



## Short sales and speed of price adjustment: Evidence from the Hong Kong stock market

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### ABSTRACT

We present empirical evidence that short sales contribute to market efficiency by increasing the speed of price adjustment to not only private/public firm-specific information but also market-wide information. Shortable stocks are characterized by weaker trade continuity and stronger quote reversals. They adjust faster to new information than non-shortable counterparts. These findings remain robust even in an “up” market condition in which short sales are not binding. The amount of information incorporated in each trade is also significantly higher for shortable than non-shortable stocks in both “up” and “down” market conditions. After controlling for firm size, trading volume, liquidity, price and option trading, short sales stand out as one of the significant factors that speed up the price adjustment.

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### 1. Introduction

A short sale is a trading strategy that capitalizes on anticipated declines in the price of a security. Shares are borrowed and sold in the open market and then bought back and returned at some point in the future. Short sellers profit if the share prices decline or incur losses if the prices rise. Both academicians and practitioners have long been interested in studying the benefits and costs of short sales. One of the major research focuses is the impact of short sales on price efficiency. In an efficient price discovery process, the price of a security should fully reflect all current and past information and should adjust to new information instantaneously (Fama, 1991). Short sales restrictions and prohibitions constrain investors from reacting to bad news but not good news, delaying the speed of price adjustment to negative information and causing an asymmetric price transmission process. Asymmetric price transmission refers to pricing phenomenon occurring when prices react

to negative information in a different manner than positive information. Asymmetric price transmission has two angles, asymmetric magnitude of price changes and asymmetric speed of price adjustment. The majority of past studies focus on the former angle, especially the relation between short sales and stock overvaluation (Miller, 1977; Figlewski, 1981; Danielsen and Sorescu, 2001; Jones and Lamont, 2002; Ofek and Richardson, 2003; Chang et al., 2007, among others).

This paper focuses on the latter angle, by measuring the speed of price adjustment to new information. We add at least four new contributions to the study of short sales: first, we examine the impact of short sales on the speed of price adjustment to both private/public firm-specific information and market-wide information.<sup>1</sup> Second, we anatomize and contrast the price discovery processes of shortable and non-shortable stocks. We discover that shortable and non-shortable stocks differ in trade continuity, quote reversals, and incorporation of information in each trade. Third, we evaluate the speed of price adjustment both in “down” and “up”

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<sup>1</sup> Bris et al. (2007) also focus on public information by demonstrating a slower price adjustment with short sales restrictions in place rather than measuring the speed itself.

market conditions. The role of short sales has not been studied in the up market condition because it was considered not binding. Fourth, we compare the impact of short sales on the speed of price adjustment to new information while firm-specific characters, such as trading volume, firm size, liquidity, the availability of options, price level, etc., are controlled.

Our analyses yield the following results. First, shortable stocks need fewer trades and less time to adjust to new information than non-shortable stocks. Second, when a stock is shortable, its trade continuity is weaker, quote reversal is stronger, and the amount of information incorporated from each trade is larger than a non-shortable counterpart.<sup>2</sup> Third, short sales speed up the price adjustment to not only private/public firm-level information but also market-wide information. Fourth, all of the results are robust in both up and down market. Fifth, short sale remain significant in enhancing the speed of price adjustment after controlling for the firm size, liquidity, trading volume and optioned status are controlled.

The rest of the paper is organized as follows: Section 2 examines the current literature on short sales; Section 3 introduces the institutional background and data; Section 4 tests the first hypotheses on the speed of price adjustment to the private/public firm-specific information content of each trade; Section 5 tests the second hypothesis on the speed of price adjustment to market-wide information; Section 6 presents the results of various robustness checks. In particular, we examine whether short sales play any role in an up market situation in which short sales are not binding. We also examine what happens to the speed of price adjustment for those stocks that are removed from the D-list. We also compare the speed of price adjustment of optioned and non-optioned stocks. We then compare the significance of short sale with other firm-specific characters, on enhancing the speed of price adjustment. Section 7 concludes the paper.

## 2. Literature review

Diamond and Verrecchia (“DV” hereafter) (1987) predict that short sales prohibitions/restrictions lead to asymmetric price discovery processes, which hinder the speed of price adjustment to new information. Specifically, DV make four predictions: first, the dominant effect of short sales constraints is the reduction of the speed of price adjustment to private/public information, especially to bad news. Second, short sales constraints lead to a larger price adjustment on information announcement days and excess returns are more skewed to the left. Third, a period of inactive trade imparts a downward bias to excess returns because the previous transaction price is a measure of a security’s value biased upward. Fourth, an unexpected increase in the announced short interest in a stock is bad news.

Most of the previous studies focus on testing DV (1987)’s second and third predictions. For example, Hong and Stein (2003) demonstrate how heterogeneous opinions can exacerbate market declines to make stock returns more negatively skewed if short sales are constrained. Bris et al. (2007) report that the lifting of short sales restrictions is associated with increased negative skewness in market returns. Driessen and Laeven (2007) demonstrate that global diversification benefits are not much affected when controlling for short sales constraints in developing countries. Reed (2003) finds that securities with short sales constraints have a larger price reaction when private information becomes public. The third prediction is closely related to Miller’s (1977) hypothesis on overvaluation and short sales restrictions. Figlewski (1981), Danielsen and

Sorescu (2001), Jones and Lamont (2002), Ofek and Richardson (2003), Chang et al. (2007), and Diether et al. (2009a) all test DV’s third prediction. For example, Chang et al. (2007) analyze the cumulative abnormal returns around the lifting and reinstating of short sales restrictions and find that individual stock returns exhibit higher volatility and less skewness when short sales are allowed. Diether et al. (2009a) find that short sellers target on overvalued stock and help correct the price by increasing short selling activities. Wu (2007) reports that the price of a stock with higher shorting volume tend to remain more closely with its fundamental value. Boehmer et al. (2008) observe that short sellers are generally well-informed and contribute to price efficiency. Daske et al. (2006) cast a doubt on the informed short seller hypothesis by indicating that short selling activities do not concentrate on firm-specific information. Kallio and Ziemba (2007) treat short selling constraints as one of frictions in arbitrage pricing conditions.

Beginning with Asquith and Meulbroek (1995), empirical evidence in support of DV’s fourth prediction has been compiled in support of the bearish signal of short interest (Aitken et al., 1998; Desai et al., 2002; Ackert and Athanassakos, 2005; Asquith et al., 2005). Aitken et al. (1998) find that the market interprets short sales as bad news and responds quickly. Other studies focus on the effect of short sale constrains on the stock price volatility and liquidity. Charoenrook and Daouk (2005) find that when short sale is possible, aggregate stock return is less volatile and there is greater liquidity. Gao et al. (2006) find that allowing for short sales reduces transaction costs and is associated with the reduction of adverse selection component of the bid-ask spread. Asem (2009) demonstrates that buying winner stocks with increases in dividends and shorting loser stocks with decreases in dividends enhance momentum profits.

There are, however, only three studies that test DV’s first prediction on the speed of price adjustment to new information but indirectly. The scarcity of empirical tests is largely attributed to the lack of transaction data and the difficulty of measuring the speed of price adjustment to new information. Diether et al. (2009b) examine the trading activities under the SEC pilot program in NYSE and Nasdaq. They find that the suspension of short sales constraints improves the symmetric price transmission process without significantly sacrificing volatility and liquidity. Fung and Draper (1999) demonstrate that relaxing short selling constraints reduces mispricing of index futures contracts. They conclude that reducing the restrictions on short sales speeds up the market adjustments and thereby provide indirect evidence that short sales enhance the speed of price adjustment. Bris et al. (2007) compare cross-autocorrelations between weekly lagged market returns and individual stock returns in 46 equity markets with and without short sales practiced and for dually listed stocks. They find a negative association between short sales restrictions and the diffusion of negative information into prices and show that the ability to short sell facilitates an efficient price discovery process. They did not directly measure the speed of price adjustment.

We measure the respective speed of price adjustment of shortable and non-shortable stocks. While so doing, the adjustment speed in reaction to not only private/public firm-specific information but also market-wide information is examined using high frequency transaction data. Furthermore, we directly examine the short sale effect on the adjustment speed in the both up and down market conditions. We adopt Hasbrouck’s (1991) dynamic vector autoregressive (VAR) model to test the speed of price adjustment to information contained in each trade. We first examine the trade continuity and quote reversals, and then we compute the impulse response function in the number of trades and calendar time. In addition, we compute two speed measures from Jones and Lipson’s (1999) partial adjustment model (PAM) and Chordia and Swamina-

<sup>2</sup> Hasbrouck (1991) finds that strong trade continuity is consistent with lagged adjustment to new information. In other words, weaker trade continuity lead to faster adjustment to new information.

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