



Short selling of ADRs and foreign market short-sale constraints

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ABSTRACT

We examine the effect of home market short-sale constraints on securities that also trade in other countries that have more liberal short-sale rules. In particular, we focus on the case of ADRs traded in the US, as in some cases, the home markets of these ADRs prohibit short selling. We find that short sellers more heavily trade ADRs from countries where short selling is prohibited than from markets where short selling is allowed. Furthermore, we find that the greater levels of short selling in ADRs with binding home-market constraints is driven by stocks with greater dispersion of investors' opinion, low fundamentals-to-price ratios, and recent price increases. Our results support the hypothesis that short sellers target ADRs with home market short-sale constraints because these ADRs are more often subject to temporary misvaluation.

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1. Introduction

Recent studies that examine international equity markets find that short-sale constraints generally reduce the efficiency of prices and can lead to overvaluation. For example, Bris et al. (2007) and Saffi and Sigurdsson (2010) find that short-sale constraints adversely affect the price efficiency of securities in the home market, while Chang et al. (2007) show that short-sale constraints in Hong Kong lead to stocks becoming overvalued. For the majority of the stocks trading in these constrained markets, investors are limited in their ability to trade on information that might indicate temporary overvaluation. However, for a small subset of these stocks with tradable ADRs, there exists an opportunity for investors to circumvent the effect of short-sale constraints by shorting the ADR.

Theory in Miller (1977) suggests short-sale constraints can lead to overvaluation, particularly in the presence of heterogeneous beliefs among investors. In related work, Dechow et al. (2001) find that short sellers target stocks with low fundamentals-to-price ratios. Dechow et al. argue that short sellers' penchant for these stocks is consistent with the idea that short sellers attempt to actively exploit temporary overpricing. Similarly, Diether et al. (2009a) find that short sellers target stocks that become

temporarily overvalued by showing that daily shorting activity is positively related to both contemporaneous and past returns.

In this paper, we revisit tenants of Miller's (1977) theory by examining the short-selling activity of ADRs while conditioning on the underlying securities' home-market constraints. For exposition, we denote ADRs of foreign stocks that face binding home-market constraints as *unfeasible ADRs*. Similarly, we denote ADRs of foreign stocks with fewer home-market constraints as *feasible ADRs*. To determine the feasibility of shorting, we use the classification of short-sale restrictions by Charoenrook and Daouk (2005) and partition ADRs based on the feasibility of shorting in the underlying security's home country.

Our hypothesis is that short-selling will be greater for unfeasible ADRs than for feasible ADRs. Specifically, if ADR prices and the prices of the underlying securities are closely correlated (Kato et al., 1990) and short sellers target stocks that become temporarily overvalued (Dechow et al., 2001; Diether et al., 2009a), then we expect to see more shorting of unfeasible ADRs that exhibit signs of potential overvaluation.¹ It is important to note, however, that our study is not concerned with determining whether binding

¹ Our focus is motivated by prior work that suggests that prices of underlying securities and ADRs are so tightly correlated that arbitrage opportunities do not exist (Maldonado and Saunders, 1983; Kato et al., 1990; Miller and Morey, 1996; Karolyi and Stulz, 1996). If ADR prices and the prices of underlying securities are tightly correlated, then the overvaluation of the underlying securities will spill over into the ADR, however we do note that Gagnon and Karolyi (2010) find any deviations between prices of ADRs and the underlying stock are a function of arbitrage costs.

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home-market constraints lead to overvaluation in the underlying security, *per se*. Nor does our study examine whether the shorting of ADRs can reduce overvaluation caused by home-market constraints.²

To examine the role that overvaluation plays in the short selling of ADRs with binding home-market constraints, we investigate three signals of overvaluation that are discussed in prior work. First, we examine whether short sellers who target stocks with greater heterogeneity among investors' opinions do so more frequently for unfeasible ADRs.³ Second, we test whether short sellers' penchant for stocks with low fundamentals-to-price ratios, shown in Dechow et al. (2001), is stronger for unfeasible ADRs. Finally, we determine whether the contrarian behavior of short sellers, documented in Diether et al. (2009a), is more pronounced for unfeasible ADRs.

We begin our tests by comparing the shorting activity of feasible ADRs to the shorting activity of unfeasible ADRs. Consistent with our hypothesis, univariate results show that shorting of unfeasible ADRs is more than 40% higher than shorting of feasible ADRs. In multivariate tests these results persist and are robust to controls for a variety of factors that influence the level of short-selling and suggest that ADR shorting activity depends, in part, on the existence of short-sale prohibitions in the ADR's underlying home market.

Next, we examine whether short sellers' attraction to overvalued securities is stronger for unfeasible ADRs than for feasible ADRs. Uniformly, our results show that short sellers' proclivity to target securities with (i) high levels of heterogeneity in investor's opinions, (ii) low fundamentals-to-price ratios, and (iii) recent increases in price is greater for unfeasible ADRs than for feasible ADRs. These results indicate that not only do short sellers circumvent home-market constraints by trading ADRs, but short sellers' propensity to do so is increasing in the likelihood that the ADR is temporarily overvalued based on the signals discussed above.

A natural extension of our analysis is to examine the common negative relation between current short selling and subsequent security returns (Senchack and Starks, 1993; Aitken et al., 1998; Desai et al., 2002; Ackert and Athanassakos, 2005; Boehmer et al., 2008; Diether et al., 2009a). Theory in Diamond and Verrecchia (1987) posits that when constraints become binding, prices adjust less quickly to negative information. If shorting ADRs provide a mechanism that mitigates the effect of constraints, then the common negative relation between current short sales and subsequent returns should be stronger for unfeasible ADRs than for feasible ADRs. In our final set of tests, we find that short selling of unfeasible ADRs is better at predicting negative returns than short selling of feasible ADRs. In economic terms, we show that the return predictability contained in short sales of unfeasible ADRs is between two to three times greater than the return predictability in short sales of feasible ADRs. Combined with earlier findings, these results suggest that, not only do ADRs provide a mechanism to bypass the effects of binding home-market constraints, but the information contained in shorting is also greater for ADRs with these constraints.

² While it would be interesting to determine whether shorting in the ADR reduces overvaluation in the underlying security, data limitations do not allow us to examine underlying security prices on the 353 ADRs with underlying securities in 41 different countries.

³ There are a variety of studies that examine the relation between short-sale constraints and dispersion of investor's opinion (Miller, 1977; Jones and Lamont, 2002; Diether et al., 2002; Berkman et al., 2009). However, none of these studies determine whether short sellers are attracted to stocks that have increasing heterogeneity. Instead, the attraction by short sellers is implicitly made in their tests. Dispersion of opinion is a necessary condition for constraint-induced overvaluation according Miller (1977).

2. Literature review and hypothesis development

2.1. The theory and evidence on the impact of short sale constraints

Miller (1977) argues that short-sale constraints can lead to overvaluation in the presence of heterogeneous beliefs. This overvaluation occurs because the constraints restrict pessimistic traders and as a result, prices only reflect the opinions of the optimistic traders. Since Miller's work, a number of studies find that short-sale constraints adversely affect market quality in the US.⁴

In a rational expectations framework, Diamond and Verrecchia (1987) show that prices of stocks that face short-sale restrictions are slower to adjust to negative information than stocks without such restrictions. Direct tests of the Miller (1977) and Diamond and Verrecchia hypotheses are performed by Jones and Lamont (2002), who use data from the early part of the 20th century to show that short-sale restricted stocks tend to have high valuations and low subsequent returns. This finding indicates that these stocks are overpriced. Similarly, Asquith et al. (2005) and Nagel (2005) show that short-sale constrained stocks underperform, but argue that for the vast majority of stocks, short-sale constraints are not binding.⁵ A similar argument is also made by D'Avolio (2002) and Boehmer et al. (2008).

In other studies of the US markets, researchers find that while short-sale constraints adversely affect market quality (Asquith and Meulbroek, 1995; Danielsen and Sorescu, 2001; Alexander and Peterson, 2008; Diether et al., 2009b; Boulton and Braga-Alves, 2008), short sellers can assist in correcting mispricing (Boehmer and Wu, 2010). In particular, Boehmer and Wu report that short selling at the daily level reduces pricing errors and improves the informational efficiency of prices. In the same spirit, Diether et al. (2009a) report that short sellers are contrarian in contemporaneous and past returns and have the ability to predict negative returns, suggesting that short sellers successfully target overvalued stocks and are able to consistently predict price reversals.⁶

2.2. The international evidence on short-sale constraints

Despite the evidence that short-sale constraints can lead to less efficient security prices, many regulators in foreign markets impose binding short-sale constraints. These foreign markets do however provide natural tests of constraint-induced overvaluation. For example, Chang et al. (2007) examine the Hong Kong stock market where regulators designate a specific list of securities that can be sold short and then prohibit the short selling of stocks not on the list. Chang et al. find that when stocks are dropped from the list, their prices decrease, consistent with the hypothesis that short-sale constraints lead to overvaluation.

In another study, Bris et al. (2007) examine short-sale restrictions in both developing and developed markets. Of the 46 markets that they examine, 11 markets prohibit short selling while 13 markets lifted restrictions during their sample time period, which ran from 1990 to 2001. Consistent with the idea that short selling allows for more rapid price discovery and efficient pricing, (as in Diamond and Verrecchia (1987)), Bris et al. find that prices respond to negative information faster in countries where short-selling is

⁴ In addition to the papers discussed below, see also: Cohen et al. (2007), Boehmer et al. (2008) and Kolasinski et al. (2010).

⁵ Reed (2007) finds that constrained stocks have large price reactions to negative earnings announcements, consistent with negative sentiments not reducing the price prior to earnings announcements.

⁶ Other studies finding that current short selling relates negatively with future returns include Senchack and Starks (1993), Aitken et al. (1998), Dechow et al. (2001), Desai et al. (2002), Christophe et al. (2004), Karpoff and Lou (2008), and Boehmer et al. (2008).

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