Analysis of the effect of restrictions on net short positions on Spanish shares between March and May 2020

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1   Introduction

The global trend in equity prices in recent months has been marked by the spread of COVID-19 (also known as coronavirus disease or the pandemic caused by SARS-CoV-2). The rapid onset of this pandemic forced many countries to implement lockdown measures on their populations, which resulted in an interruption to their productive activity. In this context, and in the face of a significant slowdown in economic growth, the main stock market indices registered sharp declines in the first quarter of the year, especially during the month of March.

In the United States, the Dow Jones index fell 23.2%, while in Japan the Nikkei lost 20%. The falls in the European stock markets were slightly higher: the Eurostoxx 50, Dax 30 and Cac 40 lost 25.6%, 25% and 26.5% respectively, while the largest falls occurred in the Italian Mib 30 (27.5%) and the Ibex 35 (28.9%). In this setting dominated by uncertainties about the evolution of the pandemic and its effects on economic activity, the implied volatilities of these stock market indices rebounded, reaching values close to 80% on 16 March (79.5% in the case of the VIX, 78.8% for the Dax 30 and 77% for the Ibex 35).

On 12 March 2020, the European stock market indices experienced extraordinarily sharp falls. The Ibex 35 lost 14.06%, the highest loss in a single day in its 28-year history. In light of the situation, the CNMV resolved, pursuant to the provisions of article 23 of Regulation (EU) No. 236/2012 of the European Parliament and of the Council, of 14 March, to ban short-selling during the day of 13 March on all liquid shares admitted to trading on the Spanish stock exchanges whose price had fallen more than 10% in the previous session (12 March) and on all illiquid shares[1] when this fall was greater than 20%. The ban affected 69 securities in total.

After another session of sharp falls on 16 March, in which the index lost an additional 7.88%, due to the exceptional nature of the situation and the high risk of disorderly movements in the market, in accordance with Article 20 of the aforementioned Regulation, the CNMV temporarily prohibited (until 17 April, extendible for additional periods, not exceeding three months, if necessary, although the practice was to establish periods and subsequent extensions of one month) the creation or increase of net short positions on shares admitted to trading on Spanish trading venues for which the CNMV is the competent authority, in accordance with the provisions of the same Regulation. On the following day, the supervisory authorities peer to the CNMV in France, Italy, Belgium, Austria and Greece adopted similar measures.

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1   According to Commission Delegated Regulation (EU) No. 918/2012 of 5 July supplementing Regulation (EU) No. 236/2012 of the European Parliament and of the Council, on short-selling and certain aspects of credit default swaps with regard to definitions, the calculation of net short positions, covered sovereign credit default swaps, notification thresholds, liquidity thresholds for suspending restrictions, significant falls in the value of financial instruments and adverse events.

**Trend of the main European equity indices
(index = 100 corresponds to 12/03/2020)**

FIGURE 1
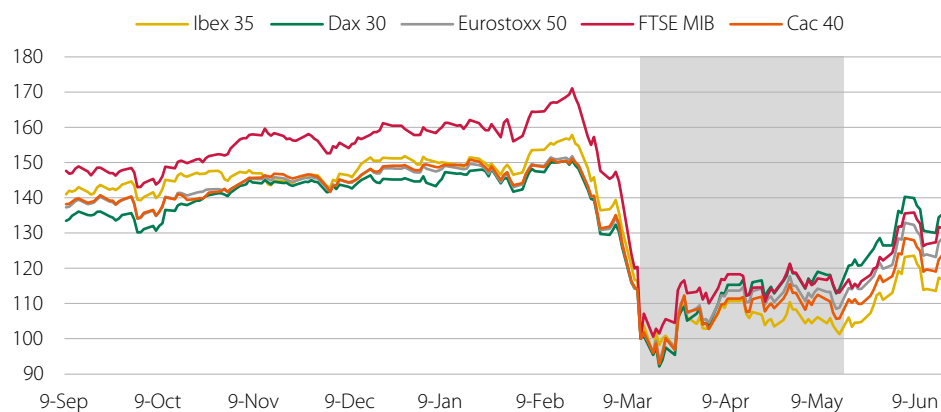
Source: Datastream. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.

The rule allows this measure to be adopted to preserve financial stability and investor confidence at times when there are turbulences that could result in disorderly price movements. However, it also affects the efficiency of the markets, in other words, a ban of this type can reduce the speed at which prices adjust to the available information and deteriorate some liquidity measures such as the bid-ask spread or trading volumes.

In the wake of the financial crisis, the short-selling bans adopted in different countries were studied in financial literature. In particular, analyses were conducted on how these bans affected the efficiency of the equity markets. Beber and Pagano (2013) used a database with 30 countries to carry out a study during the period around the Lehman Brothers' default. The authors found that the bans had resulted in a loss of liquidity in the equity markets, measured through bid-ask spreads. This finding is in line with other articles that focus on US and UK markets, such as Boehmer *et al.* (2011) and Marsh and Mayne (2012).

The article by Beber and Pagano (2013) found no evidence that the ban on short positions had a positive effect on the prices of the securities subject to the restriction. There was a theoretical debate between authors who argued that limiting the participation of the most pessimistic investors could push securities prices higher, while others maintained that it would not have an influence on prices (Diamond and Verrechia, 1987). The results of Beber and Pagano (2013) could validate the theoretical thesis that if market makers adequately internalise the information that exists in the market, the ban would not have a significant influence on the prices of the securities listed on said market.

In this same line, the closest article to this work is that of Mayordomo and Arce (2016). In this article, which describes the effects of the ban on short-selling on financial securities in the Spanish equity markets established in 2011, similar results were found to those described by Beber and Pagano (2013) in terms of the increase in bid-ask spreads. They found evidence that the trading volumes of financial securities were reduced due to the ban. Additionally, they studied other dimensions of significant interest. In terms of prices, they suggested that the ban could have helped mid-cap banks to sustain their quoted prices. But they found no such evidence for

large credit institutions. Nor did they find any evidence that the ban had any influence on the volatility of share prices for large financial institutions.

Lastly, one of the main objectives of the Mayordomo and Arce (2016) study was to analyse how the ban could have influenced the credit risk of issuers of financial securities subject to the ban. Here, results show that the ban would have helped medium-sized entities to enjoy more moderate credit risk premiums. In contrast, they found no relationship between the ban on short-selling and the credit risk of large banks. Contrary to this result, Beber *et al.* (2018) found evidence that the credit risk premium of issuers whose securities were subject to the ban increased.

One of the objectives of this article is to determine what the cost may have been, in terms of market efficiency, of the ban on creating or increasing net short positions on the most liquid securities traded in the Spanish markets, which partially entered into force on 13 March 2020 and was then applied continuously from 17 March to 18 May. Specifically, the impact on some liquidity measures (such as the bid-ask spread, trading volume or the Amihud measure) is analysed, as well as the impact on returns and intraday volatility of prices. Another objective is to assess whether the ban could have influenced the credit risk of financial and non-financial issuers whose securities are listed on equity markets. To do so, it will try to establish the relationship between the bans and the price of the 5-year CDS (credit default swaps) of various Spanish issuers.

To perform the analysis, a study was made of variables related to the returns, volatilities and liquidity measures of the shares listed on the stock exchanges that made up the Ibex 35 index in Spain and those that form part of the German Dax 30 between 9 September 2019 and 19 June 2020. This will enable sufficient data to be collected from sessions before and after the CNMV's adoption of the ban on net short positions.

The German index was chosen for this analysis, firstly, because its financial markets regulator did not adopt the decision to restrict short trades and, secondly, because the trends marked by prices, volatilities and liquidity measures during the period prior to the implementation of the measure in Spain were similar in the financial markets of both countries, as shown in the descriptive analysis section. These two circumstances are exemplary for studying the impact of the ban on the variables of interest and separating this impact from that caused by endogenous factors or factors other than the ban.

The analysis is divided into two parts: first, the databases are defined and a description of the trend marked by the variables of interest is provided. The results of an econometric analysis that measures the effect of the ban on the performance of these variables are shown below. Lastly, the conclusions are presented.

2 Databases

Two databases were taken into account when carrying out the analysis. The main database, which contains the characteristics of the securities included in the Ibex 35 index for Spain and the Dax 30 for Germany. The second database combines the credit spreads of various German and Spanish issuers whose shares are listed on their respective equity markets, as well as some characteristics of those issuers.

The period considered for both databases runs from 9 September 2019 to 19 June 2020, both inclusive. In the first database, if each security/session is considered as an observation, the database contains 12,675 observations, of which 6,825 correspond to Spanish securities that belong to the Ibex 35 and 5,850 to German securities that belong to the Dax 30. The data sources are Thomson Datastream and Bloomberg. The second database is made up of 8,815 observations, which correspond to 6,355 from 31 German issuers and 2,460 from 12 Spanish issuers (six financial issuers and six industrial issuers).[2] The data source for this second database is Thomson Datastream.

As one of the purposes of this report is to ascertain the impact that the two actions of restricting short trades has had on the most liquid securities of the Spanish stock market in terms of efficiency, in the first database the following variables for each of the securities are taken into account:

–   Bid-ask spread as a percentage of the price.

–   Trading in euros: In this case, the average of the last five days of trading in euros has been transformed into index numbers, where 100 corresponds to the trading obtained for each of the securities on 12 March 2020, the date of the announcement of the first ban.

–   Amihud measure: The ratio has been calculated for each security taking into account the previous five sessions through the average return in absolute value divided by trading in euros for each of the sessions. Subsequently, the values have been converted into index numbers, where 100 corresponds to the Amihud measure of each security on 12 March 2020.

–   Volatility: Volatility has been calculated for each security and session as a percentage using the formula described in Floros (2009), which takes into account the opening, closing, high and low prices of each session.

–   Excess returns: This has been calculated for each security and session as the difference between its daily return and the return estimated using the CAPM

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2   The financial issuers are: Banco Santander, BBVA, CaixaBank, Bankia, Banco Sabadell and Bankinter. Industrial or non-financial issuers are: Endesa, Iberdrola, Naturgy, Red Eléctrica Española, Repsol and Telefónica.

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model, where the market index is the IGBM for Spain and the CDAX for Germany. In estimating the betas of the CAPM model, data from the sessions of the last three months have been used and the risk-free return is assumed to be zero.

– Capitalisation: This is the capitalisation value of each of the securities at the close of each session expressed in millions of euros.

Additionally, variables that reflect the global and idiosyncratic risk perceived in the markets for the two countries have been considered in the econometric analysis section:

– Country risk: The 5-year CDS premium on sovereign debt of each of the countries has been considered in basis points (bp) to approximate the risk for Spain and Germany.

– Global risk: The VIX (implied volatility of the S&P500) in percentage terms has been used to approximate global risk.

Table 1 shows the descriptive statistics for each of the variables in the first database.

Descriptive statistics of the first database   TABLE 1

	Average	Standard deviation
Bid-ask spread (%)	0.2135	0.2623
Trading (index number)	53.2579	26.5660
Amihud measure (index number)	63.1002	43.8525
Volatility (%)	1.8483	1.4929
Excess returns (%)	-0.0254	2.2740
Capitalisation (million euros)	25,593	27,265
Spain 5-year CDS (bp)	63.2426	34.6668
Germany 5-year CDS (bp)	13.7244	6.3923
VIX (%)	25.1771	16.0106
Number of observations		**12,675**

Source: Thomson Datastream, Bloomberg and own compilation by the authors.

The purpose of the second database is to measure the influence of the ban on short-selling of shares on the credit risk of equity issuers. This analysis considers the following variables for each of the securities:

– 5-year CDS spread: The premium in basis points quoted at the close for all sessions of the period analysed has been collected for each one of the issuers.

– Capitalisation: This is the capitalisation value of each of the issuers at the close of each session in their respective equity markets expressed in millions of euros.

As in the first database, the Spanish and German sovereign CDSs have also been used to measure the country risk to which they are exposed and the value of the VIX as a global risk indicator.

Table 2 shows the descriptive statistics for each of the variables in this database.

Descriptive statistics of the second database   TABLE 2

|	Average	Standard deviation
Issuing CDS (bp)	78.1165	67.2150
Capitalisation (million euros)	24,711	22,824
Spain 5-year CDS (bp)	63.2426	34.6668
Germany 5-year CDS (bp)	13.7244	6.3923
VIX (%)	25.1771	16.0106
Number of observations		**8,815**

Source: Thomson Datastream.

As shown, although exactly the same securities are not included in both databases, their size in terms of capitalisation can be considered similar.

3   Descriptive analysis

Figure 2 describes the trend of daily returns of the shares that make up the Spanish Ibex 35 and German Dax 30 indices. As can be observed, these are very similar, with a correlation coefficient of 88% in the period analysed. The prices of both indices remained stable between September 2019 and January 2020. But from the second half of February, following the spread of COVID-19, extreme movements began to be registered, which intensified during the first three weeks of March. On 12 March, one day before the CNMV resolved to impose the first restriction on short-selling, both indices suffered their largest falls in the entire period studied (11% in the case of the Dax 30 and 15% for the Ibex 35). Although positive returns were recorded in the last days of March, the prices of both indices continued to fluctuate much more sharply after the outbreak of the pandemic.

Daily returns on the Spanish and German markets   FIGURE 2
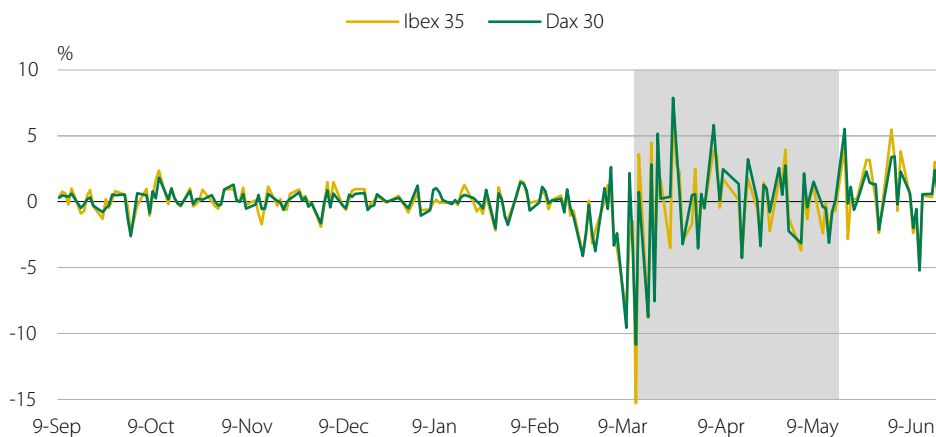
Source: Datastream. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.

Figure 3 indicates the trend of intraday volatility of both indices calculated using Floros (2009) and based on weighted logarithmic differences between the high and low prices and the opening and closing prices recorded on the same day. In line with Figure 2, volatility increased significantly in both markets in March and reached maximum values between the 12th and 17th of that month (coinciding with the period in which the greatest losses were observed). Although it gradually decreased in subsequent sessions, it never fell to the levels observed before the onset of the crisis caused by COVID-19.

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Daily volatilities of the Spanish and German markets[1]   FIGURE 3

Source: Thomson Datastream and own compilation by the authors. The shaded area indicates the period
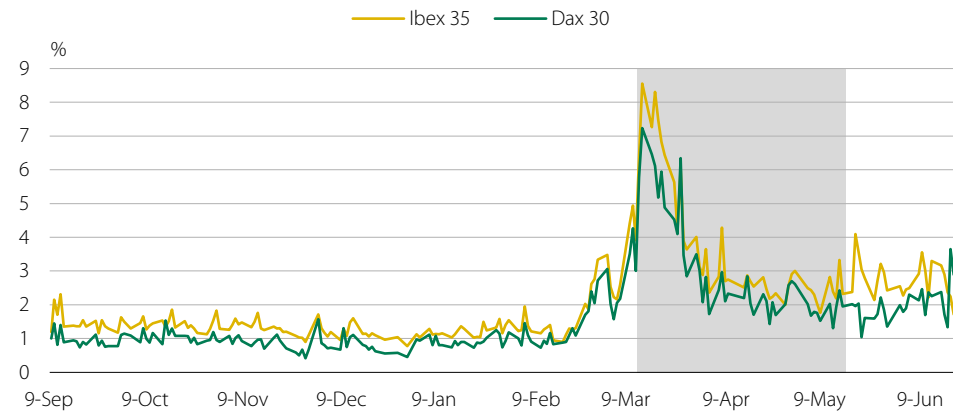during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trad-
ing in Spanish trading venues.

1   Daily volatilities have been calculated following the methodology described in Floros, C. (2009). "Modelling
    volatility using high, low, open and closing prices: Evidence from four S&P indices". *International Research
    Journal of Finance and Economics*, Vol. 287, pp. 198-206.

Figures 4.1 and 4.2 show the trend of the bid-ask spread for both countries: the first
is expressed as a percentage and the second presents the spread indexed to the value
of 12 March. The bid-ask spreads of Ibex 35 and Dax 30 shares performed in a sim-
ilar manner. Both increased in the days after the ban was implemented and tended
to decrease afterwards. However, the bid-ask spread of the Ibex 35 showed a smaller
increase in percentage terms than the Dax 30 (Figure 4.1). Compared to the period
between 9 September 2019 and 11 March 2020, the bid-ask spread of the Dax 30
increased by 107% during the time in which short positions on Spanish securities
were prohibited (98% on the Ibex 35). In the period following the lifting of the ban
on short positions, the spread was, on average, 29% above the levels observed be-
fore the start of the ban (15% for the Ibex 35). This behaviour is contrary to that
observed in the indexed bid-ask spreads for the two indices (Figure 4.2). In this case,
the increase in the spread is much greater for the components of the Ibex 35.[3]

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3   It should be noted that the bid-ask spread of the components of the Dax30 increased significantly a few
     sessions before 12 March. If the series had been indexed to any of the sessions prior to that date, the in-
     crease in the bid-ask spread of Dax 30 components would have been more similar, or even greater, than
     that of the Ibex 35 components.

Daily bid-ask spread for the Spanish and German markets (index = 100 corresponds to 12/03/2020)

FIGURE 4.1

Source: Thomson Datastream and own compilation by the authors. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.
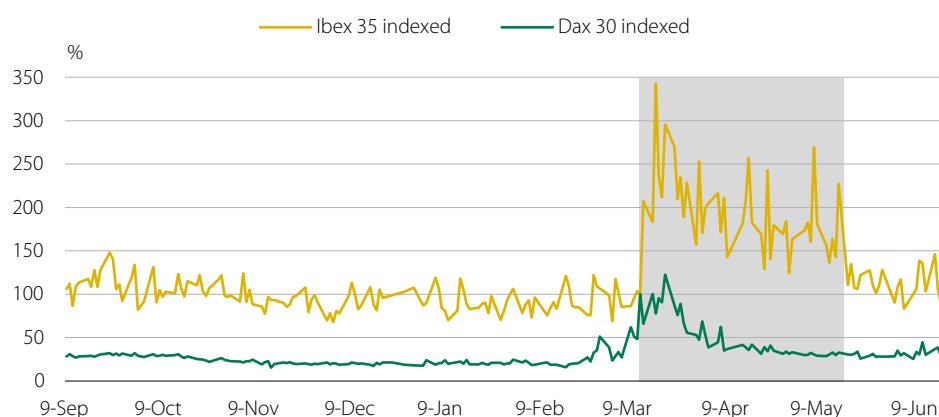
Daily bid-ask spread for the Spanish and German markets

FIGURE 4.2

Source: Thomson Datastream and own compilation by the authors. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.

The trend for trading in euros indexed to 12 March for both indices (see Figure 5) was similar throughout the period analysed and registered a considerable increase during the month of March, coinciding with the rise in volatility (Figure 3). Over the following weeks, trading levels normalised and were similar to those observed in the months prior to March. After the ban on short positions in Spanish securities was lifted, trading increased again to levels close to those seen in March.

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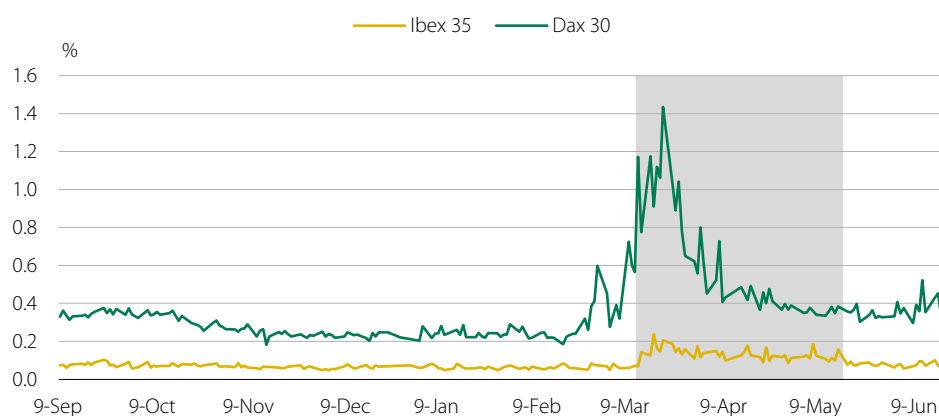
Trading in euros on the Spanish and German markets[1]   FIGURE 5

Source: Bloomberg and own compilation by the authors. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.

1 The average of the trading of the previous five sessions has been used for each of the securities in each market for the construction of the index.

Figure 6 illustrates the trend marked by the Amihud ratio for both indices. This is a measure of illiquidity that indicates the impact on prices at a given trading volume (a higher Amihud measure therefore suggests a higher degree of illiquidity).

Around the date of the announcement of the ban on short positions on Spanish securities, the Amihud measure increased for both Dax 30 and Ibex 35 securities. In the case of the Spanish index, this increase was more pronounced and sustained throughout the period during which the ban was maintained. After it was lifted, the values of the indexed Amihud measure of both indices decreased and converged to levels observed before the start of the pandemic.

Amihud measure of the Spanish and German markets[1]   FIGURE 6
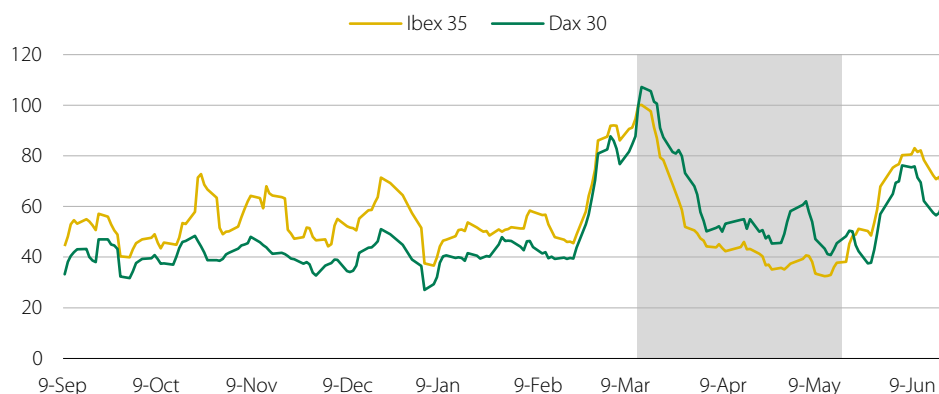**(index = 100 corresponds to 12/03/2020)**
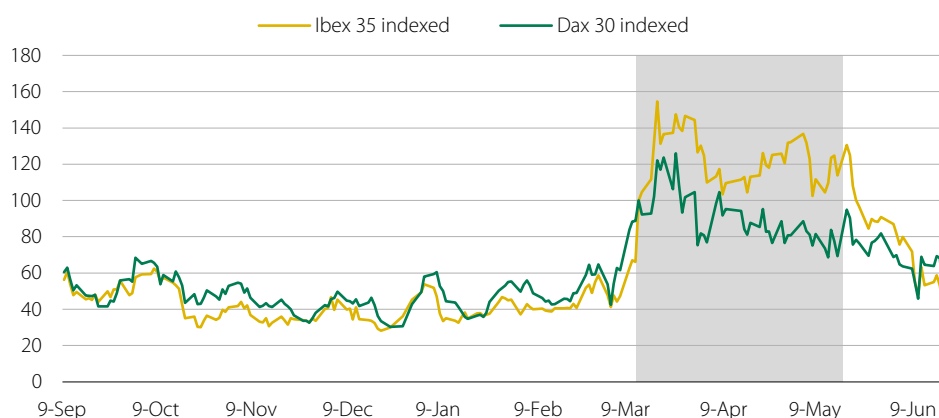
Source: Datastream, Bloomberg and own compilation by the authors. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.

1 The returns and the trading of the previous five sessions has been used for each of the securities in each market for the construction of the index.

This was similar for the trend in the average premia applied to the CDS of companies that make up the Dax 30 and the Ibex 35 (see Figure 7). CDS premia rose sharp-

ly in March, coinciding with the rebound in volatilities across the world's stock markets. As of mid-May, they decreased considerably, especially in the month of June, although they remained higher than the levels observed at the beginning of the period. The average premia on CDS for the Ibex 35 were between 10 bp and 20 bp above the average of the Dax 30 for almost the entire period analysed, with the exception of the months of February and March.

CDS premia for the Spanish and German markets[1]　　　　　　　　FIGURE 7

Source: Thomson Datastream and own compilation by the authors. The shaded area indicates the period during which the CNMV prohibited the creation or the increase of short positions on shares admitted to trading in Spanish trading venues.
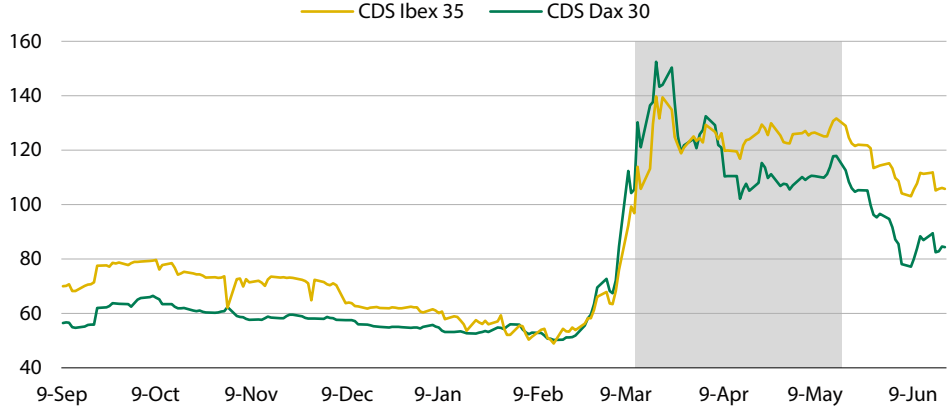
4 Econometric analysis

Using the two databases described above, two econometric analyses were carried out: the first focuses on the influence that the ban on the creation or increase of short positions may have had on the most liquid securities in the Spanish equity markets. The second includes the impact that such a ban may have had on the credit risk of Spanish equity issuers, differentiating between financial and non-financial issuers.

4.1 Effects of the ban on the most liquid securities in the Spanish equity markets

To assess the effect of the ban on short-selling on the different variables of interest, the following equation was used, which is largely based on the methodology followed by Mayordomo and Arce (2016):

$$\Delta_t DepVar_{i,m,t} = \alpha + \beta_1 \, securities\_ban_i + \beta_2 \, ban_t +$$
$$+ \beta_3 \, securities\_ban_i \, x \, ban_t + \beta_4 \, lifting_t +$$
$$+ \beta_5 \, securities\_ban_i \, x \, lifting_t + \beta_6 \, country\_risk_{m,t}$$
$$+ \beta_7 capit\_security_{i,t} + \beta_8 \, vix_t + \gamma_t + \varepsilon_{m,i,t}$$

Where $\Delta_t DepVar_{i,m,t}$ is the dependent variable considered for each of the securities that form part of the Ibex 35 and Dax 30. Specifically, the following were considered as variables of interest: the bid-ask spread, trading (indexed), the Amihud measure (indexed), volatility and excess returns on general market indices (CDAX and IGBM). The variables $securities\_ban_i$ and ban_t are dummy variables. The first takes the value 1 if the shares are subject to a ban at any time, in this case for the Ibex 35 securities, and 0 otherwise, in this case for Dax 30 shares. The second variable takes the value 1 at times when there is a ban on short-selling and 0 otherwise. The variable $securities\_ban_i \, x \, ban_t$ is also a dummy variable that takes the value 1 for the securities subject to ban (the Spanish securities) on the days that the ban is in force and 0 otherwise. Similarly, $lifting_t$ is a dummy variable that takes the value 1 from the session in which the ban on short-selling is lifted and 0 in all previous sessions. The variable $securities\_ban_i \, x \, lifting_t$ is also a dummy variable that is equal to 1 for the securities that are subject to ban after the ban is lifted and 0 otherwise.

Regarding the other variables, $country\_risk_{m,t}$ is the 5-year CDS spread on sovereign debt of Spain and Germany. The variable $capit\_security_{i,t}$ shows the capitalisation of each company. Lastly, vix_t is the quoted price of the VIX index for each of the days considered.

The estimates of the reference model have been made by ordinary least squares (OLS) corrected using the Panel Corrected Standard Errors method implemented by Beck and Katz (1995) and taking into account the possible heteroskedasticity of the

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data. The model includes time dummies for each of the sessions in the analysis period considered. This method has been used because the panel has a significantly smaller number of companies than the number of sessions considered ($N = 65$ and $T = 195$).

In addition, two alternative specifications, with models similar to the one described, have been considered as a robustness analysis. In the first of these, the dummy *securities_ban$_i$* was not taken into account, but the possibility of the existence of fixed effects for the analysed securities was. The second specification considers the same equation as the reference model. Both models are calculated using OLS corrected for heteroskedasticity. In the first model, the possible contemporary correlations between the securities are also taken into account. In the second model, the OLS method is applied grouped by securities.

The data used to estimate the different models are those presented in the section of this document that describes the first database used in this work. It is important to note that to measure the effects of the ban on the different dimensions of liquidity (bid-ask spread, trading or Amihud measure), volatility and excess return, the key variables are *securities_ban$_i$ x ban$_t$* and *securities_ban$_i$ x lifting$_t$*. This is because, in the first instance, these variables measure the impact of the ban on Spanish securities during the sessions in which it is in force, compared to the performance of these securities when they are not subject to ban and with the German securities, for which there is no ban throughout the sample. Similarly, the variable *securities_ban$_i$ x lifting$_t$* measures the possible effect of the ban on Spanish securities once it is no longer in force.

4.1.1 Bid-ask spread

As shown in Table 2, the ban on short-selling has had a negative impact on the bid-ask spread of Spanish securities; in other words, the coefficient is positive, therefore the short-selling ban would have increased the spread during the ban. This result is in line with the findings of Mayordomo and Arce (2016) and Beber and Pagano (2013). Furthermore, although less marked, the increase in bid-ask spreads persists once the ban is lifted.

Regression results TABLE 3

Dependent variable: $\Delta_t$bid_ask$_{i,m,t}$

Constant	0.4678*	-0.0762**	-0.0762**
securities_subject_ban	--	0.0872***	0.0872***
Ban	-0.3983***	-0.3985***	-0.3985***
securities_subject_ban x ban	**0.2263***	**0.2265***	**0.2265**
Lifting	0.5032*	0.0104	-0.0585
securities_subject_ban x lifting	**0.1062***	**0.1066***	**0.1066***
country_risk	-0.0030*	-0.0030	-0.0030***
ln(capitalisation_security)	-0.0024	1.6×10^{-5}	1.6×10^{-5}
VIX	-0.0248*	0.0061***	0.0061***
dummies_time (1 per day)	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**12,650**

Source: Compiled by the authors.

1 The equation has been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

One result that deserves comment is the fact that the country_risk variable obtains a negative and significant sign. This could be because the securities most affected by the variability of their country risk are Spanish securities, since the sovereign CDS has more variations. At the same time, the components of the Ibex 35 have narrower spreads than those of the Dax 30. The combination of these two factors may explain this negative sign.

4.1.2 Trading

In this case, the potential impact of the ban on the trading of Spanish securities appears to be insignificant. Therefore, it can be interpreted that the ban has not had a significant effect on trading. In this case, this result is not in line with Mayordomo and Arce (2016), who did find evidence that the securities subject to the ban experienced a decrease in their trading volume.

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Regression results   TABLE 4

Dependent variable: $\Delta_t trading_{i,m,t}$

Constant	-55.0038***	4.0743***	4.0743***
securities_subject_ban	--	0.4617	0.4617
Ban	-0.5077	-0.5193	-0.5193
securities_subject_ban x ban	**0.9987**	**1.0113**	**1.0113**
Lifting	-72.4091***	-3.8107***	-3.8107***
securities_subject_ban x ban	**1.2402****	**1.2684****	**1.2684**
country_risk	-0.0179	-0.0178	-0.0178
In(capitalisation_security)	-0.1846	-0.0054	0.0054
VIX	3.9018***	-0.0966***	-0.0966**
dummies_time (1 per day)	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**12,675**

Source: Compiled by the authors.

1 The equation has been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel
Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

4.1.3 Amihud measure

The results of the regressions show that the securities subject to the ban experienced
an increase in depth during this period, assessed using the Amihud measure, com-
pared to a situation in which no ban would have been in force. Furthermore, this
effect on the increase in depth is maintained once the ban has been lifted. It is im-
portant to note that due to the construction of the Amihud measure, the smaller it
is, the deeper the market is considered to be.

This result does not imply that the Amihud measure for the components of the Ibex
35 was lower than that of the components of the Dax 30 at the time of the ban. As
described in the descriptive section, the Amihud measure is lower for the compo-
nents of the Dax 30. The higher ratio of the Ibex 35 could be attributed to country
risk. In this case, ceteris paribus, higher premia, such as those seen in Spain, result
in shallower markets.

Regression results   TABLE 5

Dependent variable: $\Delta_t$amihud_ratio$_{i,m,t}$

Constant	-123.4968***	-5.1311	-5.1311***
securities_subject_ban	--	-1.5562*	-1.5562
Ban	3.6625	3.5633	3.5633
securities_subject_ban x ban	**-4.4216****	**-4.3278****	**-4.3278****
Lifting	-161.4981***	-4.9090**	16.2076***
securities_subject_ban x lifting	**-3.7196*****	**-3.6331*****	**-3.6331*****
country_risk	0.0574**	0.0581**	0.0581*
In(capitalisation_security)	-0.3067	0.1998***	0.1998**
VIX	8.1661***	0.1465	0.1465**
dummies_time	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**12,505**

Source: Compiled by the authors.

1 The equation has been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

4.1.4 Volatility

As in the case of trading, it can be deduced from the econometric results that the ban has not had a significant impact on the volatility of Spanish securities. This finding is, in general, in line with that described in literature.

Regression results   TABLE 6

Dependent variable: $\Delta_t$volatility$_{i,m,t}$

Constant	4.7339	0.4478	0.4478
securities_subject_ban	--	-0.6244	-0.6244
Ban	1.5859	-1.5926	-1.5926
securities_subject_ban x ban	**-0.6759**	**-0.6562**	**-0.6562**
Lifting	2.6646*	-0.4421	-0.8453
securities_subject_ban x lifting	**-0.6414**	**-0.6033**	**-0.6033**
country_risk	0.0174	0.0174	0.0174
In(capitalisation_security)	-0.2891	-0.0704	-0.0704
VIX	-0.1557*	0.0087	0.0087
dummies_time (1 per day)	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**12,597**

Source: Compiled by the authors.

1 The equation has been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

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4.1.5 Excess returns over the market benchmark

Based on the results of the regressions, it can be deduced that the ban did not have
an impact on returns, after stripping out the market trend. This result is in line with
the findings obtained in the article by Beber and Pagano (2013) and the findings of
Mayordomo and Arce (2016) referring to large cap credit institutions.

Regression results			TABLE 7
Dependent variable: $\Delta_t$excess_return$_{i,m,t}$			
Constant	7.0566	0.4801	0.4801
securities_subject_ban	--	0.2290**	0.2290
Ban	2.9595**	2.9605**	2.9605*
securities_subject_ban x ban	**0.4497****	**0.4484****	**0.4484**
Lifting	7.9430*	0.2864	-0.5278
securities_subject_ban x lifting	**0.2973*****	**0.2945*****	**0.2945**
country_risk	-0.0076**	-0.0076**	-0.0076
ln(capitalisation_security)	0.0174	0.0005	0.0005
VIX	-0.4474*	-0.0141	-0.0141
dummies_time (1 per day)	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**12,552**

Source: Compiled by the authors.

1 The equations have been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel
   Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

4.2 Effect of the ban on the credit risk of issuers on Spanish equity markets

A key aspect of the ban on short-selling in the equity markets is how these decisions
could influence the credit risk of issuers whose securities are subject to these restric-
tions. To analyse this possible relationship, the following equation has been used,
once again based on the work of Mayordomo and Arce (2016):

$$\Delta_t CDS_{i,m,t} = \alpha + \beta_1 \text{ securities\_ban\_finan}_i +$$
$$+ \beta_2 \text{ securities\_ban\_ind}_i + \beta_3 \text{ ban}_t +$$
$$+ \beta_4 \text{ securities\_ban\_finan}_i \text{ x ban}_t +$$
$$+ \beta_5 \text{ securities\_ban\_ind}_i \text{ x ban}_t + \beta_6 \text{ lifting}_t +$$
$$+ \beta_7 \text{ securities\_ban\_finan}_i \text{ x lifting}_t +$$
$$+ \beta_8 \text{ securities\_ban\_ind}_i \text{ x lifting}_t + \beta_9 \text{ country\_risk}_{m,t}$$
$$+ \beta_{10} capit\_security_{i,t} + \beta_{11} vix_t + \gamma_t + \varepsilon_{m,i,t}$$

The variables $securities\_ban\_finan_i$, $securities\_ban\_ind_i$ and ban_t are dummy
variables. The first takes the value 1 for the securities that are subject to ban at some
point and that belong to the financial sector, in this case Spanish securities that are

credit institutions. The second takes the value 1 for Spanish securities that belong to non-financial sectors and 0 otherwise. The third variable takes the value 1 at times when there is a ban on short-selling and 0 otherwise. The variable $securities\_ban\_finan_i \ x \ ban_t$ is also a dummy variable that takes the value 1 for the Spanish securities that are from the financial sector on the days that the ban is in force and 0 otherwise. Likewise, $securities\_ban\_ind_i \ x \ ban_t$ takes the value 1 for the Spanish securities that are not financial in the sessions in which the ban is in force. Similarly, $lifting_t$ is a dummy variable that takes the value 1 from the session in which the ban on short-selling was lifted and 0 in all previous sessions. Variables $securities\_ban\_finan_i \ x \ lifting_t$ and $securities\_ban\_ind_i \ x \ lifting_t$ are equal to 1 for the Spanish financial and non-financial securities that were subject to ban in the sessions subsequent to its lifting and 0 otherwise.

Regarding the other variables, $country\_risk_{m,t}$ is the 5-year CDS spread on sovereign debt of Spain and Germany. The variable $capit\_security_{i,t}$ shows the capitalisation of each company. Lastly, vix_t is the price of the VIX index for each of the days considered.

As in the previous model, the estimates of the reference model have been made by ordinary least squares (OLS) corrected using the Panel Corrected Standard Errors method implemented by Beck and Katz (1995) and taking into account the possible heteroskedasticity of the data. The model includes time dummies for each of the sessions in the analysis period considered. Again, this estimation method has been used because the panel has a notably smaller number of companies than the number of sessions considered (N = 43 and T = 205). Alternatively, and as a robustness analysis, the two specifications that include fixed effects and the estimation of the model proposed by the OLS grouped by securities have been considered.

The data used to estimate the different models are those presented in the section of this document that describes the second database used in this work. In measuring the impact that the ban may have had on the credit spreads of Spanish financial and non-financial companies, the key variables to consider are: $securities\_ban\_finan_i \ x \ ban_t$, $securities\_ban\_ind_i \ x \ ban_t$, $securities\_ban\_finan_i \ x \ lifting_t$ and $securities\_ban\_ind_i \ x \ lifting_t$. This is because, in the first cases, these variables measure the impact of the ban on Spanish securities during the sessions in which it is in force, compared to what happens with the securities when they are not subject to the ban and with the German securities, for which there is no ban throughout the sample. The variables $securities\_ban\_finan_i \ x \ lifting_t$ and $securities\_ban\_ind_i \ x \ lifting_t$ measure the impact of the ban on the credit risk of Spanish securities once the ban is no longer in force.

Table 8 shows the results of the estimated model. Based on these findings, it can be deduced that, in this case, the ban on short-selling has had no influence on the credit spreads of Spanish companies, neither during the ban nor once it was lifted.

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Regression results

TABLE 8

Dependent variable: $\Delta_t cds_{i,m,t}$

Constant	15.1531***	-1.6086*	-1.6086
spanish_financial_companies	--	-0.2977	-0.2977
spanish_industrial_companies	--	-0.0759	0.0759
Ban	-5.5099	-5.5154	-5.5154***
spanish_financial_companies x ban	**0.6683**	**0.6971**	**0.6971**
spanish_industrial_companies x ban	**-0.3898**	**-0.4041**	**-0.4041**
Lifting	1.7027***	-1.8445***	-1.8445***
spanish_financial_companies x lifting	**0.3438**	**0.3872**	**0.3872**
spanish_industrial_companies x lifting	**0.4514**	**0.4414**	**0.4414**
country_risk	0.0023	0.0025	0.0025
ln(capitalisation_security)	-0.2114**	-0.0678	-0.0678
VIX	-0.8758***	0.1314	0.1314***
dummies_time (1 per day)	**Yes**	**Yes**	**Yes**
Fixed effects	**Yes**	**No[1]**	**No[2]**
Number of observations			**8,686**

Source: Compiled by the authors.

1 The equation has been made using the OLS method grouped by securities.

2 The equation has been made using the OLS method and the errors have been corrected using the Panel
Corrected Standard Errors method.

*** Significance at 1%. ** Significance at 5%. * Significance at 10%.

This relationship has already been studied in literature with mixed results. Mayor-domo and Arce (2016) found that the ban on short-selling on financial securities that was established in Spain in 2011 had a positive influence on mid-cap financial companies. However, they found no relationship between the ban and the credit risk of large-cap financial companies. Beber *et al.* (2018), using data from various countries, concluded that this relationship could be negative and that the credit risk premium applied to issuers of the securities subject to the ban could increase. The results of this work would be more in line with Mayordomo and Arce (2016). Furthermore, it is important to note that in Spain, since 2011, when the ban analysed by them was put into practice, until now, the number of credit institutions has decreased and the average size of these institutions is larger.

5 Conclusions

This article analyses the potential consequences of the restrictions on net short positions on shares listed on the Spanish markets, announced by the CNMV on 12 March 2020 and 16 March 2020. For this purpose, a comparison was made between the performance of Ibex 35 components and components from another index in a market where no restrictions were introduced, in this case the German Dax 30. An assessment was also made of how these restrictions may have influenced the credit risk of the issuers of the securities subject to them. The descriptive and econometric analyses gave rise to the following conclusions:

– Liquidity, measured through bid-ask spreads, was affected. Spreads increased for shares listed on the Ibex 35 and Dax 30 alike in the first few days after the ban and then tended to narrow. In relative terms, the initial increase was sharper for Spanish securities and therefore, despite the subsequent decrease, pre-crisis values were only reached once the ban had been lifted. The recovery of the German securities was faster. The econometric analysis reveals that the securities included in the ban experienced a drop in liquidity compared to the unrestricted scenario, an impact which persisted when the ban was lifted, albeit to a lesser degree.

– Trading in Ibex 35 shares fell when the restrictions were imposed, standing at levels that were lower than in the pre-crisis period. However, it did bounce back when the ban was lifted. Trading in components of the Dax 30 index during the ban decreased significantly after it was announced, and the trend was similar to that of the Ibex 35. Once the restrictions had been lifted, trading patterns were similar in both markets. The econometric analysis therefore concludes that the ban did not have a significant impact on trading of the securities to which it applied.

– The average Amihud measure increased during the period of the ban for members of both the Ibex 35 and the Dax 30. This suggests that both markets lost depth during that time, which could be attributed to the generalised turbulence. Based on the evolution over time during the ban, it can be observed that the components of the Ibex 35 lost more depth than those of the Dax 30. However, once it had been lifted, both markets gained depth, reaching levels similar to those seen before the restrictions were imposed. Further, the econometric analysis finds no evidence that the ban had a negative effect on the Amihud measure of the securities it affected. The greater loss of depth recorded by the Spanish securities could be more a result of the higher country risk of these securities than the ban itself.

– Volatility in both indices was also higher compared to previous periods, only returning to pre-crisis values in the last sessions, when the restrictions were no longer in force. Volatility was not observed to have behaved differently under the ban than it would have behaved otherwise.

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– There is also no evidence to suggest that it had any notable effect on the price performance of the shares listed on the Ibex 35 with respect to share prices on the Dax 30 index compared to the situation before the ban.

– Lastly, credit spreads widened significantly in the days prior to the implementation of the ban. These spreads have been narrowing as the pandemic in Europe has eased, although they are still greater than their pre-crisis levels. In this sense, German securities have recovered to a greater extent than Spanish securities. The econometric analysis offers no evidence that the ban had any influence on the credit risk spreads of Spanish equity issuers either during the application period or after it was lifted.

In short, a greater increase in bid-ask spreads was observed in the securities affected by the ban, which has persisted to some extent after it was removed. However, the analysis found no notable evidence of effects attributable to the ban on other key variables, such as trading volumes, price trends, volatility or depth of the market, or issuers' credit spreads.

References

Beber A., Fabbri, D. and Simonelli, S. (2018). "Short-selling bans and bank stability". Available at SSRN.

Beber A. and Pagano M. (2013). "Short-selling bans around the word: Evidence from 2007-09 crisis". *The Journal of Finance*, Vol. 68, pp. 343-381.

Boehmer, E., Jones, C.M. y Zhang, X. (2011). "Shackling short sellers: the 2008 shorting ban". Working document available at SSRN.

Beck, N. and Katz, JN (1995). "What to do (and not to do) with times-series-cross-section data in comparative politics". *American Political Science Review*, Vol. 89, no. 3, pp. 634-647.

Diamond, D. and Verrechia, R. (1987). "Constraint on short-selling and asset price adjustment to private information". *Journal of Financial Economics*, Vol. 10, pp. 277-311.

Floros, C. (2009). "Modelling volatility using, high, low, open and closing prices: Evidence from four S&P indices". *International Research Journal of Finance and Economics*, Vol. 28, pp. 198-206.

Marsh, IW and Payne, R. (2012). "Banning short sales and market quality: The UK's experience". *Journal of Banking and Finance*, Vol. 36, pp. 1,975-1,986.

Mayordomo, S. and Arce, O. (2016). "The impact of the 2011 short-sale ban on financial stability: Evidence from the Spanish Stock Market". *European Financial Management*, Vol. 22, pp. 1,001-1,022.