Similarly, when the stock price declines, the arbitrageur buys stock to cover part of the short position due to the decrease in delta. Aggregate equity market trading demand, in contrast, is expected to move in the opposite direction. For example, Chordia, Roll, and Subrahmanyam (2002) show a positive correlation between stock returns and order imbalances. This means that the dynamic hedging activities of convertible bond arbitrageurs, a class of investors trading against net market demand, should improve liquidity. This potentially positive role for hedge funds and other convertible bond arbitrageurs is contrary to the view of a destabilizing role for arbitrageurs in markets (see Mayhew, 2000, for a survey of this literature).

Although we do not have direct data on convertible bond arbitrage activity in individual stocks, we are able to identify firms and dates on which we know that initial arbitrage positions are taken: convertible bond issuance dates. We use these initial positions as a proxy for the presence of convertible bond arbitrageurs in the market for the stock (i.e., their future dynamic hedging). For the period 1993 to 2006, we calculate changes in short interest at issuance. Our approach is simple, yet it captures the strategy, as we observe large increases in short interest near convertible debt offerings. The methodology allows us to use aggregate data to identify the presence of a particular type of trader in equity markets.

Our proxy for arbitrage activity (initial change in short interest of issuing firms) has several advantages over using hedge fund databases to estimate convertible bond arbitrage activity. First, this provides a measure of *positions* taken by arbitrageurs in individual securities. Fund flows data in hedge fund databases are self-reported and therefore provide an incomplete measure of convertible bond arbitrage activity. The databases only partially represent the hedge fund universe, with many large funds choosing not to participate. Second, there can be style misclassification and funds reporting multiple strategies to hedge fund databases. Third, even if we measured the assets of the funds perfectly, the positions would still be unobservable due to the use of leverage.

We find considerable evidence of arbitrage activity (i.e., short selling in the stock at the date of bond issuance). We also find increased equity market liquidity following bond issuance. Moreover, these liquidity improvements are positively and significantly related to our proxy for convertible bond arbitrage activity. We also observe changes in stock return volatility. Following convertible debt issuance there is an average decrease in total return volatility as well as the idiosyncratic component of volatility. However, we do not find evidence of a systematic relationship between convertible bond arbitrage activity and these changes. We measure price efficiency using return autocorrelation and variance ratios (as in Lo and MacKinlay, 1988), to capture the extent to which stock prices follow a random walk. We do not observe significant changes in either of these measures following issuance. Taken together, we interpret the findings as evidence that convertible bond arbitrage activity tends to positively affect equity markets; however, this is primarily through liquidity improvements, not through stock prices.

A critical aspect of the analysis is that we do not observe arbitrage activity directly. Instead, we infer it based on changes in short interest at bond issuance. We conduct several tests to examine the validity of this important assumption.[3] First, we rule out the possibility that changes that we observe are due to changes in market-wide variables or to factors impacting firms with similar characteristics. We do this by conducting all analyses based on changes relative to a set of control firms (matched on industry, exchange, size, book-to-market, and turnover). Second, it could be that the short selling that we observe is due to valuation shorting resulting from news of the convertible bond issue, not due to classic convertible bond arbitrage. In order to address this issue, we hand-collect announcement dates for our sample of issues. The announcement and issue dates allow us to separate the impact of announcement period shorting versus issue period shorting, which we interpret as valuation shorting versus convertible bond arbitrage, respectively. In all of these tests, we find evidence consistent with the view that the short selling that we observe near convertible bond issues is due to convertible bond arbitrage. We also conduct robustness tests, in which we explicitly control for other potential sources of volume that can be associated with the

(*footnote continued*)
convertible-bond trading desks." *The Financial Times* (Skorecki, 2004) reports that hedge funds bought 70% of new issues in 2003 and that 95% of trades in converts are made by hedge funds. The evidence presented in this study of large increases in short selling near issuance is consistent with that view.

[2] A convertible bond is a hybrid debt instrument: it is a bond that may, at the option of the holder, be converted into stock at a specified price for a given time period. Due to the conversion option, convertible bond purchasers may profit from equity price gains, but they also have downside protection since they are guaranteed bond payments (and, in the event of bankruptcy, are senior to equity holders).

[3] We thank an anonymous referee for encouraging this line of inquiry.