Changes in Initial Margin and Market Liquidity During the COVID-19 Pandemic

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Abstract The main role of central counterparties is the clearing and settlement of trades. In order to fulfil this role, they need to maintain financial resources to cover losses due to customer defaults. One element of these resources is the initial margin requirements. In this paper the authors have analysed whether a change in the value of the margin was followed by a significant change in the market liquidity of the most liquid Hungarian stock – the OTP Bank Group – during the period of the COVID-19 pandemic. Market liquidity is measured based on the daily traded volume. The results show that in most cases, no changes in the abnormal daily traded volume are seen on the market following a margin change, which means that no evidence has been found that margin changes and traded volume are related. This result is good from a practical point of view, because it means that the activity of the central counterparty did not negatively affect the liquidity of the market during the COVID-19 period.

Keywords:
margin,
market liquidity,
event analysis,
central clearing,
procyclicality

University of Maribor Press

DOI https://doi.org/10.18690/um.epf.5.2022.31
ISBN 978-961-286-600-6

1 Introduction

The financial crisis of 2008 highlighted the vulnerability of the financial system. Regulatory changes over the past decade have gradually increased the role of central counterparties (CCPs). Through the process of novation – becomes the buyer to every seller and seller to every buyer – CCPs increase transparency and, in order to fulfil their role, needs to maintain financial resources to cover losses due to customer defaults. To this end, CCPs operate a multilevel guarantee system, consisting of the initial margin requirements and the default fund contributions, paid by the clearing members, and also from 'skin in the game', which is a dedicated part of a CCP's own capital (Murphy et al., 2014).

This research focuses on the domestic – Hungarian – capital market, the Budapest Stock Exchange Ltd. (BSE), and the activity of the domestic central counterparty – KELER CCP Ltd. This study investigates the relationship between the initial margin and the market liquidity of the most liquid Hungarian stock – the OTP Bank Group – during the period from 1 January 2020 to 31 December 2021. The authors chose this timeframe because the Hungarian economy was notably affected during this period by the measures related to the COVID-19 pandemic. COVID-19 first appeared in Hungary at the beginning of March 2020, and the COVID-19-related restrictions were not eased until after the 2021 year-end.

In this study, liquidity refers to market liquidity, namely that '*a liquid market is a market where large volume transactions can be executed immediately or within a short period of time with minimal impact on market prices.*' (BIS, 1999, pp.13). The two most widely used liquidity measures are the bid-ask spread and volume (Kutas and Végh, 2005), which this study will apply later as a liquidity measure. This question will be analysed using an event study method, since this method is suitable for examining whether changes in the value of the initial margin result in a change in the liquidity of a security. This is an important question, since European regulation – the so-called EMIR (2012) – places a strong emphasis on protecting the market against procyclicality, meaning that during a potentially stressful period, the increased margin requirements imposed by the CCP should not create liquidity problems for market participants, which could deepen the crisis. Although procyclicality of margin requirements has been analysed in existing literature (e.g. Murphy et al., 2014; Berlinger et al., 2018) there is a lack of empirical studies that examine the effect of the initial margin required by

CCPs on the market in stressed market conditions. Therefore, the aim of this paper is to analyse whether the margin requirements during the period of the COVID-19 pandemic were followed by a change in the liquidity of securities.

2 Literature review

The effect of margin requirements on the market has been analysed from various aspects, mainly focusing on the changes in volatility and liquidity. In the related literature, the results are controversial. Some research states that margin can reduce the volatility of stock price (e.g. Hardouvelis, 1990), while others found that the effect of margin on volatility varies over time and differs across contracts on the futures markets (Fishe et al., 1990). Hardouvelis and Kim (1995) found that this relationship behaves differently on the spot and futures markets, while in a later study Hardouvelis and Theodossiou (2002) state that there is a non-linear relationship between margin and volatility. They also point out in their research the pyramiding-depyramiding effect, which highlights the procyclical nature of margins. Namely, in declining bear markets, margins should be reduced in order to free up liquidity and prevent a depyramiding effect (Garbade, 1982), while in a bullish market, margins increase and are maintained at a higher level to avoid the pyramiding effect. Park and Abruzzo (2015) also support the procyclicality phenomenon in their research, however, the results show an asymmetric relationship between the change in margin and volatility. The margin of the CCP increased as soon as the increasing volatility reached a certain level, while there was no immediate reduction in the margin after volatility reached a lower level.

Ma et. al. (1993) conducted an event study analysis to explore the relationship between margin changes and market reactions. Goldberg and Hachey (1992) and Hsieh and Miller (1990) found no significant relationship between changes in margin requirements and market volatility, while Kupiec (1993) showed that there is a positive relationship between the margin requirement and volatility of the spot equity market, since increasing margin requirements drain liquidity from the market, thereby increasing price volatility. Additionally, market participants have an effect on how the market reacts to a margin change. Based on the restriction hypothesis put forward by Nathan (1967), margin changes are most likely to have a destabilising effect for speculators. Moreover, Daskalaki and Skiadopoulos (2016) found that the market liquidity of individual contracts/groups is not affected by changes in margin,

regardless of how liquidity is measured, as changes in margin affect excessive speculation. They also observed that margin requirements are positively (negatively) correlated with price (return) changes, but only large and positive margin changes affect the characteristics of the commodity futures market, whereas small and negative changes do not.

Finally, Charath et al. (2001) investigated the impact of margin requirements on trader activity. They concluded that trading activity becomes increasingly sensitive to margin changes as the expiry of contracts approach. In addition, Chou et. al (2015) analysed trading activity, demonstrating that margin increases have led to a significant decrease in trading activity, thus suggesting that margin requirements impose high transaction costs on traders. As for price volatility and bid-ask spreads, they show that these are positively related to changes in margin.

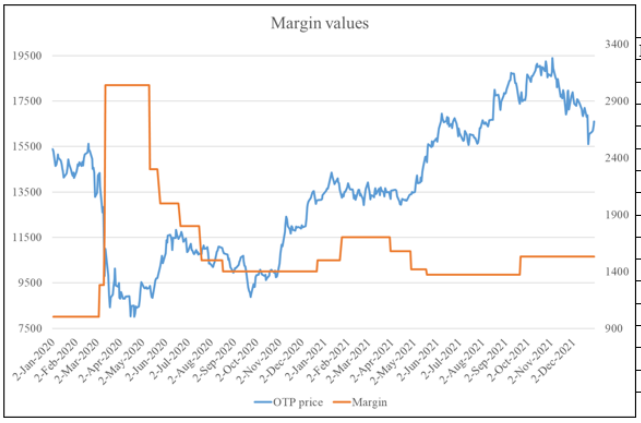
3 Methodology and data

Based on the existing literature, this study applies the event study methodology. An event study analysis measures a relationship between an event that affects securities and the return on those securities. In other words, whether a given event has an impact on the return of a given security. In this study, instead of analysing the return of an asset, the authors analysed the change in the liquidity of the asset. It is important to note that the change in the liquidity has been analysed, since the authors wanted to show whether an event has an effect on the liquidity of the stock. The question is not whether the stock is liquid or illiquid, but rather whether the event makes the stock more/less liquid, thus the log-change is measured in volume. However, further analysis would be required in order to determine a true causal relationship. In summary, the event analysis method is based on detecting abnormal changes in the traded volume after the occurrence of an event.

3.1 Event dates

The first step of an event analysis is to define the event whose impact the researcher(s) want(s) to investigate. In this paper, the authors examine how a change in the margin requirements of the Hungarian clearing house, the KELER CCP affected the log-change of the traded volume of the stock of OTP during the period from 1 January 2020 to 31 December 2021. The authors chose this period in order

to analyse how the margin changes during the period of the COVID-19 pandemic related to the change in the liquidity of the stock. The stock of the OTP Bank Group from the Budapest Stock Exchange was chosen, since it is the most liquid and most traded stock on the Hungarian market. The initial margin requirements for OTP were modified by the KELER CCP on the dates shown in the Figure 1 (KELER CCP, 2022). This study focuses on those events.



Date	Margin	Change
03 January 2020	1 000	
05 March 2020	1 280	increase
12 March 2020	1 740	increase
13 March 2020	3 040	increase
12 May 2020	2 300	decrease
26 May 2020	2 000	decrease
22 June 2020	1 800	decrease
20 July 2020	1 500	decrease
18 August 2020	1 400	decrease
23 December 2020	1 500	increase
25 January 2021	1 700	increase
31 March 2021	1 580	decrease
28 April 2021	1 420	decrease
19 May 2021	1 370	decrease
22 September 2021	1 530	increase

Figure 1: Dates of the initial margin changes
Source: Authors' own editing

The output of the event analysis depends largely on the choice of the so-called event window and estimation period. The event date is actually day zero of the analysis (Bowman, 1983), and the event window is the time interval around this date in which the impact of the event is examined. In this paper, the authors chose the day of the margin change (T) and the five trading days – namely one week – following it (T+5) as the event window, as well as the five trading days – also one week – before the change (T-5) as the estimation period. A short estimation window had to be applied since, according to Figure 1, there were several occasions when the consecutive margin changes happened within a short period of time. Even the T-5 days event window was still too long during March 2020, when the events were so close to each other that the estimation period contained the previous event as well. In order not to have a biased estimation, this problem was handled by decreasing the estimation period and the event window to T-4 and T+4 days, on 5 March 2020. In the case of 12 and 13 March 2020, two cases were handled as one event. The authors did not want to disregard these days since, from the viewpoint of this analysis, the March

2020 period is important, as this was when COVID-19 spread to Europe and the first notable measures were in place (Kormányhivatalok, 2022).

3.2 Definition of abnormal volume changes

The aim of this event analysis is to identify abnormal liquidity changes. To achieve this, it is necessary to know what the expected normal liquidity – measured in volume – changes would be. Estimating normal changes can be defined using statistical or economic models (Bedő, 2007), from which the authors chose to apply a statistical model, the so-called market model, applied by e.g. Fama et al. (1969). Its basic assumption is that there is some linear co-movement between the return of the *i*-th stock and the market return, R_m, according to the following equations, where the normalised return R_{it} of the *i*-th stock at time *t* can be seen:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it}$$
$$E(\varepsilon_{it}) = 0 \qquad var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

where α_i and β_i are the regression coefficients of *i*-th stock estimated by the OLS (Ordinary Least Square method), and ε_{it} is an error term with zero expected value. The coefficients α_i and β_i are computed over the estimation period and, taking them as constants, the abnormal returns (AR_{it}) are obtained by applying them to the event window, based on the following equation:

$$AR_{it} = R_{it} - (\widehat{\alpha_i} + \widehat{\beta_i} * R_{mt})$$

In this model, instead of the return of *i*-th stock, volume data has been used. However, instead of the market return, the authors chose not to use the traded volume of the index, on the one hand because there are no volume data available for the index, while on the other because it was proved by Amihud and Mendelson (1986) that there is a strong relationship between liquidity and returns. To be able to apply this model, the authors of this paper had to choose an instrument that was representative of the market against which they could perform the calculations. They chose the MSCI Emerging Markets Index, downloaded from Yahoo Finance (2022), together with the daily traded value of the stock of the OTP Bank Group. The index measures the performance of emerging markets, of which Hungary is one. To draw

conclusions about abnormal returns, it is necessary to cumulate them over time, which has been labelled as a cumulative abnormal return (CAR).

Whether the estimated volume change can be regarded as abnormal can be detected by statistical tests, for example by using the most commonly used parametric test – the Student's t-test. Its assumption is that abnormal returns follow a normal distribution. In the hypothesis testing, the null hypothesis is that the difference between the expected and realised return on a given day is not an abnormal return, therefore the event under investigation did not have a significant effect on the stock (McWilliams et. al., 1999).

After calculating the test function and critical values, if the test function is higher than the upper critical value or lower than the lower critical value, the null hypothesis is rejected. Therefore, in this case, the assumption that there are no abnormal returns is rejected. This implies that the event has had a significant effect on the value of the stock under consideration. If the value of the test function falls between the upper and lower critical values, the null hypothesis cannot be rejected, i.e. the returns realised in the event window are not abnormal returns, therefore the event did not have a significant impact on the value of the stock being tested (Rácz, 2019).

4 Analysis and result

For all of the events, the authors estimated the abnormal volume changes as well as the cumulative abnormal volume changes. As can be seen in Figure 2, it is clear that, mainly in those cases when the margin was increasing, the daily traded volumes decreased and vice versa. Therefore, in essence, if the margin is decreasing it is followed by more active trading the following day (or days) than expected. However, the figure only contains those events following volume changes, in which case one of the days within the event window proved to be significantly abnormal, as illustrated in Table 1 (highlighted in red). In terms of the other events – which are not shown in Figure 2 – the same phenomena can mostly be seen.

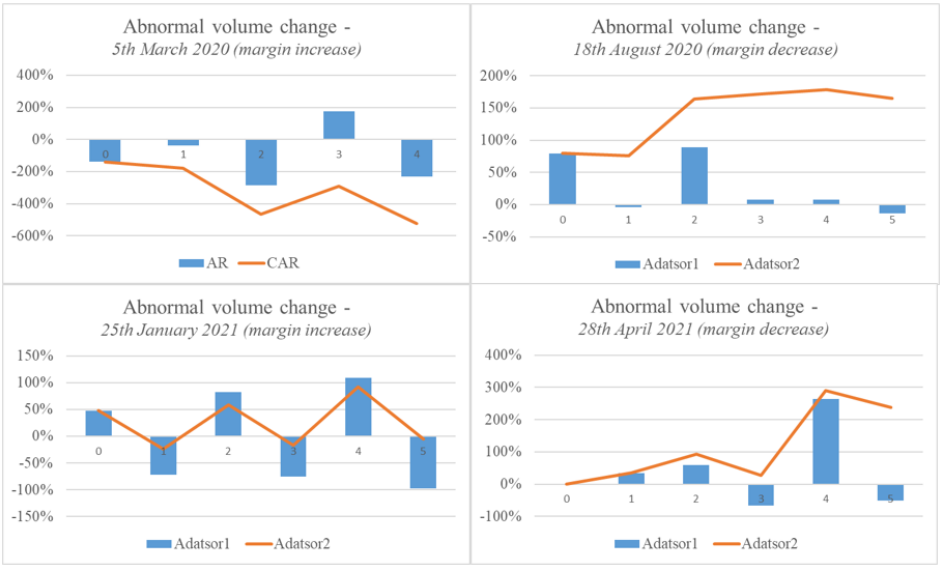


Figure 2: Significantly abnormal daily volume changes

Source: authors' own editing

Table 1: p-values

05 March 2020	increase	21,64%	17,91%	7,59%	11,77%	6,76%	
12-13 March, 2020	increase	38,21%	26,23%	20,55%	19,96%	27,55%	18,80%
12 May 2020	decrease	41,57%	39,05%	25,85%	31,20%	26,71%	19,77%
26 May 2020	decrease	17,70%	23,54%	24,04%	19,72%	40,49%	33,43%
22 June 2020	decrease	47,69%	45,93%	48,22%	39,35%	35,87%	37,54%
20 July 2020	decrease	34,36%	24,15%	42,92%	30,56%	30,42%	30,16%
18 August 2020	decrease	3,18%	5,28%	2,67%	3,04%	3,27%	3,76%
23 December 2020	increase	38,39%	41,95%	42,35%	48,81%	44,34%	49,96%
25 January 2021	increase	8,64%	20,69%	13,08%	32,56%	11,74%	44,98%
31 March 2021	decrease	14,15%	42,61%	27,20%	34,90%	30,46%	27,55%
28 April 2021	decrease	49,13%	18,09%	9,55%	28,23%	4,46%	5,45%
19 May 2021	decrease	30,53%	44,00%	47,18%	42,63%	40,91%	43,02%
22 September 2021	increase	14,74%	21,60%	18,87%	28,16%	25,23%	15,24%

Source: Authors' own editing

According to Table 1, it is evident that in most the cases, the margin change was not followed by a significantly abnormal change in traded volume. It is worth mentioning that the most notable margin changes, which occurred on 12 - 13 March, were followed by a weekend, and on the following Monday, no trading took place

on the market with OTP's stocks, as it was the time of the first lockdown due to the pandemic. The market had three days in which to react and build expectations into trading activity, therefore the results of the analysis are notably affected by the delay in the first trading activity compared to the margin change. There was only one event – 18 August 2020 – which was followed by significantly abnormal volume changes for a week, however, it would be misleading to draw general conclusion from just one event.

5 Conclusion

In this analysis the authors have shown that margin changes are followed by abnormal liquidity changes, however, these did not prove to be significant in the majority of cases. From a practical point of view this is an important result, since it means that the activities of the CCP have not caused a more illiquid market than prior to the margin change during the COVID-19 pandemic. Therefore, it was not possible to prove that the activity of the CCP would cause procyclicality. In future, it would worth analysing whether there is a causal relationship between margin changes and liquidity changes involving a longer time-period as well as a larger pool of stocks. Moreover, it would worth carrying out a causal analysis with different liquidity indicators, such as the bid-ask spread or a weighted average spread measure.

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