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# MIFID II: IMPACT OF THE NEW TICK SIZE REGIME



Risks &  
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## IMPACT STUDY OF THE NEW « TICK SIZE REGIME »

This paper sets out an initial analysis of the impact of the new tick size regime introduced by MiFID II.

### Context

Over the past few years, trading venues have raced to reduce their tick size in order to offer better/tighter prices and win market share. This broad trend has had adverse effects on the overall quality of the market: too small a tick size leads to negligible and incessant price improvements, leading to an increase in order book noise and a deterioration of the price formation process.

In order to overcome this type of hindrance, MiFID II introduced a harmonised minimum tick regime that takes each instrument's profile into account. For French blue chips and mid caps, this regime has led to an increase in the tick size of 74% of instruments and left the remaining 26% unchanged, whereas for small caps the regime has led to a reduction of 15% of the instruments' tick sizes, to an increase for 21% and for 64% of them, it left the tick size unchanged.

### First impacts

By analysing a series of indicators relating to these three distinct groups of stocks both before and after the implementation of MiFID II, this study offers an assessment of the initial effects of the regime on the liquidity and quality of the market. In particular, it reveals a sharp increase in depth and a significant reduction in the number of messages sent to the market, at the cost, however, of a widening of the spread for the most liquid securities. The outcome for market participants is a slight additional cost that is offset by the benefits of noise reduction and the increase in the quantity available at the best limits. For small caps, implementing appropriate tick sizes (compared to the constant €0.01 tick previously applicable on these stocks) resulted in a more dynamic order book and, above all, a sharp increase in traded volumes.

### Scope

The study covers more than 500 stocks listed on Euronext Paris over a 2 month time period around the entry into force of MiFID II. The paper presents average measures per group of securities and covers a period of extremely low volatility. The results should therefore be considered in this context, since only deeper analysis focused over a longer period may highlight all the impacts of the new tick-size regime.

## 1. SUMMARY : THE NEW TICK REGIME

The new tick size regime provided for in Article 49 of MiFID II aims at mitigating the effects of the lack of harmonisation of tick size mechanisms at European level. In particular, the new regime should put an end to the race between trading platforms, towards an ever-finer degree of tick granularity (race to the bottom) – a race that started when MiFID I came into force, in search of greater market share, but which had detrimental effects on market quality. The new regime also aims to simplify the management of tick sizes by reducing the number of tables previously applied within the various venues and introducing a new price increment allowing smoother changes in tick size.

In this context, ESMA's mandate was to define a tick size regime for shares as well as for similar financial instruments referred to as equity-like (ETFs, certificates, rights).

The minimum tick size needs to be adapted to each instrument taking into account the following factors:

- liquidity profile in the different markets;
- spread;
- price.

Tick size strongly influences both liquidity and the price formation process, and must always be analysed in relation to the spread. If the tick size is too small (i.e. a spread equivalent to a high number of ticks), the outbidding cost is no longer significant (it costs next to nothing to outbid) and liquidity does not aggregate effectively as there are too many increments of possible prices. Insertions, modifications and cancellations of orders are therefore more frequent, affecting book legibility and price formation. On the other hand, too large a tick size (i.e. a spread that is equivalent to a low number of ticks) increases the passive execution latency and can discourage investors from placing orders in the book.

The definition of a tick size that is "appropriate" to the spread is therefore based on a compromise between:

- the objective of stabilising the price and a tick size that is large enough to permit outbidding at an acceptable cost;
- the risk of constraining the spread with too large a tick size which excessively increases the viscosity of the order book and prices.

The regulators have agreed on an appropriate tick such that the corresponding spread is between 1.5 ticks and 2 ticks for liquid securities and between 1.5 ticks and 5 ticks for less liquid securities.<sup>1</sup>

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<sup>1</sup> ESMA considered that beyond 2 ticks on average the spread is too wide (i.e. the tick is too small), because it is not constrained by the tick most of the time. Conversely, below 1.5 ticks on average the spread is too narrow (the tick is too large) because the spread is constrained by the tick more than half the time. Such spread-to-tick ratios are close to current ratios for the most liquid securities and seem to have a balanced impact on the different types of market players.

In order for comparable liquidity and price instruments to be subject to the same tick size, the new regime relies on a two-parameter table, based on price and liquidity (expressed in terms of the number of transactions per day):

	MiFID II						MiFID I
	0≤ average daily number of trades <10	10≤ average daily number of trades <80	80≤ average daily number of trades <600	600≤ average daily number of trades <2000	2000≤ average daily number of trades <9000	9000≤ average daily number of trades	Applicable table on CAC 40 and SRD stocks - FESE 4
0≤ price <0,1	0,0005	0,0002	0,0001	0,0001	0,0001	0,0001	0,001
0,1≤ price <0,2	0,001	0,0005	0,0002	0,0001	0,0001	0,0001	0,001
0,2≤ price <0,5	0,002	0,001	0,0005	0,0002	0,0001	0,0001	0,001
0,5≤ price <1	0,005	0,002	0,001	0,0005	0,0002	0,0001	0,001
1≤ price <2	0,01	0,005	0,002	0,001	0,0005	0,0002	0,001
2≤ price <5	0,02	0,01	0,005	0,002	0,001	0,0005	0,001
5≤ price <10	0,05	0,02	0,01	0,005	0,002	0,001	0,001
10≤ price <20	0,1	0,05	0,02	0,01	0,005	0,002	0,005
20≤ price <50	0,2	0,1	0,05	0,02	0,01	0,005	0,005
50≤ price <100	0,5	0,2	0,1	0,05	0,02	0,01	0,01
100≤ price <200	1	0,5	0,2	0,1	0,05	0,02	0,05
200≤ price <500	2	1	0,5	0,2	0,1	0,05	0,05
500≤ price <1000	5	2	1	0,5	0,2	0,1	0,05
1000≤ price <2000	10	5	2	1	0,5	0,2	0,05
2000≤ price <5000	20	10	5	2	1	0,5	0,05
5000≤ price <10000	50	20	10	5	2	1	0,05
10000≤ price <20000	100	50	20	10	5	2	0,05
20000≤ price <50000	200	100	50	20	10	5	0,05
50000≤ price	500	200	100	50	20	10	0,05

(\*) Tick increases are shown in red by comparing the table previously applicable on Euronext (FESE 4), ticks that remain unchanged are indicated in white and tick decreases in green.

The liquidity band of each security (corresponding to the columns in the above table) is revalued each year on the basis of the number of transactions during the previous year in the most relevant market in terms of liquidity. Throughout the year, for a given security, the tick is adjusted according to the price of the order entered (rows of the table).

Prior to the entry into force of the new regime, the most liquid securities covered by the study were subject to the so-called FESE 4 tick size table (shown in the last column of the table above), whereas small caps (SMEs) were subject to a constant €0.01 tick. By way of illustration, with the new applicable tick size table and compared to the previous situation, the tick of the most liquid securities in the CAC 40 and SRD (mid caps) groups whose price is between €20 and €100 (second to last column) remains the same while the tick of the others (where average daily number of transactions lies below 9,000) increases.

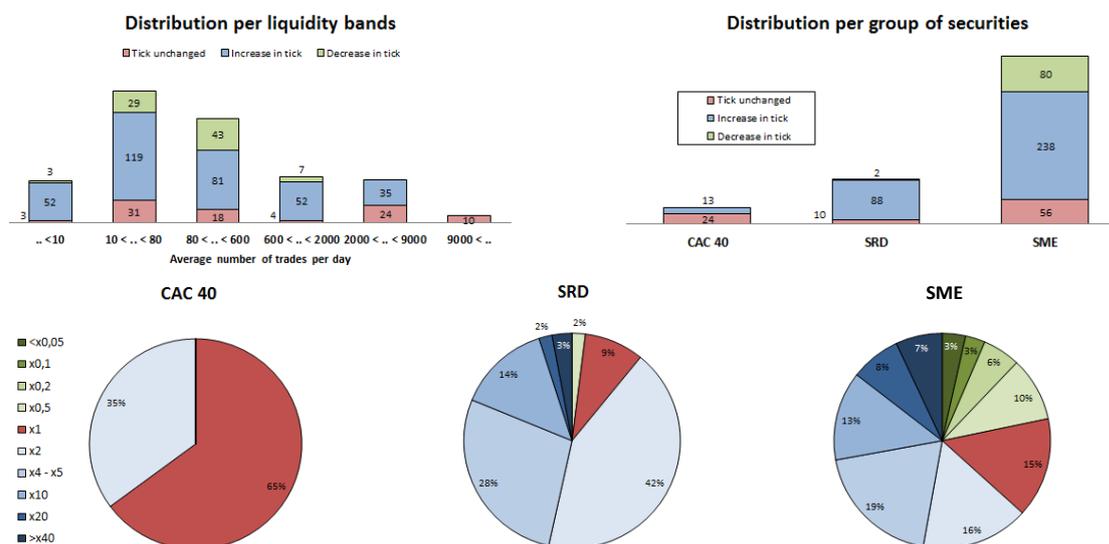
**Remark:** as presented in part 4 of the paper, an increase in tick leads to an increase in average trade size and does not impact traded volumes. As a consequence, the tick itself can have an impact on the average daily number of trades: an increase in tick would lead to a decrease in number of trades, whereas a decrease in tick would result in an increase in average number of trades. Nevertheless, this “circular” relationship between tick and liquidity will not impact the new regime as liquidity bands in the new tick size table are sufficiently wide and are revalued only once a year.

## 2. CHANGES IN TICK BROUGHT ABOUT BY THE NEW REGIME

The analysis covers a period of two months: the month preceding and the month following the entry into force of MiFID II (from 1 December 2017 to 31 January 2018).

Over this period, the AMF analysed more than 500 stocks among the most traded securities on Euronext Paris (CAC 40, SRD and small caps), which were split into three major groups:

- CAC 40 stocks: 37 French securities, of which 13 saw their tick increase (multiplied by 2 on average) while it remained unchanged for 24 securities, the most liquid in terms of the number of transactions (see above)<sup>2</sup>;
- other SRD stocks: 100 securities, 88 of which saw their tick increase (multiplied by 5 on average) while it remained unchanged for 10 and divided by two for 2<sup>3</sup>;
- small caps (SME): 374 securities, 238 of which saw their tick increase (multiplied by 10 on average) while it remained unchanged for 56 securities and it decreased for 80 of them (divided by 15 on average).



Note: these figures can change marginally as impact might change when price changes. The above figures are calculated on January 5th 2018, and throughout the study the change in tick is evaluated on a daily basis.

As shown in the first graph above (distribution per liquidity bands), and for all the CAC 40 and SRD securities covered by the study, it should be noted that securities whose tick increases are less liquid on average (in terms of average daily number of transactions) than those whose tick remains unchanged, and even more so for the CAC 40 than the SRD<sup>4</sup>. For small caps, whose tick size was constant and equal to €0.01 before the new regime, the impact is correlated to both liquidity and price of the security.

For each of these three groups, the analysis presented in this study compares the changes observed for securities whose tick increases (blue curves), those for which it remains unchanged (red curves) and those for which tick

<sup>2</sup> For example for the most liquid securities of the CAC 40: Total, Sanofi and LVMH the tick remains unchanged, whereas less liquid securities like Veolia, Legrand or Publicis saw their tick increase.

<sup>3</sup> For SRD stocks the impact of a reduction in tick size will not be analysed as the number of stocks in this class is not relevant.

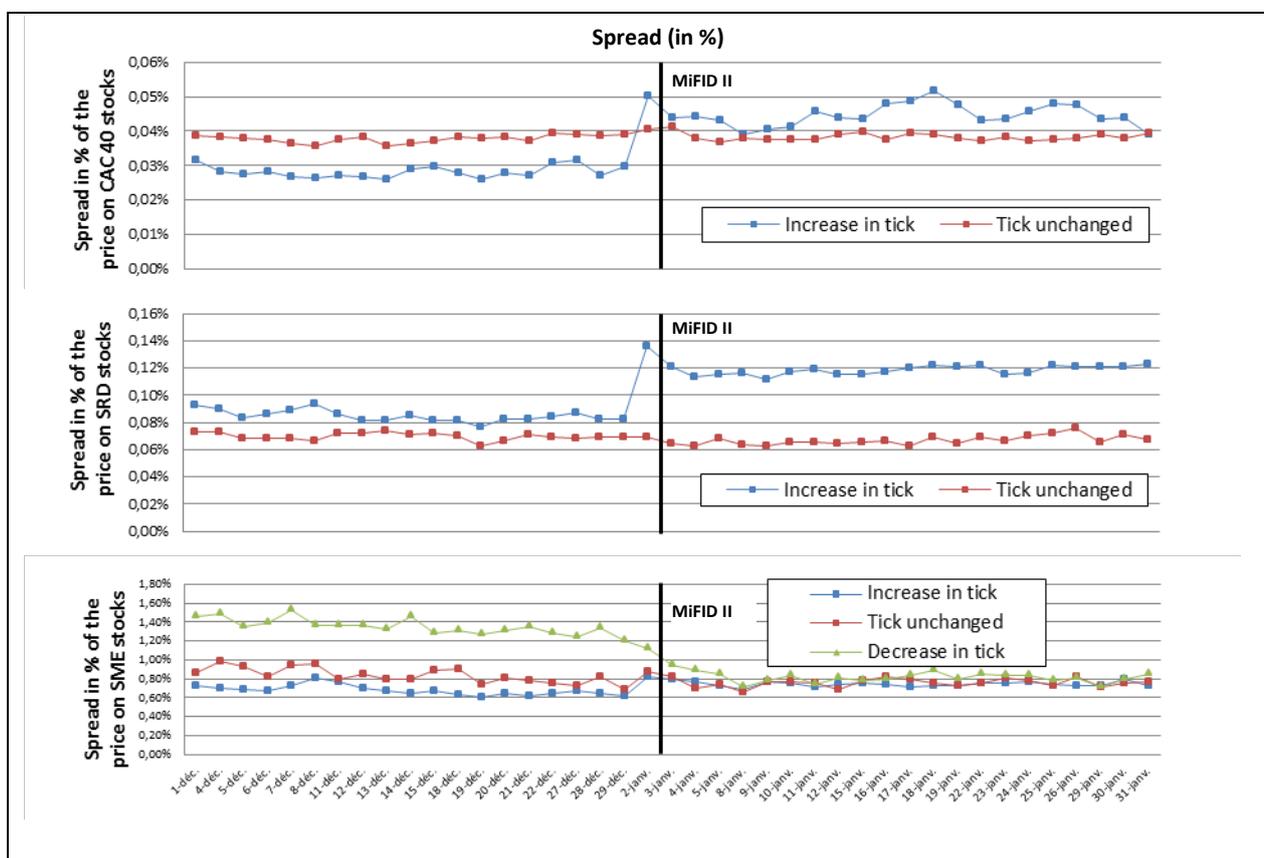
<sup>4</sup> The median number of transactions per day for securities whose tick remains unchanged on the CAC is about 8 500 (2 000 on the SRD), compared with approx. 6 500 (1 000 on the SRD) for those securities whose tick increases.

decreases (green curves)<sup>5</sup>. As levels of volatility were low and relatively constant throughout the period<sup>6</sup>, it is reasonable to assume that the change in the difference between the red curve and each of the other two curves (green and blue) can be attributed to the change in tick size<sup>7</sup>.

### 3. IMPACT OF THE NEW REGIME ON LIQUIDITY

#### 3.1. IMPACT ON THE SPREAD

The spread, measured as the average difference over time between the best bid and the best ask, can be analysed either in terms of equivalent number of ticks or as a percentage of the price. The 2 diagrams below show the change in the spread (as a percentage of the price and in ticks) for the three groups of securities selected.



<sup>5</sup> Throughout the study, the paper illustrates each result with the help of diagrams, but these analyses are confirmed by a statistical approach making it possible to estimate precisely the impact of the tick change (all else being equal) by relying on the existence of a significant control group consisting of securities whose tick remains unchanged. The details of each metric and the results of this statistical approach are presented in the appendix.

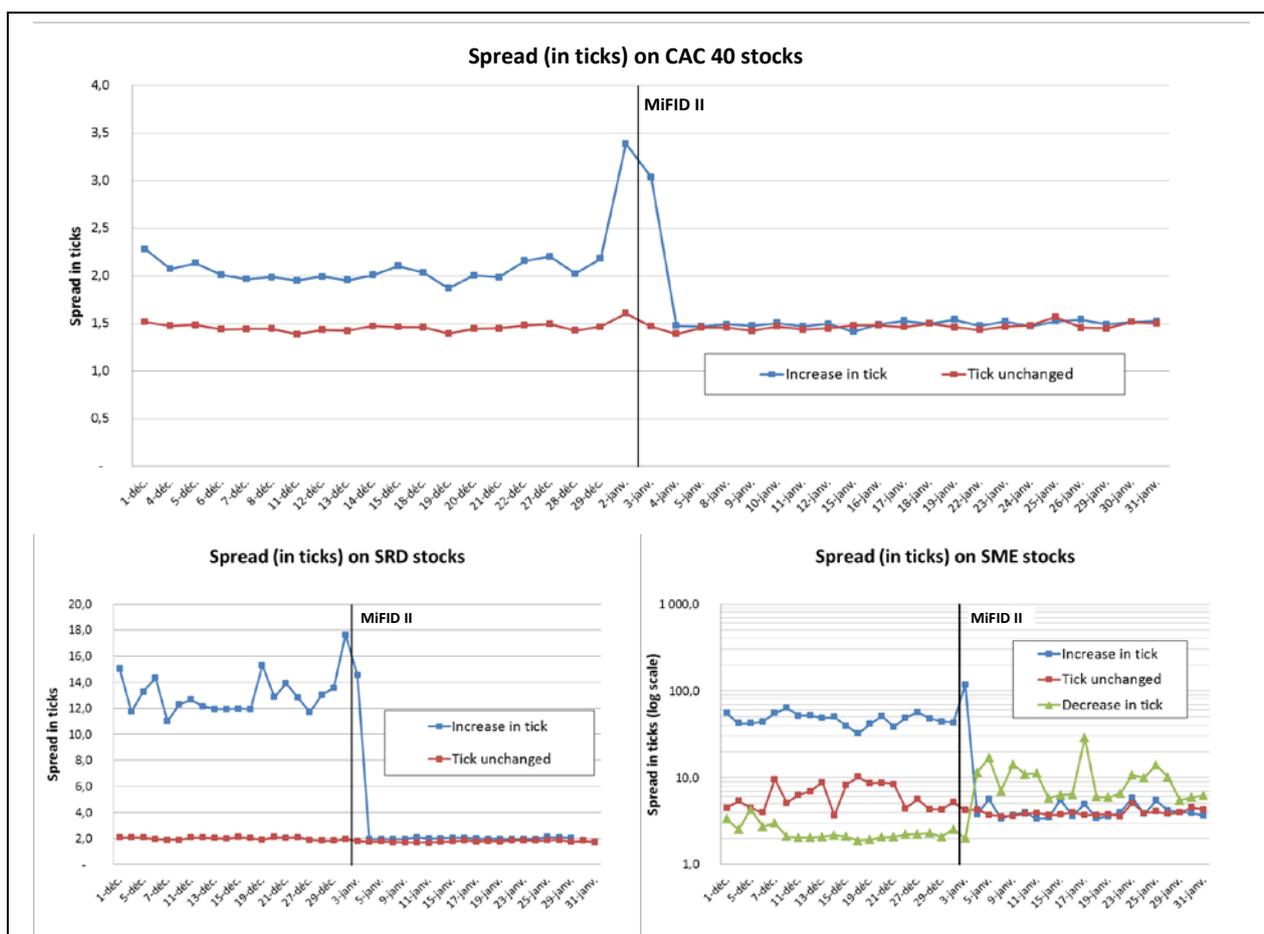
<sup>6</sup> The VCAC, the indicator of market volatility, remained in the range of 8 to 14, the lowest level in 10 years.

<sup>7</sup> The securities whose ticks remain unchanged constitute a control group making it possible to quantify the impact of the tick change, all else being equal. This also helps to eliminate seasonal effects such as the decline in activity during the last days of the year.

This clearly illustrates that the change in tick had a strong impact on the spread: expressed as a percentage of the price, the spread increased on CAC 40 securities by an average of 1.6 bps (56%) and by 3.7 bps (45%) on SRD securities. On SME stocks, the spread stabilised over the entire group around 80 bps, decreasing by 30% on stocks whose tick decreased and increasing by 20% on stocks whose tick increased.

**Remark:** In the first graph (spread as a percentage of the price for CAC 40 securities), the unexpected relative position of the blue and red curves before the entry into force of MiFID II is worthy of note. In theory, one would expect the blue curve (for the less liquid securities in terms of number of transactions) to be always higher than the red curve because the spread of the less liquid securities is on average wider than those that are more liquid. Yet this is not the case for the CAC 40 sample expressed as a percentage of the price.

Presumably, the significant arbitrage between CAC 40 equities and futures whose tick is low (1 bp) makes it possible to leave the spread at a particularly low level for securities whose tick is the smallest relative to their price, which are more strongly represented in the group of securities whose tick increases<sup>8</sup>. This phenomenon is not observed with SRD securities<sup>9</sup>.



Remark: since the red curve (tick unchanged) is constant over the period, the impact is measured as the variation of the blue curve only.

<sup>7</sup> Securities whose ticks rose had an average tick of 1.5 bps, while those whose ticks remained unchanged had an average tick of 2.7 bps.

<sup>9</sup> On SME stocks it does not seem relevant to draw similar conclusions as the impact is not only correlated with the liquidity of the securities but with the price as well (cf. 2.).

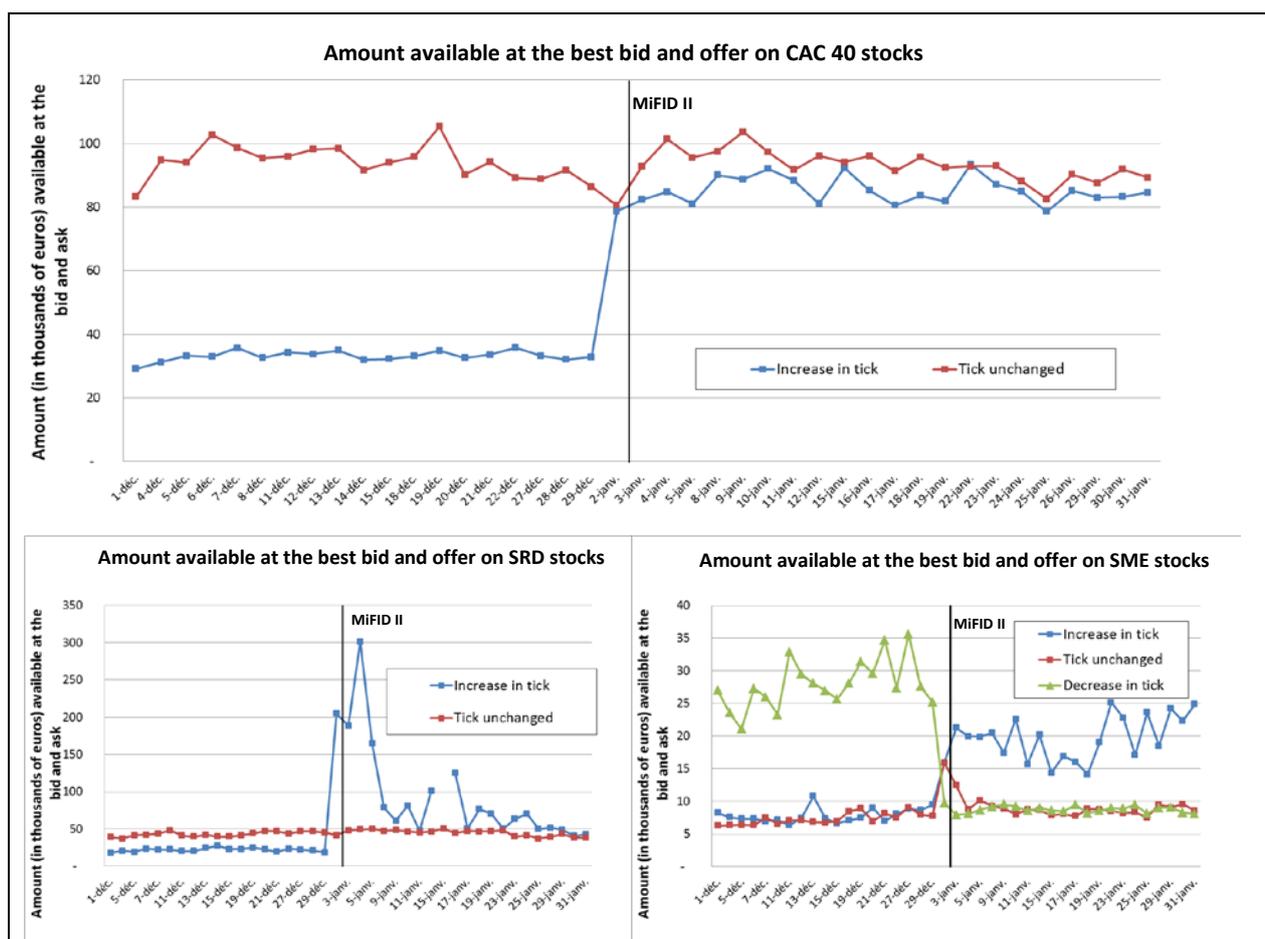
Expressed in ticks the spread fell sharply and is now uniform across all CAC 40 and SRD securities. On the CAC 40, while it was previously around 2 ticks (SRD: 12 ticks), it stabilises at 1.5 tick (SRD: 2 ticks) following the introduction of the regime.

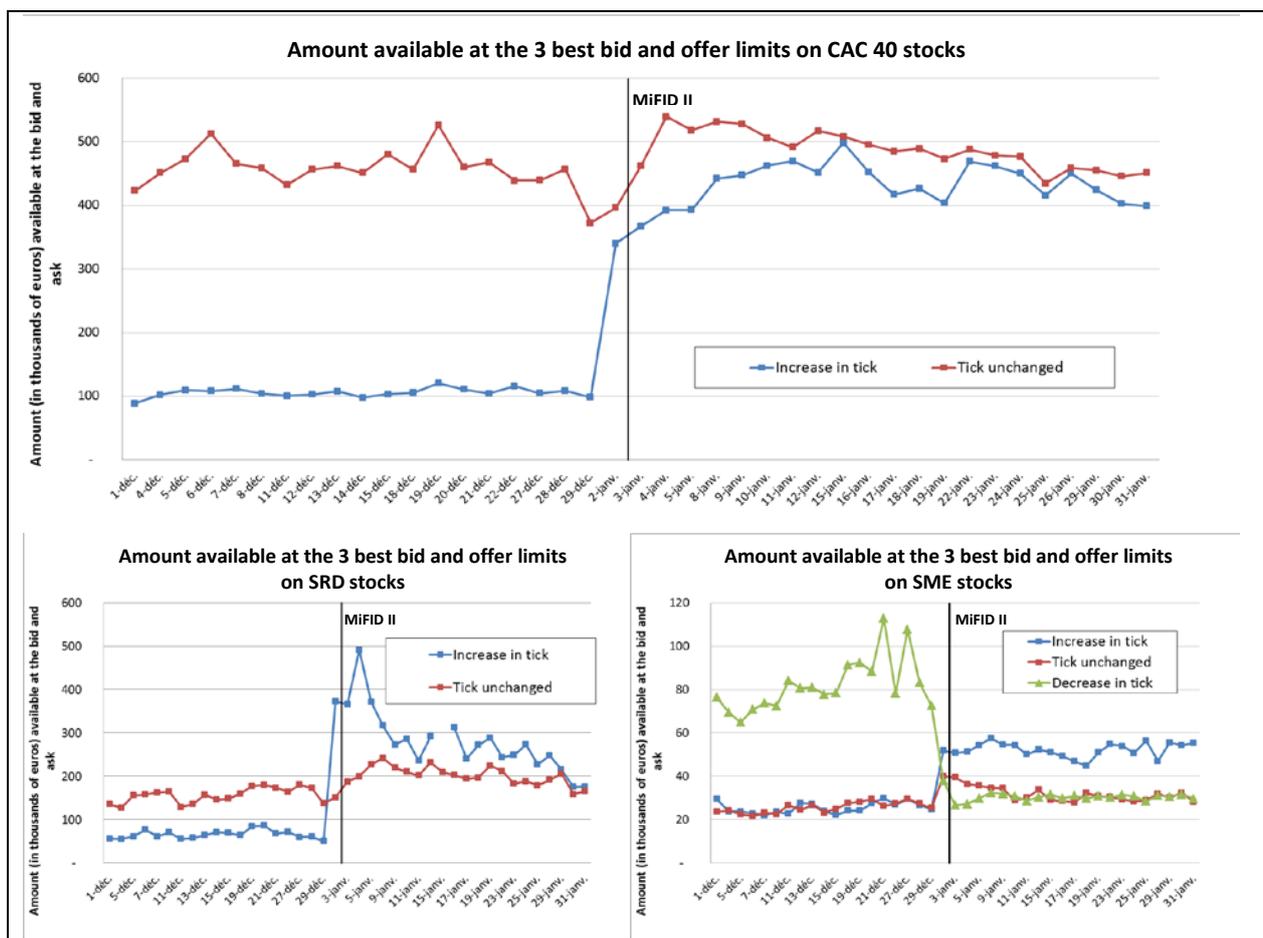
On SME stocks the spread is divided by ten among securities whose tick increased (from 50 ticks to 5 ticks) and multiplied by 4 on stocks whose tick decreased.

**Overall, the spread (in ticks) is now highly comparable between the securities impacted and those not impacted by the tick change.**

### 3.2. IMPACT ON AVAILABLE MARKET DEPTH

The tick increase results in a concentration of orders onto a smaller number of possible price limits and therefore quite logically results in an increase in the quantity available at best limits whereas a tick decrease will lead to a decrease in market depth. The 2 graphs below show the change in the quantity available at the best limit (average bid and ask) as well as the 3 best limits for the three groups of securities reviewed.





Remark: the day of January 15th was excluded for the securities of the SRD following a very marked irregularity in the data.

For securities whose tick increased, depth is markedly improved: although the tick size was multiplied by an average of 2 for the CAC 40 securities (or 5 for those of the SRD, see above), it would appear that the impact was greater on the depth which was multiplied by 4 on the CAC 40 (6 on the SRD) at the 3 best limits at the beginning of January.

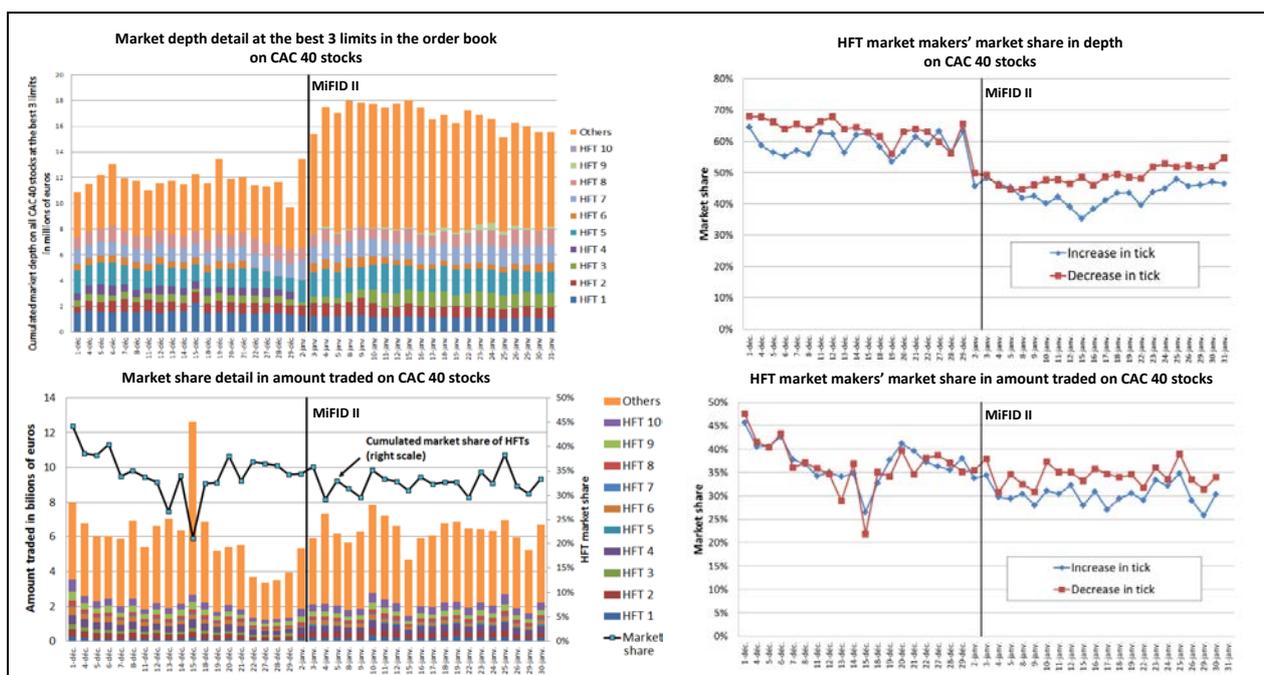
The impact is highly similar on SME stocks; one can observe a large increase (resp. decrease) in market depth on securities whose tick increases (resp. decreases).

It is important to note that the increase in depth mainly concerns orders of **non-HFT participants**.

The graphs below show, on the CAC 40 securities, the change in the amounts offered at the 3 best limits and in the market shares of the traded volumes, detailed for the different market players, to distinguish between HFT market makers and other market participants.

- It appears that the amounts provided by HFT market makers remain relatively stable whereas the depth increases by around 40% to the benefit of non-HFTs. In addition, HFT market makers' share of the depth decreases further for securities whose tick increased than for securities whose tick remained the same, **which suggests that increasing tick size allows more players to place orders at competitive prices in the order book.**

- In terms of traded volumes, for securities whose tick remained the same, HFT market makers' market share remains broadly constant, indicating that these players maintain an advantageous position in the order book queue. **On the other hand, for securities whose tick increased, HFT market makers' market share of traded volumes fell**, as did their market share in terms of depth. For these securities, therefore, HFT market makers fail to offset the competition of the other players at the best limits by gaining a better position in the queue.



Given the rapid evolution of some of these indicators<sup>10</sup>, the specific impact of the new regime on HFT activity will need to be studied in further detail over a longer period.

### 3.3. MARKET DEPTH ANALYSIS OVER A CONSTANT PRICE RANGE

The impact of the new regime on the liquidity displayed in the order book can be assessed more accurately by taking a constant interval around the mid-price into account instead of a fixed number of limits (resulting in a range mechanically impacted by the rise)<sup>11</sup>.

The graph below shows the change in the amounts available in a constant interval equal to a half spread + 3 ticks for the most liquid stocks (CAC 40 and SRD) and a half spread + 6 ticks for the SME stocks around the mid-price (by retaining the spread and tick of each security before the entry into application of the new regime)<sup>12</sup>.

<sup>9</sup> An analysis over a longer period seems all the more justified in that the market share of HFT in terms of depth, after falling behind both in respect of securities whose tick increased and those whose tick remained unchanged, seems to be gradually absorbed over the month of January.

<sup>11</sup> Average price between the best bid price and the best ask price.

<sup>12</sup> The amounts presented are higher than those calculated at the 3 best limits because the spread is generally very wide during the first hour of the day, the average spread for the security being greater than the value of the spread most of the time (median spread). Taking the average and not the median spread into consideration thus inflates the number of limits taken into account and the quantity available - close to the 5-limit quantity.



The impact on depth over the constant price range considered is not significant following the introduction of the new regime: at constant depth, the amount remains unchanged. In other words, the increase in depth completely offsets the increase in spread over an interval equivalent to 3 (6 for SME) old ticks above (or below) the ask (relative to the bid).

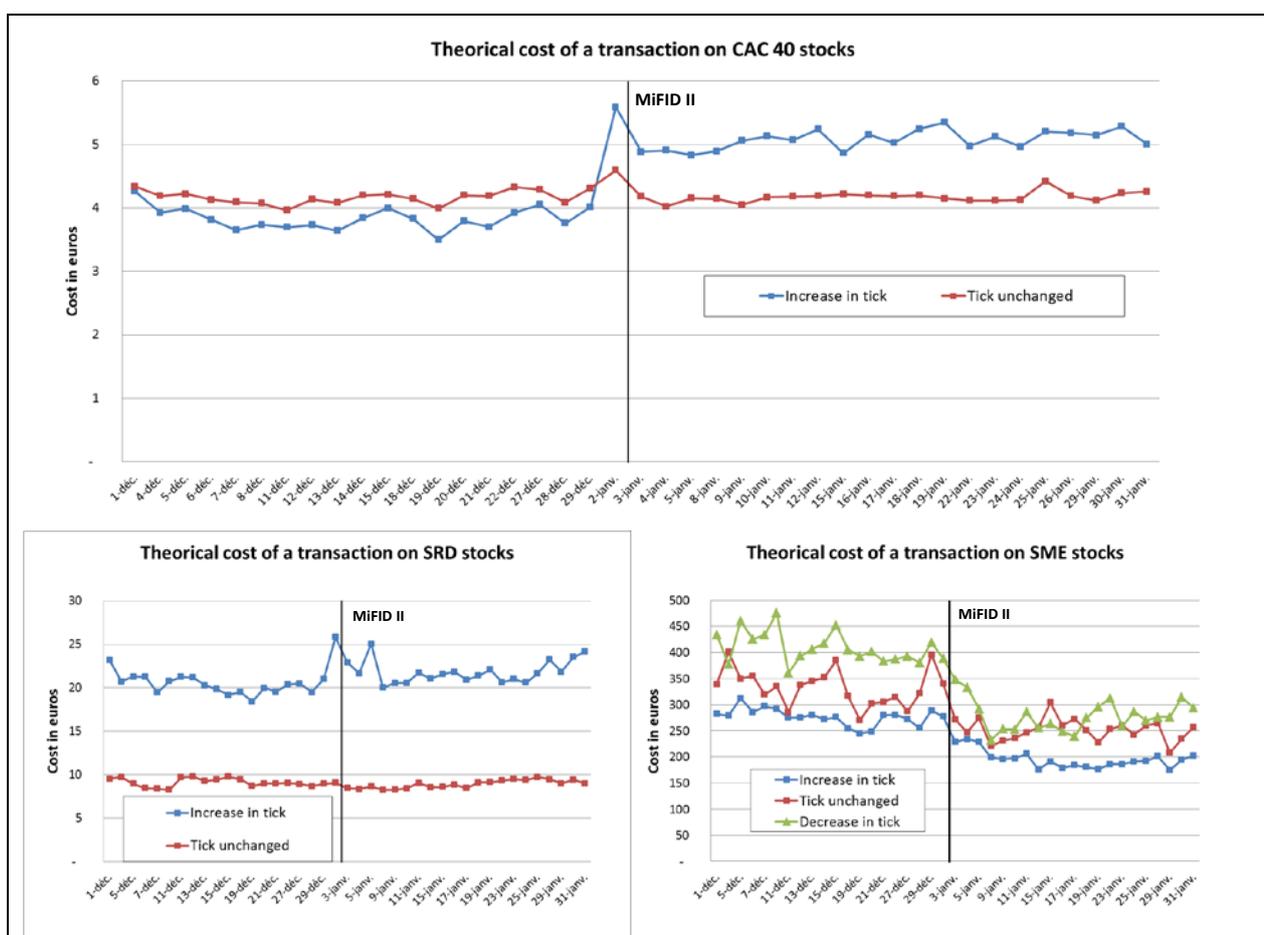
It should be noted, however, that this measurement is calculated over a relatively wide price interval, with a quantity offered that is always greater than €210k for CAC 40 securities (or €70k for SRD securities and €15k for SME securities), well above the average transaction size of around €10k (or €5k on SRD securities and €2k for SME securities).

### 3.4. IMPACT ON TRANSACTION COSTS

In order to measure the impact on liquidity even more precisely, two values must be taken into account jointly: spread and depth. The AMF thus introduces the notion of transaction cost: the cost is expressed as the difference between the average price at which an aggressive order of a given size (in euros) would have been executed and the mid-price. It is an effective value of the liquidity, integrating the depth available at the different limits and the spread. As an illustration, for an aggressive order that crosses several limits, this cost is based on the average price obtained to process €x<sup>13</sup> compared to the mid-price<sup>14</sup>; if the transaction only reaches the best limit, this cost is equivalent to a half-spread multiplied by the number of securities traded.

<sup>13</sup> The measurement was performed for amounts of €10k, €20k, €50k, €100k, and €200k.

The graph below shows the change in the transaction cost for transactions of €20k on the three groups of securities. The table shows the impact i.e. the extra cost for other amounts between €10k (close to the average transaction size for the CAC 40 securities) and €200k.



**Note:** the average additional cost of €3.80 for a total transaction of €20k involving CAC 40 securities before MiFID II is equal to 0.02% of the transaction amount, and is as expected close to the value of a half spread (~ 0.015%, see above).

Traded Amount	CAC 40			SRD			SME (increase in tick)			SME (decrease in tick)			
	Impact in value (extra cost)	Avg cost under MiFID I	relative impact	Impact in value (extra cost)	Avg cost under MiFID I	relative impact	Impact in value (extra cost)	Avg cost under MiFID I	relative impact	Impact in value (extra cost)	Avg cost under MiFID I	relative impact	
€10k	0,7 €	1,7 €	↑ 40%	1,3 €	7,5 €	↑ 17%	Not relevant	74,6 €	→ 0%	-	15,7 €	123,3 €	↓ -13%
€20k	1,2 €	3,8 €	↑ 32%	2,0 €	20,1 €	↑ 10%	Not relevant	238,3 €	→ 0%	Not relevant	353,5 €	→ 0%	
€50k	2,8 €	13,0 €	↑ 21%	Not relevant (*)	84,2 €	→ 0%	Not relevant	1 091,1 €	→ 0%	-	178,9 €	1 681,2 €	↓ -11%
€100k	4,2 €	36,9 €	↑ 11%	Not relevant	266,2 €	→ 0%	Not relevant	3 142,2 €	→ 0%	Not relevant	5 444,6 €	→ 0%	
€200k	Not relevant	112,3 €	→ 0%	Not relevant	938,4 €	→ 0%	940,1 €	8 054,6 €	↑ 12%	Not relevant	15 360,1 €	→ 0%	

(\*) The value of the regression coefficient is not material (p-value >10%).

<sup>14</sup> Average price between the best bid price and the best ask price.

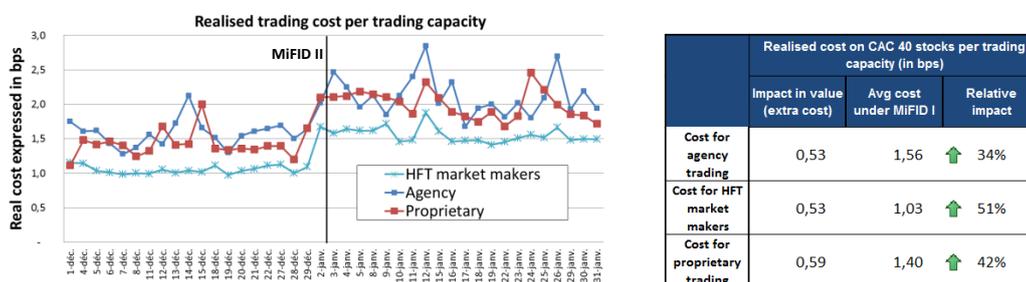
The impact of the increase in tick is quite distinct on the CAC 40 securities, whereas the impact is very slight on the SRD securities and not relevant for SME stocks. For CAC 40 securities, the tick increase results in a small increase in the cost of small transactions<sup>15</sup>. The table shows that above €100k, liquidity is no longer affected by the change in ticks<sup>16</sup>. These changes could therefore be financed by participants in small trades (usually HFT) to the benefit of participants in larger trades (generally not HFT).

**The new tick size regime offers a more homogeneous micro-structure between securities at the cost of a sometimes significant increase in the spread.**

**The increase in depth does not always fully compensate for the slight widening of the spread<sup>17</sup>, but the impact remains nevertheless extremely limited: it is restricted to small transactions involving the most liquid securities and is estimated at an additional cost of €1.2 for an average transaction of €20k, or 0.6 bps (which is equivalent to transaction costs on Euronext).**

**Remark:** the AMF measured the realised cost of transaction across all the transactions on the CAC 40 stocks per trading capacity: HFT market makers, agency and proprietary.

The graph below presents the realised cost of aggressive trades and is completed by a table displaying the estimated impact on this metric of the increase in tick on CAC 40 stocks.



The outcome is that impact is quite evenly spread over all market participants, ranging from 0.53 bps to 0.59 bps in absolute value, and to a greater extent for proprietary traders and HFTs in relative value than for agency trades. The increase in tick led to less variance between market participants in term of trading costs, and this corroborates the previous observations.

<sup>14</sup> For small transactions, the increase in depth does not compensate for the variation in the spread and the cost of a €20k transaction (close to the average transaction size) increases by about 30% from €3.8 to €5. The impact for €10k is similar to the impact on the spread but still slightly lower (40% vs. 56%), which indicates that transactions of €10k sometimes crossed several limits prior to the new regime.

<sup>15</sup> It should be noted that beyond €200k the impact is no longer significant. This is consistent with the observations of the previous section (3.3.) which concluded that at constant depth in euros (€260k or €130k bid/ask) the amounts offered were not affected.

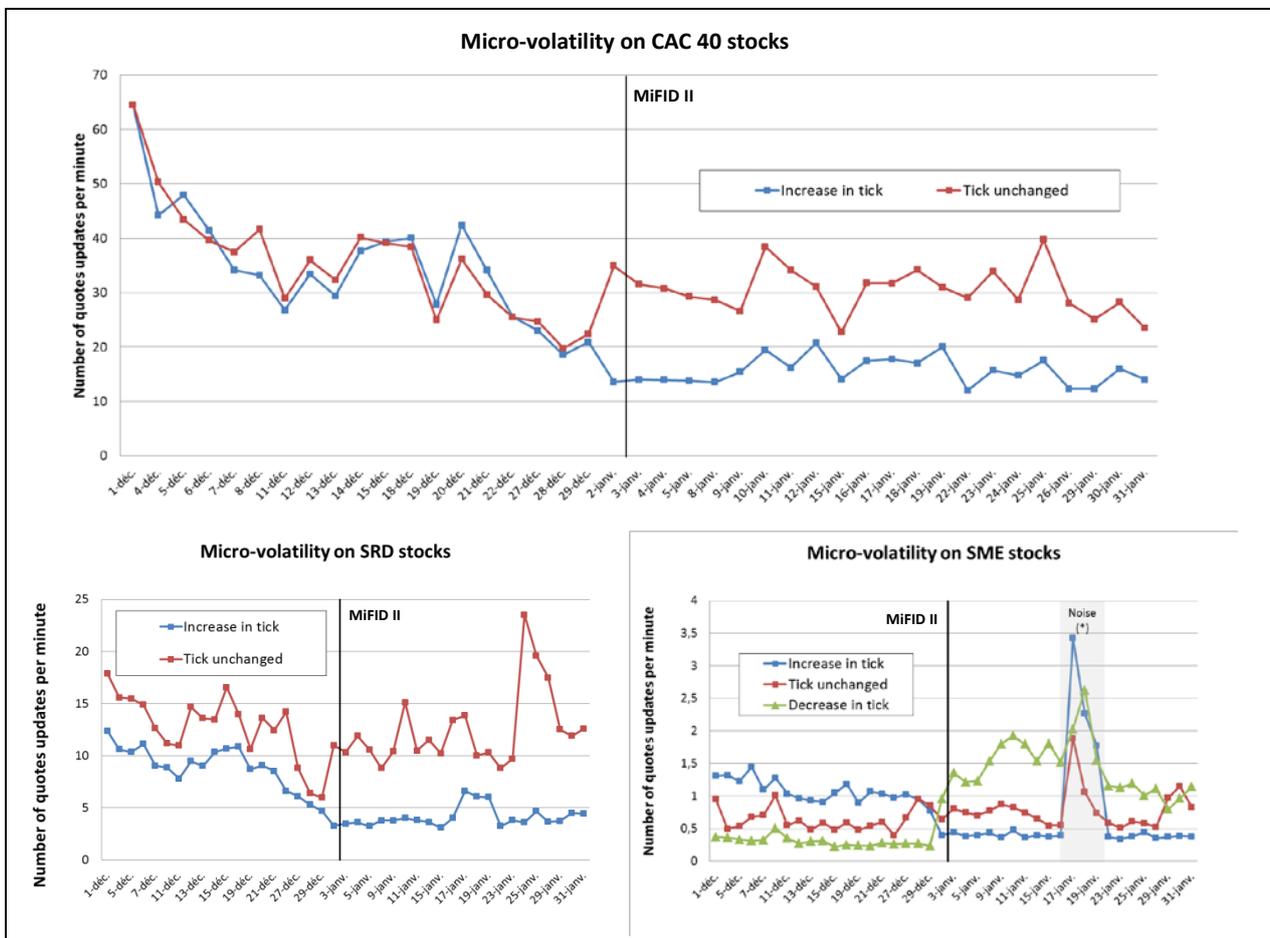
<sup>17</sup> This result comforts the previous section, which concluded that there was no significant impact on sufficiently sizeable depths, in the region of €260k (see previous footnote).

## 4. ANALYSIS OF THE IMPACT OF TICK SIZE ON THE MICRO-STRUCTURE

### 4.1. HIGH FREQUENCY METRICS AND PRICE FORMATION PROCESS

The increase in tick size reduces the micro-volatility of prices<sup>18</sup>, allowing for larger transactions. At the same time, the increase in the tick reduces the possibilities of outbidding and therefore the number of unexecuted orders sent (quantified by the order-to-trade ratio - OTR). A decrease in tick would have the opposite effect on these indicators.

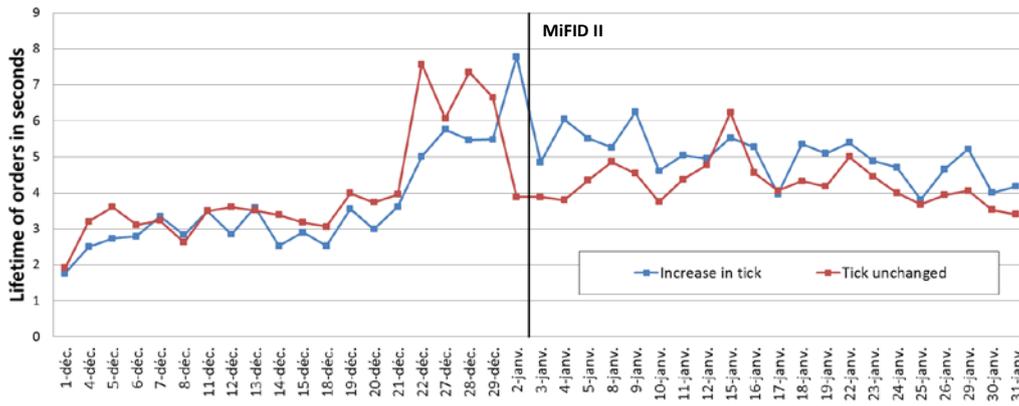
The 4 graphs below show the change in micro-volatility, in the median lifetime of cancelled orders, in the order-to-trade ratio, and in average transaction size:



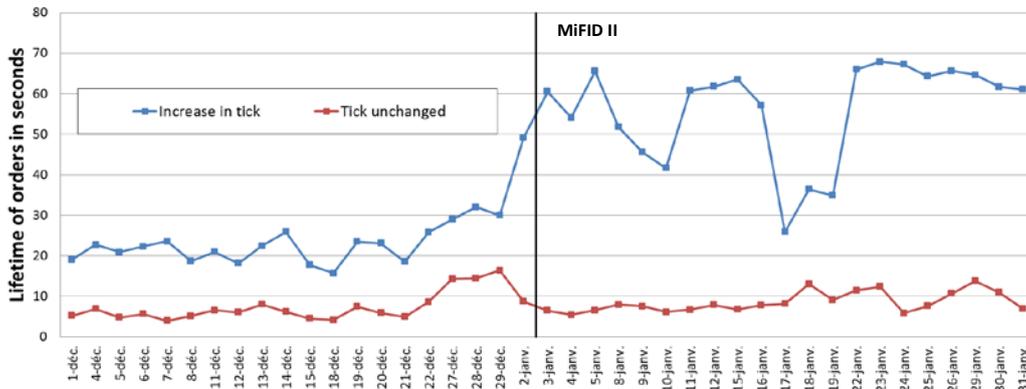
(\*) On January 17th, 18th and 19th, the trading activity attributed to one participant sharply disrupted the metric on SME. These days were therefore excluded from the regression model to estimate the impact of the new regime all things being equal.

<sup>18</sup> Micro-volatility is expressed as the number of best bid or ask updates in the order book.

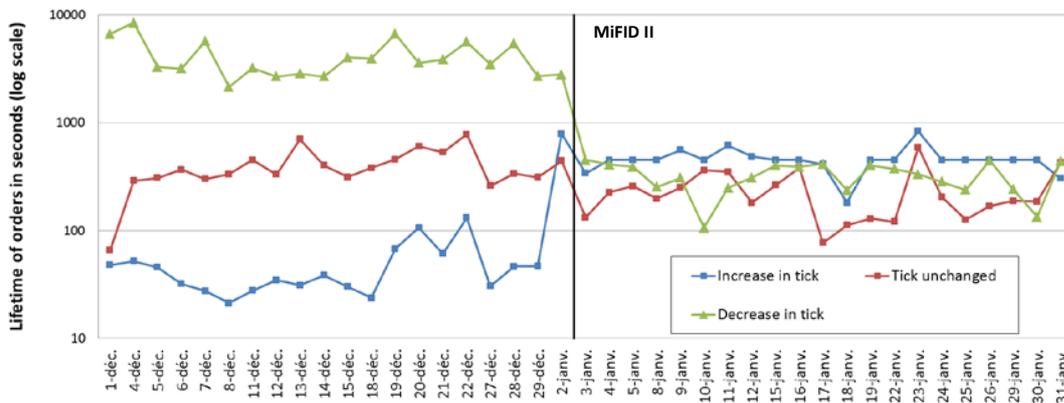
Median lifetime of cancelled orders on CAC 40 stocks



Median lifetime of cancelled orders on SRD stocks

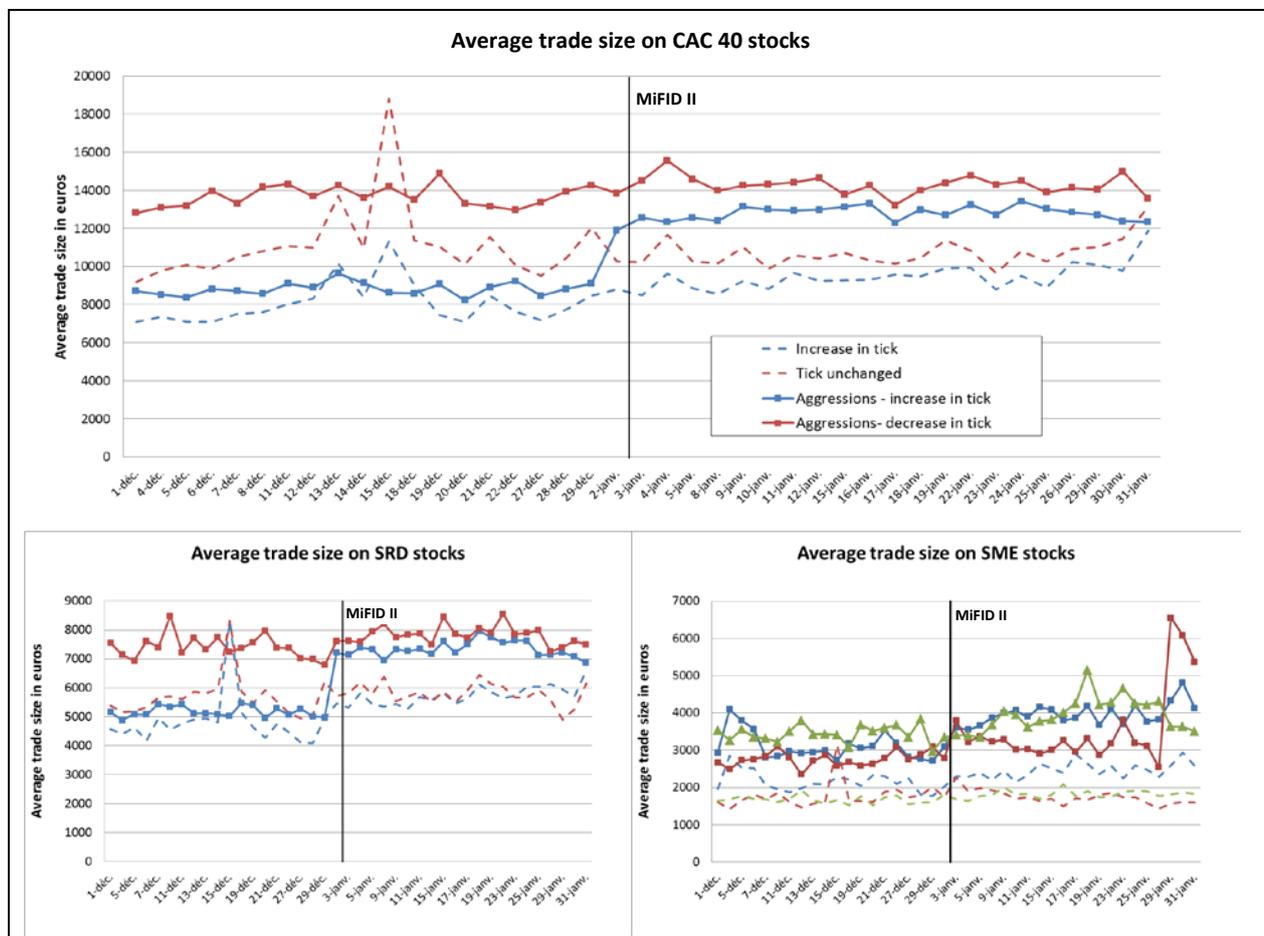


Median lifetime of cancelled orders on SME stocks





(\*) On January 17th, 18th and 19th, the trading activity attributed to one participant sharply disrupted the metric on SME. These days were therefore excluded from the regression model to estimate the impact of the new regime all things being equal.



The observed impact is absolutely clear - precisely as expected.

- The very short-term volatility in the book, expressed as the number of spread updates per minute, decreased significantly (by 32 messages per minute to 18 or -40% on the CAC 40 and by 8 messages per minute to 4 messages or -50% on the SRD)<sup>19</sup>. Similarly on SME securities the impact is also clear, on securities whose tick increases, the noise in the book is reduced by 70% whereas on securities whose tick decreases it is multiplied by 4.
- Order lifetime increased significantly as tick increases on SRD securities (from 20 seconds to 39 seconds for the median duration, i.e. +100%) and SME securities (from 50 seconds to almost 8 minutes). The impact is considerably less marked on CAC 40 securities (from 3.5 seconds to 5 seconds, i.e. +36%). On stock whose tick decreases the impact is the opposite, and a strong decrease in order lifetime from 40 minutes to 8 minutes is observed.
- The OTR fell from 16 to 14, or -15% for CAC 40 securities that are often the subject of intense HFT activity<sup>20</sup>. The impact is much less significant on less liquid stocks.

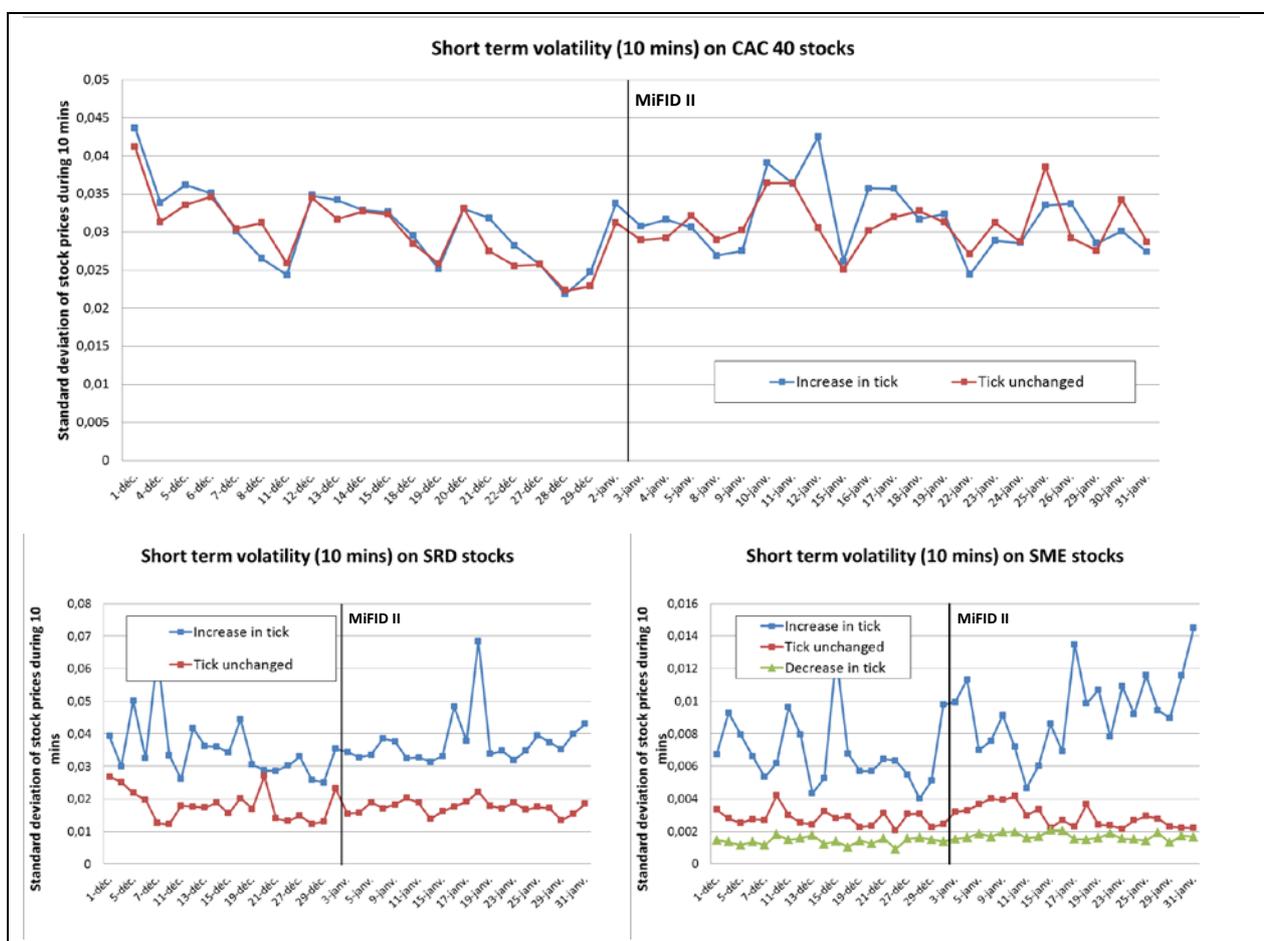
<sup>19</sup> It should also be noted that the seasonality of this metric engenders an increase after the last week of the year usually less active. In order to measure the impact of the tick change, it is necessary to take into account the difference of variation between the control group and the group of securities whose tick increases as opposed to the absolute variation.

<sup>20</sup> For the CAC 40, the OTR decreased by 2.5 for an average of 16, and on the SRD a non-significant impact for an average OTR of 10.

- The average size of a transaction increased significantly for all securities (+20% on average); the increase of the average size is even greater for trades triggered by an aggressive order<sup>21</sup> (from €9 000 on average to €12 500 for securities of the CAC 40, i.e. +40% on average and from €5 300 to €7 200 for SRD securities, i.e. +36% on average).<sup>22</sup>

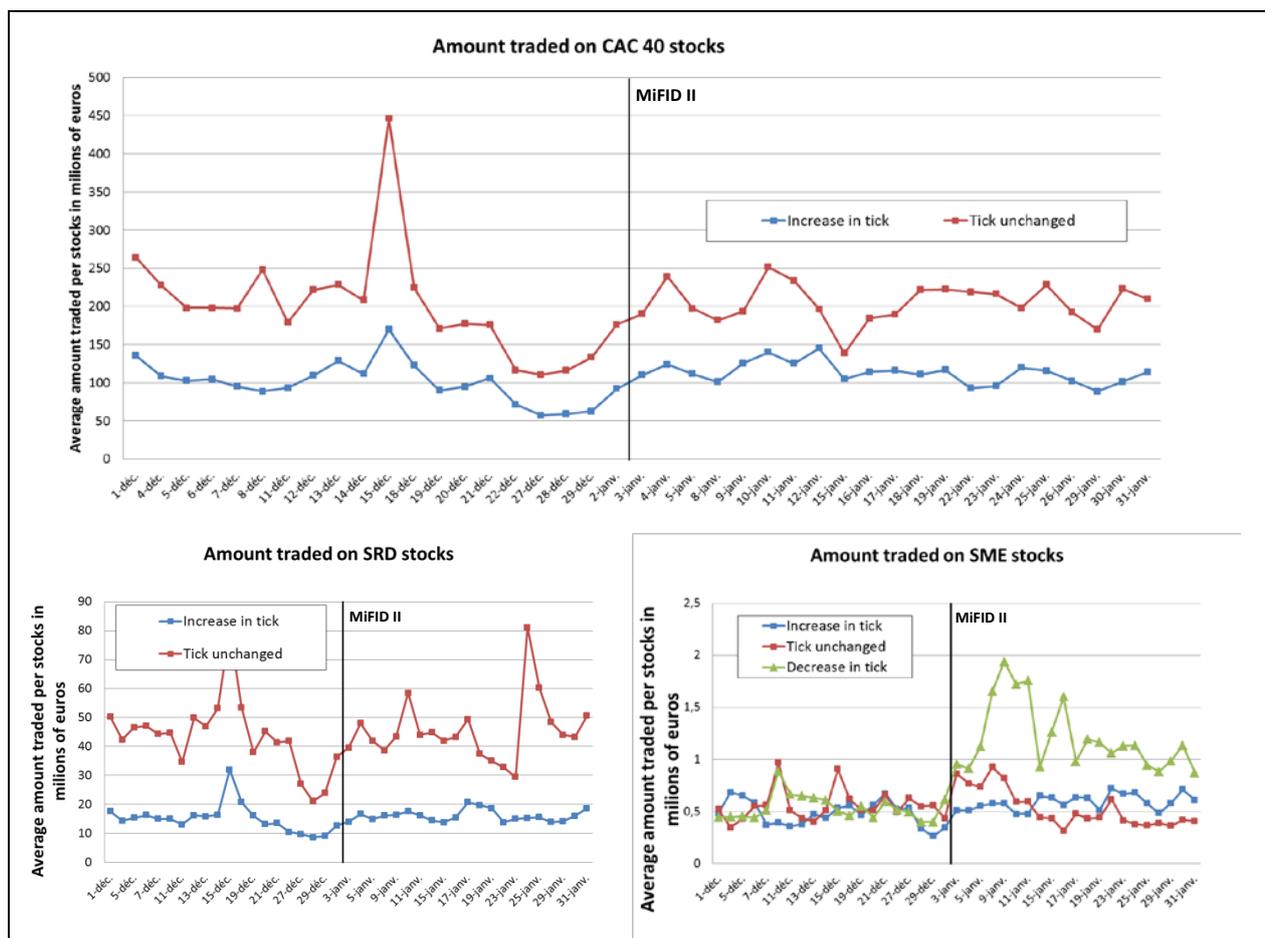
#### 4.2. MACRO METRICS

The 2 diagrams below show the change in short-term volatility and trading volumes for the securities analysed.



<sup>21</sup> An aggressive order may result in several transactions.

<sup>22</sup> For the CAC 40, an increase of €3 500 for €9 000 on average and, for the SRD, an increase of €1 900 for €5 300 on average.



It is difficult to draw a clear trend attributable to the introduction of the new regime. For the vast majority of securities the change in tick size does not seem to have had an impact on macro metrics.

Nevertheless one should note the marked increase in amount traded for SME stocks whose tick size changes, and especially so for those stocks whose tick size decreases. The new regime seems quite visibly to increase trading activity on those stocks as shown by the reduction of the lifetime of orders from 40 minutes to 8 minutes and the clear increase in amount traded.

**Overall, the increase in tick size has the desired effect on the micro-structure: increased viscosity (longer order lifetime and larger transaction size) in order to reduce noise in the order book (smaller OTR). Furthermore the new regime does not disrupt large macro indicators like trading volumes or volatility.**

## 5. CONCLUSIONS

One month after MiFID II's entry into force, the impact of the new tick size regime would seem to have had the desired effect. The outcome is a tick size that is coherent in terms of the spread across all securities and an overall improvement in the quality of the market: significant increase in depth and marked reduction in the number of messages. However, the tick increase results in a slight widening of the spread for the most liquid securities, the extra cost of which for players dealing in medium sized trades may be offset by larger transaction sizes and by the bandwidth savings that will result from the reduction in noise (44% decrease in the number of spread updates<sup>23</sup> for CAC 40 securities).

For SME stocks, the new regime led to a more appropriate tick size in regard to the spread, and resulted in more dynamic trading activity and greater traded volumes.

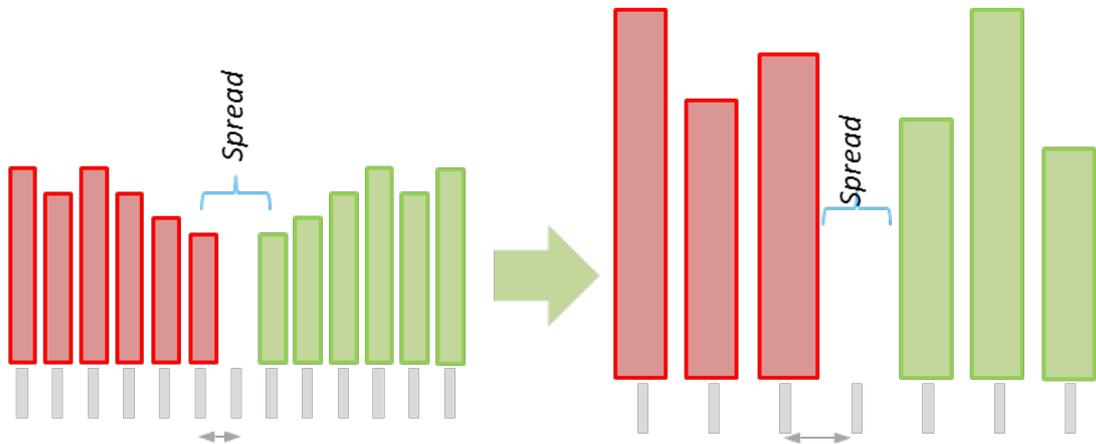
This study further demonstrates that by allowing the ticks of securities to vary by modifying liquidity bands<sup>24</sup>, the new regime offers the legislator a tool that can directly influence the quality of the market.

Finally, it should be noted that the analysis was conducted in a context of particularly low volatility, hence the results should be followed up by a study of the impact of the new regime over a longer period.

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<sup>23</sup> This is the very short-term volatility presented in Part 4.1.

<sup>24</sup> A new modification of the bands would however require an amendment of the regulatory technical standards and would therefore have to be approved by the European Commission.



Increase in tick size on  
CAC 40 securities

tick **x2**  
Spread **+56%**  
**1,5 ticks**

Lifetime of  
orders

OTR **-15%**

Depth at the best  
bid and offer **+150%**

**+43%**

Average  
trade  
size

**+40%**

**-44%**

Noise in the order  
book

Cost of a €20k trade

**+0,6 bps** Close to Euronext trading  
fees

## 6. APPENDICES

### 6.1. ANNEXE : TABLE SUMMARISING THE IMPACT

All these metrics are calculated based on orders and trades data used to build the order book. It's important to point out that to simplify the calculations we did not take into account persistent orders in the book, this might marginally impact the metrics and especially on SME securities. Nevertheless as all the metrics are the same for securities whose tick change and for those whose tick doesn't change, this approximation shouldn't impact the impact assessment.

The details of each metrics are presented hereunder:

- **Spread in %** : median of average spread compared to the price per minute per security on each group ;
- **Spread in ticks** : average of average spread in ticks per minute per security on each group;
- **Market depth** : average of average depth cumulated at the bid and ask per minute per security on each group;
- **Cost of a transaction for €x (spread at €x)**: average of the transaction costs per stock for each measurement (one measure per minute maximum). This metric under-weight security with very low activity (less than an order per minute).
- **Market depth at constant price range** : average market depth at constant price range per minute per security on each group;
- **Micro-volatility** : average number of bid-ask updates per minute per security on each group;
- **OTR** : total number of orders divided by the total number of trades on each group;
- **Lifetime of orders** : median lifetime of cancelled orders per stock on each group;
- **Average trade size** : average trade size on all the trades on each group;
- **Average aggression size** : average size of aggressions on all trades on each group;
- **Volatility 10 minutes** : average standard deviation over all the measurements (on measure per minute maximum) on each group;
- **Amount traded**: average amount traded per stock on each group.

The results presented and illustrated by the graphs in the note above are confirmed by a rigorous statistical approach. The impacts are calculated by solving the following regression (a, b, and c) using the least squares method:

$$\text{Metric}_{\text{Tick increase}} = a \times \text{Metric}_{\text{tick constant}} + b \times 1_{\text{MiFID II}} + c$$

with b giving the impact of the implementation of MiFID II and the value of c being forced to 0. January 2<sup>nd</sup> 2018 was excluded from the model as an anticipated impact is noticeable during this day.

Metric	CAC 40			SRD		
	Impact in value	Avg value under MiFID I	relative impact	Impact in value	Avg value under MiFID I	relative impact
Spread in %	0,016%	0,028%	↑ 56%	0,037%	0,083%	↑ 45%
Spread in ticks	0,50	2,06	↓ -24%	8,77	12,04	↓ -73%
Market depth at the BBO	52 160 €	32 879 €	↑ 159%	62 591 €	25 156 €	↑ 249%
Market depth at the 3 best limits	318 062 €	108 396 €	↑ 293%	189 393 €	78 659 €	↑ 241%
Market depth at the 5 best limits	609 776 €	206 842 €	↑ 295%	316 125 €	147 306 €	↑ 215%
Spread at €10k	0,7 €	1,7 €	↑ 40%	1,3 €	7,5 €	↑ 17%
Spread at €20k	1,2 €	3,8 €	↑ 32%	2,0 €	20,1 €	↑ 10%
Spread at €50k	2,8 €	13,0 €	↑ 21%	Not relevant	84,2 €	→ 0%
Spread at €100k	4,2 €	36,9 €	↑ 11%	Not relevant	266,2 €	→ 0%
Spread at €200k	Not relevant	112,3 €	→ 0%	Not relevant	938,4 €	→ 0%
Market depth with constant price range	25 371,7 €	204 654	↑ 12%	Not relevant	77 090	→ 0%
Micro-volatility	13,9	31,9	↓ -44%	3,9	8,1	↓ -48%
OTR	2,40	16,01	↓ -15%	Not relevant	9,58	→ 0%
Median order lifetime (in μs)	1 474 479	3 427 005	↑ 43%	38 714 716	20 084 907	↑ 193%
Average trade size	1 812 €	7 813 €	↑ 23%	833 €	4 870 €	↑ 17%
Average aggression size	3 628 €	8 998 €	↑ 40%	1 902 €	5 303 €	↑ 36%
Volatility 10 minutes	Not relevant	0,04	→ 0%	Not relevant	0,06	→ 0%
Amount traded	15 761 487 €	96 747 995 €	↑ 16%	Not relevant	14 725 903 €	→ 0%

Metric	SME (increase in tick)			SME (decrease in tick)		
	Impact in value	Avg value under MiFID I	relative impact	Impact in value	Avg value under MiFID I	relative impact
Spread in %	0,132%	0,640%	↑ 21%	-0,402%	1,278%	↓ -31%
Spread in ticks	16,71	33,95	↓ -49%	8,36	1,63	↑ 512%
Market depth at the BBO	10 859 €	8 454 €	↑ 128%	24 378 €	30 272 €	↓ -81%
Market depth at the 3 best limits	21 354 €	28 094 €	↑ 76%	69 730 €	90 654 €	↓ -77%
Market depth at the 5 best limits	26 270 €	49 371 €	↑ 53%	93 845 €	135 448 €	↓ -69%
Spread at €10k	Not relevant	74,6 €	→ 0%	15,7 €	123,3 €	↓ -13%
Spread at €20k	Not relevant	238,3 €	→ 0%	Not relevant	353,5 €	→ 0%
Spread at €50k	Not relevant	1 091,1 €	→ 0%	178,9 €	1 681,2 €	↓ -11%
Spread at €100k	Not relevant	3 142,2 €	→ 0%	Not relevant	5 444,6 €	→ 0%
Spread at €200k	940,1 €	8 054,6 €	↑ 12%	Not relevant	15 360,1 €	→ 0%
Market depth with constant price range	Not relevant	10 307	→ 0%	Not relevant	138 610	→ 0%
Micro-volatility	0,7	1,0	↓ -67%	1,0	0,3	↑ 374%
OTR	4,66	8,86	↓ -53%	0,79	2,86	↑ 28%
Median order lifetime (in μs)	419 904 257	48 095 495	↑ 873%	1 581 706 013	2 526 461 674	↓ -63%
Average trade size	468 €	2 021 €	↑ 23%	274 €	1 564 €	↑ 18%
Average aggression size	Not relevant	3 147 €	→ 0%	Not relevant	3 362 €	→ 0%
Volatility 10 minutes	0,0 €	0,02	↑ 30%	Not relevant	0,00	→ 0%
Amount traded	205 943 €	391 245 €	↑ 53%	739 008 €	479 267 €	↑ 154%