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The impact of short sale limitations on equity market.

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ABSTRACT

After the failure of Lehman Brothers many countries reacted to the crisis by banning the sale of uncovered securities. Empirical evidences indicate that at best the ban did not have a significant impact on prices, but damaged the liquidity of the market. A particularly serious damage occurred when the liquidity was already scarce and investors were looking desperately for it because of the freeze of many fixed markets. A lesson that market authorities will better remember in the future.

On the 19th of September 2008, shortly after that the Lehman bankruptcy had shaken confidence in banks' solidity and made them collapse in prices for their shares, the Securities and Exchange Commission (SEC) imposed a ban on short-selling shares of banks and financial companies, aiming at supporting their prices.

This decision was quickly copied by the majority of other countries: some of them banned only the naked short sales, where the seller does not borrow the shares to deliver them to the buyer during the settlement period, others banned also the covered short sales, where the seller protects himself by borrowing the shares.

This dissertation analyzes these policies and its consequences. The following work is divided into three sections: in the first part the short-selling practice is defined, the second part explains its regulations, going through historical facts, and the last part empirically analyzes the effects of the ban in different countries. At the end, we will discover that the short-selling bans imposed during the crisis are associated with a statistically and economically significant liquidity disruption, especially for stocks with small market capitalization, high volatility and no listed options.

The decision of imposing these bans will at the end be revaluated by the stock market authorities, which, after this experience, will surely not repeat this mistake.

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1. SHORT-SELLING: WHAT IS IT AND HOW IT WORKS.

1.1 Definitions

According to the Oxford dictionary, short selling means "to *sell stock or other securities or commodities which one does not own at the time, in the hope of buying at a lower price before the delivery time*."

This technique of selling activities that you do not (yet) possess, is often considered an immoral practice adopted by speculators to profit from the reduction in the price of these assets. It is complex, opaque and contrary to the "normal" market logic lead by the idea that first one buys a good and then he sells it. Undoubtedly, it is a technique at the center of important debates with many opponents and as many supporters, especially during the recent financial crisis.

Over the centuries, national authorities have often forbidden or restricted short sales, especially because of financial crises, to support financial markets by loosening pressure on the sales side, but also sometimes seeking a scapegoat for the complex economic and financial situation of the time, difficult to manage and explain to the population. In the light of these considerations, it is interesting to investigate the effects on the markets of such regulatory measures.

First of all, we need to start from the basic transactions of the market: *buying long* and *selling* at a later date. We profit from these operations when the sale price is higher than the purchase price.

These two activities are *cash transactions* since they do not require any loan or involve any collateral, which is an asset or property offered by the borrower to secure the loan and it is usually denoted as *margin*.

Margin transactions usually involve a third party, the security lender; when the investor (hedge fund) buys on margin he borrows cash, while, he borrows a security when selling short. Indeed, these are the two main transactions involving a collateral: *buying on margin* and *short selling*.

Focusing on short-selling, we know that it is a speculative operation that allows you to gain when markets tumble since it benefits from falling prices. That is why it is commonly criticized, although it provides markets with relevant benefits.

Short selling is often seen as a unique transaction, still we can go through all its basic operations so to have a better understanding of this process.

- It all starts in the moment the hedge fund sells a specific number of securities not yet in his possession. From this moment, he will have to arrange the sale to cover the affair due to the delivery date, while the buyer of the securities does not acknowledge that.
- The hedge fund finds a security lender and borrows the same number of securities he owns the buyer. In exchange, he will have to pay interests to the security lender and put a collateral as a guarantee of the repayment. (Fig.1)
- The hedge fund delivers the securities to the buyer with full legal ownership, including voting rights, and this transaction is recorded on the hedge fund account.
- Later, the same number of securities will be repurchased from the market and they will be returned to the lender. At this point the short position is closed. (Fig.2)

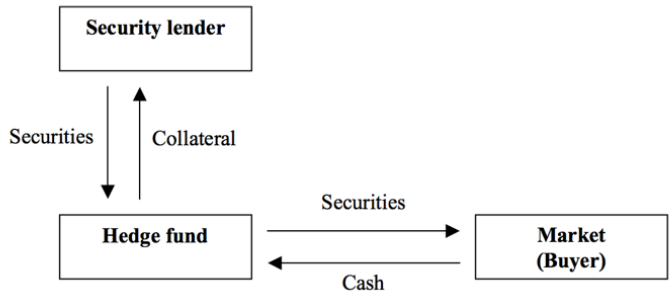


Figure A: Flows resulting from initiating a short sale transaction

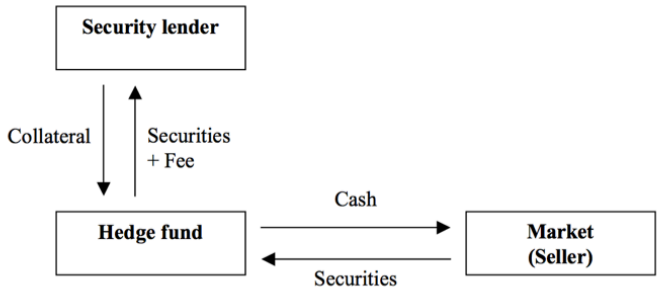


Figure B: Flows resulting from closing a short sale transaction

In the first phase, defined as *"Selling Securities on the Market"*, the counter value of the transaction is retained by the system, together with a certain amount withdrawn from the current account, called "margin to guarantee". In fact, the broker not only freezes out-of-stock funds, a guarantee and coverage for the next repurchase, but also requires an additional amount (the *Margin of Warranty*)

to protect the seller's ability to repay by repurchasing financial instruments sold although the prices of the latter have in the meantime increased considerably.

A possible bullish reaction that could jeopardize the profits of the transaction involves the so-called "*short-squeeze*", that is to say, the sudden closing of the uncovered transactions by those who sold the securities without having them.

The second step is the so-called "*Repurchase of securities on the market*", using the counter value of the sale and the Guarantee Margin, the securities sold are shorted on the market. The broker obviously delivers the margin and, as a result, the position is closed.

The difference between the inflow gained during the sale and how much is spent on the repurchase is the profit (or loss) of the short selling transaction.

It may also be possible for the broker to anticipate early sales of the short sales in case of corporate transactions (capital increases, groupings, divisions, mergers, divisions, tax-exempt dividends, etc.). The lender shall remain entitled to the assignment of shares in the event of a free increase in capital and an option in the event of a payment increase.

Short sales can be of two types, *Covered* and *Naked*.

Covered sales are covered by securities lending: the seller borrows a certain number of shares equal to how many shares he intends to sell as a guarantee for the buyer. At a later date, it acquires the same quantity of shares on the market to return it to the lender. The lender may claim both cash and financial instruments as collateral. If collateral is represented by financial instruments, lenders receive commissions from the seller, and if the collateral is money, the lenders match the seller's interest at a lower rate than the market rate.

On the other hand, *naked* sales are not assisted by securities lending at the time of order, so the seller must look for the shares to be delivered to the buyer so to adjust their position. Coverage can be made through the loan of securities or with a purchase, off-market or on the market. If the hedge fund does not manage to find the shares by the delivery date, there is a *failure to deliver* shares to the buyer.

Therefore, naked short sales give rise to a high risk of non-delivery of securities on the contractual settlement date. This risk becomes a certainty if the securities are purchased on the market the days after the sale order was executed.

One of the various reasons why naked short selling is frequently criticized is that broker and dealers allow it when there is not possibility of delivering share to the buyer through the stock price manipulation. However, they may also be used to protect investor by price manipulation. For example, even without a real justification, market makers could decide to go short just to stabilize

the market, avoiding an increase in stock prices. This can be explained because the security lender, during the short sale activity, turns his securities into cash still having the ownership.

Therefore, we can conclude highlighting the two positions that can be taken while a short sale takes place: the *real* position occupied by the buyer of the short securities, and a *phantom* position held by the entity lending the security to the hedge fund, which is responsible for any corporate action with respect to the stock lender.

You can take *short positions* on a title not only by selling it on the open market but also through the use of derivative instruments from which the obligation or the right to deliver the security derives within a certain date.

1.2 Short selling purposes

Typically, three goals can be identified for which investors resort to short selling.

I. *Speculative purposes.* When an investor believes a stock is overvalued he can sell it out, trusting that the price will return to the fundamental value of the stock, and thus gaining from the reduction in its listing. In reality, short sellers, through the use of certain investment strategies, could also make a profit in the event of a rise in stock quotes. For example, the seller could bet on the performance of the title against another one, taking a long position on the undervalued title and selling the overvalued one; in this case, the investor's profit will depend on the relative performance of the two securities and not only by the performance of the stock sold.

II. *Arbitrage purposes.* By simultaneous purchase and sale of related financial instruments (such as shares and derivatives) to exploit the misalignment of relative prices in the various markets in order to obtain a profit.

III. *Hedging purposes.* The sale allows you to cover the risk arising from a previous position. For example, if the investor sold a put option on a stock or acquired a convertible bond, he has a long position on that title (e.g. he gains if the price rises), thus selling it he may take a short position to cover the long one: in the case of a decrease in the price, the short-term gains compensate the losses on the long position and vice versa.

1.3 Analysis of the short sales on the market

Theoretically, there is no limit to the amount of money you may lose: if you have a long position, your maximum loss will be covered when the asset reaches a zero value. When you sell a title,

however, the price could in theory continue to go up infinitely. So, the risk is unlimited and that is why you might consider inserting a *stop-loss* in your position to ensure coverage of your maximum potential loss.
Short selling is an activity that does not require any initial investment; however, it presents relevant risks:

- *Market risk*: the hedge fund sell the securities expecting their prices to fall, however that does not always happen and the prices could rise, causing a loss to the short seller.

- *Recall risk*: when the short seller borrows the securities, these could be recalled at any time. A risky situation occurs in the moment the fund hedge cannot find an alternative lender and is forced to close his position and repurchase the securities in the open market at any time. This event is typically named *short squeeze*, or *market corner*.

- *Liquidity risk*: If there are not enough liquid securities, it would be more difficult for the short seller to close his position since the market may dry out and there would be fewer securities to buy.

The main risk for short sales results from the possibility that the forecasts are misleading and the stock sold goes up: since the price may increase unlimitedly, the seller could potentially have an unlimited loss. To prevent these situations from occurring, stop-loss orders are used to limit losses resulting from financial transactions. In this case, this is done by closing the position and purchasing the sold item when its price rises above a certain threshold, thus limiting the loss.
Short selling has often been accused of damaging the downward trend in stock prices and, because of it, it is often considered a practice to prohibit. When a large size short sale is realized, it is possible to create fears and uncertainties in the market, discouraging the opposite operation from other traders. This risk is even more concrete during market tension phases, where it is easier to create a situation of panic which will push the negative price dynamics.

In order to monitor the performance of the stock prices and valuate if it is an optimal time to short sell, hedge funds rely on the *short interest*, which is the quantity of stock shares that investor have sold short but not yet covered or closed out. When other investors go short the cost of borrowing securities increases, that is why many hedge funds prefer to hide their short position. This is the consequence of a paradox: the securities lending market works well, except when everybody wants to use it to sell short, in which case it works very badly.

Market instability generated by short-sale positions is considered more severe when short sales are naked: since they do not have any position coverage, they can be executed more quickly, at lower costs and for larger quantities.
Regulators are considering to increase short sale limitations since the intensification of these transactions increases the difficulty for traders to obtain in time the securities sold in the open market, increasing the likelihood of defaulting in the liquidation process (meaning that they fail in the securities delivery at the date contractually established) and its duration. This risk may alter the proper functioning of markets by increasing transaction costs and reducing the trade level. The magnitude of this risk is closely linked to the current regulations.

One of the most problematic issues associated with short selling practices is the abuse of the market: according to opponents of this practice, traders who profit from a downward trend in a stock may be encouraged to manipulate the market by spreading rumors and misleading signals about the real value of the same, thus encouraging other investors to sell and causing the asset price to collapse.
Short selling's supporters believe that this practice is not only a legitimate trading strategy but that, under normal market conditions, it may be effective.

As an investor with positive information about a stock can express his vision going along the market, short sales allow those who have negative information (or low expectations) to reveal them through the sales. This increases the efficiency of the *price discovery process*, that is, the process by which the prices of the assets are formed on the market as a result of the interaction between buyers and sellers. Price discovery is influenced by information provided by traders: those who have negative information can make it known to the market by selling the security, even though they do not possess it; this allows a reduction in the price of the overvalued asset which improves price information efficiency, their ability to reflect all available information and thus the fundamental value of securities traded on the market.

Outbound sales with arbitrage purposes help facilitate the realignment of relative prices on their respective markets by improving the efficiency of the market as a whole. For example, *Index arbitrage* strategy promotes communication and linkage between cash and futures markets, resulting in greater efficiency.

The realization of short sales with hedging purposes, instead, enables traders to cover the risk of a collapse of the asset prices they own, which due to a variety of reasons they may not be able to sell. Thus, it allows to clarify better risk management and flow management strategies.
Finally, a greater number of sales deals improves the number of transactions, increasing liquidity and allowing for lower transaction costs in terms of bid-ask spreads.

Short sales could have a size and speed that could lead to a significant and sudden reduction in stock prices, creating disorder in the markets and increasing the level of price volatility in the short term. In fact, "robust" and fast-track sales can create fears and uncertainties in the market, discouraging intervention with opposite sign orders from potential buyers. This risk is even stronger in particularly stressful market situations, where sales are more likely to cause panic and disorientation, triggering chain reactions and thus exacerbating the bearish trend in the market.
The risk of instability may be higher in the case securities sales do not involve experts such as brokers or dealers, which would make the sales faster and more substantial than covered sales. In fact, in the case of covered short selling, the hedging request could limit both the speed of the transaction (given the need to cover) and its consistency (limited by the ability to borrow the securities).

1.4 Positive and negative effects of short selling

In spite of the use of the short sale is somewhat controversial and subject to numerous criticisms, the economic literature on the subject supports the idea that it normally contributes to the efficient functioning of the markets. In particular, it is believed that out-of-stock sales bring substantial benefits to the market, improving price information efficiency and increasing liquidity.
On the other hand, however, it is believed that it may have a negative effect on market stability, in that it can be used for manipulative purposes and it increases the risk of settlement.

Many investors and believe that short sales are more risky than conventional operations but it is not. There are mainly 3 reasons why short selling is considered to be safer and more efficient than an upward operation and they are:

I. The violence with which a market is collapsing is far greater than the strength with which it tends to grow (short selling you can earn more and quicker).

II. The only "flaw" is that for short sales there is a gain limit represented by the achievement of zero dollar (or whatever currency) and the title cannot go beyond this limit. This implies that the maximum gain for a short operation is 100 percent of the initial value of the title we are considering. This feature does not imply any problem as, if we want, when the title goes to zero we can close the position and open another one.

III. Short sales are safer because if you use a stop loss position, there is a smaller risk of being ignored by the system; in fact, the rate at which a title collapses can be violent (as a result of panic selling), while usually a title tends to increase in price much slower and the stop loss is more likely to be taken into consideration. In fact, this is not always true, meaning that more than once securities increased by 20 or more percent; however, it is unlikely to happen, especially when this is accompanied by a general market collapse .

2 SHORT SELLING REGULATIONS

2.1 Regulatory options

In general, to stem the phenomenon of short sales, regulatory authorities may impose a short period of time for the liquidation of transactions, or they may suspend uncovered activity.
A more radical measure is, however, the obligation of the issuing order to have the securities ownership and availability from the day of the order until the settlement of the transaction, excluding the temporary loan of the financial instruments.
The main regulatory hypotheses to regulate the short selling can be typed in at least five cases:

1) The total and temporally unlimited ban on any short selling (naked and non);
2) The partial prohibition of any short selling transaction, which could be temporary and/or limited to certain securities;
3) Prohibition (temporary or not) of naked short selling only;
4) Stricter rules on securities lending and/or disclosure of volumes negotiated;
5) The uptick rule or plus tick rule, which imposes the price of the short sale order to be higher than the current bid, so to prevent an asset from a further price decline.

The options 1) and 2) prevent all open sale transactions (both covered and naked), while the third only prohibits naked short sales. In particular, solution 2) establishes the impossibility of selling out

when there are exceptional or concurrent market situations, such as an increase in capital operations. Regarding the duration of the restrictions, it should be noted that permanent ban options may be completely ineffective, since institutional trading clients often rely on brokers who do not have securities in custody. This makes it impossible for the intermediary to carry out any kind of control over the type of sales, except for relying on customer declarations. Such an impediment is therefore likely to render ineffective any prohibitions imposed. In addition to the transparency option in point 4) above, it should be noted that there is a reporting option to the supervisory authority which is linked to some other mixed reporting and transparency options.

In detail, it should be pointed out that the reporting option consists in communicating significant net short positions. So, the mixed reporting and transparency options that you usually consider include:

1) The disclosure of significant net short positions to the supervisory authority and the subsequent communication, by the Authority, to the aggregated data market (through a flagging system, which sales provides an audit trail of short sales that allow market authorities to monitor transactions, follow up on suspicious transactions and to collect information for public disclosure).
2) Reporting to the Authority and reporting to the market significant net short positions with different thresholds (two-tier system).
3) Transparency/reporting on securities lending.

The transparency option number 1 regarding aggregate short sales assumes that the market will be provided with information about the sales for every title thanks to the use of a flagging regime. In this case, the aggregate data disclosure would not allow the Supervisory Authority to have the information needed to identify suspicious positions in the market. Moreover, the information obtained through the adoption of a flagging scheme may be imprecise due to the complexity of the system and the difficulty of monitoring the accuracy of the data provided.
In addition, communications should be aimed at individual net short positions taken also through derivative products; while a permanent threshold for market transparency requirements should be provided for capital increase operations, as proposed by the CESR (European Security Regulators Committee).
The third is in fact a generic option, as it includes both transparency options and reporting options related to the securities lending transaction. On the other hand, the disclosure of securities lending is considered to be a proxy for short selling activities, although the lending may take place not only to assume bearish positions, yet for different reasons. In any case, sales would not be evident.

2.2 The introduction of the ban

Before going into details about the valuation of these limitations, it could be useful to first introduce the time line of the events.

In 2008, following the insolvency of Lehman Brothers, financial markets experienced exceptional tensions and volatility. Fearing that short sales could help increase market tensions, the supervisory authorities of the major countries adopted a series of measures to limit, to a certain extent, the practice of short sales. These measures were adopted in order to limit sharp corrections on downward quotations and to ensure a smooth price formation process, while reducing market abuse opportunities.

On July 2008, due to the financial crisis, the SEC, under pressure from Senators Hillary Clinton and Chuck Schumer, issued a restriction on naked short sales in nineteen financial stocks; they believed that when the short seller failed to borrow shares and deliver them to the buyer on the established date, this could reduce the efficiency in the market; so, an emergency order was necessary. Indeed, on the 17th of September the SEC decided to adopt *Temporary Rule 204T*, which required "enhanced delivery requirements on the sales of all equities securities" in all US stocks, which would start to be effective on the following day. This action influenced the United Kingdom so much that on the 18th of September the FSA (Financial Service Authority) put a temporary ban on short selling in thirty-two stocks, that together with the American ban were planned to last until the 16th of January 2009 for 797 financial stocks. Since all these actions were taken overnight, on September 22, the SEC called out the exchanges to decide which companies would be added to the list of the short sale banned ones. Consequently, the NYSE added 71 stocks on the same day, after the market closed, but over the following days the list reached almost 1000 banned stocks.

The introduction of these bans was so immediate due to exceptional market events that it created confusion and uncertainty all over the market. This happened because of the lack of advance notice. Because of this speed in introducing the ban many details evolved over time, such as the fact of letting exchanges implement names on the list which came later. The ban expired on the 2nd of October 2008, yet the SEC decided to extend it for few days more. On October 3, Friday, President Bush signed the bill into law and the SEC announced that the ban would expire on the 8th of October. So, on October 9 only the naked shorting ban was still effective, meaning that market participants must pre-borrow shares before entering a short sale.

2.3 Short-selling practice in various countries

It is very interesting to notice how the financial systems stimulate individuals to purchase stocks, yet do not want them to sell those short. However, overtime there was an evolution of the number of countries allowing short selling, since they gradually realized that short sales could increase the liquidity of the market and slow down the price declines. That is why, regulators decided to introduce a set or short sale limitations, not to completely limit short sales but at least to control them. Of course, every market brought out these constraints in its way, so every country imposed different regulations about this issue (see table below).

For instance: in Sweden only traders could go short without having borrowed the shares in advance, while individuals could not (this may be because individuals usually had a longer-term time horizon, while traders tended to hold assets for shorter periods of time to capitalize on short-term trends), in Greece before the 2001 only member of the Athens Derivatives Exchange could short sell, in Brazil you had to be represented domestically to short sell, until 1996 in Hong Kong short sales were only allowed for specific securities, in Taiwan it was forbidden unless individuals had a special authorization from the Ministry of Finance.
Moreover, many exchanges required a plus tick or zero-plus tick movement in order to short sell. According to the plus tick rule, better known as an up-tick, the short sale only occurs in the event that the price of the security is higher than that one on the previous transaction; meanwhile, the condition for the zero-plus rule is that the actual price must be the same as the previous one, which was an uptick. Both these two rules were introduced to prevent a further fall in prices of a stock that are already declining.

Each market has a different level of information transparency, so that sometimes it is difficult to distinguish a short sale from a normal one. This might occur because some participants have a privileged position regarding the stock information; for this reason, many regulators introduced several disclosure requirements, allowing investors to follow the trend of any particular security and create their own opinion about it.
For example, in Canada information about the 20 largest short positions must be disclosed daily, the United States have to publish the aggregate short position per security monthly and the most frequent disclosure, which takes place twice a day, occurs in Hong Kong. Another way of disclosure is to publish lending figures instead of short sales and it is adopted by countries such as Brazil, Sweden and Spain.

Table 5.1 Summary of short selling practice in various countries

Country	Short selling permitted?	Short selling practised?	Short selling details and restrictions	Tick rule
Albania	No	No		
Argentina	Yes	No	Only allowed for 16 stocks and cannot last more than 360 days in a row. Securities lending is rare and occurs only between brokers	
Australia	Yes	Yes	Liquid securities only, and maximum 10% of the capital issued may be sold short. Not allowed during takeovers. Disclosure is required	Yes
Austria	Yes	Yes		
Belgium	Yes	No	No organized market for securities lending	
Brazil	Yes	Yes	Disclosure on securities lending	
Bulgaria	No	No	Short selling is prohibited	
Canada	Yes	Yes	Disclosure is required	Yes
Chile	Yes	No	Not market practice for tax reasons and cannot last more than 360 days in a row	Yes
China	No	No	Short selling is not permitted	
Colombia	No	No	Securities lending is not permitted	
Czech Republic	Yes	Yes	Possible but the securities must be bought or borrowed in the market before the settlement	
Denmark	Yes	Yes		
Ecuador	Yes	No	Not market practice for tax reasons	
Egypt	No	No	Short selling is not permitted	
Estonia	No	No	Short selling is not permitted	
Finland	Yes	No	The transfer tax laws place a serious burden on the activity	
France	Yes	Yes		
Germany	Yes	Yes		
Greece	Yes	Yes	Short selling has recently been introduced as part of the ADEX securities lending programme	Yes
Hong Kong	Yes	Yes	Liquid securities and underlying securities of a derivative or an approved exchange-traded fund. Extensive disclosure	Yes
Hungary	No	No	Short selling is not recognized market practice	
India	No	No	Not allowed for foreign investors, but local investors (i.e. retail investors and broker/dealers on proprietary books) are permitted to short sell in the market	
Indonesia	Yes	No		
Ireland	Yes	No	Securities lending is limited	
Israel	Yes	No	Short selling in the market is permitted only under certain conditions and circumstances	
Italy	Yes	Yes		
Japan	Yes	Yes	Disclosure is required	Yes
Jordan	No	No		
Lithuania	No	No		
Luxembourg	Yes	Yes		
Malaysia	No	No	Short selling and securities lending were suspended during the Asian crisis of 1997	
Mexico	Yes	Yes	Liquid equities only, with restrictions for foreign investors. Disclosure required	Yes

(*Continued*)

Table 5.1 Summary of short selling practice in various countries (*Continued*)

Country	Short selling permitted?	Short selling practised?	Short selling details and restrictions	Tick rule
Morocco	No	No		
Netherlands	Yes	No	Although permitted, short selling is rarely practised. Disclosure required	
New Zealand	Yes	No	Not market practice for tax reasons	
Norway	Yes	Yes	Reporting required	
Pakistan	No	No	Short selling is not allowed	
Peru	Yes	No	Reporting required	
Philippines	Yes	No	Rules are not clearly defined	
Poland	Yes	No	Although permitted, short selling is rarely practised	
Portugal	No	No		
Russia	Yes	No	Short selling is not a recognized market practice	
Singapore	Yes	No	No restriction, but the exchange may declare a security ineligible for short selling if speculative activity is excessive	
Slovakia	No	No		
South Africa	Yes	Yes		
South Korea	Yes	No	Prohibited to insiders and available only for designated securities. Naked short sales are not permitted	Yes
Spain	Yes	No	Reporting required	
Sri Lanka	No	No	Short selling is prohibited	
Sweden	Yes	Yes	Disclosure required	
Switzerland	Yes	Yes		
Taiwan	No	No		
Thailand	Yes	No	Short selling is allowed only for securities listed in the SET 50 index. Disclosure required	
Turkey	Yes	No	Short selling is allowed only for securities listed in the ISE-100 Index. Disclosure required	
United Kingdom	Yes	Yes		
United States	Yes	Yes	Short selling is permitted	Yes
Venezuela	No	No		
Zimbabwe	No	No		

Source: *International Encyclopaedia of the Stock Market*, *Handbook of World Stock*, Derivative and Commodity Exchanges, and various foreign nationals linked to the finance industry.

3. ANALYSIS OF SHORT SALE BANS EFFECTS ON EQUITY MARKET

3.1 Scenario

Our aim will now be that of analyzing the short sale bans effect on the quality of the financial markets in 2008-2009. To do so we first have to select a sample, which in this case will consist of daily data for 16,491 stocks in 30 countries in a time period that goes from January 2008 to June 2009. Our analysis will study the effects of these bans on different variables of the market: the primary focus will be the effects on the *market liquidity*; secondly, we will analyze the other two issues which are *price discovery* and *stock overpricing*.

For the market liquidity, it is important to take into account the liquidity measure named *bid-ask spread*, the difference between the lowest price a seller is willing to receive (ask) and the higher price that a buyer is willing to pay (bid) for that security. The theoretical model of Diamond and Verrecchia (1987) show that the bans on short sales, reduce the speed of price discovery, creating uncertainty over investors and increasing then the bid-ask spread. Anyhow, this statement is only true if there is a uniform level of information between buyers and sellers, since the fraction of traders with negative information makes prices less revealing, increasing the risk to ununiformed market participants and the spread as a consequence.

Regarding the speed of price discovery, always thanks to the theoretical contribution of Diamond and Verrecchia, we know that avoiding short sales through the use of bans, traders with negative information are limited from the latter and the price discovery slows down. It influences more the bear market than the bull market. Indeed, regulators' goal is to prevent bad news from being rapidly impounded in stock prices, thanks to short selling bans, because this bad news is believed to reflect negative bubbles or herding behaviors rather than important information. However, according to the investigation of Bris, Goetzmann and Zhu (2007), we know that prices incorporate negative information faster in countries where short sales are allowed and practiced: they used the data from 46 equity markets around the world to show that short-selling bans cause a less efficient price discovery at the individual security level. As it happened in the U.S. during the financial crisis, when there is a partial short-selling ban, the latter may slow down price discovery and stock prices might become more sensitive to the short sales that investors are allowed to carry out on other stocks.

About overpricing, which occurs when prices are above the equilibrium level, there are several hypotheses: as Miller (1977) believed, short sale limitations can avoid the spread of negative

information or opinions in stock prices. If investors had heterogeneous beliefs, a short selling ban would only reflect the valuation of bullish investors and those of bearish investors who currently own the stock. All the bears in the market who do not possess a stock are exclude from trading, so to not affect the price with their valuations. Therefore, in presence of a ban prices should rise above their full-information values and decline when the ban is lifted. In contrast with Miller's theory we find the more rational framework of Diamond and Verrecchia (1987), where stocks are not overpriced in equilibrium when short sales are banned; that is because market participants adjust their valuations to take into account negative information. Hence, with risk-averse investors the net effect of a short-selling ban on stock prices is ambiguous, and is more likely to be negative the greater the slowdown in price discovery induced by the ban.

However, despite constraints make mispricing occur, they can only explain the behavior of one side of the market: these limitations can tell you why a rational investor fails to short the security, yet cannot explain why everyone purchases the overpriced securities. So, everyone agrees on the fact that stocks are overpriced, still they want to hold stocks. Therefore, as we can see, only two things are needed for substantial mispricing: trading costs and some investors with downward sloping demand curves. The need of holding overpriced stocks can be justified by two different investors behaviors: on one side, it is because of irrational optimism, while, on the other side, it may be caused by a rational speculative behavior reflecting differences of opinion.

Harrison and Kreps (1978) built a model on rational investors where stock price is even higher than the most optimistic investor's value due to the union of short sale constraints and opinion differences. Indeed, the bans create a pattern of overpriced stock automatically followed by low returns; the whole model is supported by the *"great fool theory"* which states that investors could always make profits by buying overvalued securities and selling them at a higher price since there will always be someone else, defined as the bigger or greater fool, who is willing to accept the higher price. That is why according to this model people recognize the overpricing, yet act as if it is not relevant.

It is interesting how the overpricing effect had opposite consequences in U.S. in 2008 during the short-selling ban. Boehmer, Jones, and Zhang (2009) document large price increases for banned stocks upon announcement of the ban, followed by gradual decreases during the ban period. Yet they recognize that the correlation with the ban could be spurious, as the prices of U.S. financials could have been affected by concomitant announcement of the Troubled Asset Relief Program (TARP). This was later on supported by the fact that the stocks added on the ban list did not present positive price effects. Nevertheless, Harris, Namvar and Phillips (2009) tried to estimate a factor model to

justify the stock price changes and controlled for the concomitant bank bail-out announcements. What they found was that banned stocks presented abnormal returns both during the ban and after. Therefore, with respect to the U.S., we cannot identify the price effect of the ban since the beginning period of the ban on short sales coincides with bank bailouts announcements.

3.2 Empirical analysis

As already stated above, the analysis of this dissertation will be based on a data set composed by 16,491 stocks. Beber and Pagano (2011) reached this value taking daily stock bid and ask prices (measured when the market close), volumes, short selling bans characteristics, inceptions dates and lifting dates for 17,040 stocks from 30 countries in a period that goes from the 1st of January 2008 to the 23rd of June 2009. So, the initial data set contains 5,992,679 stock/day observations, from which values exceeding 54.9% (the top 1% of bid-ask spread) and the observation with negative bid-ask spread are removed. At the end of these changes they ended up with a sample of 5,143,173 stock/day observations and 16,491 stocks.

The structure of the data set is presented in Table I: as we can see 31.5 percent of the observations refer to stocks affected by the short selling bans, naked or covered, which started to be effective from the 1st of October 2008. It also shows that in several countries bans were imposed together with disclosure requirements, while in some other countries, they had to disclose information only if short positions represented a significant fraction of existing shares (usually 0.25 percent).

From Figure 1 we can see the spread of short selling bans, divided in naked and covered bans, across the countries always during the crises of the 2008-09. The two darker histograms plot the market capitalization of the stocks subject to naked and covered bans, respectively, as a fraction of total market capitalization. The two lighter histograms plot the fraction of stocks subject to naked and covered bans, respectively (as percent of the number of stocks in our sample on the corresponding date). It is observed in the graph that in September 2008, there was a jump from 0 to 20 percent of the overall banned stocks, which increased again to 30 percent in October to go back to 20 percent in the following 8 months. Notice that in September and October 2008 naked bans were less widespread than covered ones, even though in June 2009 covered bans had almost disappeared while naked bans were still spread over the 20 percent of the stocks.

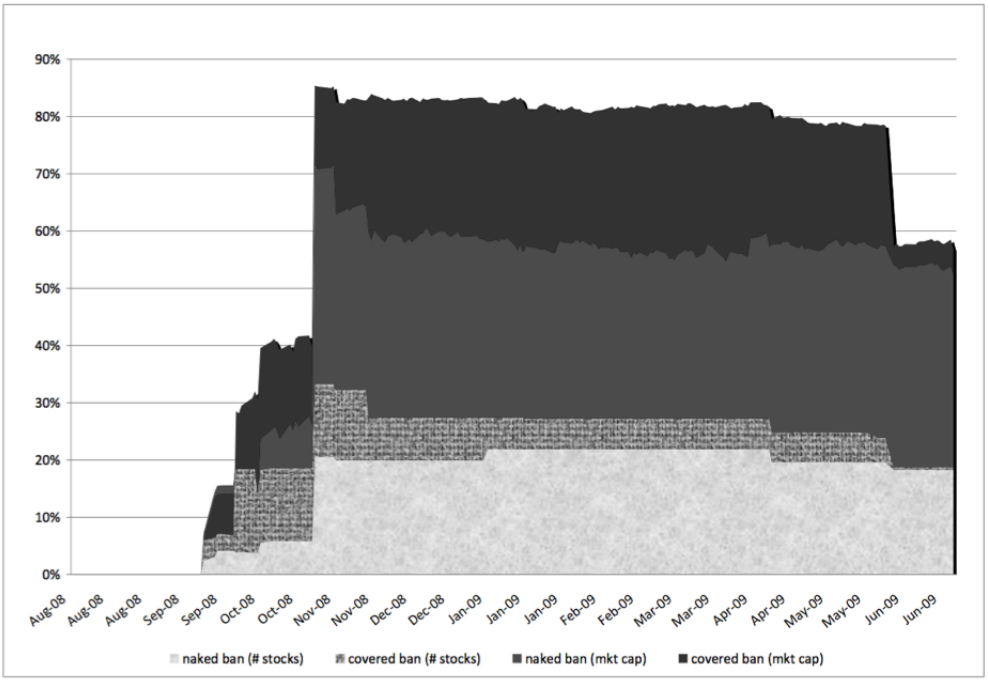
Table I. Structure of the Data Set

Country	Ban start date	Partial ban lift date	Ban lift date	Scope of ban	Disclosure	Duration** (days)	Day/stock observations	Day/stock observations with ban	Fraction of day/stock obs. with ban	Number of stocks on 1 Oct. 2008	Number of stocks with ban on 1 Oct. 2008
Australia	22 Sep 08	18 Nov 08	25 May 09	all stocks	all stocks	245	357,003	58,594	16.4%	956	956
Austria	26 Oct 08			financials	financials	240	31,094	660	2.1%	89	
Belgium	22 Sep 08			financials	financials	274	47,479	1,084	2.3%	120	6
Canada	19 Sep 08		8 Oct 08	financials	all stocks	19	385,912	154	0.0%	1,136	11
Czech Rep.				no ban			9,113		0.0%	25	
Denmark	13 Oct 08			financials		253	60,408	7,099	11.8%	171	-
Finland				no ban			52,343		0.0%	145	
France	22 Sep 08			financials	financials	274	269,636	3,454	1.3%	719	19
Germany	20 Sep 08			financials		276	318,318	2,124	0.7%	845	12
Greece	10 Oct 08		1 Jun 09	all stocks	all stocks	234	102,822	41,217	40.1%	273	
Hong Kong				no ban			403,900		0.0%	1,058	
Hungary				no ban	all stocks		11,283		0.0%	31	
Ireland	19 Sep 08			financials	financials	277	17,343	736	4.2%	50	4
Israel				no ban			55,858		0.0%	170	
Italy	22 Sep 08*	1 Jan 09	1 Jun 09	financials, then all		252	138,240	63,704	46.1%	360	53
Japan	30 Oct 08			all stocks	all stocks	236	776,840	362,625	46.7%	2,294	2,294
Luxembourg	19 Sep 08			financials		277	11,588	2,231	19.3%	41	18
Netherlands	22 Sep 08		1 Jun 09	financials	financials	252	32,546	1,242	3.8%	117	8
New Zealand				no ban			30,382		0.0%	102	
Norway	8 Oct 08			financials		257	73,303	1,945	2.7%	227	
Poland				no ban			24,485		0.0%	79	
Portugal	22 Sep 08			financials	all stocks	274	17,277	1,311	7.6%	53	9
Singapore				no ban			144,116		0.0%	426	
Slovenia				no ban			7,044		0.0%	21	
South Korea	1 Oct 08	1 Jun 09		all stocks		265	208,199	98,592	47.4%	616	616
Spain	24 Sep 08			all stocks	financials	272	64,112	30,137	47.0%	173	173
Sweden				no ban			98,102		0.0%	309	
Switzerland	19 Sep 08		16 Jan 09	financials		119	128,907	56,181	43.6%	381	381
U.K.	19 Sep 08		16 Jan 09	financials	financials	119	575,811	2,188	0.4%	1,826	33
U.S.	19 Sep 08		8 Oct 08	financials	all stocks	19	1,539,215	10,015	0.7%	4,253	776
Totals							**5,992,679**	**745,293**	**12.4%**	**17,066**	**5,369**

* The ban initially applied to financials, and was extended to all stocks on 10 October 2008. ** As of 23 June 2009.

In the first four columns, we use data of all the countries of Table 1 (25 countries), with the exception for Czech Republic, Greece, Hungary, Israel and Luxembourg.
In the last three columns, instead, we use only data for Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Netherlands, Norway, Portugal, U.K. and U.S.; the 12 countries that only banned short sales for financial stocks. Volatility is a moving standard deviation of returns based on the previous 20 observations. In column 1, 2, 5 and 6 there are all Ordinary Least Squares (OLS) regressions on daily data with robust standard errors clustered at the stock level, while columns 3 and 4 show the AR correction. The specification of column 1 is estimated with OLS, stock-level fixed effects, and robust standard errors clustered at the stock level. In the regression of column 6, for computational reasons the estimation is implemented by replacing dependent and independent variables by their deviations from the respective stock-level average and including daily fixed effects in the regression. The numbers reported in parenthesis below the coefficient estimates are t-statistics. The estimates marked with three (two, one) asterisks are significantly different from zero at the 1 (5, 10) percent level.

Figure 1: World Percentage of Stocks Subject to Short-Selling Bans. The two darker histograms plot the market capitalization of the stocks subject to naked and covered bans, respectively, as a fraction of total market capitalization. The two lighter histograms plot the fraction of stocks subject to naked and covered bans, respectively (as percent of the number of stocks in our sample on the corresponding date).



To better understand the effects of short selling bans on those which are the main stock variables, liquidity, speed of price discovery and overpricing, we will go through a regression which includes observations from both countries with no ban and those ones with the ban on stocks. We will use two variables with different degrees of severity: the Naked ban, which is softer, and the stricter Covered ban. They are dummy variables and take the value of 1 when only naked/covered short sales are forbidden. Moreover, we add disclosure as another variable, which will take the value 1 when short sellers are required to disclose and 0 otherwise. Notice that they have a dummy variable on the ban and another on disclosure exactly because they want to separate the effect of changes to the transparency of the market from those deriving from the short sale ban.

What it is easily to observe from Table I and Figure 1 is that the short selling limitations have been different for every country during the crisis in many aspects: the inception dates were different, for example Spain put the ban after the U.S.; lifting dates were different as well, indeed the U.S. and Canada were the first countries to lift the ban; some countries, such as the Scandinavian ones, decided to impose no bans at all; there were differences in the scope of bans,

which applied only to financials in some countries (e.g., the U.S. and most European countries) and to all stocks in others (e.g., Australia, Japan, South Korea and Spain); stringency of bans were different as well, some were naked and others covered.
This research tells us more information about the U.S.; in fact, we know that the U.S. was the first country to impose and lift the ban, which was covered from the start. In addition the SEC banned short sales only on financials, differently from other countries which banned for all stocks or did not ban at all.

Going back to the regression analysis, from Table II we can analyze if the correlation between the bid-ask spreads and the short-selling bans persists when one controls for different types of bans, for stock characteristics and for time-varying stock-level and aggregate factors. in this regression, the percentage quoted bid-ask spread at the market close represents the dependent variable, while the short sale bans are measured using the 3 dummies listed before: Naked Ban, Covered Ban and Disclosure.
From column 1 to 6 we regress with stock-level fixed effects, while in column 7 we estimate fixed effects for matched pairs of stock. In this analysis, short-selling disclosure is linked to a decrease of 0.65 percentage points in the spread, meaning that there is a negative relationship between the bid-ask spread and the obligation to disclose short sales. Apparently, short sellers will feel monitored by the market authorities and other market participants and they will trade less aggressively on their negative information; all of this may occurs because disclosure could manage to reduce the adverse selection problems in the market.
In these regressions, we also see that all three coefficients are significantly different from zero at the 1 percent level and that the coefficients of the naked and covered ban variable are positive, while the coefficient of disclosure is negative. Even though we restrict the estimation to financial stocks only, the outcomes are still very similar. The fact that the coefficients of the disclosure and ban dummies are opposite clarifies why it is important to insert both in the regression. The one on disclosure is an important control variable, which if missing would invalidate the analysis of short sale bans.
The specification of column 1 is estimated with OLS, stock-level fixed effects, and robust standard errors clustered at the stock level. With the same method used for column 1, in column 2 the regression is re-estimated on the subset of financial stocks only. Since financial stock bans were enacted at different times in different countries, we can still identify the effects of the short-selling bans. Analyzing column 2 it is observable the fact that the coefficient of the covered ban dummy estimated on the subsample of financial stocks is not statistically different from that

obtained in the overall sample; instead, the coefficient of the naked ban dummy is significantly smaller for the subsample of financial stocks. Hence, here again, it is shown that short-selling bans go together with a larger bid-ask spread.
In column 3 the regression has been re-estimated using the specification in column 1 with an AR(1) correction for the error term because the bid-ask spread is usually auto correlated. Comparing the estimates in column 3 with those ones in Column 1, the coefficients of the three variables of interest are smaller in absolute value but remain sizeable and significantly different from zero at the 1 percent level. Column 4 shows the estimates on volatility among the explanatory variables, where volatility is measured on the previous 20 trading day as the rolling standard deviations of returns. The coefficients of the three ban variables are virtually the same as in column 3, and the coefficient of volatility is positive, consistently with the idea that increases in risk should be associated with larger bid-ask spreads. Again, all estimates are significantly different from zero at the 1 percent level.

Notice that the coefficients of these regressions are positive for the Naked and Covered Ban variables and negative for Disclosure, and all three are different from zero at the 1 percent level. Even though the estimation is restricted to financial stock only, the results are similar and also robust to the introduction of volatility among the explanatory variables.
The first four columns of Table II include both countries that banned short sales on all stocks and those with no bans at all, so the estimated coefficient on the ban variables may be affected by changing differentials between country-level bid-ask spreads. To solve this issue and consequently make a "diff-in-diff" estimation, twelve countries that applied short-selling bans only to financial stocks have been selected in columns 5 to 7.
When comparing the estimates reported in column 5 with those ones in column 4, it results that a smaller selected sample gives stronger effects than the larger one. Indeed, as it happened for the AR(1) correction, in the smaller sample, the short-selling ban causes a larger increase of the bid-ask spread and a larger decrease of disclosure.

In this subsample where bans apply only to some stocks in each country, one can also control for market-wide developments related to the financial crisis by adding day dummies to the list of the explanatory variables. To ease the burdensome computational task of estimating firm fixed effects and day effects all at once, we first de-mean all the variables at the stock level and then perform a panel regression with day fixed effects. The resulting estimates of the short-selling variables' coefficients shown in column 6 of Table II are considerably smaller than those obtained in column

5 (from 2.43 to 0.23 for the Naked Ban, from 2.75 to 0.46 for the Covered Ban, and from −1.79 to −0.50 for the Disclosure dummy), but their signs and statistical significance remain the same. The estimate of the constant is close to zero, because this panel regression is estimated on zero-mean variables.

Table II. Bid-Ask spreads and Short-Selling Bans: Regression Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Countries	All	All	All	All	Partial bans	Partial bans	Partial bans
Constant	3.93*** (1993.65)	3.76*** (749.94)	4.97*** (3290.72)	4.90*** (3092.86)	4.20*** (997.52)	0.0005*** (3.71)	0.71*** (42.76)
Naked Ban	1.28*** (76.04)	0.86*** (6.50)	0.89*** (29.31)	0.90*** (29.60)	2.43*** (20.06)	0.23*** (3.99)	0.56*** (2.82)
Covered Ban	1.98*** (150.74)	2.14*** (14.84)	1.63*** (57.44)	1.63*** (57.61)	2.75*** (24.75)	0.46*** (2.39)	1.19*** (3.66)
Disclosure	−0.65*** (−37.84)	−0.27** (−1.84)	−0.37*** (−11.54)	-0.37*** (-11.59)	−1.79*** (−15.10)	−0.50*** (−2.25)	−0.55* (−1.75)
Volatility				0.99*** (35.84)	−0.36*** (−14.65)		
Day Fixed Effects	No	No	No	No	No	Yes	Yes
Stock-Level or Pair-Level Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes+
AR(1) Disturbances	No	No	Yes	Yes	No	No	No
Methodology	Panel	Panel	Panel	Panel	Panel	Panel	Matching
Number of Observations	5,143,173	878,279	5,126,682	5,124,349	3,188,903	3,188,903	45,588
Included Stocks	All	Financials	All	All	All	All	All
Number of Stocks (Pairs in Column 7)	16,491	2,718	16,456	16,452	10,253	10,253	1,566

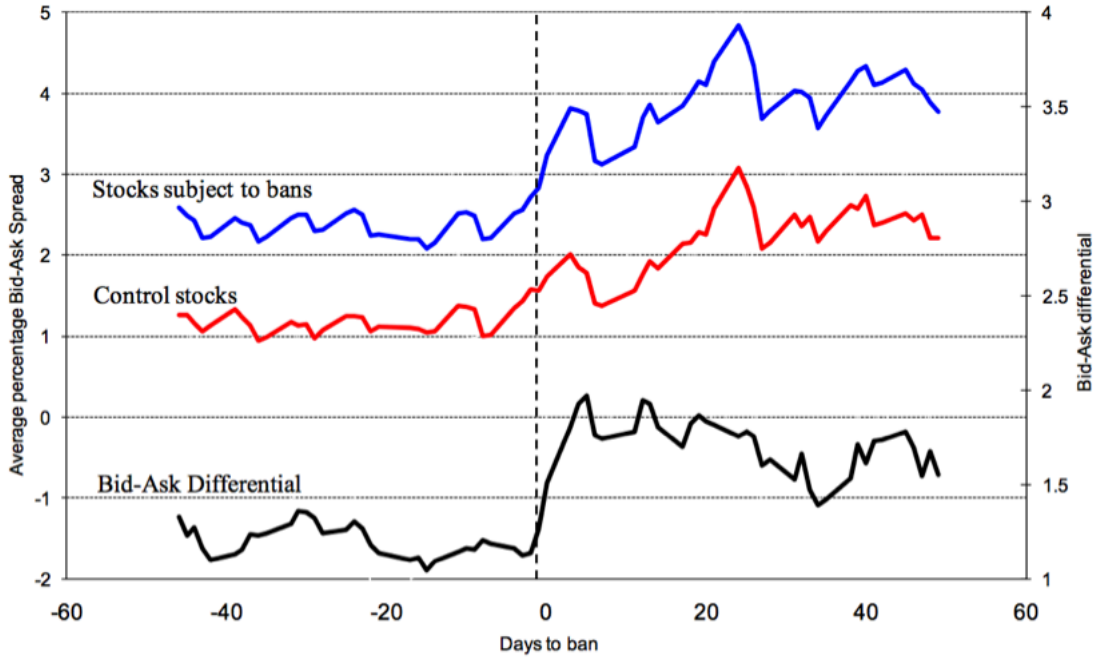
One thing that could be noticed always from Table 2 is the fact that results in columns 1 to 6 show that the impact of short-selling bans may be clouded by the inclusion of observations that are far away from the inception date of the bans. Indeed, columns 7 reports recent studies dated to 50-days before and after the day the ban was implemented (only for countries with partial bans).
The events shown in column 7, which includes fixed effects for each pair of matched stock and day effects, are consistent with the results of the panel data regression, with the exception of a stronger estimated impact of short selling bans. In fact, in column 6, where also day fixed effects are included, the coefficients of the variable are twice as smaller as those of panel estimation in

column 7, although they are estimated with similar precision. Instead, the coefficient of the disclosure variable is almost identical in size, though less precisely estimated.

To perform this regression, Beber and Pagano matched each stock subject to the ban with the exempt stock traded in the same country and with the same option listing status that was closest in terms of market capitalization and stock price. Lately, in order to provide a check on the quality of the control sample, in Figure 2 we plot the average bid-ask spreads of the banned stocks and their matching stocks during our event window, as well as that of their differential: the figure shows that the average bid-ask spreads of two samples are very similar before the ban inception and diverge precisely after the ban date.

In the figure below it is depicted the 3-day moving average of the bid-ask spreads cross sectional average for stocks subject to bans and control stocks (left scale) together with their differential, on the right scale, during a 50-day period time around the ban inception date, identified as date 0. The lines plot data referred to only countries with partial bans such as U.S., U.K., Portugal, Austria, Norway, Ireland, Netherlands, France, Denmark, Germany, Canada and Belgium.

Figure 2. Average Bid-Ask Spread of Stocks Subject to Bans and of Matched Exempt Stocks for Countries with Partial Bans



One more concern about the second table's results is represented by the possible endogeneity of short-selling bans, which occurs when the correlation of the bans with market illiquidity no longer appears to be a causal relationship if policy makers tend to impose bans at time in which stocks tend to become illiquid for some reasons, such as when financial stocks tend to experience negative abnormal returns and become more volatile, or when the corresponding financial institutions feature greater default risk. Causality may go from the drop in stock returns, rise in volatility or in default risk to short-selling bans, rather than the other way around.

In order to analyze this issue, Beber and Pagano (2011) estimate an instrumental variables (IV) regression, where the first stage is a linear probability model that determines the likelihood of a ban and the second stage models its effects on liquidity. Our international panel data allows us to attack this identification problem more effectively than would be using data from a single country. Furthermore, the focus would be on two waves of short-selling bans imposed at very different times and to financial sectors in different conditions, allows us to better identify instruments with the desired characteristics. In these cases, one of the main step is to identify what are the suitable instruments, which are variables to be included in the first stage that are correlated with the decision of imposing the ban, yet that are not correlated with the residuals of the return, volatility, probability of default regression. Bear in mind that the choice to impose a short-sale ban does not affect only one country but affects other countries as well, it is a decision at the market-wide level; hence, the instruments must be market-wide variables, and must vary over time to avoid perfect collinearity with the stock-level fixed effects.

For our analysis, we identify two candidate instruments: the lagged values of the country-level credit default swap (CDS) spreads for financial stocks and of the financial stress index proposed by Balakrishnan, Danninger, Elekdag and Tytell (2009). The country average CDS spread of financial institutions is a market-based and timely assessment of insolvency risk in the financial sector, and we expect countries where this risk is greater to be more inclined to impose protective regulations such as short selling bans on financials. On the other hand, the financial stress index, is mainly based on stock returns information and focuses more on the systematic risk borne by financial institutions in each country. Therefore, countries where banks are more exposed to systematic risk to be more likely to impose short-selling restrictions. Both variable have strong explanatory power in the first stage regression.

The coefficients of the ban variable keep being positive and significant when these two variables are used as instruments in an IV panel regression with day and stock-level fixed effects: even accounting for their endogeneity, short-selling bans are associated with greater illiquidity.

3.3 Stock Prices

The bans imposed during the financial crisis of 2007-09 were imposed to help stem financial panics. As Miller (1977) believed, short-selling bans had the goal to prevent underpricing of stocks: stock market regulators feared that, with optimistic investors largely neutralized by funding constraints, unbridled short-sales would have triggered an unwarranted collapse in share prices. Beber and Pagano examined whether the bans provided effective support for the prices of financial stocks, when benchmarked against exempt stocks.

The first evidence is obtained by comparing countries were the ban did not apply universally and the post-ban median cumulative excess returns for stocks subject to bans with those of exempt stocks, where excess returns are defined as the difference between individual stock returns and the respective country equally-weighted market indices. Is it possible to meet this "visual diff-in-diff" evidence in Figure 3 and 4, where the first one is referred to the U.S and the second one excludes the latter and represents all other countries that imposed a short-selling ban only on financial stocks. The decision of taking the U.S. as a single country is because it is the only country where returns have behaved differently during the ban period, it may have happened because in the U.S. the effect of the ban on financial stock prices may be clouded by the concomitant TARP announcement, precisely aimed at supporting U.S. financial institutions.
Figure 3 shows that the median cumulative excess return of U.S. financial stocks, which were subject to a covered ban, exceeded that of exempt stocks throughout the 14 trading days after the ban inception (date 0 in the figure), a finding that agrees with that reported by Boehmer, Jones, and Zhang (2009) for the U.S. market. Is it possible to see that this event did not occur in Figure 4 as well: for the other countries, the line corresponding to the median excess return on stocks subject to naked and covered bans is very close to that for exempt stocks, and it lies above it only in about half of the first 60 days of trading after the inception of the ban. Since the result in the U.S. might be caused by the TARP, Figure 4 is believed to be more precise in representing the ban's effects on stock returns.

Figure 3: Cumulative Abnormal Returns in the U.S. for Stocks Subject to Covered Bans and for Exempt Stocks. The figure plots cumulative abnormal returns in the 14 trading days after the ban date, which corresponds to date 0 in the graph.

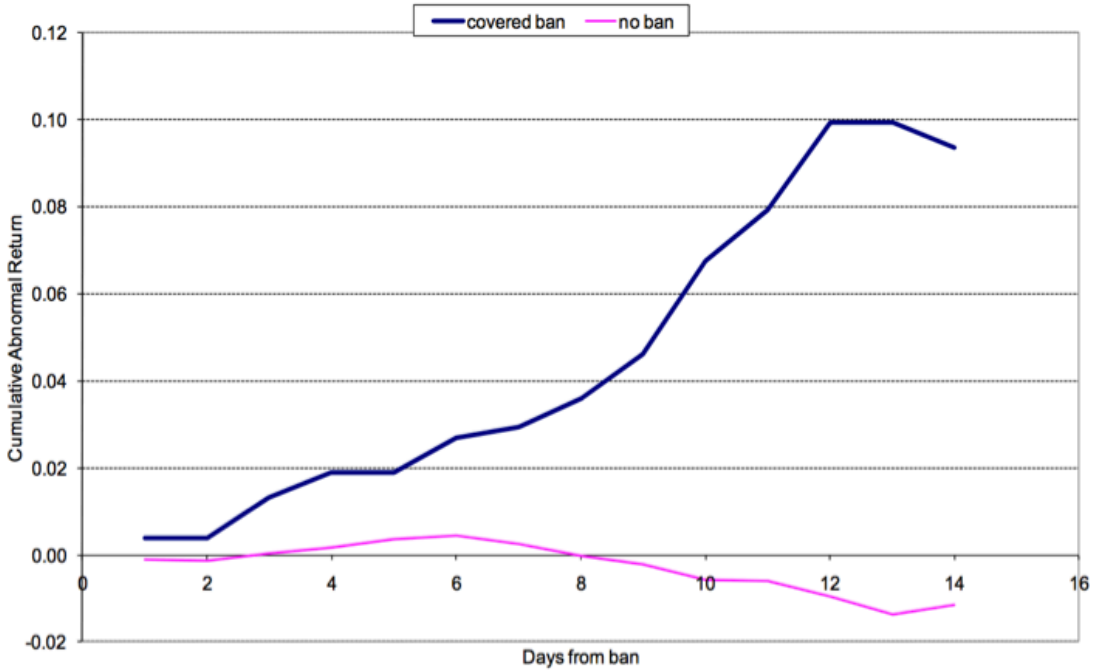
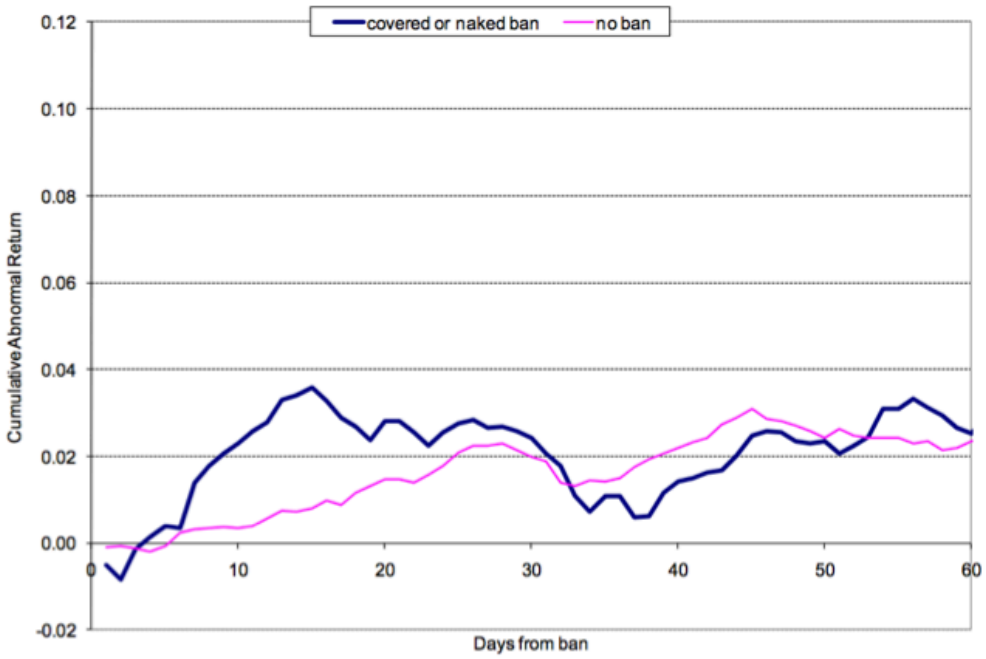


Figure 4: Cumulative Abnormal Returns in Countries with Partial Bans (except the U.S.) for Stocks Subject to Ban and Exempt Stocks. The figure plots cumulative abnormal returns in the 60 trading days after the ban date, which corresponds to date 0 in the graph.



With the aim of supporting analytically these results, Table III shows the weekly regression on the Naked Ban, Covered Ban and Disclosure dummies, plus stock-level fixed effects to control for the risk characteristics of individual stocks. Columns 1 and 2 support Figure 3, since they only refer to the U.S., while columns 3 and 4 refer to all the other countries, as in Figure 4. As in the two figures above, excess returns are defined as differences between raw returns and the respective equally-weighted market indices. We drop observations for which the raw weekly return is zero, to avoid biases arising from stale prices due to non-trading. In Table III, we use two different approaches to identify the effect of short sales restrictions. In columns 1 and 3, we report standard panel estimates where the control group is formed by all the stocks that were not subject to bans, respectively for the U.S. and for other countries with partial bans. Instead, the estimates in columns 2 and 4 are obtained using an event-study methodology, again respectively for the U.S. and for other countries with partial bans, with a 50-day window before and after the ban inception date.

Table III: Stock Returns and Short-Selling Bans

	(1)	(2)	(3)	(4)
Constant	0.0583***	0.0022***	–0.0017***	–0.0008***
	(29.82)	(10.78)	(–58.50)	(–1.77)
Naked Ban			–0.0026	–0.0081***
			(–0.67)	(–3.13)
Covered Ban	0.0611***	0.0041***	–0.0004	–0.0025
	(18.82)	(3.77)	(–0.12)	(–0.67)
Disclosure			0.0066	–0.0006
			(1.17)	(0.17)
Stock-Level Fixed Effects	Yes	Yes	Yes	Yes
Weekly Fixed Effects	Yes	Yes	Yes	Yes
Countries in the sample	U.S.	U.S.	Countries with partial ban except U.S.	Countries with partial ban except U.S.
Methodology	Panel data	Event study	Panel data	Event study
Number of observations	245,631	43,973	299,980	7,695
Number of stocks	3,717	1,354	5,369	240

For this regression, it is adopted the same method used before for column 7 of Table II: each stock subject to the ban is matched with the exempt stock traded in the same country and with the same option listing status that is closest in terms of market capitalization and stock price. According to the analysis, the U.S. stock market response to short-selling bans is positive and significant; on the other hand, for other countries with partial bans, the coefficients of the ban variables are not significantly different from zero in the panel data estimates of column 3 and in column 4 as well the covered ban coefficient is not significantly different from zero, and the naked ban's coefficient is negative and significant. Therefore, in countries other than the U.S., short-selling bans are associated either with no significant change or with a decline in stock returns. This confirms the visual evidences above.
In conclusion, the results show that bans on short sales appear to have failed to support market prices, thereby missing the prime objective of regulators.

Summary of results

In this research, daily data on 16,491 actions from thirty countries between January 2008 and June 2009 have been used to analyze the effects of short sale bans, exploiting the differences in intensity, scope, and duration of these schemes.

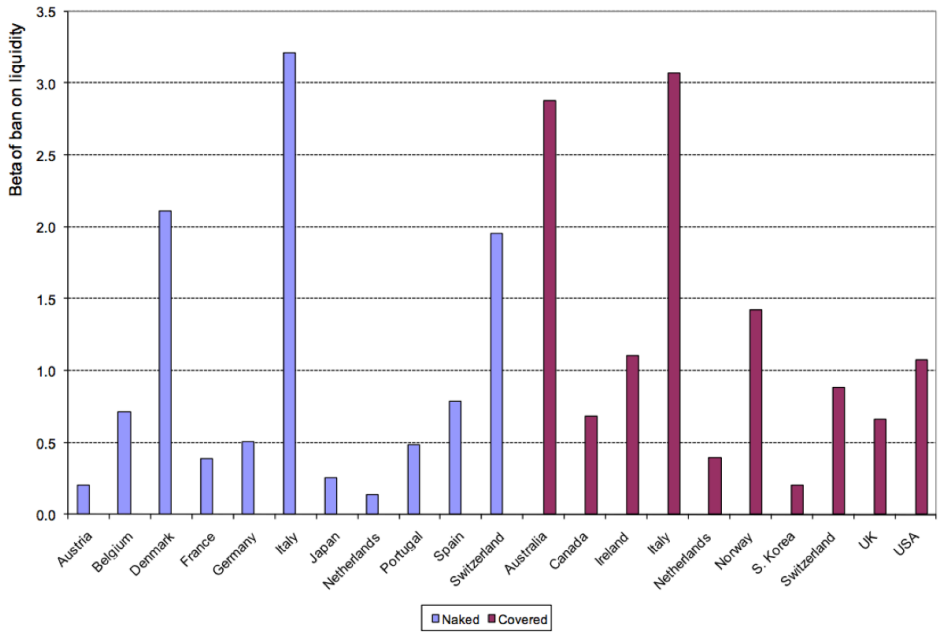
Our results indicate that only in the United States the bans slowed the decrease in stock market prices. Figure 3 shows that in the United States, the majority of the shares affected by the ban had higher returns than those exempted in the 14 days following the ban (date 0 in the figure). However, this may be due to the simultaneous announcement of bank bailouts by the US government, which makes American data unsuitable for identifying the effect of the short sales bans on stock prices. It has been much more useful for this purpose to use data from other countries where bans have not been accompanied by bank rescue ads, or even have not hit bank actions at all. Figure 4 shows that in other countries that have imposed bans on financial titles only, the intervention does not seem to have supported the prices of the stocks: the line for the performance of the shares affected by the ban is very close to that of the exempt actions and only exceeds it in about half of the sixty days after the ban.

This conclusion is confirmed and strengthened by the econometric analysis conducted on the entire sample: the result of the estimates is that banning Naked short-sales did not have any significant effect on the stock price trend, and also prohibiting Covered short sales even worsened the situation.

Additionally, the empirical analysis shows that the banned short sales imposed during the crisis have ended up reducing significantly the market liquidity. Actually, they led to a significant increase in transaction costs measured by the bid-ask spread (the percentage difference between the price at which a title can be purchased and the one at which it can be sold). The negative effects of bans on liquidity are even higher for low capitalization stocks with more variable returns. Therefore, in those markets where such shares are found, short selling bans are associated with a higher increase in bid-ask spreads.

This is illustrated in Figure 5, which shows an estimate of the effect of bans in various countries, separately for the prohibitions of Naked and Covered short-sales.

Figure 5: Impact of Short-Selling Ban on the Percent Quoted Bid-Ask Spread, by Country.



Empirical evidence indicates that, in most countries, the quick reaction to the crisis by the stock market authorities, that is the imposition of bans on short sales, at best did not have a significant impact on prices but at the same time damaged the liquidity of the market. It was a particularly serious damage because it occurred when liquidity was already scarce and investors were desperately looking for the latter because of the freeze of many fixed markets.

It should be added that, in the general foolishness of the supervisory authorities, some have distinguished themselves not only by the speed in imitating the action of the SEC at the end of 2008 but also by the slowness in copying the subsequent repentance. While the United States and

Canada have eliminated short selling bans on October 8, 2008 and Switzerland and Great Britain in January 2009, Italy and the Netherlands waited until June 2009, and other countries have removed the bans even later. A small drapery of countries banned naked short sales until the early 2010, and Ireland and South Korea still ban short sales of financial securities.

The conclusion that this paper distils from this evidence is best summarized by the words of the former SEC Chairman: *"Knowing what we know now, ... [we] would not do it again. The costs appear to outweigh the benefits"*. Perhaps the greatest benefit of this worldwide experiment was to produce a great quantity of data on the effects of short selling bans so to be prepared for the next potential crisis and face it with some experience.

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