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Futures mispricing, order imbalance, and short-selling constraints

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ABSTRACT

The aim of the research is to determine how the lifting of price restrictions on short sales and security-lending sales affects market efficiency, liquidity and arbitrage opportunities. The study examines trading behaviors of large and small traders separated by their transaction costs and shows the lifting of price restrictions strengthens the correlation between extreme order imbalance and extreme mispricing. Also, autocorrelations of the underpricing and overpricing persist longer, in particular for big traders, and so do those of buy-side and sell-side order imbalances. However, the outcomes for the post-lifting market efficiency are mixed. This paper provides evidence that lifting price restrictions enhances informed trading and the lead–lag relationship between mispricing and order imbalance in the cash and futures markets.

1. Introduction

Although short selling[1] has existed for years in major financial markets around the world, its effects on market efficiency, especially pricing efficiency, remain of interest to financial researchers. Governments often restrict short selling in an attempt to keep security prices high, but how short selling impacts capital markets is highly controversial, with regulation varying widely across countries and capital markets. A variety of empirical or theoretical studies over the past decades point to impediments associated with short sales as possibly creating arbitrage opportunities. The measure of these opportunities is mispricing. We are interested in examining whether lifting short-sale price restrictions on the underlying component stocks improves the mispricing, and whether increased liquidity in the stock market caused by eliminating price restrictions spills into the futures market.

The price restrictions on short sales or securities lending sales[2] in Taiwan come from a trading rule stipulating that the prices of short selling or security lending selling (lending selling afterwards) must be equal to or above the previous closing price. Short sales differ from lending sales in several ways. Shares for lending sales come from the Security Lending Center, securities finance

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[1] Short selling refers to the ability of an investor to sell a borrowed security to a third party.

[2] Securities lending, or stock lending, refers to the lending of securities by one party to another. Security-lending sale thus refers to a transaction in which the seller borrows the stocks for sale.

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companies, and brokerage firms. Shares for short selling come from securities finance companies and brokerage firms. The initial margin is around 140% for lending sales but only 90% for short sales. The borrowing fee is fixed at 0.08% for short sales, but is based on each day's closing price for lending sales.

Throughout this study, we used two types of transaction costs (low for large traders and high for small traders) to explore futures mispricing and emphasize situations in which different traders face different kinds of short selling or lending selling restrictions. As around 95% of short sellers are individuals and around 95% of lending sellers are from institutions, we can track their different effects on the misalignment of index futures and cash index during different market events, as well as on signed order imbalances. Therefore, this study also investigates the price pressure exerted by arbitrageurs and speculators in the futures market, both before and after price restrictions are lifted.

The Taiwan Stock Exchange Corporation (TWSE) removed price restrictions on short sales or lending sales based on a subset of stocks listed in the Taiwan Weighted Average Stock Index (TAIEX). They did so because price restrictions may have different effects on stocks with different sizes of market capitalization. TWSE removed price restrictions on short sales in May 2005 on all stocks listed in the Taiwan 50 index, which consists of the top 50 stocks traded in the Taiwan Stock market (defined by market capitalization), then lifted price restrictions on lending sales on stocks listed in the same index in May 2007, and then relaxed price restrictions on short sales and lending sales on the same day for all stocks listed in the Taiwan mid-cap 100 index in November 2007. The Taiwan mid-cap 100 index consists of stocks ranked in size from 51 to 150. The first lifting of price restrictions on short sales exempted around 67% of market capitalization of the TAIEX, the second lifting of price restrictions on lending sales exempted around the same percentage of market capitalization of the TAIEX, and the third lifting on short sales and lending sales exempted 17.40% more market capitalization to equal to around 84% of the TAIEX (the exact percentage is shown in Table 1). For the entire market or individual stock, however, the volume of short sales plus the volume of security lending for selling purpose is limited to 25% of the total number of shares outstanding.

According to a survey conducted by Charoenrook and Daouk (2004) for short-selling regulations and feasibility from 111 countries, more than 55% of all the financial markets in the world prohibit short selling from WWII through 2002. A similar study done by Bris, Goetzmann, and Zhu (2007) notes short sales are typically allowed in major markets that encourage financial innovation—particularly with respect to capital structure and new security developments. Generally, theoretical models predict that short-sale constraints can cause stocks to be either overvalued or undervalued. Diamond and Verrecchia (1987) maintain that restricting short selling slows the downward adjustment of securities prices to reflect bearish information. This evidence supports the following insights that short-sale prohibitions make short selling more costly for investors who have a negative opinion about stock prices since their views may register less in the prices than if short sales are allowed. If such costs are significant, we would expect the removal of price restrictions to cause short selling to increase or, if the restrictions are not costly, remain the same. As price restrictions may impose costs on short sellers in the form of lower fill rates and execution delays, Alexander and Peterson (2008) report that eliminating price tests benefits traders by allowing them to trade more aggressively with orders that could be executed more quickly. The effect of transaction costs on the index-futures price relationship under a setting of prohibition from short selling has been explored quite a few in the literature. For example, Abhyankar (1995) documents that

Table 1
Descriptive statistics for mispricing and futures order imbalance.
This table presents summary statistics for overpricing (Mis^+), underpricing (Mis^-), order imbalance of buy-side ($Foib^+$) and sell-side ($Foib^-$) of Taiwan stock index futures during six-month period, three months before and three months after the four market events, SS50, SS100, LS50 and LS100 spanned from Feb, 2005 through Feb, 2008. SS50 and SS100 (LS50 and LS100) denotes lifting TWSE uptick rule which regulates prices of short sales (security lending sales) be equal or above the previous closing price for component stocks of Taiwan 50 or Taiwan mid-cap 100 indices respectively. Note events SS100 and LS100 occurred on the same day. Panel A consists of two sub-panels, 1) low transaction costs category applied to large traders and 2) high transaction costs category applied to small traders. Mis^+ and Mis^- are measured over a 5-minute interval. Std. Dev. denotes standard deviation.

Event (Exempt market capitalization %)	Pre-SS50 *(67.04)*		Post-SS50 *(67.38)*		Pre-LS50 *(66.87)*		Post-LS50 *(66.69)*		Pre-SS/LS100 *(83.76)*		Post-SS/LS100 *(84.76)*	
Panel A: Mispricing	Mis^+	Mis^-	Mis^+	Mis^-	Mis^+	Mis^-	Mis^+	Mis^-	Mis^+	Mis^-	Mis^+	Mis^-
1) Low transaction costs												
No of observations	14	1088	15	2425	29	1159	19	2539	185	1351	84	1164
Mean	0.0021	−0.0019	0.0017	−0.0049	0.0016	−0.0027	0.0025	−0.0037	0.0014	−0.0047	0.0041	−0.0022
Median	0.0007	−0.0015	0.0009	−0.0040	0.0007	−0.0022	0.0016	−0.0024	0.0007	−0.0033	0.0029	−0.0015
Std. Dev.	0.0023	0.0016	0.0020	0.0038	0.0024	0.0022	0.0027	0.0038	0.0027	0.0045	0.0048	0.0032
2) High transaction costs												
No of observations	5	242	3	1440	5	391	4	1016	18	716	42	257
Mean	0.0018	−0.0012	0.0021	−0.0039	0.0025	−0.0020	0.0040	−0.0040	0.0046	−0.0047	0.0040	−0.0025
Median	0.0016	−0.0009	0.0020	−0.0030	0.0007	−0.0015	0.0029	−0.0028	0.0028	−0.0037	0.0015	−0.0014
Std. Dev.	0.0007	0.0012	0.0003	0.0034	0.0038	0.0020	0.0026	0.0042	0.0053	0.0043	0.0054	0.0053
Panel B: Futures order imbalance												
	$Foib^+$	$Foib^-$	$Foib^+$	$Foib^-$	$Foib^+$	$Foib^-$	$Foib^+$	$Foib^-$	$Foib^+$	$Foib^-$	$Foib^+$	$Foib^-$
No of observations	1701	1825	1814	1901	1536	1694	1901	1921	1686	1919	1572	1928
Mean	0.3585	−0.3607	0.3474	−0.3614	0.2459	−0.2526	0.2391	−0.2476	0.2118	−0.2278	0.1761	−0.2050
Median	0.3392	−0.3333	0.3191	−0.3436	0.2234	−0.2337	0.2222	−0.2314	0.1948	−0.2134	0.1566	−0.1914
Std. Dev.	0.2252	0.2299	0.2206	0.2266	0.1661	0.1631	0.1575	0.1644	0.1389	0.1532	0.1222	0.1333