



# Merger arbitrage short selling and price pressure<sup>☆</sup>



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## ABSTRACT

We evaluate the over-valuation hypothesis and merger arbitrage price pressure hypothesis as potential explanations for the observed negative returns to stock acquirers around merger announcement. Using daily shorting flow data, we show that the majority of the negative announcement returns can be attributed to price pressure induced by merger arbitrage short selling. Additional analysis of shorting activity and associated returns for floating-exchange-ratio stock acquirers at deal closings and among withdrawn stock deals further supports merger arbitrage price pressure explanation. We also find merger arbitrage activity increases with estimated arbitrage spread on a daily basis. As a whole, the results suggest that merger arbitrageurs play a critical role in stock mergers.

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## 1. Introduction

It is well documented that stock acquirers experience large negative returns at merger announcements. One standard explanation provided in the literature is overvaluation of acquirers' stock price. This view posits that stock acquirers use their over-valued currency to purchase targets and markets correct misvaluation when such deals are announced (see, e.g., [Shleifer and Vishny, 2003](#)).<sup>1</sup> One implicit assumption in this explanation is that excess demand curves for stocks are perfectly elastic and price changes reflect all relevant information. Merger arbitrage price pressure explanation, a less explored but equally important hypothesis, relaxes this assumption. In particular, with stock mergers, if excess demand curves for stocks are downward sloping and arbitrage-driven short sellers significantly increase the effective supply of shares, equilibrium price may decline in the short term. [Mitchell et al. \(2004\)](#) provide some evidence that merger arbitrage short selling can explain nearly half of the negative announcement returns for stock acquirers.

This research performs direct tests that are not found in the prior literature to evaluate these two explanations and provides new evidence on merger arbitrage short selling price pressure hypothesis. One innovation is the use of newly available daily short selling flow data that more precisely quantify the magnitude and timing of short selling activity in stock mergers at various different stages in the deal process. Rather than use monthly short interest to infer short selling activity at merger announcement, we

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<sup>1</sup> A partial list of papers that provide empirical evidence on overvaluation includes [Akbulut \(2013\)](#), [Chang \(1998\)](#), [Dong et al. \(2006\)](#), [Fu et al. \(2013\)](#), [Harford et al. \(2012\)](#), [Masulis et al. \(2007\)](#), [Myers and Majluf \(1984\)](#), [Savor and Lu \(2009\)](#), [Servaes \(1991\)](#) and [Travlos \(1987\)](#).

employ data on the actual short selling activity over the exact same 3-day window when the abnormal returns are measured to more accurately map between shorting activity and returns.<sup>2</sup> Moreover, the novelty of the data allows us to test the price pressure conjecture proposed by Savor and Lu (2009) when mergers are terminated.

Another important feature of our study is the use of detailed information of methods of payment, exchange ratios, pricing periods, closing dates, withdrawn dates etc. that is hand collected from merger documents through the EDGAR filing system of the SEC. As we show, such information allows us to conduct sharper tests to better differentiate between the over-valuation explanation and short selling price pressure explanation.<sup>3</sup> Finally, our research also examines how short sellers adjust their daily trading activity to important deal characteristics such as estimated arbitrage spread, an important source of returns to merger arbitrageurs. This new analysis helps to advance our understanding of merger arbitrage, an increasingly active trading practice in the capital markets.<sup>4</sup>

Cash mergers and fixed-exchange-ratio stock mergers are the two major types of deals in our sample. Depending on deal types, a merger arbitrageur is expected to set up different strategies. In a fixed-exchange-ratio stock merger, an arbitrageur typically longs the target and shorts the acquirer based on the announced exchange ratio to remain hedged. He then uses shares received from the acquirer to cover the short position when the deal is completed. In a cash merger, an arbitrageur has little need to set up short position in the acquirer since there is no swap of shares at deal completion. As expected, we find that these two types of acquirers exhibit distinct patterns in short selling and returns. At merger announcement, cash mergers on average experience no significant changes in short selling and stock prices, suggesting little interest from short sellers. In sharp contrast, fixed-exchange-ratio stock acquirers witness a very pronounced spike in short selling volume and large negative abnormal returns in the 3 days around announcement, indicating active participation of short sellers in these deals.

To gauge the amount of negative returns that can be attributed to the short selling activity over the 3 days surrounding the merger announcement for these stock acquirers, we estimate a similar two-stage regression proposed in Mitchell et al. (2004; MPS), but make two important improvements in the test design. First, instead of using relative market cap of an acquirer to its target to proxy for the exchange ratio that guides arbitrageurs, our test directly employs the actual fixed exchange ratios collected from merger documents. This mitigates the concern that relative size could also proxy for over-valuation (Dong et al., 2006). Second, rather than use only completed deals, our test includes all announced deals. This factors the risk of potential deal failure that faces merger arbitrageurs when they establish their position at announcements. Our estimation shows that about 62% of the negative reaction is due to merger short selling in the same 3-day window. Specifically, after controlling for changes in short selling, the average announcement return declines to  $-1.48\%$ , compared to  $-3.87\%$  when the effects of merger arbitrage short selling are not controlled for. This result suggests that the large negative returns to the fixed-exchange-ratio stock acquirers are predominantly driven by the downward price pressure from merger short arbitrage.

We cannot rule out overvaluation explanation here because the announcement returns coincide with both the release of new information and a shift in supply from merger arbitrage short selling. To help evaluate this alternative story, we conduct additional tests with floating-exchange-ratio stock mergers, withdrawn mergers, deal closings and Rhodes-Kropf et al. (2005) market-to-book decomposition.

Floating-exchange-ratio stock deals offer a cleaner setting to differentiate the two hypotheses. Different from fixed-exchange-ratio stock mergers that set the exchange rate at merger announcements, the exchange ratios in floating-exchange-ratio stock deals are only determined until the end of the pricing period which is usually several months after merger announcement and lasts about two to three weeks and typically reveals little new information about the likelihood of merger completion. If arbitrage-driven short selling is active in these deals, we expect to see increased shorting at the end of the pricing period and associated downward price reaction. Since the pricing period typically spans less than a month (the average pricing period is only 15 days in our sample), our daily shorting data allow us to zoom in to the end of the pricing period when all the activities are expected to happen. This sharpens the analysis that uses monthly short interest data. We find that increased shorting concentrates only in the 2 days leading to the end of the pricing period accompanied by significant negative abnormal returns of  $-1.32\%$ . This finding further supports the explanation of price pressure from merger arbitrage shorting rather than overvaluation story because these effects are independent from the announcement effect.

Next, we examine failed mergers. The misvaluation hypothesis and merger arbitrage price pressure hypothesis also give distinct predictions to short selling patterns and returns around deal termination dates. Since investors cannot fully anticipate deal failure at announcement, we expect to see increase in abnormal short selling and negative price reaction in stock acquirers as merger arbitrageur set up their strategy. When a stock acquirer announces to withdraw the deal, merger arbitrage price pressure hypothesis predicts a decrease in abnormal short selling and positive price reaction as these traders exit their strategy by purchasing back acquirers' shares which pushes up stock prices. By contrast, the misvaluation hypothesis does not give such

<sup>2</sup> Using monthly short interest around merger announcement month to infer the effect of arbitrage-driven short selling on the 3-day  $[-1, 1]$  returns centered around merger announcement date 0 could either under- or over-estimate the effect. For example, if a stock merger is closed within two months after announcement, using change in monthly short interest from the month prior to announcement to the month after announcement would underestimate merger arbitrage shorting (the change of monthly short interest would be zero in this case). On the other hand, if an arbitrageur establishes some short position outside the 3-day window, e.g., two days after announcement date, this amount of shorting technically has little to do with the 3-day announcement returns but using change in monthly short interest would attribute this to the 3-day returns.

<sup>3</sup> Prior research shows that SDC does not always have accurate information on merger deals. For example, Boone and Mulherin (2007a) provide evidence on incomplete reporting of termination provisions on the SDC database. The SEC filings indicate that 91% of takeovers had a termination provision while the SDC data report only 66%. Kisgen et al. (2009) also report that information from SDC on the advisors providing the fairness opinions is sporadic and inaccurate. They find that more than one-third of the time SDC reports inadequate information about fairness opinion advisors.

<sup>4</sup> Capital devoted to merger arbitrage hedge funds has grown from \$233 million from 1990 to \$28 billion by 2007 according to Hedge Fund Research (2008).

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