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# What does academic research say about short-selling bans?

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## Abstract

As a reaction to higher market volatility due to the global COVID-19 pandemic, in March 2020 some financial regulators imposed short-selling bans on equity markets. Their argument is that short-selling exacerbates downward price movements, thus being responsible for heightened volatility and reduced market confidence. This paper reviews the academic literature on short-selling and short-selling bans, comparing the arguments against banning short-selling with the arguments in favour. We find that the evidence almost unanimously points towards short-selling bans being disruptive for the orderly functioning of markets, as they are found to reduce liquidity, increase price inefficiency and hamper price discovery. In addition, short-selling bans are found to have negative spillover effects on other markets, for example option markets. According to the literature, during periods of price decline and heightened volatility, short-sellers do not behave differently from any other traders, and contribute less to price declines than regular 'long' sellers. As research has shown that short-selling bans are more deleterious to markets characterized by a relatively high amount of small stocks, low levels of fragmentation, and fewer alternatives to short-selling, emerging markets should be particularly wary of bans on short-selling.

Keywords: Short-selling bans; Liquidity; Price discovery

JEL codes: G14, G18

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# 1 Introduction

As a reaction to higher market volatility due to the global COVID-19 pandemic, in March 2020 some financial regulators imposed short-selling bans. Their argument is that short-selling exacerbates downward price movements (sometimes characterised as ‘negative’), thus being responsible for heightened volatility and reduced market confidence.<sup>1</sup> In spite of their controversial effects, the recourse to short-selling bans is nothing new, as during (and after) the 2008 financial crisis, regulators around the world imposed short-selling bans on very similar grounds (Autore et al., 2011; Beber and Pagano, 2013; Beber et al., 2015; Crane et al., 2018; Boehmer et al., 2013; Marsh and Payne, 2012) . As of April 2020, most COVID-19-related short-selling bans were imposed in continental Europe, though regulators and exchanges are currently discussing the adoption of such measures in other parts of the world.<sup>2</sup>

This paper reviews the academic literature on short-selling and short-selling bans, comparing the arguments against banning short-selling with the arguments in favour. The evidence almost unanimously points towards short-selling bans being disruptive for the orderly functioning of markets, as they are found to reduce liquidity, increase price inefficiency and hamper price discovery (Battalio and Schultz, 2011; Beber and Pagano, 2013; Boehmer et al., 2013; Marsh and Payne, 2012). In addition, as Beber and Pagano (2013) and Crane et al. (2018) show, short-selling bans are more deleterious to markets characterized by a relatively high amount of small stocks, low levels of fragmentation, and fewer alternatives to short-selling. As such, we believe that regulators in emerging markets should be particularly wary of bans on short-selling.

Another review (Reed, 2013) summarises the main findings of the literature on short-selling

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<sup>1</sup>See excerpt below taken verbatim from ESMA (2020), in which the EU financial regulator expresses a positive opinion towards Italy implementing a short-selling ban: “ESMA considers that the adverse situation linked to the COVID-19 has greatly increased the vulnerability of EU financial markets, and there is a concrete risk that the observed downward trend will continue in the coming days and weeks. . . following the outbreak of the COVID-19 pandemic in Italy, Italian stocks were subject to severe downward price movements and high price volatility. CONSOB considers that the steep decrease in the prices is also due to the increase of net short positions on the Italian stocks. Namely, net short positions reported to CONSOB in Italian shares in respect to the FTSE MIB market capitalisation increased by approximately 22.35% from 6 to 12 March 2020 (passing from 1.19% of 6 March 2020 to 1.46% of 12 March 2020). . . ESMA considers that the observed increase in net short positions in the last days may further exacerbate the downward price spirals, thereby further weakening market confidence in Italy.” This vision is shared by national regulators, such as the French one, as documented in this article. As this paper demonstrates, however, the effectiveness of these measures seems hardly justifiable on scientific grounds.

<sup>2</sup>As of April 2nd 2020, short-selling bans are present mostly in continental Europe: read here. Other jurisdictions have, however, introduced or are discussing the introduction of short-selling bans: read here

till 2013. Our review contributes to the existing literature by providing a different angle (our focus is on short-selling bans) and by adding more recent literature.<sup>3</sup>

This paper is structured as follows. Section 2 reviews the literature on the effect of short-selling on markets during regular periods of activity. Section 3 reviews the literature on the effect of short-selling on markets during periods of heightened uncertainty. Section 4 reviews the literature on the effect of short-selling bans on market quality. Section 5 concludes.

## **2 The effect of short-selling on markets during regular trading activity**

Short-selling refers to the practice of selling a security that is not owned at the time of the trade (Geraci et al., 2018). Short-selling can be covered, meaning that the seller has borrowed the security before selling it, or uncovered ('naked' in market jargon), meaning the seller has not (yet) borrowed the security at the time of the trade. Given its nature, short-selling activity is tightly related to the supply of stocks in the stock lending market (Geczy et al., 2002; Saffi and Sigurdsson, 2011). Short-sellers act on the basis of correctly identifying over-valued stocks. This is realised through the well documented mechanism of i) borrowing shares for ii) delivery to buyers in the market; and then iii) in due course buying shares in the market, for iv) delivery to the lender; v) earning any difference between the initial sale price and the subsequent purchase minus the cost of borrowing (Marsh and Payne, 2012). The initial delivery of the security to the buyer must take place as normal at the end of the settlement cycle, two or three days after the trade in most jurisdictions, resulting in the activity having an attributable funding cost between executions (Fotak et al., 2014; Reed, 2013).

The effect of short-selling on stock prices during periods of regular trading activity is ambiguous, and generally explained with two contrasting theoretical predictions. On one hand Miller (1977) predicts that when there are short-selling constraints (such as a ban) and investors have different opinions about stocks (both conditions have to hold at the same time, as noted

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<sup>3</sup>Enriques and Pagano (2020) worked independently and in the same period on a review of the literature on the topic from a law perspective.

in Boehme et al. (2006)), stocks are overvalued. This is because bearish investors who do not own the stock are not allowed to sell, and as such their valuation does not affect the stock price (Beber and Pagano, 2013). As a consequence, according to Miller's model, short-selling should have a downward influence on stock prices (Crane et al., 2018). On the other hand, in Diamond and Verrecchia's model (Diamond and Verrecchia, 1987), rational agents are able to incorporate short-selling constraints (or otherwise) into their expectations, therefore (banning) short-selling should in principle not give rise to (overpricing) underpricing. The empirical evidence on the topic is mixed, and explained using Miller's prediction when short-selling leads to underpricing (Boehme et al., 2006; Chang et al., 2014), or using Diamond and Verrecchia's predictions when short-selling has no influence on stock prices/returns during regular periods of activity (Crane et al., 2018; Geraci et al., 2018).

While the effect of short-selling on stock prices is debated, the literature tends to agree that short-selling has a positive effect on market quality. It is generally accepted that short-sellers are investors motivated by economic fundamentals (Reed, 2013), who are skilled at identifying overvalued stocks (using for example accounting ratios, as shown in Dechow (2001), or press news, shown in Engelberg et al. (2012)) in anticipation of price declines (Lee, 2016). Indeed, higher intraday short-selling activity is related to negative intraday future returns, a hint that short-sellers can correctly predict future price movements (Boehmer et al., 2008; Diether et al., 2009; Aitken et al., 1998). As such, short-sellers are found to contribute to price discovery and enhance price efficiency (Diether et al., 2009; Boehmer and Wu, 2013). Short-sellers are responsible for a quick convergence of stock prices towards their fundamental value after the price decline has taken place (Lee, 2016). This mechanism is more pronounced in less liquid stocks (Lee, 2016). To summarise, most empirical papers report that during periods of regular trading activity, short-selling has a positive influence on liquidity, price discovery and price efficiency, thus supporting the idea that short-selling is crucial to maintain the orderly functioning of markets.

### 3 The effect of short-selling on markets during periods of heightened uncertainty

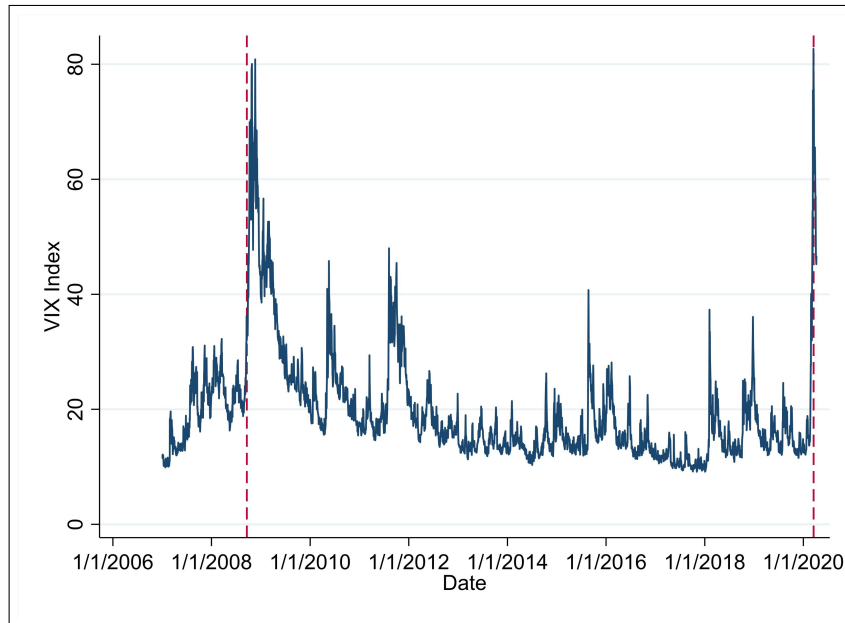
It must be noted that there is some academic evidence that during periods of sharp price declines short-selling adds to downward price movements. Geraci et al. (2018) for example find that high levels of short-selling are correlated with (but do not cause) low returns, i.e. short-selling activity seems to be higher during sell-off periods. In an important contribution, Shkilko et al. (2012) find that during sell-off periods, both long- and short-sellers contribute to price declines, however the impact of regular traders (long-sellers) on prices is much higher than that of short-sellers. In addition, the authors find no evidence that short-selling causes the price decline in the first instance, consistently with the finding of Fotak et al. (2014). Quoting Shkilko et al. (2012): “In fact, during large price reversals, the magnitude of abnormal short-selling is *markedly smaller* than that of abnormal long selling... Long selling has a *notably more significant downward effect* on prices and is the main force behind the pre-rebound price declines... We caution that our results should not be misinterpreted as a call to further restrict short-selling” (indenting added by the authors of this paper). In other words, according to the existing evidence short-selling cannot be blamed for having triggered downward price reversal during the 2008 financial crisis. In addition, there is evidence that long-sellers contribute to negative price movements much more than short-sellers during market declines.

### 4 The effect of short-selling bans on market quality

Historically short-selling bans have been introduced during periods of heightened uncertainty (Jones, 2012). The March 2020 discussion makes no exception: as evident from the graph below, global market volatility, as represented by the VIX index, reached levels last recorded during the 2008 financial crisis.

Consistently with economic theory (Diamond and Verrecchia, 1987), the imposition of a short-selling ban should in principle slow down the price discovery process, thus leading to an increase

Figure 1: VIX index – daily close – January 1st 2007 – April 8th 2020



Source: Thomson Reuters. The dashed red lines indicate the SEC short-selling ban in September 2008 and the French short-selling ban in March 2020.

in bid/ask spreads, and therefore to a deterioration of liquidity. In addition, and as predicted by Hong and Stein (2003), short-selling bans can amplify downward price movements, thus leading exactly to the results that they aim to prevent. Because the bans themselves (as well as the selection of stocks to be banned) are typically endogenous (Beber et al., 2015), the identification of the effect of the intervention on market characteristics could be challenging from an empirical perspective (Beber et al., 2015; Beber and Pagano, 2013; Crane et al., 2018; Boehmer et al., 2013; Brogaard et al., 2017).<sup>4</sup>

As short-selling bans became common during the 2008 financial crisis, several studies implemented credible identification strategies exploiting these regulatory interventions, which allowed them to draw sound conclusions on the effects of these bans on market quality. The two most important studies are perhaps Boehmer et al. (2013), focusing on the September 2008 SEC ban,

<sup>4</sup>Endogeneity refers to the fact that, as bans are introduced in periods of heightened uncertainty and/or affected stocks that are particularly volatile during crisis periods, it is statistically difficult to disentangle the effect of the ban on post-ban market quality characteristics that are in turn correlated with pre-ban conditions. Isolation of causal effects is performed through particular empirical strategies ('identification').

and Beber and Pagano (2013), focusing on short-selling bans around the world during the 2008 crisis. Boehmer et al. (2013) match banned and non-banned stocks following the SEC short-selling ban in 2008 to estimate the effect of the intervention on liquidity and volatility using a difference-in-differences approach on end-of-day data. Difference-in-differences is an appropriate identification strategy in this case as it does not require stocks to be banned at random; its key assumption is that banned and not-banned stocks would have had the same trend in short-selling was the ban not implemented. The authors find that the short-selling ban was responsible for a deterioration of bid/ask spreads and increased illiquidity, generating exactly the problems it was meant to limit. Comparable evidence on the US September 2008 ban is provided in Autore et al. (2011). The study by Beber and Pagano (2013) evaluates the effectiveness of short-selling bans around the world, using longitudinal data for 17,040 stocks from 30 countries (mostly developed European and non-European markets) for the period January 1, 2008 - June 23, 2009. The authors also apply a difference-in-differences identification strategy using end-of-day data. Consistently with Boehmer et al. (2013), the authors report that the ban “was detrimental for market liquidity, especially for stocks with small market capitalization, high volatility, and no listed options. Moreover, it slowed price discovery, and hence was at best neutral in its effects on stock prices.” (Beber and Pagano, 2013). It must be noted, however, that Boehmer et al. (2013) find that the US ban especially detrimental for large cap stocks’ liquidity.

Brogaard et al. (2017) expand on the evidence provided by Boehmer et al. (2013) on the US September 2008 short-selling ban by analysing whether the short-selling ban had a different effect on HFT and non-HFT short-selling using the same sample. The authors implement an instrumental variables (IV) estimation to isolate the causal effect of HFT and non-HFT short-selling on liquidity. The instruments they choose are pre-ban levels of stock market capitalisation, stock prices, PE ratio and book-to-market ratio, multiplied by a binary indicator equal to one for stocks included in the ban (and to zero otherwise). The rationale for these instruments is that HFTs are found to trade more in larger stocks (Brogaard et al., 2017), while non-HFT are found to short more in stocks that are overpriced based on fundamentals (Dechow, 2001). Based on their empirical strategy, the authors find that HFT short-selling depletes liquidity, while non-HFT short-selling enhances liquidity. We, however, find the identification strategy of this paper



not completely convincing.<sup>5</sup> In addition, and as noted by the authors, this result might be driven by the unclear effect of HFT on market liquidity rather than by short-selling per se, due to low latency traders adversely selecting slower (human) traders. Human short-sellers have instead a positive influence on market liquidity, consistent with the rest of the literature.

Crane et al. (2018) study the effect of short-selling on liquidity on the Hong Kong Stock Exchange (HKEX). Their study is one of the most convincing to date in terms of identification strategy. In 2001 HKEX started identifying stocks eligible for short-selling based on a number of different criteria, including the stock being the component of an index; the stock being an underlying to derivatives contracts; as well as free-float, size (market capitalization) and liquidity (turnover velocity) thresholds. Stocks' eligibility is evaluated on a quarterly basis. The authors exploit the last three criteria to identify the effect of short-selling on liquidity using a regression discontinuity design. The rationale is that eligibility for stocks at the threshold can be considered random, i.e. independent from stocks' characteristics. In other words, by comparing the outcomes of firms just above and just below the threshold (which are likely to have similar characteristics and be eligible or not merely by chance) the authors are able to estimate the causal effect of short-selling on a set of market characteristics. They find that short-selling does not lead to downward pressure on prices, does not increase volatility, and is not associated with increased prevalence of extreme negative returns. These results are unchanged during the financial crisis, suggesting that short-selling does not create abnormal price movements during periods of higher uncertainty.

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<sup>5</sup>As mentioned by the authors (page 6), one of the assumptions of an IV identification strategy is validity, i.e. the instrument should not be correlated with the dependent variable. Put in other words, the instrument should be uncorrelated with the error term of a regression of the dependent variable on the endogenous regressor and the set of control intended to be introduced in the specification. Validity cannot be tested – because the error term is unobservable (what we observe is the residual that converges to the error term only at the probability limit). Now, the authors suggest that by well-specifying and saturating the model, the instruments would likely be uncorrelated with the error term (top of page 7). This would however be wrong if the instruments were to be directly correlated with the dependent variable and hence omitted in the main model, omission that would be reflected in the (unobservable) error term. The authors in Table 2 (page 37) show that the instruments are in fact highly correlated with the dependent variables, spread measures of liquidity. In particular, they report that the ban was associated with higher spreads (consistent with Boehmer et al. (2013)), and that the spread reduction affected larger stocks and stocks with higher market-to-book ratio proportionally less. The identification strategy would have been credible if the correlation between the ban and the continuous variables they are interacted with was explained solely by the reduction in short-selling (relevance and validity). However, the authors note that the ban itself is endogenous, i.e. it was introduced with the intent of reducing heightened volatility (the widening of spreads being a manifestation of it) (Crane et al., 2018). In addition, many of the indicators the ban interacts with (to name one, market capitalisation) are directly correlated with spreads without passing through the reduction in short-selling. We believe this evidence questions the validity of their identification strategy.

Marsh and Payne (2012) contribute to the literature with a high-frequency study on the effects of a short-selling ban implemented by the UK regulator (the erstwhile Financial Services Authority [FSA]) from September 2008 to January 2009. The ban covered 32 stocks in the financial sector, deemed by the FSA to be more susceptible than other stocks to excessive negative price movements caused by short-selling activity (Beber et al., 2015). To study the effect of short-selling on market quality, the authors implement a wide range of analyses. Following the literature (Beber and Pagano, 2013; Boehmer et al., 2013), the authors firstly implement a difference-in-differences estimation, finding that stocks in the financial sector were not more affected than other stocks by negative price movements in the pre-ban period, and that the ban in fact reduced trading volumes and led to higher spreads, i.e. reducing liquidity. Consistent with Shkilko et al. (2012), the authors show that the short-selling ban did not manage to forestall selling pressure on financial stocks, which continued to experience precipitous price declines during the ban (Marsh and Payne, 2012, fig. 1). Another important finding is that the ban, intended to alleviate the pressure on the bid for financial stocks, had an equally negative effect on both sides of the order book, leaving the net flow essentially unchanged. To study the effect of the ban on price efficiency and price discovery, the authors exploit the high-frequency nature of their data and apply Hasbrouck's techniques (Hasbrouck, 1991). The authors find that the ban led to fewer price-forming trades, therefore hampering the efficiency of price discovery for banned financial stocks, whereas no significant differences in these measures was found between financial and non-financial stocks in the pre-ban period.

Most evidence on the topic focuses on developed markets, which might hinder the generalisability of the findings. Chang et al. (2014) however contribute to the literature by studying the effect of lifting existing short-selling bans on the mainland Chinese markets, thus providing additional evidence on a large emerging market. Their findings are in line with the rest of the literature: lifting short-selling bans leads to price undervaluation on eligible stocks, consistently with Miller (1977); short-sellers enhance price efficiency and diminish volatility. The authors conclude that removing the ban was highly beneficial for mainland Chinese markets.

An important argument against short-selling bans is that they have spillover effects on related markets, for example options markets. Research and industry practice suggest that investors can

circumvent short-selling bans by buying put options, a strategy similar to short-selling though not perfectly equivalent (Battalio and Schultz, 2011; Kolasinski et al., 2013; Reed, 2013). Research shows that attempts to circumvent the US September 2008 ban by “shorting” on the option market had negative consequences on the option market itself: for example, Battalio and Schultz (2011) find that the US September 2008 short sale ban led to disproportionately higher spreads in the option contracts of banned stocks. Similar evidence is provided by Cakici et al. (2018) and Grundy et al. (2012).

Another unintended yet predictable consequence of short-selling bans is shifting liquidity from regulated to OTC markets, evidence of which was found for the United Kingdom by Marsh and Payne (2012). Finally, Shkilko et al. (2012) show that during short-selling bans traders route short-selling through venues where the ban is not present in order to circumvent the ban, another unintended but not surprising effect of short-selling. This is an undesirable, as brokers should direct orders to venues where they can ensure best execution Anand et al. (2019). Therefore, short-selling bans might have distortive effects on the routing and execution of orders, something that the literature, to the best of our knowledge, hasn’t studied yet.

Finally, it must be noted that short-selling bans might be detrimental for bank stability. Beber et al. (2015) note that most European short-selling bans focused on financial institutions, and especially banks. The concern is that short-selling, by contributing to a decline in stock prices, might deteriorate banks’ ability to tap into funding thus hampering their solvency. This concern is backed up by theoretical work (Brunnermeier and Oehmke, 2014; Liu, 2015), though the empirical evidence on the topic is scarce (if one excludes Beber et al. (2015) itself). The authors show that short-selling bans are responsible for higher probability of default, higher credit default swap (CDS) premia and heightened volatility for banned financial institutions. By performing their estimation on matched samples and using a (credible) instrumental variables approach, the authors tackle sample selection and ban endogeneity concerns. The authors explain their result by noting that short-selling bans may act as a negative signal on banks’ fundamentals, leading to the exact outcome that they aim to prevent.

## 5 Conclusions

To conclude, as much as short-sellers are found to enhance market quality during periods of regular activity, the existing academic evidence suggests that banning short-selling during periods of heightened uncertainty seems to exacerbate, rather than contain, market volatility. Banning short-selling hampers liquidity, limits price discovery and worsens price efficiency. In addition, short-selling bans can have negative spill-over effects on other markets due to short-sellers trying to circumvent the ban, thus hampering the orderly function of the exchange for additional reasons. For example, short-selling bans have negative consequence on related options markets, induce investors to trade OTC and to execute on venues where the ban is not present, thus motivating routing on grounds different from best execution. Even if short-selling activity could in any possible way contribute to price declines during sell-off periods, their contribution does not seem to be undue or out-of-the-ordinary in the context of declining fundamental valuations. In other words, the existing evidence is that short-selling bans are deleterious to the efficiency of markets and likely to undermine the policy goals they are intended promote.

Based on the existing evidence, we recommend financial regulators not to introduce short-selling bans, as the academic literature demonstrates not only their lack of effectiveness, but their negative impact on market quality. In addition, and based on the evidence provided in Beber and Pagano (2013) and Crane et al. (2018), we believe that regulators in emerging markets should be particularly wary of bans on short-selling, as these papers show short-selling bans are more deleterious to markets characterized by a relatively high amount of small stocks, low levels of fragmentation, and fewer alternatives to short-selling (such as well-developed option or ETF markets).

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