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Reflections on the Mechanisms to Protect Against Formation of Price Bubble in the EU ETS Market

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Abstract
The rapid increases of European Union Allowance (EUA) prices and very high market volatility, resulting mainly from the growing role of speculative entities, can contribute to forming a price bubble. This may cause the market instability and could have a implications on planning future reduction investments by European Union Emissions Trading Scheme (EU ETS) participants. That is why they need some kind of 'safety valve', an effective EU ETS instrument, which can be triggered when the situation requires it.
The purpose of this paper is to examine whether the current legislative rules of the EU ETS protect against sudden EUA price fluctuation and the risk of formation of a price bubble. This paper tries to assess the potential EUA price bubble and to review of existing instruments within the EU ETS, analysing their efficiency using different assumptions and identify channels of possible other market instruments to efficiently prevent the carbon market instability caused by rising EUA prices and market speculation. We argue that the European Commission (EC) does not currently have an appropriate market instrument to respond to the EUA price fluctuation. Moreover, there are some legislative loopholes in the system, which may encourage market speculators to influence EUA prices, and there is need to introduce better market safeguards.

LIST OF ABBREVIATIONS

CAKE	Centre for Climate and Energy Analyses
EC	European Commission
ESR	Effort Sharing Regulation
EU	European Union
EU ETS	European Union Emissions Trading Scheme
EUA	European Union Allowances
KOBiZE	The National Centre for Emissions Management
LRF	Linear Reduction Factor
MAR	Market Abuse Regulation
MSR	Market Stability Reserve
Non-ETS	Sectors not covered by the European Union Emissions Trading Scheme and regulated by Effort Sharing Regulation.

1. INTRODUCTION

The European Union (EU) is facing the challenge and opportunity of implementing the Green Deal while simultaneously initiating the recovery of the economy following the coronavirus crisis. While funding for investment opportunities is often discussed, what is needed above all for the transition is a transparent policy framework that makes investments in climate-friendly technologies economically viable and ensures that companies actually implement the investments in the transition. In this respect, special attention needs to be paid to the EU ETS market itself, in particular to look at the observed increases in the EU carbon price, which are reaching new records per ton.
The purpose of this paper is to answer for one research question whether the EU ETS is properly secured against rising EUA prices and the risk of a possible bubble in the EUA allowances market and whether the EC have any instruments in the EU ETS regulations that will protect participants from the future price shocks. In this respect, it is worth emphasizing that in this paper we focus mainly on the identification of the potential creation of a price bubble on the CO_2 market, reviewing the current legislative instruments in the EU ETS and some elements of this legislation that should be improved to avoid market manipulation and to ensure better market safeguards.

Figure 1. EUA allowances on the secondary spot market in the period from April 2013 to June 2021 (prices in EUR)
Source: Own study based on ICE and EEX data

2. THE EUA PRICE INCREASE AS A POTENTIAL PRICE BUBBLE

We can observe (Figure 1) increases on EUA prices in recent couple of years. From 17 April 2013 to 22 June 2021, the EUA price increased on the spot market from EUR 2.75 to EUR 52.33 (approx. 1800%). The value of EUR 2.75 is the lowest price of allowances on the futures market in the period after 2007, when it was possible to transfer (bank) allowances between periods. We can see the most extreme price spikes took place two times: in August 2017–2019 and in May 2020–June 2020 when prices rose from EUR 5,3 to 29,4 and from EUR 15,23 to 52,33. In the first case, it was more than a 450% price increase during only 2 years, and in the second one, it was almost a 250% increase during a year. It could mean that EUA prices rise too high and too fast, and some experts believe that this could be a beginning of a 'price bubble'.

A price bubble according to one of the definitions is an economic cycle that is characterised by the rapid escalation of market value, particularly in the price of assets. This fast inflation is followed by a quick decrease in value, or a contraction, that is sometimes referred to as a 'crash' or a 'bubble burst'. Typically, a bubble is created by a surge in asset prices that is driven by exuberant market behaviour. During a bubble, assets typically trade at a price, or within a price range, that greatly exceeds the asset's intrinsic value[1]. A question should be asked whether EUA prices, which have risen from 2.75 to 53.23 EUR (by 1800%) during over 8 years (from April 2013 to June 2021), can be considered as 'the rapid escalation of market value'. As explained earlier, this time period was chosen because the value of EUR 2.75 was the lowest price of allowances on the futures market in the period after 2007, when it was possible to transfer (bank) allowances between periods. When we compare EUA price increases to current assets, which are considered by some experts as a bubble[2], in the same time period, for example, NASDAQ Composite Index in the US and BITCOIN, we can get the following results: NASDAQ increased from 3 300 to 14 141 USD ('only' by approximately 330%) and Bitcoin increased from 118 to 32 123 USD (by approx. 27,000%). It cannot be ruled out that in the case of the latter asset, the bubble is just bursting, because in March 2021, BITCOIN grew by 50,000%. It is well presented in the Figure 2. Throughout history, we observed several price bubbles, one of the most famous was the bubble on NASDAQ in USA, the so-called 'dot-com bubble' [Quinn W., Turner J. 2020]. Before it burst in 2000, this index had risen about 800% in 8 years. We can conclude that the EUA allowances have broken this value more than twice.

Another technical measure to assess the possible scale of the overvalued price asset may be their comparison to a moving average. For example, we can compare current prices to the 200-session moving average on weekly basis charts. This type of average is considered by investors whether the asset is in an upward or downward trend[3].

1 See: https://www.investopedia.com/terms/b/bubble.asp (June 22, 2021).

2 See: https://time.com/5944831/stock-market-bubble-analysis/ (June 22, 2021).

3 See: https://www.investopedia.com/ask/answers/013015/why-200-

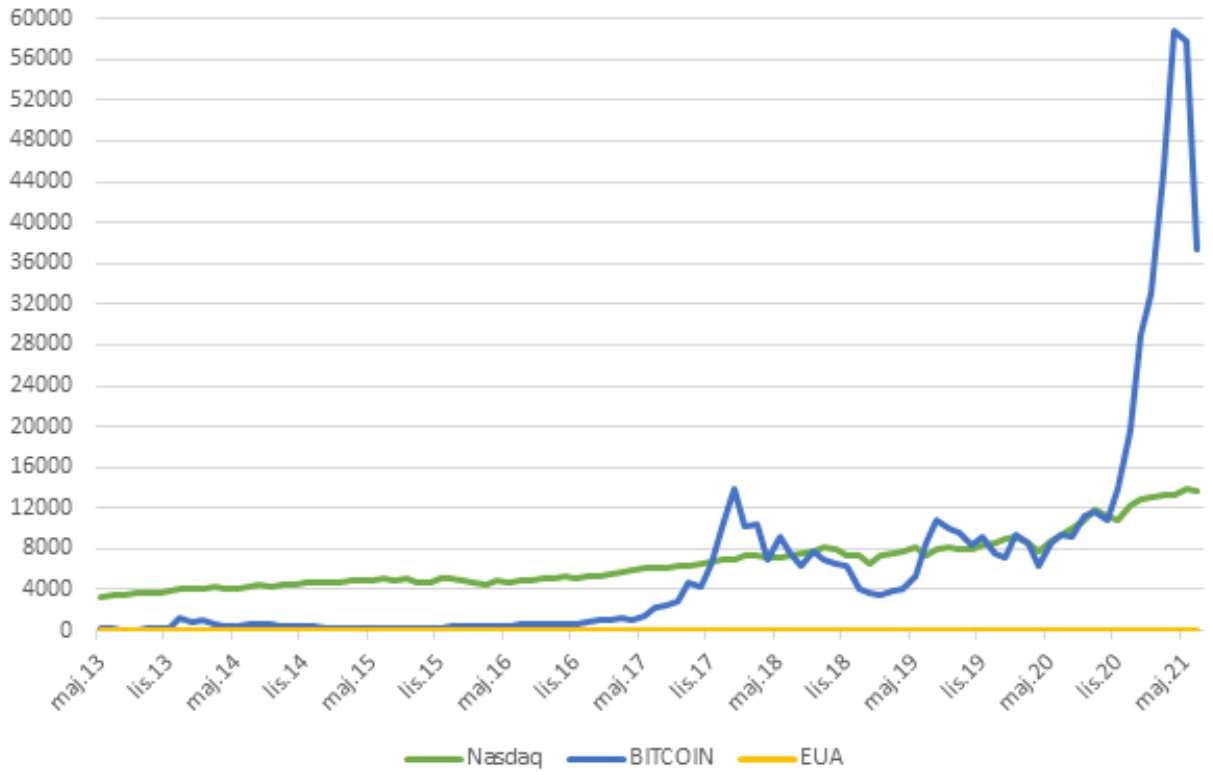

Figure 2. Comparison of Bitcoin quotations, EUA allowances (DEC Futures) and NASDAQ over April 2013 to June 2021 (in US dollars)
Source: Own study based on investing.com data

When the price deviates significantly from this average, this could be a sign that a given asset in the market may be 'overheated' and overvalued[4] and a price bubble may begin to form. In the case of EUA prices, the 200-session moving average on 22 June this year amounted to EUR 23 (Figure 3). Taking into account the prices quoted on that day (EUR 53.11), it can be seen that the current price is near 2.5 times higher than average which is almost the same value when the dot-com bubble on NASDAQ burst in March 2000.

Looking at the current situation, NASDAQ deviates from the 200-session average by about 57%, while the value of Bitcoin is currently about two times (i.e., 130%) higher than this average [it should be taking into account that earlier this year in March 2021, Bitcoin was six times higher than the 200-session average (i.e., 500%), and we can suspect that the Bitcoin bubble could have just burst]. Therefore, comparing the current distance of EUA allowance prices from the 200-session moving average, it is very similar in this respect to the dot-com bubble on the US market from 2000. In turn, compared to Bitcoin, it can be concluded that EUA prices still have a much space to increase (comparing to March 2021 results).

In the literature, we have some examples what could cause a real price bubble. One of these examples has been introduced by American economist Hyman P. Minsky who had identified five stages of this potential phenomenon [Islam J., Hasan M. 2014]:

1. **Displacement.** This stage takes place when investors start to notice a new paradigm, like a new product or technology, or historically low interest rates. This can be basically anything that gets their attention.
2. **Boom.** Prices start to rise. Then, they get even more momentum as more investors enter the market. This sets up the stage for the boom. There is an overall sense of failing to jump in, causing even more people to start buying assets.
3. **Euphoria.** When euphoria hits and asset prices skyrocket, it could be said that caution on the part of investors is mostly thrown out the window.
4. **Profit-Taking.** Figuring out when the bubble will burst isn't easy; once a bubble has burst, it will not inflate again. But anyone who can identify the early warning signs will make money by selling off positions.
5. **Panic.** Asset prices change course and drop (sometimes as rapidly as they rose). Investors want to liquidate them at any price. Asset prices decline as supply outshines demand.

simple-moving-average-sma-so-common-traders-and-analysts.asp (June 22, 2021).

4 See: https://qnews.pl/pl/news/rynki-wschodz%C4%85ce-z-dyskontem-najwi%C4%99kszym-od-dw%C3%B3ch-dekad (June 22, 2021).

Figure 3. EUA allowance prices (blue line) in recent years with the 200-session moving average (green line) on a weekly basis (prices in EUR).
Source: investing.com

Analysing what could have influenced EUA price increases we came to conclusion that three of five of Minsky's points could be met. It seems that one of the characteristic pattern for EUA prices is that they do not only reflect the current fundamental factors in the EU ETS, but also future conditions like cap tightening in the EU ETS until 2030 or even after that period, for example, by higher reduction target or stricter changes in Market Stability Reserve (MSR). The latter mechanism is particularly important when we focus on changing market fundamentals. The TNAC[5]-dependent intake and outtake in MSR magnifies the price impact of anticipated changes in market fundamentals, induces multiple and unstable equilibria, and is prone to speculative attacks [Perino G. et al., 2021]. This is possible due to the specificity and the structure of the EU ETS itself, with long 10-year compliance periods and the possibility of banking allowances between them. It has an impact to the EU ETS compliance companies, which had to change their hedging strategies – it is challenging, especially to the industry sector who prefers to keep allowances in their accounts rather than sell them, and even buy them on the market in order to avoid future shortages. In addition, there are other market actors that buy EUA's, treating them as a great possibility to take profit – long-term investment hedge funds and short-term market speculators. For example, the market share of financial institutions increased during over the year from 21% to 27% (investment funds from 4% to 9%) [Refinitiv Commodities Research, 2021]. It seems that it is only a matter of time when investment products for individual investors start to appear in Europe, for example, investment funds or exchange traded fund (ETF) units. These kinds of funds are already available in the US – for example, *KraneShares Global Carbon ETF* have a 77% share of EUA in their portfolio and assets worth 300 million USD, and it is sharply increasing day by day[6]. We can expect in the near future that this would significantly increase the additional demand on EUAs and gains in prices.

The importance of the EU ETS reform and the activity of hedging funds for the formation of a price bubble are emphasised by Friedrich M. et al. (2020). They believe a price EUA bubble could be caused by an overreaction of the market to the reform of EU ETS. Much of the price run-up follows due to trading activities from speculative investors like banks and hedge funds in anticipation of the (price) effect of the reform. This can be confirmed by growing volumes of allowances.

5 The Total Number Of Allowances in Circulation.

6 See: https://kraneshares.com/krbn/ (June 22, 2021).

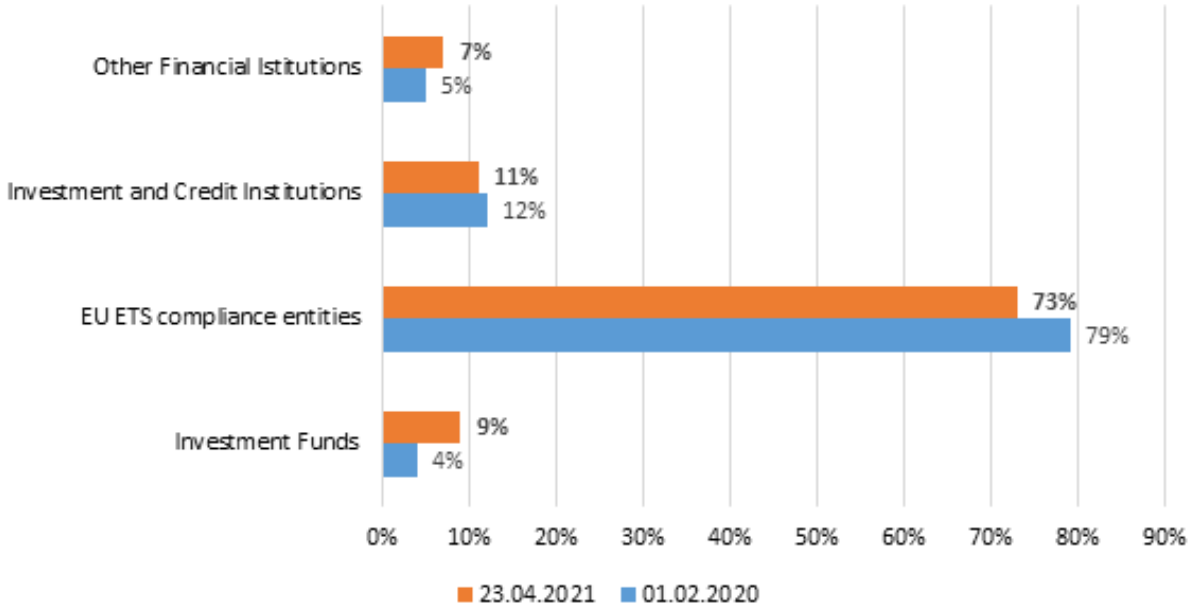

Figure 4. EUA allowances futures long positions by buyer type
Source: own study based on Refinitiv

3. ARTICLE 29A OF THE EU ETS DIRECTIVE AS THE ONLY 'PRICE STABILITY' MECHANISM AVAILABLE IN EU ETS

As one of the results we came to conclusion that EUA prices are rising too high and too fast. That is why the EU ETS market is extremely volatile, which is on the one hand unfavourable for EU ETS compliance entities, but on the other hand, it is very beneficial for speculators. For such entities, an extreme volatility means more money. It seems the EC do not have an effective tool to stabilise the EUA price right now. Definitely, such a tool cannot be called the mechanism in Article 29a of the EU ETS Directive [Directive…2003] allowing for the release of 100 million allowances from the MSR and their auctioning in the event of a sudden increase in the EUA prices [Decision…2015]. The main rule from this article states '*If, for more than six consecutive months, the allowance price is more than three times the average price of allowances during the two preceding years on the European carbon market, the Commission shall immediately convene a meeting of the Committee established by Article 9 of Decision No 280/2004/EC*'. We find evidence that with the current structure and interpretation of this provision, it is practically impossible to trigger this mechanism. But even the EUA price would reach to extremely levels, and there is no guarantee to trigger the mechanism. The reason is another subjective condition that must be met, which is the observed price changes '*does not correspond to changing market fundamentals*'. This concept can cover virtually every change that affects the EU ETS, and since it is being changed continuously, the question arises, which change does not 'substantially' affect the market. The condition is also calling a meeting within the Climate Change Committee, which also could take some time. All these Article 29a provisions may suggest that the EC has a decisive voice in this matter, and it depends solely on its interpretation whether any market intervention will occur.

We can find out that the current structure of Article 29a can cause some problems with right interpretation. That is why there are a few options of interpretation of the Article 29a mechanism, which are circulating and probably all evidenced it is practically impossible to trigger this mechanism. In this paper, we examined three of them which are listed below.

- **Option 1**: based only on the 2019 and 2020 year price averages (a full 2019 and 2020 year is taking into account). Then this 2-year average is tripled and compares to a 6-month price-moving average. It needs to be highlighted that this is 2-year average. The mechanism is triggered when the 6-month moving average meets the triple 2-year average.
- **Option 2**: based on the last recent two years, so it can take for, example, a half of 2019, full 2020, and a half of 2021. This 2-year moving average should be tripled and compared to the last 6-month price-moving average. The mechanism is triggered when the 6-month moving average meets the triple 2-year moving average.
- **Option 3**: based on the last recent two years, so it can take, for example, a half of 2019, full 2020, and a half of 2021. This 2-year average should be tripled and compared to the last 6-month price-moving average. The mechanism is triggered when the 6-month moving average meets the triple 2-year moving average.

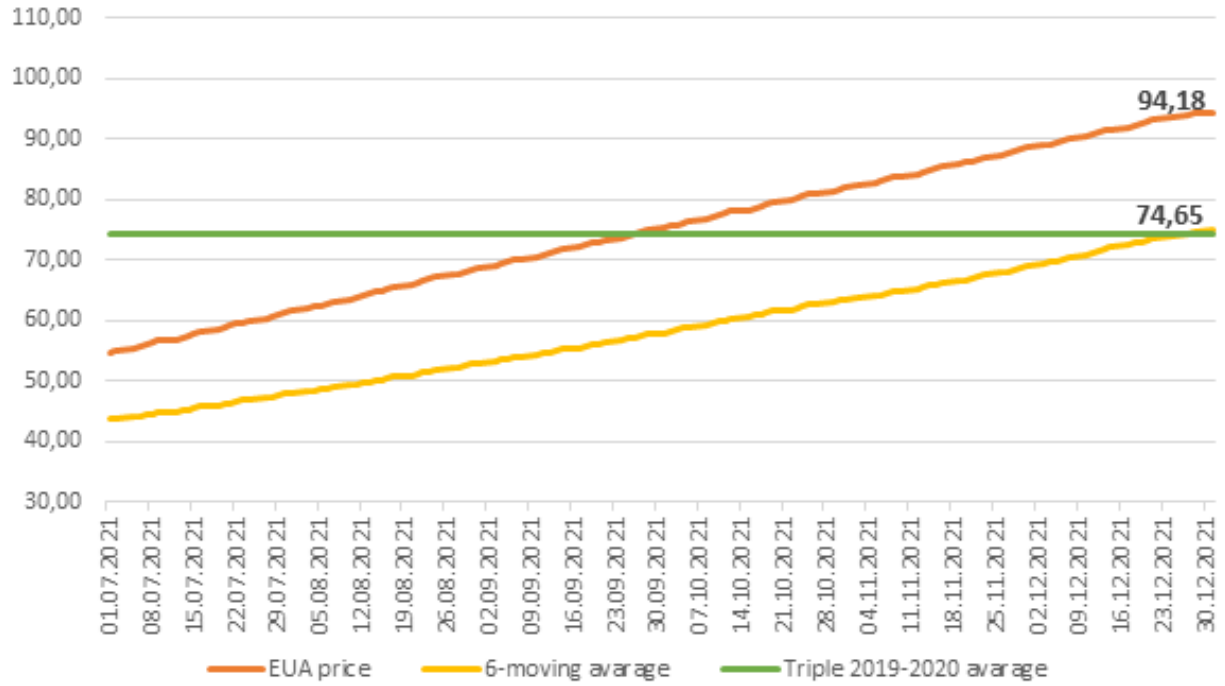

Figure 5. Option 1 of Article 29a based on 2019 and 2020 simple averages. In this example assuming a daily EUA price increase of 0,31 EUR the mechanism would be triggered in 28-th of December 2021 when the closing EUA price would reach to 94,18 EUR (6-moving average crossing triple 2019-2020 average)
Source: own study based on ICE and EEX data

Based on The Intercontinental Exchange (ICE) and European Energy Exchange (EEX) EUA price data (spot market), the **first option** indicates that EUA prices have to reach on average EUR 74,43[7] in the next 6 months. It means hypothetically that the EUA prices have to rise from approximately EUR 53 now to EUR 74,43 from tomorrow, and this price should persist for next 6 months. The results of simulation of the first option indicates that the EUA price would have to increase by 0,31 EUR per day 22 June 2021 to trigger the Article 29a mechanism on 28 December 2021 when the closing the EUA price reaches to EUR 94,18. This is the day when the 6-month moving average (EUR 74,65) would cross triple 2019–2020 average (EUR 74,43). If we translate EUR 0,31 per day to the rise per month, we can get about EUR 7 increase. The preceding results suggest that it is very unlikely that the price of the EUA will continuously rise by EUR 7 per month over a period of 6 months.

The **second option** indicates that EUA prices have to reach on average EUR 89,11[8] in the next 6 months from 1 July 2021. It means hypothetically that EUA price have to rise from approximately EUR 53 now to EUR 89,11 from 1 July 2021, and this price should persist for the next 6 months. The results of option 2 indicates that the EUA price would have to increase by EUR 0,51 per day from 1 July 2021 to trigger the Article 29a mechanism on 28 December 2021 when the closing EUA price reaches EUR 121,18. This is the day when the 6-month moving average (EUR 89,31) would cross triple 2-year moving average (EUR 89,11). If we translate EUR 0,51 per day to the rise per month, we can get the preceding EUR 11 increase. Our results suggest this option is even less likely to be activated than option 2.

The **third option**, unlike options 1 and 2, is based on a triple moving 2-year average with no constant over time and changing during the 6-month period. As a result, the pace of EUA price growth must be greater to a 6-month moving average reach this triple 2-year moving average. In this option, EUA price would have to increase by EUR 3 per day from 1 July 2021 to trigger the Article 29a mechanism on 28 December 2021 when the closing EUA price reach to EUR 457,33. This is the day when the 6-month moving average (EUR 269,83) would cross a triple 2-year moving average (EUR 269,52). When we translate EUR 3 per day to the worth per month, we receive above EUR 66 increase. This option in comparison to both earlier presented options is extremely unlikely.

All three Article 29a simulations indicate that the launch this mechanism is very unlikely. Therefore, the structure of the wording of this mechanism in the EU ETS directive should be changed in such a way as to enable

7 The arithmetic average of EUA spot prices on the ICE and EEX exchanges for the 2-year period from 1 January 2019 to December 2020 was calculated and multiplied by the number 3.

8 The arithmetic and weighted average of EUA spot prices on the ICE and EEX exchanges for the 2-year period from 1 January 2019 to December 2020 was calculated and multiplied by the number 3.

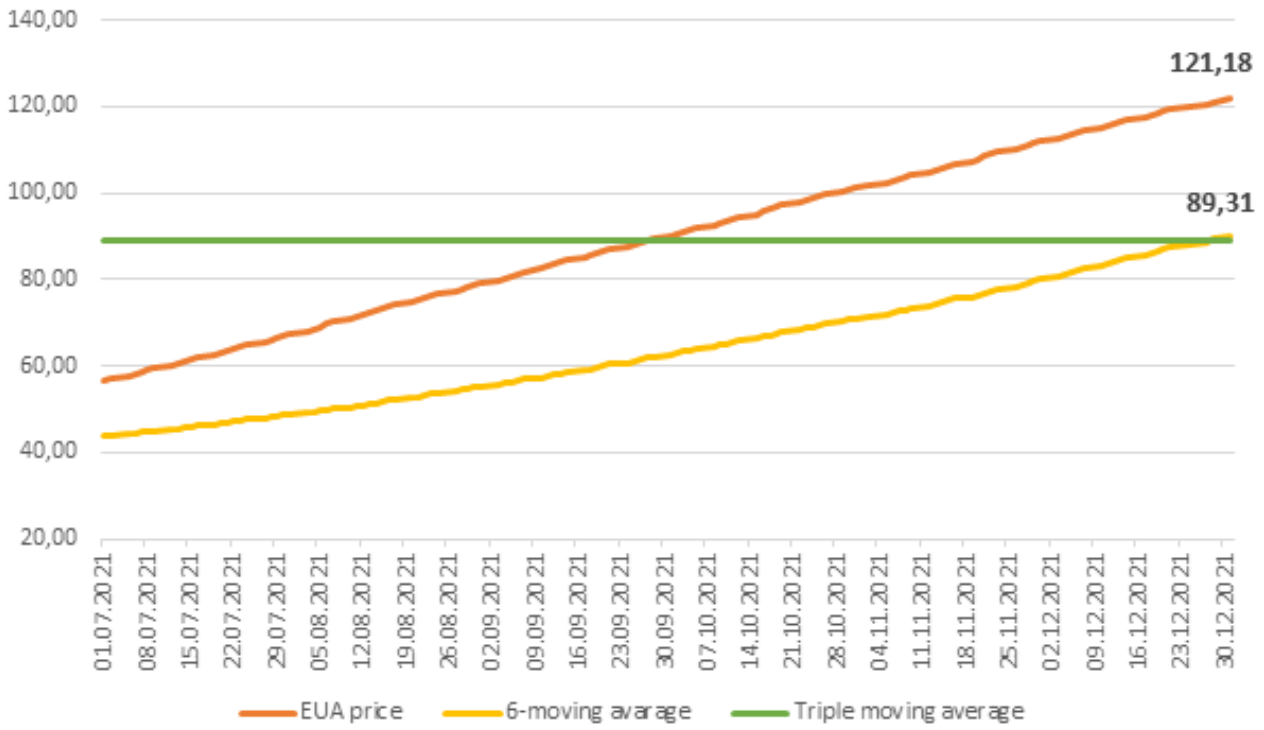

Figure 6. Option 2 of Article 29a based on 2019 and 2020 moving averages with constant triple average. In this example assuming a daily EUA price increase of 0,51 EUR the mechanism would be triggered 28 December 2021 when the closing EUA price would reach 121,18 EUR
Source: own study based on ICE and EEX data

a faster response to the sharp increase in EUA prices. A great example of a mechanism, which can be shortly activated, is the twin mechanism used by the United Kingdom in UK ETS – the so-called Cost Containment Mechanism (CCM). It is triggered, if the average price of allowances on the futures secondary market is twice as high as the average price for the previous 2-year period for 3 consecutive months. As we can see, the average price has to be only two times higher (three times in the EU ETS) and only valid for 3 months (not 6 months as in the EU ETS). In line with this provision, from 10 May, this price was calculated at GBP 44,74 (EUR 52), which means that with the current prices for allowances in the UK ETS, the CCM mechanism may soon be applied.

4. CURRENT LEGISLATIVE PROVISIONS IN THE CONTEXT OF SUFFICIENT PROTECTION AGAINST MARKET MANIPULATION

Another risk for the EUA's market is the possibility of potential price manipulation. One of the example is using the primary market to manipulate the price in the secondary market. This kind of behaviour could have happened during first Polish EUA auction in 2021, which was cleared at 38 EUR, that is above 1,5 EUR the secondary market price. Immediately thereafter, the price on the secondary market increased significantly to nearly 38 EUR level. Theoretically, it could had been done on purpose – someone who offered an enormous price and finally bought allowances at the auction (offered bids on Poland auction amounted to 50 EUR/EUA) could previously have bought long-future EUA contracts on the secondary market (using, for example, the financial leverage). Doing so would allow this entity to earn a fortune. It seems such a case can be seen as a kind of market manipulation in accordance with the provisions of Art. 12 (2e) of Market Abuse Regulation [Regulation…2014]: (…) '*The following behaviour shall, inter alia, be considered as market manipulation: (e) the buying or selling on the secondary market of emission allowances or related derivatives prior to the auction held pursuant to Regulation (EU) No 1031/2010 with the effect of fixing the auction clearing price for the auctioned products at an abnormal or artificial level or misleading bidders bidding in the auctions'.* This kind of market behaviour should be detected by an exchange operator (EEX), and the competent authority of Member State exchange is situated (German Financial Supervision). But with the current structure of primary CO_2 market, there is no certainty that this type of market behaviour will be identified so quickly that it will not disturb the EUA price movement. To avoid this situation, the Auction Regulation [Commission Regulation…2010] should be changed. As a reminder, there is a provision

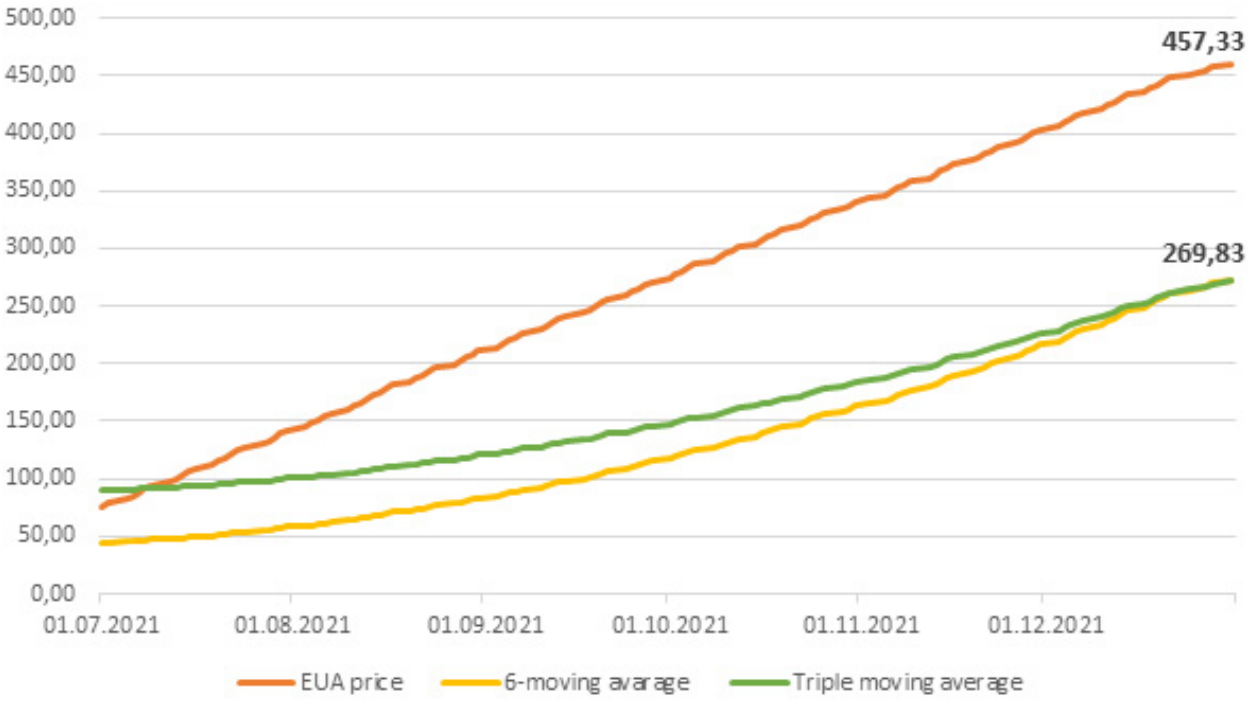

Figure 7. Option 3 of Article 29a based on 2019 and 2020 moving averages with triple moving average. In this example assuming a daily EUA price increase of 3 EUR the mechanism would be triggered on 28 December 2021 when the closing EUA price would reach to 457,33 EUR (six-moving average crossing triple 2-year average)
Source: own study based on ICE and EEX data

concerning the auction cancellation: '(…) *Where the auction clearing price is significantly under the price on the secondary market prevailing during and immediately before the bidding window when taking into account the short term volatility of the price of allowances over a defined period preceding the auction, the auction platform shall cancel the auction*.' This provision works only one way, as it only applies to situations where the price is significantly lower than the price on the secondary market. However, when the price is significantly higher, the auction is not cancelled. This gives a room for manipulation, because such a speculator is sure that the auction always will take place clearing abnormally high in relation to secondary market price. It seems that this kind of practice should be thwarted just at the stage of auction regulation, and that is why there should to be a similar mechanism cancelling the auction when the EUA auction price is significantly higher than the secondary EUA price.
The second example of potential price risk manipulation is the *Financial Times* publications. There has been a trend that as soon as a specific 'EUA price forecast' article appeared in this newspaper, prices rose sharply in the short term. This was the case in February 2021 when one of the hedge funds announced that it expected EUR 100 per EUA this year. After this information had been published, the market reacted immediately EUA spikes. This case could be also treated as price manipulation as the Market Abuse Regulation (MAR) provision stated in art. 12 (2d): *(…) 'The following behaviour shall, inter alia, be considered as market manipulation: (d) the taking advantage of occasional or regular access to the traditional or electronic media by voicing an opinion about a financial instrument, related spot commodity contract or an auctioned product based on emission allowances (or indirectly about its issuer) while having previously taken positions on that financial instrument, a related spot commodity contract or an auctioned product based on emission allowances and profiting subsequently from the impact of the opinions voiced on the price of that instrument, related spot commodity contract or an auctioned product based on emission allowances, without having simultaneously disclosed that conflict of interest to the public in a proper and effective way (…)'* It seems there is also (as 'auction case') a lot of room for abuse and price manipulation, and competent supervisory authorities should watch this carefully.
It is interesting because both of the preceding examples could be calling a kind of market manipulation according to MAR provisions. It seems this kind of loopholes in legislation acts need to be improved and better market safeguards in MAR and auction regulation provisions should be ensured.

5. CONCLUSIONS

We can conclude that specificity and structure of the EU ETS with the possibility of banking allowances through a 10-year compliance period and the EC's efforts to constantly

reform this system by increasing the reduction target and tightening the cap (not only by the Linear Reduction Factor (LRF) but additionally by MSR reserve) encourage CO_2 market participants to buy a lot of allowances. The EU ETS compliance entities have been changing their hedging strategies, purchasing more allowances now and keeping them in their accounts rather than selling to avoid future shortages. There are also other market participants who buy EUAs to take profits such as long-term investment funds and short-term market speculators, which can be expected that their activity in the market will grow in coming years. All these demand factors have a big impact on EUA price stabilisation, which is rising too high too fast. This may lead to an EUA price market bubble as we saw earlier on the dot.com bubble in 2000 in USA and we probably observe now on BITCOIN.

As we examined earlier in this paper, the EC does not have an effective instrument to avoid the price destabilisation in the market. Moreover, it seems that current market legislation (e.g. the MAR directive) may encourage market speculators to manipulate the EUA price. The EU ETS compliance participants should have some kind of guarantee that when an extreme situation occurs on the market (when EUA prices increase too high and too fast as we seen today), the EC has a transparent and immediate mechanism that is automatically triggered. Such a 'safety valve', in which various options are presented below, would be indispensable for stabilization to the EU ETS participants contributing to a better planning of future investments and to bear lower operating costs.

- The next MSR review could be a great chance for changes and introducing a price stabilising mechanism. It seems that the starting point for further actions should be considering the possibility of resigning from the EUA's cancelling from 2023 in MSR ('invalidation mechanism'). These allowances may become a valuable asset in the future when the market situation changes drastically, and intervention is required.
- As we examined in this paper, all three Article 29a simulations indicate that the launch of this mechanism is very unlikely. Therefore, the structure of the wording of this mechanism in the EU ETS directive should be changed in such a way as to enable a faster response to the sharp increase in EUA prices. A great example of a mechanism, which can be shortly activated, is the twin mechanism used by the United Kingdom in UK ETS – the so-called CCM. It is triggered, if the average price of allowances on the futures secondary market is twice as high as the average price for the previous 2-year period for 3 consecutive months. As we can see, the average price has to be only two times higher (three times in the EU ETS) and only valid for 3 months (not 6 months as in the EU ETS). In line with this provision, from 10 May, this price was calculated at GBP 44.74 (EUR 52), which means that with the current prices for allowances in the UK ETS, the CCM mechanism may soon be applied.
- Reducing or blocking access to the EU ETS market for entities that are not installations, which do not have to compliance their own emission, could lead to a decrease or even an end to price speculation in the EU ETS. Only financial entities purchasing allowances for the account of the installation (and not for their own account) could be an exception. Restrictions on access to EUA allowances should only apply to the market where the actual exchange of EUA allowances take place between entities, and therefore limit to the spot market and the over-the-counter market for forward transactions. Only futures contracts should be excluded from this option. In this way, we will not block the possibility of hedging needs by EU ETS entities.
- A solution that may limit speculative activity on the EU ETS market may be the introduction of a tax levied on market turnovers (tax on exchange transactions) for entities that are not an EU ETS compliance entity. The intention is to limit the influence of speculative entities and operations. At the same time, it would be necessary to guarantee EU ETS installations the possibility of long-term planning of emission compliance and consequently the possibility to unlimited purchases of EUA allowances.

In addition to the options previously mentioned, there is another possibility that should also be mentioned that was not covered in this article. We find it important for further research the possibility of introduction of flexibility mechanisms between the EU ETS and non-ETS, that could be used to reduce the price of allowances in the EU ETS, while increasing liquidity in the market. As an example of combining the non-ETS and EU ETS, a mechanism can be proposed that would be based on the possibility of using units generated in non-ETS (coming from projects implemented in non-ETS) and using them in the EU ETS to emission compliance obligation.

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