

Worldwide short selling: Regulations, activity, and implications*

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Abstract

We characterize the legality, the feasibility and the incidence of short selling in a worldwide, multimarket framework. Home country short selling restrictions not only curtail home market stock borrowing, but also have international *regulatory reach* in curtailing short selling of the country's ADRs in the U.S. These effects survive in the multivariate regression, which controls for firm size, put option availability, past returns, stock volatility, dividend yield, institutional ownership, and home bias. As an implication of *regulatory reach*, we find that the portfolio of ADRs from restrictive countries underperforms the portfolio of ADRs from unrestrictive countries.

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1. Introduction

Short selling is an integral part of the current trading environment.¹ Yet, the role of short selling is highly controversial. Proponents argue that short selling is an essential part of the price discovery mechanism (Boehmer, Jones and Zhang (2009) and Kolasinski, Reed and Thornock (2009)) whereas opponents express concern about price manipulation (Shkilko, Van Ness and Van Ness (2008)). The frequent regulatory interventions and restrictions underscore the lack of clarity or consensus about the purpose and effectiveness of short selling. There is a rich cross-country and time-series variation in the home-country legality and feasibility of short selling (Beber and Pagano (2010), Bris, Goetzmann and Zhu (2007), and Charoenruek and Daouk (2008)). Are national regulators able to effectively enforce these restrictions in their home markets? The answer to this question is yes according to our analysis of variation in short selling related borrowing across countries. Now, how do home market restrictions affect short selling in a global multimarket setting? We answer this question and perform the first test of a *regulatory reach* hypothesis, which states that home country restrictions on short selling curtail worldwide short selling activity in cross-listed stocks such as ADRs from that country. The alternative hypothesis is a *regulatory arbitrage* hypothesis, which states that short selling moves to foreign locations when the home market restricts short selling.

Regulatory reach can decrease the total short volume both directly and indirectly. The direct channels affecting *regulatory reach* are reduced or delayed profitability of short positions and reduced availability of shares for borrowing. First, short positions are beneficial when negative information is incorporated into prices soon after the trade. Negative information can be

¹ Diether, Lee and Werner (2009) find that short selling volume is 24% of NYSE and 31% of NASDAQ trading volume.

produced by both local and foreign researchers. Restrictions on short selling activity in the home markets curtail the local researchers' incentives to produce negative information about firms. Thus, the aggregate global frequency and quantity of price declines is lower with home market restrictions on short selling. Ceterus paribus, traders will more aggressively short ADRs for which negative information can be produced in both local and foreign markets relative to ADRs for which local researchers are inactive. Second, the legal restrictions in the home market limit the institutional share lending markets. Thus, fewer shares are available in the worldwide market from which short sellers can borrow to fulfill delivery requirements, which again results in short sellers being less aggressive.

The indirect channels affecting *regulatory reach* are the enforcement actions of home country governments. Enforcement agencies often cooperate with their counterparts in other countries (Block (2007)). Hamilton (2008) reports that "following the lead of the SEC and the U. K. Financial Services Authority, and in an effort to prevent *regulatory arbitrage*, securities regulators around the world have acted to ban different forms of short selling as the crisis in the financial markets spreads globally." Regulators in the home country may target institutions that attempt to circumvent local short selling bans. Also, in many countries' governments have ownership stakes in local institutions through which they can influence behavior. Countries may specify a worldwide jurisdiction for their restrictions, at least for the activities of their citizens. Lau and McInish (2002) report that the Malaysian government was able to issue regulations that prevented the trading of Malaysian equities in Singapore despite opposition from both the Singapore government and Singapore investors. This evidence is an example of our *regulatory reach* hypothesis in the context of regular trading. We are not aware of any prior academic test of

this hypothesis in the context of short selling despite the spate of regulatory activity taking place in this area.

The alternate *regulatory arbitrage* hypothesis asserts that investors short sell in another country when short selling is prohibited in the home country (Kim, Szakmary, and Mathur (2000) and Nilsson (2008)). *Regulatory arbitrage* increases ADR short volume if traders opt to trade in unrestricted regimes. However, the complexity of international arbitrage is increased by taxes or fees on foreign transactions, capital controls, inconvertibility of currencies, and market segmentation (Foerster and Karolyi (1999)). On balance, the *regulatory reach* is more plausible than the *regulatory arbitrage*. We test these competing views using several unique datasets, we provide the first detailed characterization of the world market for stock borrowing, short selling, and the regulations governing these activities in 82 countries. Stocks originating from a given country are borrowed both in the home markets and in foreign markets. We find that home market restrictions effectively reduce short selling in ADR markets consistent with *regulatory reach*.

Next, we examine the factors that exacerbate or mitigate *regulatory reach*. It is well established that investors and traders have a home bias (Carrieri Errunza & Hogan (2007), and de Jong & de Roon (2005 JFE)). When traders avoid buying or selling foreign securities, the rules restricting short selling become more effective and thus can strengthen *regulatory reach*. Similarly, availability of put options in the home market itself reduces the incentive for international *regulatory arbitrage*, lowering ADR short volume. In contrast, factors that increase the incentives and profitability of short trades are expected to weaken *regulatory reach* and increase the observed amount of ADR short selling. Such factors may include past returns, firm size, dividend yield, level of ADR, stock price volatility, and higher institutional ownership.

Our study contributes to the literature in several ways. We present the first test of effectiveness of regulatory enforcement of short selling restrictions in 82 countries. Although, there is a rich literature on the potential valuations consequences of short selling, a global analysis of the actual short selling activity is largely missing. We use the Data Explorer dataset, which has comprehensive information regarding short selling related stock borrowing worldwide. We find that short selling related stock borrowing is significantly lower in countries that impose restrictions than in countries that do not.

Second, we identify *regulatory reach* as a new determinant of short selling in the international context by combining several virgin datasets. Apart from Data Explorer, we use shortsqueeze.com, which provides short interest information concerning U.S. equities including ADRs. We also download data from the FINRA web sites made available as a result of the SEC's Regulation SHO. These rich datasets enable us to take a first look at worldwide stock borrowing activity and depict a complete picture of various facets of the short selling process, especially in the context of multi-market trading. Univariate comparison, matched control sample experiments, multivariate regressions, all consistently point to *regulatory reach*. Our findings remain strongly significant after controlling for firm specific characteristics, stock borrowing costs, put-option availability in the home country, industrial sectors, trading volume, stock price volatility, and outstanding short interest.

Third, we create a short selling regulation enforcement index. This index is a function of short selling related stock borrowing scaled by market capitalization of the country and legality of short selling in the home country. Unlike the dummy variable used in prior work (Charoenrook and Daouk (2008) and Beber and Pagano (2010)), our continuous index of actual borrowing information, from the new Data Explorer dataset, is a better proxy for the

effectiveness of regulatory enforcement in a country. We control for this enforcement variable in testing the reach of home country restrictions in curtailing ADR short selling and find the results consistent with *regulatory reach*. We also provide much more detailed descriptions about the exact nature of short selling legality and restrictions by examining the specific trading mechanism (up-tick rule), pre-borrowing requirements (ban on naked short selling), and ban on shorting selected stock (mainly financial stocks). Interesting examples are from (1) the U.S. where short selling is allowed on upticks, but restricted on downticks, (2) Mexico where covered short selling is legal, but naked short selling is illegal, (3) the U. K. where market makers were exempted from the recent short selling ban, and (4) Poland, Turkey, the U.S. and several other countries where specific lists are created for stock that can or cannot be shorted. We have rich cross-sectional as well as time-series variation in the legality and feasibility of short selling.

Fourth, we look at the regulatory reach in the reverse direction as well. We test the effect of short selling restrictions in the U.S. on the short selling related borrowing of underlying stocks in the home country. We employ a research design commonly used in the hard sciences literature with a treatment group and a control sample by matching each ADR issuing firm with a non-ADR issuing home country firm as well as with a U.S. stock based on key firm characteristics. This approach enables us to tightly control cross country differences that often are an issue with international studies. We form an index of relative strictness defined as the difference between US restrictions and home country restrictions. This index negatively affects the short selling volume of ADR issuing underlying stocks vis-à-vis non issuers.

Fifth, we study the implications of *regulatory reach* in the context of a constraints hypothesis. According to this hypothesis when short selling is constrained, stocks become artificially overvalued and suffer from poor stock return performance in the long run (Diamond

and Verrechia (1987), Miller (1977), Bris, Goetzmann and Zhu (2007), and Prado Brounen, and Verbeek (2009)). The valuation effects are expected to be particularly high when short sell constraints are binding i.e. when the inherent shorting demand is high (Boehmer, Jones and Zhang (2008)). We compare the performance of: a) portfolios of ADRs from countries where it is legal to short sell against the portfolio of ADRs from the countries where it is illegal to short sell, and b) portfolios of ADRs with high short interest against the portfolio of ADRs low short interest using the double sorting methodology of Asquith, Pathak and Ritter (2005). Using a Fama-French four factor regression model, we find that portfolios of ADRs from the countries where it is illegal to short sell underperform portfolios of ADRs from the countries where it is legal to short sell.

2. Data sources and descriptive statistics

We form our research dataset by combining information from various sources described in the data appendix. Our sample firms include ADR-issuing firms from 82 countries, a matched sample of non-issuers from the same set of home countries, and a matched sample of domestic U.S. firms. This approach lets us examine the behavior of short sellers in the context of worldwide multi-market trading. We analyze short selling related borrowing, total short interest, short trading volume, and return in both the U.S. and the underlying markets. These variables are obtained from Data Explorer, shortsqueeze.com, FINRA, and Datastream.

Data Explorer is based in New York and London and according to its web site is the world's most comprehensive resource for data on short-selling related borrowing. Data Explorer covers thousands of equities worldwide and receives information on more than 3 million transactions daily from over 100 top securities lending firms, for commercial dissemination. Data

Explorer estimates that its institutional clients account for 70% of the worldwide borrowing market. For each security, the data include information on the value and quantity of the stock borrowing, cost of borrowing (VSA), the number of brokers and agents, SL tenure (the weighted average number of days from borrowing initiation date to measurement date, for all open short transactions in the given stock), and other variables. The location of the borrowing is also provided so that it is possible to tell whether the shares are being borrowed in the home country or elsewhere. Although, this dataset has been used by Faulkner (2008) to assess the impact of securities lending on the corporate governance landscape and by Flatley (2009) to understand trends and changes in market micro-structure, we are the first one to characterize short selling itself and its determinants in the multi-market context.

Our data comprise daily stock borrowing activity for the period from July 2006 through Jan 2010. We clean the Data Explorer data in several ways. We eliminate exact duplicates. Data Explorer provides values in one of four currencies—USD, EUR, JPY, AUD—depending on where the data are collected. We convert all monetary values into USD based on daily exchange rates obtained from DataStream. Data Explorer includes a variable called *dividend requirement* that allow us to make sure that our results are not affected by dividend capture.

Shortsqueeze.com provides fortnightly short interest data for over 16,000 stocks that trade on NYSE, NASDAQ, AMEX, OTC/BB and Pink Sheets. Short interest is defined as total number of outstanding shorted shares for each security. In addition to the number of shares short, additional supporting data such as days to cover, number of shares outstanding, and institutional ownership are combined to provide a deeper gauge of market opportunity, stock selection and timing. This is the most comprehensive dataset of domestic U.S. short selling information. We access these data for the period from November 2007 to October 2009.

The short volume dataset is based on reporting requirements of Regulation SHO, which was implemented in January 2005 to reduce abusive naked short selling practices. Regulation SHO data are now publicly accessible from the Financial Industry Regulatory Authority (FINRA) website. We downloaded the daily short sale volume files from the website for the period from August 2009 through November 2009, which is all of the data available at the time of our study.

Our merged dataset enables us to depict a complete picture of various facets of the short selling process from stock borrowing to trade initiation to management of open short interest in the light of ever changing regulatory environment.

2. 1. Short selling regulations and feasibility around the world

We obtain detailed information on legality and feasibility of short selling in each country. We begin with a survey of academic articles (Bris, Goetzmann and Zhu (2007), Charoenruek and Daouk (2008) and Beber and Pagano (2010)) and practitioners' reports and briefings (Chance (2009) report, released by well-known law firm Linex Legal). We verify and supplement this data with direct correspondence with stock exchanges and financial market regulators in each country in our sample. Initially, we follow the approach used in the papers cited above and define an indicator variable *illegal*, which equals 1 if short selling is prohibited in the home market and 0 otherwise. Subsequently, we extend the literature by going beyond the indicator variable approach and examining in more details the countries where short selling is permitted in restricted forms.

We form a *restrictions* variable that equals 0 when there are no restrictions on short selling in the home country and 3 when there is a total ban. The index equals 1 if there is either

an uptick rule or a ban on naked short selling and 2 if both of these restrictions are present. Since we create this variable individually for each stock, stocks within the same country can have a different index value. Some examples may help. The *restrictions* variable has a value of 1 for Brazil because it prohibits naked short selling, but all other forms of short selling are allowed. Similarly, the index is 1 for Russia because it has an up-tick rule, but all other forms of short selling are allowed. The index has value of 2 for Mexico and Taiwan, both of which have a ban on naked short selling as well as an up-tick rule in place.

Both *illegal* and *restrictions* variables vary over time for countries that introduced change in short selling restriction during our sample period. For example, in the U.S, for many decades short selling was allowed on upticks, but not on downticks. The uptick rule was repealed in 2007, but shortly thereafter a similar restriction, called Rule 201 was enacted. Restrictions may also vary from firm to firm within a country.¹⁶ countries imposed temporary restrictions on short selling of financial, banking or insurance stocks in the 2008 financial crisis. Thus, we consider all types of restriction and bans separately rather than just the overall legality of short selling in each country.

One of the novelties of our paper is a *feasibility index* that is calculated as the aggregate short selling related borrowing volume in the home country divided by the market capitalization of the country. We obtain market capitalization from the World Bank website and borrowing data from Data Explorer. If a country is not in Data Explorer, we assign a value of 0 to this index. For some counties we also obtain this information through direct correspondence with stock exchange officials or the country's regulators.

In Table I, we show the legality status with the specific period when short selling was legal or illegal, the nature of restrictions, and the *feasibility index* for each country in column 2

and 5. We report the average short interest ratio for all ADRs from each country in column 6, which is calculated as short interest divided by shares float, from shortsqueeze.com data. We report global feasibility index in the Table and identify the countries where there is no home country borrowing. In our *regulatory reach* analysis, we use the local feasibility index, which is based only on home country borrowing. Aggregate short selling related borrowing of stocks from each country is reported in the last column. Overall, we observe rich cross sectional as well as time series variation in the regulatory restrictions, which we take into account in our multivariate analysis. This time series variation is important in the light of the perennial controversy surrounding the role of short selling and vacillating regulatory stand on the issue.² Our contribution is to simultaneously study the effect of changing regulations in a given country on stocks that are cross listed as ADRs on multiple exchanges with different short selling regimes.

[Insert Table I here]

2. 2. *Main sample – American Depository Receipts*

We focus on firms which are cross listed in multiple markets as ADRs because they provide an ideal setting for testing our research questions. The fact that their underlying shares originate from 82 countries with diverse short selling laws enable a direct test of our two hypotheses--*regulatory reach* versus *regulatory arbitrage*. Next, the ability to match ADRs with domestic U.S. stocks enables us to test whether home bias strengthens or weakens *regulatory reach* in globally integrated markets. Furthermore, our focus on ADRs allows us to test the *regulatory reach* of the U.S. restrictions in the reverse direction. Finally, Errunza and Miller

² Removal of the uptick rule in the U.S. shortly followed by its reinstatement in the form of rule 201 circuit breakers, bans on short selling of financial stocks, bans on naked short selling in the recent financial crisis by most countries, and a pilot test by allowing short selling of 11 brokerage firms by China during the same period is evidence of the fact that there is still disagreement about the role of short selling in financial markets.

(2000) shows that ADR listing helps the underlying firm reduce its cost of capital. However, regulatory restrictions may cut back some of these benefits. We test the valuation implication of *regulatory reach* by looking at the return performance of ADRs from countries that impose short selling restrictions versus those that do not.

To begin constructing our main sample of U.S. ADRs we obtain the list of ADRs from the Bank of New York Mellon and J. P. Morgan web sites in November 2009. Both of these firms provide comprehensive datasets that have a wide variety of information on ADRs, including type or level, the number of shares underlying each ADR, ADR's ISIN code, and the underlying stock's ticker symbol.³ We identify each firm's home country using the first two digits of the International Securities Identification Number (ISIN), which represents the originating country's ISO codes.

To be useful for research, additional data for these ADRs must be available from other datasets. A triangular intersection of the initial ADR list, shortsqueeze.com data, and Datastream international data yields a shortsqueeze sample of 1,307 ADRs with fortnightly short interest data. Similarly, the intersection of the initial ADR list, FINRA data, and Datastream international yields a FINRA sample of 918 ADRs with daily short volume. We use these shortsqueeze and FINRA samples to test the *regulatory reach* hypothesis.

³ Unlike ADRs, 179 cross listed securities from Toronto Stock Exchange are fully fungible with the same shares traded in the U.S. However, we refer to these Canadian stocks as ADRs too, sacrificing some linguistic accuracy for expositional convenience.

In addition to ADRs that are freely traded, there are two types of restricted ADRs which we exclude from our sample: a) SEC Rule 144(a) ADRs are private placements that do not trade on an established exchange and can be purchased only by a Qualified Institutional Buyer b) Regulation S ADRs can also be used to raise capital. These ADRs are not registered in the U.S. and can only be traded outside the U.S. by non-U.S. persons.

2.3 Matched control samples

Now we begin forming the two matched control samples of domestic U.S. stocks and home country non-issuer home-country stocks that have firm characteristics similar to the main ADR sample.

We use exchange, industry, price to book value ratio (PTBV) and market capitalization from DataStream to develop our first control sample of non-ADR domestic U.S. firms. For each ADR, we calculate the difference between the PTBV of that firm and the PTBV of all the non-ADR domestic U.S. firms in our data within the same industry and exchange. We match the ADR firm with a non-ADR domestic U.S. firm for which the difference in the PTBVs is at a minimum. If the PTBV difference of one ADR is same for more than one non-ADR domestic U.S. firm then we match based on the minimum difference in market capitalization. For the firms where we do not have the PTBV information, we find matches based on the market capitalization differences only. We form these control samples with replacement to ensure that matched firms resemble the main sample firms very closely. We match 1,221 ADRs with 700 unique non-ADR domestic U.S. firms. We provide the descriptive statistics of our main sample and control sample in Table II, Panel A. Our results for the basic model, not reported here, are robust to matching without replacement, where we match 1,221 ADRs with 1,221 unique non-ADR domestic U.S. firms. We use these samples to test whether home bias strengthens *regulatory reach*.

The next step in our analysis is to merge our initial sample of ADRs with the Data Explorer dataset to obtain short selling related borrowing information, and with DataStream International to obtain industry classification and other firm characteristics to form matched control firms of home country non-issuers. We use a matching process analogous to the one

outlined above. These control sample firms have not issued any ADRs, but are from the same country as the corresponding ADR sample firm. We use country, industry, PTBV and market capitalization as matching variables. We form these control samples with replacement. We match 1,406 ADR issuing firms with 1,120 unique non-ADR issuing firms. We provide the descriptive statistic of our main sample and control sample in Table II, Panel B. We use these samples to analyze the effectiveness of *regulatory reach* in complementary versus substitute markets. Our results for the basic model, not reported here, are robust to matching without replacement, where we match 1,406 ADR issuing firms with 1,406 unique non-ADR issuing firms.

[Insert Table II here]

2.4. Control variables:

Prior literature points us to various additional determinants of short selling. Diether, Lee and Werner (2009), find that short sellers increase short selling activity after positive stock returns whereas Blau, Van Ness, Van Ness and Wood (2010) find that short selling increases after extremely negative market returns. Thus, we include past return as a control variable.

Evans, Geczy, Musto and Reed (2009) state that, unlike traders in general, a market maker can short sell without having to located shares to borrow as a part of a bona fide hedging transaction. These authors find that market makers then choose not to borrow and instead fail to deliver stock to buyers when failing is cheaper than borrowing the stock. In the spirit of market intermediation, we include the number of active agents, the number of inactive agents and the cost of stock borrowing as control variables. A higher number of active agents indicate more competition in the market whereas a higher number of inactive agents indicate less competition. Therefore, we expect a positive relation between the extent of short selling and the number of active agents, because it will be cheaper for short sellers to trade in stocks with high competition.

For similar reasons, we expect a negative relation between the extent of short selling and the number of inactive agents.

Chang, Cheng and Yu (2007) find that when short selling is allowed, individual stock returns show higher volatility. They also find that a short sale constraint causes overvaluations of stocks and that the overvaluation effect is higher for individual stocks with higher volatility. Therefore, we also control for stock return volatility in our regression models using the standard deviation of return as a proxy for volatility.

Jones and Lamont (2002) find that stocks that are expensive to short or that enter the borrowing market have high valuations and low subsequent returns, consistent with the overpricing hypothesis. D'Avolio (2002) describes the market for lending and borrowing U.S. equities and finds that the probability of being on special (high lending fee) decreases with size and institutional ownership. Thus, we include stock borrowing fee as a control variable. Because of limited availability of worldwide institutional ownership data, we use it in a robustness test and we expect a positive relationship between institutional ownership and the amount of short selling.

Foster and Viswanathan (1990) predict that informed traders have more information on Monday, which increases the price volatility and reduce Trading Volume by counterparties at the beginning of the week. Blau, Van Ness and Van Ness (2009) study the relation between short selling and the weekend return using the SHO regulation data for the NYSE for 2005. They test the Chen and Singal (2003) hypothesis that because short sellers face risks in holding positions over the weekend they are likely to close out their position on Friday and reopen them on the following Monday. They do not find more abundant short selling on Monday. Because of these

weak priors, we simply perform robustness tests with day of the week dummies, but do not include them in our main presentation.

Other control variables related to short selling include dividend yield, firm size (Diether, Lee and Werner (2009)), duration of borrowing, and days to cover. Because these control variables are not the focus of our study, we do not have hypotheses about their relation to the extent of short selling. The Appendix shows the data sources and variable definition for each of our control variables.

3. Results

3. 1. Effectiveness of short selling restriction in curtailing home market stock borrowing

In this section we test the effectiveness of home country restrictions using Data Explorer data for short selling related borrowing. If the regulations are effectively enforced then we should observe a lower amount of stock borrowing in countries with restrictions. Thus, we expect a statistically significant negative coefficient for the illegal/Restriction variable in the following regression with stock borrowing as a dependent variable. We estimate all or a subset of the following equation:

$$\begin{aligned}
 \text{Shares borrowed} = & \alpha_0 + \alpha_1 \text{ illegal/Restriction} + \alpha_2 \text{ Put option} + \alpha_3 \text{ Return} \\
 & + \alpha_4 \text{ Dividend yield} + \alpha_5 \text{ Standard deviation of return} + \alpha_6 \text{ Market capitalization} \\
 & + \alpha_7 \text{ VSA} + \alpha_8 \text{ SL Tenure} + \alpha_{9-13} \text{ Industrial sector fixed effects} + \varepsilon
 \end{aligned} \tag{1}$$

where $\alpha_0 - \alpha_{13}$ are parameters to be estimated and ε is a random error term. Models 1a to 1c in Table III are estimated at the country level. The dependent variable is *Shares borrowed*, which is the ratio of aggregate home market borrowing for all the stocks from a given country divided by aggregate stock market capitalization of that country. Models 1d and 1e are estimated at the firm

level, i.e., the dependent variable is the firm level stock borrowing and firm specific control variables are included. Please see the appendix for other variable definitions and data sources.

[Insert Table III here]

Hereafter in this paper, we present standardized coefficient estimates to allow comparison of the relative impact and importance of each determinant of short selling.⁴ The coefficient of *illegal* is negative and significant in Model 1a, indicating that stock borrowing in the home country is lower for the countries where short selling is illegal. The coefficient of our alternative measure of legality, *Restriction*, is also negative and significant in all 4 specifications in Models 1b to 1e. These results point to the effectiveness of short selling restrictions in curtailing borrowing activity in the home country.

3. 2. *Effect of home country short selling restrictions on short selling activity of ADRs in the U.S.*

In this section we test the *regulatory reach* hypothesis versus the *regulatory arbitrage* hypothesis. We also test whether additional firm-specific fundamentals or the market wide trading environment weaken or strengthen *regulatory reach*. We estimate two separate sets of regressions for short interest and short volume. First, we estimate regressions based on all or a subset of the following equation using short interest data from shortsqueeze.com:

⁴ We obtain these coefficients using the *stb* function of SAS. These coefficients are estimates when all variables in the model are standardized to zero mean and unit variance prior to performing the regression computations. Of course, the standardized intercept is 0.0000. The t-statistics for the standardized and unstandardized coefficients are the same.

$$\begin{aligned}
\text{short interest} &= \alpha_0 + \alpha_1 \text{ illegal/restriction} + \alpha_2 \text{ enforcement index} + \alpha_3 \text{ put option} \\
&+ \alpha_4 \text{ return} + \alpha_5 \text{ market capitalization} + \alpha_6 \text{ dividend yield} + \alpha_7 \text{ lagged days to Cover} \\
&+ \alpha_8 \text{ level of ADR} + \alpha_9 \text{ standard deviation of return} + \alpha_{10-14} \text{ industrial sector fixed effects} \\
&+ \varepsilon
\end{aligned} \tag{2}$$

where $\alpha_0 - \alpha_{14}$ are parameters to be estimated and ε is a random error term. Please see the appendix for variable definitions and data sources.

Second, we perform a short volume regression using daily FINRA data:

$$\text{short volume} = \alpha_0 + \alpha_1 \text{ illegal} + \alpha_2 \text{ put option} + \alpha_3 \text{ return} + \alpha_4 \text{ market capitalization} + \varepsilon \tag{3}$$

where $\alpha_0 - \alpha_4$ are parameters to be estimated and ε is a random error term. Variable definitions and data sources are shown in the appendix.

In Table IV, we present the results. Models 2a to 2d are based on equation 2 and Model 3 is based on equation 3. The coefficient for *illegal* is significant and negative in all the specifications, i.e., in Models 2a, 2b, 2d and 3. If it is illegal to short sell the stock in the home country, short selling activity is also reduced for that country's ADRs in the U.S. This result supports our *regulatory reach* hypothesis. In the alternative specification of Model 2c, the main explanatory variable is *Restriction*, which is a finer measure of illegality of short selling. The coefficient of *Restriction* is also negative and significant. The more restrictions that a home country adds to the short selling in the home country, the less is the short selling of that country's ADRs in U.S.

[Insert Table IV here]

We control for the home country enforcement index in Model 2d. This coefficient is negative as expected, but statistically insignificant. The coefficient of *Return* is insignificant in

Models 2a to 2d, though it is positive and significant in Model 3. This coefficient indicates that short interest goes up when the previous day's return for the stocks is positive or when the prices of the stocks are going up, consistent with the findings of Diether, Lee and Werner (2009). The positive and significant coefficient of *market capitalization* in all four specifications indicates that *total short interest* is higher for bigger firms. The negative and significant coefficient for *dividend yield* indicates that short sellers are less interested in high dividend paying firms. The positive and significant coefficient of *lagged days to cover* indicates that traders are not too anxious about the length of the time that it might take to cover the aggregate short positions outstanding. Instead, our findings demonstrate that traders apply momentum strategies and short previously shorted stocks even more. We also include *level of ADR* as a control variable to see if short sellers are trading one level more than another. We find the coefficient to be positive and significant, indicating more short selling for higher level of ADRs. This increased trading interest may be due to the fact that higher level ADRs implies increased compliance with the stricter U.S. listing standards.⁵ The positive and significant coefficient of *standard deviation of return* indicates higher short-selling for firms with higher dispersion of opinion.

In Models 2b and 2d, our results are robust to sector classification effects when we include sector dummies based on data from DataStream. Our results from both fortnightly and daily data are qualitatively similar, which is natural given the statistically significant positive

⁵ J. P. Morgan dataset indicates whether the ADR is Level I, II, or III. To qualify for having a sponsored Level I ADR, a company's shares must be traded on at least one foreign exchange and the firm must post an annual report in English on its web site, but the company is not required to meet U.S. accounting standards. To qualify for a Level II sponsored ADR, a firm must register with the SEC and comply with U.S. accounting standards. Firms meeting Level II standards can have their ADRs traded on a U.S. stock exchange. Firms wishing to raise capital in the U.S. from investors can do so through a Level III ADR program by meeting standards similar to those for U.S. companies.

correlation of 0.66 between these two alternative dependent variables. These results strongly support the *regulatory reach* hypothesis.⁶

The negative coefficients on the *illegal/restriction* variables are robust to alternative model specifications and sub-samples. We do not tabulate those results for brevity, but summarize our findings in this paragraph. In this discussion of robustness tests, the benchmark value for the coefficient of *illegal* is -0.0331 from Model 2b of Table IV. First, we use *trading volume* instead of *market capitalization* to capture the size effects on the right hand side and coefficient of *illegal* becomes -0.0355. Second, we run the regression using a smaller sample of only level III ADRs, which have most stringent disclosure requirements, and the coefficient of *illegal* becomes -0.0347. Third, our conclusions about *regulatory reach* are the similar after the recent financial crisis (the coefficient for *illegal* is -0.0695 in Model 3 for the period from August 2009 to November 2009) as they are for the overall sample period. Fourth, we control for day-of-the-week effects and institutional ownership effects and find qualitatively similar results.⁷ All these coefficients are significant at 1% level unless stated otherwise. Thus, our results on *regulatory reach* are robust for different specifications and sub-samples.

3. 3. ADRs verses domestic U.S. stocks

In this section, we test how *home bias* may strengthen the worldwide reach of home country short selling restrictions. We conjecture that *home bias* reduces the possibility of *regulatory arbitrage*. In other words, due to home bias, investors outside the home country are

⁶ Although, examination of Miller's divergence of opinion hypothesis is beyond our scope, our results suggest that the issuance of ADRs in the U.S. is not sufficient to allow home countries to overcome the deleterious effects of short selling restrictions.

⁷ a) After adding day of the week dummies in Model 3 the coefficient for *illegal* becomes -0. 0695. b) After adding institutional ownership Model 2b the coefficient of *illegal* becomes -0. 0250. We do not include this variable in our main regression because we do not have this information available for all the ADRs.

reluctant to short sell foreign securities. To investigate the interest of investors in ADRs against the non-ADR U.S. firms, we estimate all or a subset of the following regression equation using short interest data shortsqueeze.com:

$$\begin{aligned} \text{total short interest} = & \alpha_0 + \alpha_1 \text{ADR dummy} + \alpha_2 \text{return} + \alpha_3 \text{market capitalization} \\ & + \alpha_4 \text{dividend yield} + \alpha_5 \text{standard deviation of return} + \alpha_6 \text{lagged days to cover} \\ & + \alpha_{7-11} \text{industrial sector fixed effects} + \varepsilon \end{aligned} \quad (4)$$

where α_0 – α_{11} are parameters to be estimated and ε is a random error term. Please see appendix for definition and data sources of control variables. Second, we estimate a similar regression using FINRA short volume data, based on all or subset of the variables in the following equation:

$$\text{short volume} = \alpha_0 + \alpha_1 \text{ADR dummy} + \alpha_2 \text{return} + \alpha_3 \text{market capitalization} + \varepsilon \quad (5)$$

where α_0 – α_3 are parameters to be estimated and ε is a random error term.

In Table V, Models 4a and 4b, are based on equation 3 and Model 5 is based on equation 5. The coefficient for the *ADR dummy* is significant and negative for all three specifications. Investors in general are more interested in short selling U.S. local firms than ADRs. We interpret the results as evidence that home bias strengthen the worldwide reach of home country short selling regulations. Our results on the impact of home bias on *regulatory reach* are also robust to ADR level effect and day of the week effects.⁸

[Insert Table V here]

3. 4. Bi-directional regulatory reach in globally integrated markets

So far, we have been focusing on the effects and reach of home market restrictions.

However, the short selling regime in the U.S. itself has ranged from restrictions on downticks for

⁸ a) We run the regression of Model 4a separately for each ADR level. The coefficients of ADR dummy for these three levels are as follows: Level I, -0.1568; Level II, -0.2905; Level III, -0.2648. After adding the day of the week dummies in Model 4a, the coefficient of ADR Dummy is -0.0950.

several decades, to unrestricted short selling allowed in 2007, to a complete ban on short selling financial stocks in 2008, to the newest variation of restrictions based on NBBO quotes. These restrictions might well affect the short selling activity of underlying stocks which are also cross-listed as ADRs. In this section, we test the regulatory reach in this reverse direction, i.e. we investigate the effects of short selling restriction in the U.S. on short selling and borrowing activity in the home market. In this context, what matters is the relative strictness of short selling regulation in the U.S. vis-à-vis the home country. Therefore, we form an index of relative strictness defined as the difference between U.S. restriction index and the home country restriction index. We estimate all or a subset of following regressions equation using the stock borrowing Data Explorer data:

$$\begin{aligned}
\text{shares borrowed} = & \alpha_0 + \alpha_1 (\text{US - home country}) \text{ restriction} + \alpha_2 \text{ cross listed} + \alpha_3 \text{ return} \\
& + \alpha_4 \text{ market capitalization} + \alpha_5 \text{ dividend yield} + \alpha_6 \text{ standard deviation of return} + \alpha_7 \text{ VSA} \\
& + \alpha_8 \text{ SL tenure} + \alpha_9 \text{ active agents} + \alpha_{10} \text{ inactive agents} \\
& + \alpha_{11-15} \text{ industrial sector fixed effects} + \varepsilon
\end{aligned} \tag{6}$$

where α_0 – α_{10} are parameters to be estimated and ε is a random error term. *Shares borrowed* is the total quantity of borrowed/loaned securities net of double counting from the Data Explorer dataset. We take *shares borrowed* as our left hand side variable because it is a proxy for short selling. Please see the appendix for definition and data sources of other variables.

In Table VI, we present our results, which are based on equation 6. In Model 6a, we use the sample of ADR issuing firm and in Model 6b, we use the sample of ADR issuing firm along with a matched sample of non-issuing firms. The coefficient of *(US - home country) restriction* is negative and statistically significant in both specifications. This implies that when short selling restriction in the U.S. are higher than short selling restriction in the home country, short selling

borrowing of those stocks reduces in the home country as well. Hence, U.S. short selling restrictions have a reach in the home markets. In Model 6b, where we use the sample of ADR issuing firms and their matched firms, the coefficient of *cross listed* is positive and significant. This indicates higher short selling of issuer firms in the home country compared to that of non-issuer firms, consistent with complement market view (Barclay, Hendershott, and McCormick (2003)). Nonetheless, the relative restriction index has a negative sign, implying that regulatory reach works in both directions. Our results of regulatory reach in this section are robust to including other control variables.

[Insert Table VI here]

3. 5. *Implication of regulatory reach*

In this section, we test the effects of home country restrictions on the returns of ADR portfolios. First, we divide our ADRs into two portfolios based on legality of short selling in the home country. Second, we use a double sort approach; where after dividing the ADRs into legality portfolios we further divide them into the short interest groups. This classification is based on Asquith, Pathak and Ritter (2005) who create portfolios based on short interest and institutional ownership. We use an alternative measure of short sell constraint, restriction on short selling in the home country. The strongest relation between short interest and abnormal returns should exist for stocks that have large short positions combined with restrictions on short selling. These are the stocks that are most likely to be short-sale constrained. Asquith, Pathak and Ritter (2005) assume that short interest is a proxy for short sale demand and that institutional ownership is a proxy for the supply of shares available to be shorted. The first assumption is consistent with the finding in the literature that high short interest precedes abnormal returns (see Asquith and Meulbroek, 1995; and Desai, Ramesh, Thiagarajan and Balachandran, 2002). The

second assumption is consistent with the assumption in the literature that high institutional ownership prevents short-sale constraints, i.e., stocks with high institutional ownership are readily available to borrow, and, hence, the stocks do not become overpriced (see Chen, Hong and Stein, 2002; Nagel, 2004). We use legality as an alternative measure of short sell constraint and conjecture that it is a proxy for supply of shares available to be shorted. Our prediction is that portfolios of ADRs with high short interest and from countries with short selling restrictions, which are the most constrained, have the lowest subsequent returns. Portfolio of ADRs with high short interest and from countries with no restrictions on short selling should be less constrained and should have normal or less negative subsequent returns.

We estimate regressions using portfolios of 1,350 ADRs divided in two groups; *legal* and *illegal*. *Legal (illegal)* is the portfolio of ADRs that are from the countries where it is legal (illegal) to short sell at time t . In this specification we use the entire sample of ADRs from all countries for which data is available. An alternative specification also divides the portfolio into two similar portfolios of *no restriction* versus *total ban* with slightly different technical definitions. This alternative specification excludes ADRs from countries that impose partial restrictions on short selling. Here, *no restriction* is portfolio of ADRs that are from the countries where it is not only legal to short sell, but also there are no other restriction on short selling such as a ban on naked short sell or an up-tick rule. *Total ban* is portfolio of ADRs that are from the countries where it is totally illegal to short sell in any form. We revise this classification at the end of each month to form rebalancing portfolios and look at their performance over next the one month.

We follow Asquith, Pathak and Ritter (2005), and run the time series regressions using the Fama-French four factor model for the period from 1980 -2010, at monthly frequency, as follows:

$$r_{pt} - r_{ft} = \alpha + \beta_m Mkt-RF_t + \beta_s SMB_t + \beta_h HML_t + \beta_o MOM_t + \varepsilon_{pt} \quad (7)$$

where α_0 – α_{10} are parameters to be estimated and ε is a random error term. $r_{pt}-r_{ft}$ is the monthly percentage returns calculated as the excess return over the risk-free rate on an equally weighted portfolio. Our independent variables are *Mkt-RF*, *SMB*, *HML*, and *MOM* based on the U.S. market. *Mkt-RF* is the realization of the market risk premium in the period. *SMB* is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. *HML* is the return on a portfolio of high book-to-market (value) minus low book-to-market (growth) stocks. *MOM* is the return on a portfolio of prior winners minus the return on a portfolio of prior losers. We obtain monthly factor return realizations and risk free return from Kenneth French’s website.

[Insert Table VII here]

In Table VII we report the results from estimating equation 7. These results indicate that as a result of *regulatory reach* constrained stocks underperform unconstrained stocks even though the constraints may be imposed by the home market and ADRs may trade in the U.S. market. Similar to Asquith, Pathak and Ritter (2005) we use intercept as the measure of portfolio monthly abnormal performance. In Table VII, Panel A, we report the results of *legal* and *illegal* portfolios. We find that the intercept of *illegal* portfolios is more negative compared to the intercept of *legal* portfolio. These results indicate that the portfolio of ADRs from the countries where it is illegal to short sell underperform portfolios of ADRs from the countries where it is legal to short sell. In Table VII, Panel B, we report the results of *no restriction* and *total ban*

portfolios. Similar to Panel A, we find that the intercept of *total ban* portfolio is more negative compared to the intercept of *no restriction* portfolio.

Next, we contemplate the possibility that both short selling demand and short selling restrictions may affect the price efficiency of stocks. To consider the demand side of short selling, we double sort our data based on the short interest ratio and legality status. From the *squeeze.com* data for the period from November 2007 to October 2009, we calculate the average short interest ratio of each ADR for each month. We merge this with the return data from Datastream. Then we divide the ADRs into three groups: low, medium and high short interest ratio. We revised this classification at the end of each month to form rebalancing portfolios. We focus on the two extreme groups of low and high short interest. We then sub-divide these short interest portfolios based on their legality status similar to that in Table VIII, i.e. *legal*, and *illegal* or alternatively, *total ban* and *no restriction*. We report the results of these double sort rebalanced portfolios in Table VIII.

[Insert Table VIII here]

In Table VIII, Panel A, we find that the intercept, which is a measure of abnormal return, is most negative for the portfolio where short interest is high and it is illegal to short sell in the home country. This portfolio is the portfolio of ADRs that are most constrained. Within the short interest groups, our results are similar to those reported in Table VIII. We find similar results for our classification of short sale constraints as restrictions on short selling in the home country in Table VIII, Panel B. Thus, the effects of short selling restrictions reach far beyond the local jurisdictions as we show in the context of ADR's mispricing. Such is the power of *regulatory reach*.

4. Summary and conclusions

We provide the first comprehensive characterization of the world market for short selling and stock borrowing using several datasets that capture short selling regulations, actual short selling trading activity, and outstanding short interest in stocks from 96 countries.

The theme of our paper is the effectiveness and reach of short selling regulation in a multimarket environment.

We address four related research questions:

First, are restrictions on short selling in a given country effective in reducing short selling related borrowing? Many previous papers have looked at the effect of short selling restrictions on the market quality but none of them examines if the restrictions are actually effective in curtailing short selling activity. We perform the first test of this effectiveness using both country level and stock level data and find that short selling regulations are actually effective in reducing the short selling related borrowing in the home country.

Second, we examine whether home country restrictions on short selling reduce ADR's short selling in the U.S., which we call the *regulatory reach* hypothesis. Alternatively, the competing hypothesis of *regulatory arbitrage* takes the view that if short selling is illegal in a country that is home to ADRs' underlying shares there is greater short selling of the ADRs in the U.S. due to efforts to circumvent the home country regulations. Using two years of fortnightly short interest data for 1,307 ADRs, we find support for the *regulatory reach* hypothesis in both cross-sectional and panel-data tests. Thus, government power outweighs the ability or willingness of global traders to benefit from *regulatory arbitrage*. Our results of *regulatory reach* are robust to the inclusion of home country enforcement index as a control variable.

This finding leads us to an examination of factors that strengthen or weaken *regulatory reach*. We start by looking at the availability of substitute securities such as options, which is an important market feature that can mitigate short selling restrictions. Security substitution as well as market completeness effects of options can stimulate new trading, arbitrage activity, or spillover effects on the short selling side. Given the importance of put options for short selling, we also control for put option availability in the home country in our model where we test the *regulatory reach* hypothesis and our results are robust to this control.

Third, do short sellers in the U.S. focus their attention more heavily on domestic U.S. stocks relative to ADRs of comparable firms? If yes, this home bias is expected to strengthen *regulatory reach*. In the absence of such a bias, in a globally integrated market, restrictions in the home country should simply move short selling activity elsewhere. Because domestic U.S. stocks may be easier to analyze and borrow in the U.S. than ADR stocks, we investigate whether short sellers in the U.S. focus their attention more heavily on domestic U.S. stocks relative to ADRs. Using the ADR sample as the experimental group and forming a matched control sample of domestic U.S. stocks, we find that the short volume in a given stock is higher for domestic U.S. stocks than for comparable foreign stocks. Our results support the notion that home bias strengthens *regulatory reach*.

Fourth, do short selling restrictions in the U.S. affect short selling related borrowing in the home country of a stock? We test this aspect of *regulatory reach* using home market daily stock borrowing data of ADR issuers and a matched sample of non-issuers. In this matched control sample experiment, we find that when the short selling restrictions in the U.S. are higher than those in the home country, the short selling related borrowing in the home country reduces. These results are consistent with bi-directional *regulatory reach*. We also find that borrowing

increases when the stock is cross listed in the U.S. Thus, ADR listing has an added benefit of increased price efficiency for ADR-issuing firms. Univariate comparison, a matched control sample experiment, multivariate regressions, and an event study, all consistently point to both *regulatory reach* and ADR listing effects. Our results are robust to differences in firm specific characteristics, such as past returns, dividend yield, stock price volatility, size, borrowing costs, home country, industrial sectors.

Finally, we look at the implications of *regulatory reach* in terms of the returns of ADRs under constrained and non-constrained short selling environment in the home country. We use the Fama-French four factor regression model. We find that portfolios of ADRs that are from the countries where it is illegal to short sell underperform the portfolio of ADRs from the countries where it is legal to short sell or where there are no restrictions on short selling. Using double sort based on short interest and legality status, we find similar results overall and within the short interest groups. The portfolio of ADRs that have higher short interest and that are from the countries where it is illegal to short sell underperform the most. These results extend the results of the existing literature by showing that short-selling-constrained stocks underperform non-constrained stocks even though the restrictions may be imposed in home country and stocks trade in both the home country and an external market in the form of ADRs. Thus, *regulatory reach* has important valuation implications.

In summary, our paper contributes to the short selling and cross listing literature with five main findings. First, restrictions on short selling in a given country are effective in reducing short selling related borrowing in that country. Second, from investors' point of view, cross listing in the U.S. is not a vehicle for circumventing the regulatory control on short selling activity in the home country. Regulatory controls in the home country also stifle short selling in ADRs. Third,

home bias strengthens *regulatory reach* as investors prefer to short sell domestic U.S. stocks instead of ADRs, perhaps because they can analyze the domestic stocks more easily. Fourth, reach also works in the reverse direction, i.e., short selling restrictions in the U.S. reduce short selling related borrowing in the home country. Finally, the valuation implication of *regulatory reach* is that short selling constrained portfolios of ADRs underperform the unconstrained portfolio of ADRs.

Appendix

Variables definitions and data sources

In this table, we provide the definition and data sources for all the variables that are used in this paper.

Variable	Definition	Source
Shares borrowed	Total quantity of borrowed/loaned securities net of double counting	Data Explorer
Total short interest	Total number of outstanding shorted shares for each ADR for each fortnight	Shortsqueeze.com
Short volume	Aggregate number of shares sold short each day	Reg SHO data from FINRA
Return	$\log(\text{Return index}_t) - \log(\text{Return index}_{t-1})$	Datastream International
Illegal	Indicator variable that has value of 0 when short selling is banned in the home country and 1 when short selling is allowed	Bris, Goetzmann and Zhu (2007), Charoenrook and Daouk (2008), Chance (2009), and for time series Beber and Pagano (2010) and direct correspondence with stock exchanges and regulators
Restriction	Ranges from 0 to 3 where a higher number means more restrictions on short selling in a country, such as prohibition on naked short selling, an up-tick rule, or a total ban on short selling.	Chance (2009) and direct correspondence with stock exchanges and regulators
Put option	Dummy variable that equals 1 if put options are traded in the home country and 0 otherwise	Charoenrook and Daouk (2008) and direct correspondence with stock exchanges and regulators
Dividend yield	Dividend per share as a percentage of the firm's share price	Datastream International
Standard deviation of return	Captures return volatility of each stock during our sample period	Datastream International
Market capitalization	A firm's share price multiplied by the number of ordinary shares outstanding in millions of USD	Datastream International
VSA	Value weighted average fee for all open loans expressed in undisclosed fee buckets 0-5 (0 indicates the cheapest to borrow)	Data Explorer
SL Tenure	Weighted average number of days from borrowing initiation date to measurement date, for all open short transactions in the given stock	Data Explorer
Sector	Dummy variables for 9 industrial sectors	Datastream International

Enforcement index	Total short selling related borrowing in a country (in USD) as of November 1, 2007 scaled by total market capitalization of that country multiplied by illegal and -1	Borrowing from Data Explorer and market capitalization from World Bank website
Level of ADR	Ordinal variable that equals 1(OTC), 2 (exchange listed), or 3 (public offering to raise capital)	Bank of New York Mellon (www.adrbnymellon.com) and JP Morgan (www.adr.com)
Lagged days to cover	Current short interest divided by average daily trading volume (ratio computed for previous day)	Shortsqueeze.com
ADR dummy	Dummy variable equals 1 if the firm is an ADR firm and 0 if the firm is a non-ADR U.S. firm.	Bank of New York Mellon (www.adrbnymellon.com) and JP Morgan (www.adr.com)
Cross Listed	Dummy variable equals 1 if the firm is an ADR-issuing firm and 0 if the firm is a non-issuing control firm from the home country	Bank of New York Mellon (www.adrbnymellon.com) and JP Morgan (www.adr.com)
(US - home country) restriction	Difference between the restriction variable for the U.S. and the restriction variable for the home country	Chance (2009) and direct correspondence with stock exchanges and regulators
Active Agents	Number of custodians and lending agents with open loans	Data Explorer
Inactive Agents	Number of custodians and lending agents with inventory, but without open short loans	Data Explorer
Mkt_RF	Market risk premium	Kenneth French's website
SMB	Return on a portfolio of small stocks minus the return on a portfolio of big stocks	Kenneth French's website
HML	Return on a portfolio of high book-to-market (value) minus low book-to-market (growth) stocks	Kenneth French's website
MOM	MOM is the return on a portfolio of prior winners minus the return on a portfolio of prior losers	Kenneth French's website

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Table I

Global shifts in short selling regulations, feasibility, and activity

We provide the history of legality of short selling around the world including the dates of bans implemented during the recent financial crisis. We also provide the details of borrowing in the home country, and short selling of ADRs in the United States. In columns 2 and 3, we report the period when the short selling was legal or illegal in a particular country. For these two columns, we classify the period as illegal based on a total ban. *None*, *always*, and *since inception* in these two columns refer to periods within our sample period. In column 4, we report the other restrictions on short selling when it is not completely banned. In column 5, feasibility index is calculated as total borrowing volume for all of a country's stock in USD (as of November 1, 2007) divided the market capitalization (for the year 2007) of the country. In column 6, the ADR short interest ratio is calculated as short interest divided by shares float. In column 7, we report borrowing volume for all stocks for the given country as of November 1, 2007.

Country	Period when legal	Period when illegal	Nature of restriction and other comments	Global Feasibility Index	ADR Short interest ratio	Borrowing (\$ million)
Argentina	Since 1999	Before 1999	Up-tick rule applies; Naked short selling prohibited	0.00	0.86	0
Australia	Pre 09/22/2008; 11/20/2008 - Present	09/22/2008 - 11/19/2008	Naked short selling prohibited since 2001 Ban on shorting financial stock: 09/22/2008 - 05/25/2009	3.92	0.35	50,853
Austria	Since inception	None	Ban on naked short selling of financial stocks: 10/27/2008 - 11/30/2010	1.35	0.00	3,097
Bahrain	None	Always		0.00	0.00	0
Bangladesh	None	Always		0.00	0.00	0
Barbados	None	Always		0.00	0.00	0
Belgium	Since inception	None	Ban on naked short selling of financial stocks: 9/22/2008 - 9/21/2009	1.82	0.52	7,017
Bermuda	None	Always		NA	0.00	13,374
Brazil	Since inception	None	Naked short selling prohibited	0.00	10.03	42
Bulgaria	None	Always		0.00	0.00	0
Canada	Since inception	None; see comments	Ban on shorting financial stocks (including inter- listed in U.S): 09/19/2008 - 10/08/2008; Up-tick rule applies	3.81	0.00	83,246
Cayman Islands	Since inception	None	Very little trading occurs on the stock exchange	NA	6.71	9,692
Chile	Since 1999	Before 1999	Up-tick rule applies; Naked short selling prohibited	0.00	0.36	0
China	None	Always; see comments	In Sep2008, China allowed short selling of 11 brokerage firms on a pilot basis	0.27	0.87	17,090
Colombia	None	Always		0.00	0.74	0
Croatia	None	Always		0.00	0.00	0
Cyprus	None	Always		1.10 [†]	0.00	324

Table I – continued						
Country	Period when legal	Period when illegal	Nature of restriction and other comments	Feasibility Index	ADR short interest ratio	Borrowing (\$ million)
Czech Republic	Since inception	None		0.68 [†]	0.00	500
Denmark	Since inception	None; see comments	Ban on shorting bank stocks: 10/13/2008 – Present	1.38	0.13	3,829
Ecuador	None	Always		0.00	0.00	0
Egypt	None	Always		0.00	0.00	0
Finland	Since 1998	Before 1998		2.30	0.55	8,475
France	Since inception	None; see comments	Ban on naked short selling of credit institutions and insurance companies' stocks: 09/22/2008 - Present	4.95	2.63	137,207
Georgia	None	Always		0.00	0.00	0
Germany	Since inception	None; see comments	Investment funds except hedge funds may not short sell; Ban on naked short selling of specified financial stocks: 09/19/2008 – Present	4.21	0.53	88,639
Greece	Pre 10/10/2008; 06/01/2009 -Present	10/10/2008 - 05/31/2009	Up-tick rule applies; Naked short selling prohibited	0.05	0.08	129
Hong Kong	Since 1994	Before 1994	Permitted for specified securities (33 in 1994-95); Up-tick rule applies; Naked short selling prohibited	1.29	6.29	14,974
Hungary	Since 1996	Before 1996		2.28 [†]	0.05	1,088
Iceland	Since inception	None; see comments	Ban on naked short selling of financial stocks: 11/06/2008 - 01/31/2009	0.38 [†]	0.00	156
India	Since 12/20/2007	Before 12/20/2007 (Badla trading existed)	Badla trading means carry over transaction with extended rolling settlements; Naked short selling is prohibited; On 10/20/2008, SEBI disapproved stock lending by FIIs of participatory notes (PNs) stocks	0.00	1.26	2
Indonesia	Pre Oct 2008; May 2009 – Present	Oct 2008 - Apr 2009	Legal only for specified stocks	0.03	0.24	57
Ireland	Since inception	None; see comments	Ban on naked short selling of financial stocks: 09/19/2008 – Present	2.57	0.97	3,705
Israel	Since inception	None	Naked short selling prohibited	0.13	1.09	313
Italy	Since inception	None	Naked short selling ban for financial stocks: 09/22/2008 - 05/31/2009; Naked short selling ban for non-financial stocks: 10/10/2008 - 01/01/2009	4.63	1.66	49,618
Jamaica	None	Always		0.00	0.00	0
Japan	Since inception	None	Up-tick rule and locate requirement apply; Ban on naked short selling: 10/30/2008 – Present	1.33	0.30	59,009
Jordan	None	Always		0.00	0.00	0
Kazakhstan	None	Always		0.00	0.00	0
Kuwait	None	Always		0.00	0.00	0
Latvia	None	Always		0.00	0.00	0

Table I – continued						
Country	Period when legal	Period when illegal	Nature of restriction and other comments	Feasibility Index	ADR Short interest ratio	Borrowing (\$ million)
Lebanon	None	Always		0.00	0.00	0
Lithuania	None	Always		0.00	0.00	0
Luxembourg	Since inception	None	Ban on naked short selling of banks and insurance companies: 09/19/2008 – Present	5.29 [†]	3.19	8,786
Malaysia	Pre 1997; Jan 2007 – Present	Sep 1997 to Dec 2006	Naked short selling prohibited; Uptick rule applies; Legal only for specified stocks	0.00	0.00	0
Malta	None	Always		0.00	0.00	0
Mauritius	None	Always		0.21 [†]	0.00	12
Mexico	Since inception	None	Naked short selling prohibited; Up-tick rule applies	0.32	1.33	1,270
Morocco	None	Always		0.03 [†]	0.00	21
Netherlands	Since inception	None	Naked short selling ban: 09/22/2008 - 06/01/2009	2.20	0.92	21,030
New Zealand	Since 1992	Before 1992	Since Apr 1992, specified securities eligible for short selling; After Jul 2000, all liquid securities eligible. Short selling is hindered by tax legislation.	2.42	0.09	1,149
Nigeria	None	Always		0.00	0.00	0
Norway	Since 1992	None; see comments	Ban on naked short selling of 5 specified financial stocks: 10/08/2008 - Present	1.56	0.32	5,587
Oman	None	Always		0.00	0.00	0
Pakistan	Since inception	None	"Regulations for Short Selling under Ready Market" introduced in 2002: Naked short selling is prohibited; Up-tick rule applies; Short selling allowed only in prescribed securities	0.00	0.00	0
Panama	None	Always		30.75 [†]	0.00	1,912
Peru	None	Always		0.00	0.96	0
Philippines	Since 1998	Before 1998	Naked short selling prohibited; Up-tick rule applies; Legal only for specified stocks	0.01	0.31	8
Poland	Since 2000	Before 2000	Shorting allowed only in the permitted securities	0.00	0.00	0
Portugal	Since inception	None	Ban on naked short selling of specified financial stocks: 09/24/2008 - Present	2.12	0.03	2,806
Qatar	Since inception	None		0.00	0.00	0
Russia	Pre 09/18/2008; and 06/16/2009 -Present	09/18/2008 - 06/15/2009	Up-tick rule applies	0.00	1.47	64
Serbia	None	Always		0.00	0.00	0
Singapore	Since inception	None	Ban on naked short sales in buy-in market. Onshore lending is limited while offshore lending is active	1.17	0.07	4,135
Slovakia	None	Always		0.00	0.00	0
Slovenia	Since inception	None		0.00	0.00	0

Table I – continued

Country	Period when legal	Period when illegal	Nature of restriction and other comments	Feasibility Index	ADR Short interest ratio	Borrowing (\$ million)
South Africa	Since inception	None	Naked short selling prohibited	0.57	1.02	4,777
South Korea	Sep 1996 to 09/30/2008; and 06/01/2009 -Present	Before 1996; 10/01/2008 - 05/31/2009	Ban on shorting financial stocks: 10/1/2008 – Present; Naked short selling ban from June 2000 to Present; Up-tick rule applies	0.58	0.76	6,573
Spain	Since 1992	Before 1992	Naked short selling prohibited	3.26	0.09	58,596
Sri Lanka	None	Always		0.00	0.00	0
Sweden	Since 1991	Before 1991		1.26	1.39	7,726
Switzerland	Since inception	None; see comments	09/19/2008 - 01/16/2009: Swiss Federal Banking Commission and SIX Swiss Exchange prohibited naked short selling; SWX-Europe also prohibited creation or increase of a net short position in certain specified UK and Swiss financial stocks	2.38	0.92	30,281
Taiwan	Pre 10/01/2008; 11/28/2008 - Present	10/01/2008 - 11/28/2008	Up-tick rule applies	0.00	0.76	267
Thailand	Since Jan 2001	Before Jan 2001	Only specified securities are eligible (underlying securities of SET 50 index, ETF, and underlying securities of ETF); Up-tick rule applies; Naked short selling prohibited	0.35	0.00	677
Tunisia	None	Always		0.00	0.00	0
Turkey	Since inception	None	Up-tick rule applies; Only specified stocks eligible	0.33	0.38	954
Ukraine	None	Always		0.00	0.00	0
UAE	None	Always		0.00	0.00	0
United Kingdom	Since inception	None; see comments	Ban on short selling of specified financial stocks: 09/19/2008 - 01/16/2009	2.57	0.55	99,069
United States	Since inception	None; see comments	Up-tick rule effective: 02/01/1938 - 07/03/2007; Ban on naked short selling of 19 financial stocks: 07/21/2008 - 08/12/2008; Ban on short selling of specified financial stocks: 09/19/2008 - 10/08/2008; Quote based restrictions imposed in 2010.	3.70	0.00	738,217
Venezuela	None	Always		0.00	0.00	0
Zambia	None	Always		0.00	0.00	0
Zimbabwe	None	Always		0.00	0.00	0

† These countries do not have any local home market borrowing.

Table II

Descriptive statistics of underlying stocks, ADRs and their matched samples

In Panel A, we report the descriptive statistics for ADRs and their matched non-ADR domestic U.S. firms. We perform this matching based on exchange, industry, price to book value (PTBV) and market capitalization. For 536 ADRs for which PTBV is not available, we match firms based on exchange, industry, and market capitalization. In Panel B, we report the descriptive statistics for ADRs underlying firms and their matched non-underlying domestic firms from the home country. We perform this matching based on country, industry, PTBV and market capitalization.

<i>Panel A: ADRs and matched non-ADR domestic U.S. firms</i>							
	Number of firms	Price to book value			Ln market capitalization		
		Mean	Median	StdDev	Mean	Median	StdDev
ADRs	1,221	3.13	2.34	6.81	7.80	8.10	1.99
Non-ADR domestic U.S. firms	1,221	3.13	2.33	5.91	7.35	7.58	1.79

<i>Panel B: Cross listed firms and matched non cross listed firms</i>							
	Number of firms	Price to book value			Ln market capitalization		
		Mean	Median	StdDev	Mean	Median	StdDev
Cross listed firms	1,406	2.68	2.08	2.30	7.84	8.08	1.85
Non - cross listed firms	1,406	2.61	2.08	2.24	5.52	5.60	1.86

Table III

Effectiveness of short selling restrictions in curtailing home market stock borrowing

We estimate regressions using the Data Explorer dataset as of November 1, 2007. The dependent variable in Models 1a to 1c is *shares borrowed* at country level, which is the ratio of aggregate home market borrowing for all the stocks from a given country divided by the aggregate stock market capitalization of that country. The dependent variable in Models 1d and 1e is the *shares borrowed* at firm level. We create two variables to capture the regulatory framework; *illegal* and *restriction*. *Illegal* equals 1 for the period when short selling is illegal in the home market and 0 otherwise. *Restriction* ranges from 0 to 3 where a higher number means more restrictions on short selling in the home market, such as prohibition on naked short selling, an up-tick rule, or a total ban on short selling. *Put Option* is a dummy variable that equals 1 if put options are traded in the home country of the ADR and 0 otherwise. *Return* is return for the stock during the previous fortnight or day. *Dividend yield* is dividend per share as a percentage of the share price. *Standard deviation of return* is a measure of stock price volatility for the period from day t_{-280} to day t_{-30} . *Market capitalization* is the share price multiplied by the number of ordinary shares outstanding in millions of USD. *VSA* is value weighted average fee for all new loans expressed in undisclosed fee buckets 0-5 (0 is the cheapest to borrow). *SL Tenure* is the weighted average number of days from borrowing initiation date to measurement date for all open short transactions in the given stock. All coefficients are standardized using the SAS proc reg stb option. Statistical significance is based on heteroscedasticity-consistent standard errors.

<i>Variable/Dependent variable</i>	<i>Shares borrowed</i> (at country level)			<i>Shares borrowed</i> (at firm level)	
	<i>Model 1a</i>	<i>Model 1b</i>	<i>Model 1c</i>	<i>Model 1d</i>	<i>Model 1e</i>
Intercept	0.0000***	0.0000***	0.0000*	0.0000***	0.0000***
Illegal	-0.4294***				
Restriction (0-3)		-0.4937***	-0.2035*	-0.0636***	-0.0321***
Put option			0.3703***		0.0100***
Return (t)			-0.1656*		0.0224
Dividend Yield			0.0580		-0.0014***
Standard deviation of return			-0.2760*		0.0183
Market capitalization					0.0021
VSA					-0.1103***
SL Tenure					0.0001
Sector fixed effects					Yes
Adjusted R Square	0.1742	0.2343	0.2943	0.004	0.0152
Number of Observations	82	82	42	22,793	7,509

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Table IV

Effect of home country short selling restrictions on short selling activity of ADRs in the U.S.

For Models 1a – 1c, our dependent variable is *total short interest*, which is the total number of outstanding shorted shares. For Model 2, our dependent variable is the number of shares sold short. We use a number of independent variables. We create two variables to capture the regulatory framework; *illegal* and *restriction*. *Illegal* equals 1 for the period when short selling is illegal in the home market and 0 otherwise. *Restriction* ranges from 0 to 3 where a higher number means more restrictions on short selling in the home market, such as prohibition on naked short selling, an up-tick rule, or a total ban on short selling. *Enforcement Index* is calculated as total borrowing volume in USD divided by the market capitalization of the country multiplied by *illegal* and -1. *Put Option* is a dummy variable that equals 1 if put options are traded in the home country of the ADR and 0 otherwise. Other control variables are defined as follows. *Return* is return for the stock during the previous fortnight or day. *Market capitalization* is the share price multiplied by the number of ordinary shares outstanding in millions of USD at the beginning of our sample period. *Dividend yield* is dividend per share as a percentage of the share price. *Level of ADR* is an ordinal variable ranging from 1 to 3 for each level of ADR. *Standard deviation of return* is a measure of return volatility during our sample period. *Lagged days to cover* is the number of days required for cumulative daily trading volume to equal the current number of shorted shares outstanding at time (t-1). All coefficients are standardized using the SAS proc reg stb option. Continuous variables are winsorized at the 1st and 99th percentile. Statistical significance is based on heteroscedasticity-consistent standard error.

<i>Variable/Dependent variable</i>	<i>Total short interest (fortnightly)</i>				<i>Short volume (Daily)</i>
	<i>Model 2a</i>	<i>Model 2b</i>	<i>Model 2c</i>	<i>Model 2d</i>	<i>Model 3</i>
Intercept	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
Illegal	-0.0243***	-0.0331***		-0.0348***	-0.0695***
Restriction (0-3)			-0.0245***		
Enforcement index				-0.0042	
Put option		-0.0107	-0.0016	-0.0114	-0.0868***
Return (t)		0.0008	0.0016	0.0011	0.0117**
Market capitalization		0.2248***	0.2208***	0.2249***	0.1805***
Dividend yield		-0.0514***	-0.0548***	-0.0514***	
Level of ADR (1-3)		0.3965***	0.4002***	0.3965***	
Standard deviation of return		0.0705***	0.0695***	0.0703***	
Lagged days to cover		0.0723***	0.0716***	0.0722***	
Sector fixed effects		Yes	Yes	Yes	
Adjusted R Square	0.0006	0.2389	0.2385	0.2388	0.0376
Number of Observations	34,494	28,780	28,780	28,780	41,826

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Table V

Home bias in short selling: ADRs versus matched control sample of domestic U.S. stocks

We estimate regressions with a sample of 1,221 ADRs and their control sample of 1,221 non-ADR U.S. firms. For Models 3a and 3b, our dependent variable is *Total short interest*, which is the total number of outstanding shorted shares for each ADR for each fortnight. For Model 4, our dependent variable is *Short volume*, which is the number of shares sold short each day for each ADR. We use a number of independent variables. Our main variable of interest is *ADR Dummy*, which is equals to 1 if the firm is an ADR firm and 0 if the firm is a non-ADR U.S. firm. Other control variables are defined as follows. *Return* is return for the stock during the previous fortnight or day. *Market capitalization* is the share price multiplied by the number of ordinary shares outstanding in millions of USD at the beginning of our sample period. *Dividend yield* is dividend per share as a percentage of the share price. *Standard deviation of return* is a measure of stock price volatility during our sample period. *Lagged days to cover* is the number of days required for cumulative daily Trading Volume to equal the current number of shorted shares outstanding at time (t-1). All coefficients are standardized using the SAS proc reg stb option. Observations are winsorized at the 1st and 99th percentile values of continuous variables to eliminate any potential data errors and outliers. Statistical significance is based on heteroscedasticity-consistent standard errors.

<i>Variable/Dependent variable</i>	<i>Total short interest (fortnightly)</i>		<i>Short volume (Daily)</i>
	<i>Model 4a</i>	<i>Model 4b</i>	<i>Model 5</i>
Intercept	0.0000***	0.0000***	0.0000***
ADR dummy	-0.1928***	-0.2595***	-0.1504***
Return (t)		0.0060	0.0477
Market capitalization		0.2282***	0.0636***
Dividend yield		0.0124***	
Standard deviation of return		-0.0045	
Lagged days to cover		0.1495***	
Sector fixed effects		Yes	
Adjusted R Square	0.0372	0.1240	0.0259
Number of Observations	65,839	59,022	88,034

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Table VI

Effect of short selling restrictions in the U.S. on short selling activity in home country

We estimate regressions with a sample of 1,406 ADR-issuing firms and their matched control sample of 1,406 non-issuing firms. We use a number of independent variables. (*US - home country*) *restriction* is the difference between the restriction index for the U.S. and the restriction index for the home country (restriction index ranges from 0 to 3 where a higher number means more restrictions on short selling, such as prohibition on naked short selling, an up-tick rule, or a total ban on short selling). *Cross listed* is 1 if the firm is an ADR-issuing firm and 0 if the firm is a non-issuing control firm. *Return* is return for the stock during the previous fortnight or day. *Market capitalization* is the share price multiplied by the number of ordinary shares outstanding in millions of USD. *Dividend yield* is dividend per share as a percentage of the share price. *Standard deviation of return* is a measure of stock price volatility during our sample period. *VSA* is value weighted average fee for all new loans expressed in undisclosed fee buckets 0-5 (0 is the cheapest to borrow). *SL Tenure* is the weighted average number of days from borrowing initiation date to measurement date for all open short transactions in the given stock. *Active agents* is the number of custodians and lending agents with open share lending transactions. *Inactive agents* is the number of custodians and lending agents with inventory, but without open transactions. All coefficients are standardized using the SAS proc reg stb option. Observations are winsorized at the 1st and 99th percentile values of continuous variables to eliminate any potential data errors and outliers. Statistical significance is based on heteroscedasticity-consistent standard errors.

<i>Variable/Dependent variable</i>	<i>Shares borrowed (daily frequency)</i>	
	<i>Model 6a</i>	<i>Model 6b</i>
Intercept	0.0000***	0.0000***
(US - home country) restriction	-0.0444***	-0.0281***
Cross listed		0.0279***
Return (t)	0.0000	-0.0001
Market capitalization	0.1995***	0.2080***
Dividend Yield	0.0492***	0.0470***
Standard deviation of return	0.1013***	0.0881***
VSA	-0.0041***	0.0047***
SL Tenure	-0.0087***	-0.0018***
Active agents	0.4283***	0.4413***
Inactive agents	-0.0434***	-0.0400***
Sector fixed effects	Yes	Yes
Adjusted R Square	0.2877	0.3356
Number of Observations	982,217	1,459,345

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Table VII

Implications of *regulatory reach* for price efficiency and future returns

Following Asquith, Pathak and Ritter (2005), we report the time series regression results using the Fama-French four factor model for the period from 1980-2010. In Panel A, we report the regression for *legal* and *illegal* portfolios, rebalanced based on the legality status at the end of the previous month. *Legal* is the portfolio of ADRs that are from the countries where it is legal to short sell at time t . *Illegal* is the portfolio of ADRs that are from the countries where it is illegal to short sell at time t . In Panel B, we report the regression for *no restriction* and *total ban* portfolios, rebalanced based on the legality status at the end of the previous month. *No Restriction* is the portfolio of ADRs that are from the countries where it is not only legal to short sell, but also there are no other restriction on short selling such as a ban on naked short selling or an up-tick rule. *Total ban* is the portfolio of ADRs that are from the countries where it is totally illegal to short sell. Our dependent variable is monthly percentage returns calculated as $r_{pt} - r_{ft}$, the excess return over the risk-free rate on an equally weighted portfolio. Our independent variables are *Mkt-RF*, *SMB*, *HML*, and *MOM* based on the U.S. market. *Mkt-RF* is the realization of the market risk premium in each period. *SMB* is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. *HML* is the return on a portfolio of high book-to-market (value) minus low book-to-market (growth) stocks. *MOM* is the return on a portfolio of prior winners minus the return on a portfolio of prior losers. Statistical significance is based on heteroscedasticity-consistent standard errors.

Panel A: Fama- French four factor regression model by legality (n = 358)

Legality	Intercept	Mkt_RF	SMB	HML	MOM	R Square
Illegal	-0.54*	0.05	0.28***	0.23**	-0.05	0.0377
Legal	-0.41*	0.11*	0.25***	0.28***	-0.01	0.0607

Panel B: Fama- French four factor regression model by restriction(n=358)

Level of Restriction	Intercept	Mkt_RF	SMB	HML	MOM	R Square
Total ban	-0.54*	0.05	0.28***	0.23**	-0.05	0.0377
No restriction	-0.23	0.15**	0.21**	0.28***	0.00	0.0556

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level

Table VIII

Double sorted portfolios: Impact of *regulatory reach* and borrowing demand for price efficiency and future returns

Following Asquith, Pathak and Ritter (2005), we report time series regression results using the Fama-French four factor model for the period from November 2007 to October 2009. We sort our sample in two ways. First, we create portfolios based on the short interest at the end of each month. We divide our sample into three parts, low short interest, medium short interest and high short interest; we focus on the two extreme groups. Second, within each short interest group, we sort based on legality status or restrictions on short selling for the home country of each ADRs. In Panel A, we report the regression for *legal* and *illegal* portfolios. *Legal* is the portfolio of ADRs that are from the countries where it is legal to short sell at time t . *Illegal* is the portfolio of ADRs that are from the countries where it is illegal to short sell at time t . In Panel B, we report the regression for *no restriction* and *total ban* portfolios. *No restriction* is the portfolio of ADRs that are from the countries where it is not only legal to short sell, but also there are no other restriction on short selling such as a ban on naked short sell or an up-tick rule. *Total ban* is the portfolio of ADRs that are from the countries where it is totally illegal to short sell. Our dependent variable in the regression model is the monthly percentage returns calculated as $r_{pt} - r_{ft}$, the excess return over the risk-free rate on an equally weighted portfolio. Our independent variables are *Mkt-RF*, *SMB*, *HML*, and *MOM* based on the U.S. market. *Mkt-RF* is the realization of the market risk premium in period. *SMB* is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. *HML* is the return on a portfolio of high book-to-market (value) minus low book-to-market (growth) stocks. *MOM* is the return on a portfolio of prior winners minus the return on a portfolio of prior losers. Statistical significance is based on heteroscedasticity-consistent standard errors.

<i>Panel A: Fama- French four factor regression model by legality (n=23)</i>						
Level of Restriction	Intercept	Mkt_RF	SMB	HML	Mom	R Square
<i>Short interest (Low)</i>						
Illegal	-2.79*	0.24	-0.21	-0.21	-0.18	0.1729
Legal	-1.75	0.41**	-0.09	-0.17	-0.02	0.1975
<i>Short interest (High)</i>						
Illegal	-3.92*	0.36	-0.09	-0.46	-0.40	0.2193
Legal	-1.56	0.41*	-0.39	-0.19	-0.17	0.1725

<i>Panel B: Fama- French four factor regression model by restriction (n=23)</i>						
Level of Restriction	Intercept	Mkt_RF	SMB	HML	Mom	R Square
<i>Short interest (Low)</i>						
Total ban	-2.79*	0.24	-0.21	-0.21	-0.18	0.1729
No restriction	-1.61	0.42**	-0.32	-0.25	-0.10	0.1932
<i>Short interest (High)</i>						
Total ban	-3.92*	0.36	-0.09	-0.46	-0.40	0.2193
No restriction	-1.33	0.43*	-0.48	-0.17	-0.16	0.1892

***Significant at 0.01 level, **Significant at 0.05 level, *Significant at 0.10 level