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Dynamic Arbitrageurs' Long-Run Impacts on Convertible Bond Issuers' Stock Prices

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Abstract

I examine convertible bond arbitrageurs' long-run impact on convertible bond issuers' stock prices. I find a negative relation between arbitrage activity around convertible bond issues and convertible bond issuers' long-run stock returns. Average three-year holding period return of convertible bond issuers with no-arbitrage activity around their convertible bond issues is two times larger than that of convertible bond issuers with arbitrage activity around their convertible bond issues. Overall, I show that convertible bond arbitrageurs' price impact is not limited to short-term [1], but it also has a long-term component.

Keywords

Convertible Bond, Stock Prices

1. Introduction

A convertible bond (CB) is a hybrid security that resembles to regular bond in that it makes fixed coupon payments, and equity in that it gives the bondholder the option to convert the bond into issuer's stock. CB market in the U.S. has been growing fast. CB issues increased from $15.1 billion in 1993 to $61.6 billion in 2007 [2]. Main traders in CB issues are hedge funds, which purchase around 70% to 80% of offerings in primary markets to arbitrage [3] [4]. The increase in CB arbitrage has significant impacts on the market's reaction to CB issues. Because of increased arbitrage activity, the market's reaction to convertible bond issue announcements becomes two times more negative since 2000 compared to 1990s [1].

The arbitrageurs' short selling around CB issues may cause short-term and long-term price pressure.[1] The short-lived price pressure caused by arbitrage re-

[1]Shkilko *et al.* [5] present supportive evidence that short sellers may occasionally create price pressure.

lated short selling is studied extensively in the literature [1]. However, empirical evidence regarding to long-term price pressure caused by CB arbitrage related short selling is limited. I expect CB arbitrage related short selling to have long-term price pressure, because Lynch and Mendenhall [6], Dhillon and Johnson [7], and Mazzeo and Moore [8] provide empirical evidence that part of price pressure effect is unabated. A possible long-term component of price pressure is also consistent with Shleifer's [9] downward sloping demand curve for securities. To this end, I contribute to the literature by examining the long-lived part of price pressure induced by CB arbitrage around convertible bond issues. Specifically, I ask: do CB arbitrageurs have long-term impacts on CB issuers' stock prices?

By analyzing the returns of convertible debt issuers for 3-year period, I find that holding period returns (HPR) of CB issuers that experience arbitrage activity around their CB issues are 7.80%, 20.32% and 34.83% in 1-, 2-, and 3-year horizons.[2] On the other hand, HPRs of CB issuers that do not experience arbitrage activity around their CB issues are 40.22%, 61.07% and 70.03% in 1-, 2-, and 3-year horizons. Average three-year HPR of CB issuers with no-arbitrage activity around their CB issues is two times larger than that of CB issuers with arbitrage activity around their CB issues.[3] A wealth relative comparison also shows that, except 6-month horizon, the no-arbitrage sample's stock returns outperform the arbitrage sample's stock returns from 1st month of issue to 36th month.

In a multivariate analysis, I examine the relation between the CB arbitrage activity and future stock price movements of CB issuers. Interestingly, I find a negative relation between CB issuers' stock returns and CB arbitrage activity in long-run. The coefficients of the CB arbitrage proxies are (−0.098), (−0.0806), (−0.0669), (−0.0666), and (−0.0551) in 1-, 2-, 6-, 12-, and 18-month periods in multivariate analysis. The magnitudes of the coefficients are decreasing in time. CB arbitrage proxy has a marginally significant negative impact in 24-month period and after 24 months impact completely disappears.

A possible explanation for the long-run price impact of CB arbitrage activity on CB issuers' stock prices is the following. As Choi *et al.* [3] state the arbitrage activity has two steps. In the first step, position is created and in the second step, CB arbitrageurs trade in the opposite direction of the market. Since arbitrage strategies are profitable in long-run [10], it is expected that the second step of the strategy will take place in a long-time horizon. Thus, CB arbitrageurs may put price pressure of the stocks they short by continually trading in the opposite side of price movements for a long time. This explanation is also consistent with Kondor's [11] theoretical prediction that beyond a threshold level, arbitrageurs may cause prices to diverge. Overall, my findings indicate that arbitrage induced short selling around convertible bond offerings has a negative long-run impact on CB issuers' stock prices.

[2]Following Choi *et al.* [3], I use change in short interest around convertible bond issues as a proxy for the presence of convertible bond arbitrageurs. The data section explains the proxy calculation procedure in detail.

[3]From here on, I refer CB issuers with (no-)arbitrage activity around their CB issues as (no-) arbitrage sample.

This study contributes to short selling, convertible bond, and convertible bond arbitrage literature. One line of research documents that short sellers' actions predict short-run stock returns [12] [13] [14] and short sellers have superior abilities to interpret publicly available data [15]. My findings extend short-selling literature by showing that CB arbitrage related short selling can have long-term impacts on stock returns. Thus, examining types of short-sellers can improve our understanding of short-selling activities. Theoretical models predict that convertible bond issue leads efficient investment decisions [16] [17] [18]. However, using samples of convertible debt issuers prior to 1990, Spiess and Affleck-Graves [19] [20] and Lewis *et al.* [21] find that firms experience poor long-run stock price and operating performance following convertible debt offers. I contribute to the convertible bond literature by showing that the CB arbitrage activity has a negative long-term effect on stock CB issuers' stock prices. Finally, I add to the convertible bond arbitrate literature by documenting that price impact of CB arbitrageurs is not limited to short-term [1] but it also has a long-term component.

The paper proceeds as follows. Section 2 presents hypothesis development and related literature. Section 3 describes data and sample selection. Section 4 explains the long-run price performance measures. Section 5 presents and discusses the findings of paper. Section 6 concludes.

2. Hypothesis Development and Related Literature

Arbitrage related short selling around CB issues creates price pressure. For example, due to arbitrage induced short selling CB issuers experience negative abnormal stock returns around CB issues [1] [2]. While De Jong *et al.* [2] and Duca *et al.* [1] document short-term price pressure of arbitrage related short selling around CB issues, CB arbitrageurs can also create a long-term price pressure. Consistent with Shleifer's [9] downward sloping demand curve for securities, Lynch and Mendenhall [6], Dhillon and Johnson [7], and Mazzeo and Moore [8] find that long lived part of price pressure effect is persistent. In addition, arbitrage-like strategies are expected to be profitable in long run [10] and dynamic arbitrage's second leg is executed in long run [3].[4] Hence, I expect arbitrage activity around CB offerings to have a long-lived price effect. Duca *et al.* [1] find that short-run impact of dynamic arbitrage on stock price is negative. Thus, I expect long-run impact of dynamic arbitrage on stock price to be negative. Specifically, I test the following hypothesis.

Hypothesis 1: *Arbitrage induced short selling around convertible bond offerings have negative long-run impact on CB issuers' stock prices*.

3. Data and Sample Selection

The sample consists of all convertible bond issues (public, private, and Rule 114a)

[4]Convertible bond arbitrage has two phases, in the first phase hedge funds buy convertible bond at issue and short the underlying stock. In the second phase, arbitrageurs adjust their positions by shorting the stock if prices go up and buy it if prices go down [3].

by U.S. publicly traded firm from Jan-2006 to Dec-2012.[5] I obtain accounting data from the Compustat Fundamentals Annual database, stock price related data from the Center for Research in Security Prices and convertible bond offerings from the Securities Data Corporation Database. Choi *et al.* [3] develop the proxy for convertible bond arbitrageurs and numerous studies employ this proxy in their analyses [2] [22]. I follow their methodologies to create CB arbitrage proxy. The proxy uses changes in stock's short interest following convertible bond issuance to measure convertible bond arbitrage activity. As in Choi *et al.* [3], I define the proxy as: *Delta* SI_t, which is the change in short interest (number of shares) during the period t, scaled by total shares outstanding in period $t-1$. The change in short interest is the difference between short interest in month t and short interest during month $t-1$.

Specifically, I obtain monthly short interest data of convertible debt issuers from the Compustat Supplemental Short Interest Files from Jan-2006 to Dec-2012. Following Choi *et al.* [3] and Duca *et al.* [1], I match short interest data to convertible bond issues. When a bond is issued prior to the cut off trade date of a given month (3 days before the 15th of each month), I match the issue date with short interest for that month. Otherwise, the short-interest data for the next month is matched to the issue month. Since September 2007 short interest data is reported twice in month, I adjust my algorithm to bi-monthly reporting starting that month. I normalize the change in short interest by the number of shares outstanding measured on trading date-20 relative to the convertible bond issue date.

Table 1 summarizes the descriptive statistics of the sample. Number of issues per year is 67, mean change in short interest rate around convertible bond issues is around 1.51, and average shares outstanding fluctuates from year to year. I divide the convertible bond issuers' sample into two subsamples: arbitrage and no-arbitrage subsamples. When the dynamic arbitrage proxy (*Delta* SI_t) is positive then the firm is included in arbitrage sample, otherwise firm is included in non-arbitrage sample.

4. Long-Run Price Performance Measures

The long-run price performance measures are calculated following Ritter [23]. These measures are commonly used in literature [19] [20]. Main stock price performance variables are *average market adjusted returns* (*AR*), *cumulative average return* (*CAR*), *holding period return* (*HPR*), and *wealth relative* (*WR*). In return calculations months are defined as successive 21-trading-day periods relative to CB issue date. Hence, first month consists of event days 2 - 22, second month consists of event days 23 - 43, and so on. The CRSP daily price files are the source of returns data.

Monthly market adjusted returns are calculated as the monthly raw return on a stock minus the monthly CRSP value-weighted market index for the corresponding

[5]This is the period I have access to the short-interest data.

Table 1. Descriptive statistics.

Issue year	Number of issues	Change in short interest		Shares outstanding	
Year	N	Mean	Std. Dev.	Mean	Std. Dev.
2006	69	0.8853	3.3365	182,111.68	387,055.46
2007	79	2.0595	3.2143	115,093.06	214,482.7
2008	67	1.2382	2.6363	176,394.45	357,651.76
2009	78	1.9771	2.7208	251,544.17	776,325.63
2010	59	0.8251	5.2471	638,575.61	1,838,559.92
2011	57	1.9653	2.1677	627,543.61	3,836,712.22
2012	60	1.6867	2.3589	139,105.15	211,435.88

This table represents number of convertible debt issues per year from 2006 to 2012. N is the number of issuers. Change in short interest is calculated by following Choi *et al.* [3] and Duca *et al.* [1] algorithms. If a bond is issued before the cutoff trade date of a given month (3 trading days prior to the 15th of each month), I match the issue date with the short interest data of the month. Otherwise, I match the issue date with short interest data for the following month. Change in monthly short interest is scaled by the number of shares outstanding measured on trading day -20 relative to the debt issue date.

21-trading-day period. The market adjusted return for stock i in month t is defined as:

$$ar_{i,t} = r_{i,t} - r_{m,t}, \tag{1}$$

where $r_{i,t}$ is raw return of the firm i month t and $r_{m,t}$ is the CRSP value-weighted market return in month t.

The average market-adjusted return on a portfolio of n stocks for month t is the equally-weighted arithmetic average of the market-adjusted returns:

$$AR_t = \frac{1}{n}\sum\nolimits_{i=1}^{n}\left(r_{i,t} - r_{market,t}\right), \tag{2}$$

where $r_{i,t}$ is the total return on the issuer firm in event month t, and $r_{market,t}$ is the return on CRSP value-weighted market portfolio. The t-statistics are calculated as $AR_t * \sqrt{n_t}/Sd_t$, where AR_t is the average market adjusted return for month t.

The cumulative market adjusted returns from month q to month s is the summation of the average market-adjusted returns:

$$CAR_{q,s} = \sum\nolimits_{t=q}^{s} AR_t \tag{3}$$

Following Ritter [23] as an alternative to cumulative market adjusted returns, I also compute holding period returns for 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, and 36 months. For each time period t holding period return is calculated as:

$$HPR_t = \prod\nolimits_{t=1}^{n}\left(1 + r_{i,t}\right) - 1, \tag{4}$$

where $r_{i,t}$ is the daily return on stock i.

To have a clear interpretation of holding period return, in the spirit of Ritter [23], I calculate wealth relative as a performance measure. Wealth relative defined as:

$$WR_t = \frac{1 + \text{average } t \text{ month total return of no arbitrage firms}}{1 + \text{average } t \text{ month total return of arbitrage firms}}. \quad (5)$$

A wealth relative greater (less) than 1.00 can be interpreted as no-arbitrage sample outperforms (underperforms) relative to the arbitrage sample.

5. Results

5.1. Empirical Evidence Related to Arbitrageurs' Long-Term Price Pressure

Table 2 reports the average market-adjusted returns (AR) and cumulative market-adjusted returns (CAR) for 36 months following the convertible bond issue. ARs in 12-, 24-, and 36-month periods (−0.19, −0.14, −0.13) are negative and statistically significant at 5% level. The negative adjusted returns are more frequent in the first and second years compared to third year. The lowest negative adjusted return is observed in the first month of the CB issue.

The results in Table 2 indicate a trend in adjusted returns. In the first month of CB issue firms experience lowest negative returns, the frequency and magnitude of the negative returns are higher in the first and second years compared to third year. Stock price performance seems to be affected by the CB issue and impact continues around 2 - 3 years. The trend in cumulative abnormal returns is similar to the trend in the adjusted returns. Cumulative abnormal returns decrease in first two years and we observe lower negative CARs in year two compared to year three. Table 2 analysis reveals a long-run trend in the stock price performance of convertible debt issuers for the three-year period.

Next, I divide the sample into arbitrage and no-arbitrage subsamples and compare the performances of the two subsamples. I calculate the performance measures following Ritter [23] and summarize performance comparisons of two subsamples in Table 3. Table 3 presents no-arbitrage sample has always positive holding period returns. However, arbitrage sample has negative holding period returns in 1- and 3-month horizons. After 6-month horizon both samples have positive holding period returns, but no-arbitrage sample has larger holding period returns than the arbitrage sample. HPRs of no-arbitrage sample are 40.22%, 61.07% and 70.03% in 12-, 24-, and 36-month horizons. Whereas, HPRs of arbitrage sample are 7.80%, 20.32% and 34.83% in 12-, 24-, and 36-month horizons. Thus, stocks that CB arbitrageurs are inactive outperform the stocks that CB arbitrageurs are active traders.

Ritter [23] argues that some benchmark is necessary to quantify the long-run performance and proposes wealth relative measure for this purpose. Thus, I also employ the wealth relative measure to compare long-run stock price performance of the arbitrage and non-arbitrage subsamples. Note that a wealth relative (WR) greater (less) than 1 implies that no-arbitrage sample outperforms (underperforms) relative to the arbitrage sample. Table 3 wealth relative column shows that, except 6-month horizon, the no-arbitrage sample's stock prices outperform the arbitrage sample's stock prices. The outperformance is more pronounced in year three compared to years one and two.

Table 2. Abnormal returns of convertible debt (CD) issuers in 2006-2012.

Month of CB issuing	AR	t-stat.	Number of issuers	CAR
1	−0.2297**	−2.17	467	−0.2297
2	−0.1928**	−2.40	467	−0.4225
3	−0.1812**	−2.10	466	−0.6037
4	−0.1090	−1.60	466	−0.7127
5	−0.0936*	−1.82	466	−0.8063
6	−0.1623*	−1.76	466	−0.9686
7	−0.1152*	−1.70	465	−1.0838
8	−0.0757	−0.93	465	−1.1595
9	−0.1214*	−1.93	465	−1.2809
10	−0.1388**	−2.28	459	−1.4197
11	−0.0734	−0.67	457	−1.4931
12	−0.1918**	−2.28	457	−1.6849
13	−0.1494**	−2.42	455	−1.8343
14	−0.0590	−0.81	447	−1.8933
15	−0.1181*	−1.96	439	−2.0114
16	0.0533	0.22	433	−1.9581
17	−0.0830*	−1.79	421	−2.0411
18	−0.1249*	−1.78	421	−2.1660
19	0.1435	0.49	403	−2.0225
20	−0.1685**	−2.26	396	−2.1910
21	−0.1219**	−2.20	388	−2.3129
22	0.9515	0.92	381	−1.3614
23	−0.1253*	−1.74	376	−1.4867
24	−0.1499**	−1.99	375	−1.6366
26	0.5233	0.78	372	−1.1133
27	−0.1591	−1.60	368	−1.2724
28	−0.1169	−1.55	364	−1.3893
29	−0.1267	−1.53	359	−1.5160
30	−0.0598*	−1.85	358	−1.5758
31	−0.0418	−1.09	355	−1.6176
32	−0.0384	−0.98	348	−1.6560
33	−0.0923	−1.09	339	−1.7483
34	−0.0803	−1.59	331	−1.8286
35	−0.1196**	−1.98	325	−1.9482
36	−0.1333**	−2.03	312	−2.0815

Average market-adjusted returns (AR) and cumulative average return (CAR), in percent, with associated t-statistics for the 36 months after issuing the convertible debt. $AR_t = \frac{1}{n}\sum_{i=1}^{n}\left(r_{i,t} - r_{market,t}\right)$, where $r_{i,t}$ is the total return on the issuer firm in event month t, and $r_{market,t}$ is the return on CRSP value-weighted market portfolio. The t-statistics are calculated as $AR_t * \sqrt{n_t} / Sd_t$, where AR_t is the average market adjusted return for month t, n is the number of observations in month t, and Sd_t is the cross-sectional standard deviations of the adjusted returns in month t. CAR is the cumulative average adjusted returns in month t. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

Table 3. Distribution of holding period return (HPR).

Month of issuing	No arbitrage sample	Arbitrage sample	Wealth Relative
1-month	0.0998	−0.0128	1.1141
3-month	0.0297	−0.0253	1.0564
6-month	0.0769	0.1296	0.9533
9-month	0.2520	0.1036	1.1345
12-month	0.4022	0.078	1.3007
15-month	0.2790	0.1647	1.0981
18-month	0.3245	0.1966	1.1069
21-month	0.3180	0.1869	1.1105
24-month	0.6107	0.2032	1.3387
27-month	0.6282	0.2298	1.3240
30-month	0.7131	0.2493	1.3712
33-month	0.6623	0.3245	1.2550
36-month	0.7003	0.3483	1.2611

For each time period holding period return is calculated as $HPR_i = \prod_{t=1}^{n}(1+r_{i,t})-1$, where $r_{i,t}$ is the daily return on stock *i*. Arbitrage sample is the sample of firms that change in short interest (ΔSI) is positive, in the no arbitrage sample ΔSI is negative or equals to zero. Wealth relative is calculated, following Ritter [23], as (1 + No arbitrage sample HPR/1 + arbitrage sample HPR). A wealth relative greater (less) than 1.00 can be interpreted as no-arbitrage sample outperforms (underperforms) arbitrage sample.

Table 2 shows a long-run trend exists in stock price performance in overall sample. When I separate the sample according to arbitrage activity (Table 3), I find that in the long-run stocks that don't experience CB arbitrage activity outperforms the ones that experience CB arbitrage activity. The mean HPR of no-arbitrage sample is more than twice of that of arbitrage sample at the end of third year. These results indicate that the arbitrageurs may have a negative impact on CB issuers' stock prices in long-run.

5.2. Multivariate Analysis

I also examine the impact of CB arbitrageurs on CB issuers' stock prices in a multivariate setting. Similar to Ritter [23] and Engelberg *et al.* [15], I run regressions that show the direct impact of arbitrage activity on CB issuers' stock returns. Specifically, I estimate the following model:

$$\text{Return}_i = b_0 + b_1 \Delta SI_i + b_2 \log\left(\text{volume}_i\right) + b_3 \text{market\_}ret_i + \varepsilon_i, \quad (6)$$

where $Return_i$ is the raw return of CB issuer in a given period, measured by using 21 trading days in a given month. ΔSI_i the change in short interest (proxy for arbitrage activity) is calculated by following Choi *et al.* [3] and Duca *et al.* [1] algorithms, detailed procedure given in Table 1. $\log(volume)_i$ is total number of shares traded daily in a given month. $Market\ ret_i$ is the return on the CRSP value weighted market index. Table 4 reports the direct impact of arbitrage activity on CB issuers' stock returns over three-year period. The standard errors used to compute the t-statistics are adjusted for heteroskedasticity and within-firm clustering.

The first finding of Table 4 is that arbitrage proxy is statistically significant and negative up to 24 months, but in 30 and 31 month it is insignificant. The coefficient of the arbitrage proxy is (−0.098) with a t-stat of (−2.97) in the first month. Thus, even after controlled for volume and market return, the CB arbitrage activity decreases the first month returns of CB issuers by 9.8%. This negative impact continues around 24 moths. The coefficients of the arbitrage proxies are (−0.0806), (−0.0669), (−0.0666), and (−0.0551) in 2-, 6-, 12-, and 18-month periods. In the 6-month period the coefficient is statistically significant at alpha of 0.05 level, and all other coefficients are statistically significant at alpha of 0.01 level. The impact is marginally significant at alpha of 0.1 level for 24-month period. The magnitudes of the coefficients are decreasing in time; the largest impact is found in the first month and smallest impact found in 18-month period. We still observe a negative impact in 24-month period, but this is marginally significant and in 30 and 31 months impact completely disappears. Findings in Table 4 provide multivariate support for the findings in Table 3 and show that CB arbitrage activity has a negative impact on CB issuers' returns in long-run (around 24 months).[6]

Table 4. Return as a function of ΔSI.

	Variable	Coeff.	t-stat		Variable	Coeff.	t-stat
1-month	Intercept	−4.2545***	−6.80	18-month	Intercept	−2.7181***	−4.02
	Delta SI.	−0.0978***	−2.97		Delta SI.	−0.0551***	−2.70
	Volume	0.4057***	6.68		Volume	0.1591***	3.98
	Market ret.	−0.6556	−0.29		Market ret.	2.0396*	1.76
	R-Square	0.0997			R-Square	0.0576	
	N	468			N	413	
2-month	Intercept	−4.3042***	−5.79	24-month	Intercept	−4.2256***	−5.94
	Delta SI.	−0.0806***	−3.39		Delta SI.	−0.0349*	−1.65
	Volume	0.2520***	5.74		Volume	0.2460***	5.82
	Market ret.	−0.8206	−0.58		Market ret.	0.6817	0.63
	R-Square	0.0852			R-Square	0.0902	
	N	467			N	375	
6-month	Intercept	−4.9289***	−5.81	30-month	Intercept	−2.0104***	−6.58
	Delta SI.	−0.0669**	−2.44		Delta SI.	0.0056	0.62
	Volume	0.2896***	5.77		Volume	0.1152***	6.36
	Market ret.	2.9198*	1.77		Market ret.	1.6019***	3.38
	R-Square	0.0811			R-Square	0.1279	

[6]For robustness I also conduct a risk adjusted return analysis of four factor model, Fama and French [24] three factors and Carhart [25] momentum factor. This analysis also provides similar results. For brevity I do not report the results. The findings are available upon request.

Continued

	N	466			N	358	
12-month	Intercept	−4.9138***	−6.26	31-month	Intercept	−1.9411***	−5.27
	Delta SI.	−0.0666***	−2.69		Delta SI.	0.0021	0.20
	Volume	0.2862***	6.16		Volume	0.1127***	5.15
	Market ret.	2.2155	1.58		Market ret.	1.6552***	2.76
	R-Square	0.0933			R-Square	0.0868	
	N	458			N	355	

The regression model is $\text{Return}_i = b_0 + b_1 \Delta SI_i + b_2 \log(\text{volume}_i) + b_3 \text{market\_}ret_i + \varepsilon_i$. Return_i is the raw return of CB issuers in a given period, measured by using 21 trading days in a given month. ΔSI_i the change in short interest is calculated by following Choi *et al.* [3] and Duca *et al.* [1] algorithms, detailed procedure given in Table 1. $\log(\text{volume}_i)$ is total number of shares traded daily in a given month. $\text{market\_}ret_i$ is the return on the CRSP value weighted market index. The standard errors used to compute the t-statistics are adjusted for heteroskedasticity and within-firm clustering. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

6. Conclusions

I examine CB dynamic arbitrageurs' impacts on CB issuers' stock prices in long-run. I proxy for arbitrage activity around convertible bond issues applying proxy developed by Choi *et al.* [3]. I find that the holding period returns of no-arbitrage sample are 40.22%, 61.07% and 70.03% in 1-, 2-, and 3-year horizons. However, holding period returns of arbitrage sample are 7.80%, 20.32% and 34.83% in 1-, 2-, and 3-year horizons. These findings show that the stocks that CB arbitrageurs are inactive perform better than the stocks that arbitrageurs are active traders in two- to three-year period. A multivariate analysis also finds that arbitrage activity around CB issues negatively affects CB issuers' returns in short- and long-time periods (*i.e.* around 18 - 24 months).

My findings extend short selling literature by documenting that CB arbitrage related short selling can have long-term impacts on stock returns. Hence, examining types of short-sellers can improve our understanding of short-selling activities. I also add to the convertible bond literature by showing that the CB arbitrage activity has a negative long-term effect on stock CB issuers' stock prices. Finally, my findings contribute to the convertible bond arbitrate literature by documenting that price impact of CB arbitrageurs is not limited to short-term, but it also has a long-term component.

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