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# STUDY OF THE IMPACT OF DARK POOLS ON THE PROPER FUNCTIONING OF EQUITY MARKETS

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## EXECUTIVE SUMMARY

The sustained development of dark pools over the past decade, a paradoxical consequence of the increased market transparency sought by regulators, has rightly raised questions about their effects on market features such as the price formation process, price and market volatility, and liquidity, but also on specific regulatory decisions such as the Double Volume Cap (DVC) recently introduced in Europe.

Having recalled the principles, the functioning, the history of volumes and the current situation of dark pools, this study proposes to draw up a state of the art of the academic research on these various subjects.

Unless otherwise stated, the dark pool considered will be limited to the dark trading register within regulated platforms (MTFs in Europe, ATs in the US) and not to dark trading in general, i.e., orders hidden in lit exchanges or SIs/OTC platforms or even auction trading that could be assimilated to "quasi dark" trading<sup>1</sup>.

All academic studies, although numerous, have been hampered by the quality and quantity of available data. Researchers need abundant, reliable, meaningful data to calibrate their models. However, for various reasons (fragmentation, nature of the problem (dark trading), granularity, etc.), the quality of the reports, and therefore of the data that can be manipulated, is still not satisfactory. In addition, the COVID 2020-2021 period has rather worsened the situation by the closure of some platforms, the teleworking of some operators, etc.

This leads to a high variability of results dealing with the same issue. Similarly, it is difficult to compare studies between different geographical areas to draw replicable best practice conclusions. Indeed, the market structure and the way in which regulation is applied in detail often prevent definitive conclusions from being drawn.

In the end, the published papers, which we have listed in the appendix, allow us to identify certain trends, the main ones being:

- i. After sustained growth in the relative volumes of dark pools in the main financial centers, these have stabilized since 2017, regardless of the regulatory context, to the benefit of other types of less regulated platforms (SI and Auction Trading in particular).
- ii. The studies do not show a clear trend on the impact of the existence of dark pools on liquidity. Some observe a slight deterioration, others conclude nothing or note a slight improvement depending on the geographical areas or periods considered.
- iii. Regarding the price formation process, the conclusion of most papers is mixed, ranging from an improvement to a neutral or even negative effect. However, some of them warn that beyond a certain threshold of dark trading, one could observe detrimental effects on market quality.
- iv. Similarly, the impact of the Double Volume Cap, introduced by the European regulator, is considered weak by researchers, whether on liquidity or the price formation process. All observe, as indicated above, that a new balance between platforms and different types of orders (Lit, dark, SI, OTC, Auction) was formed (still in formation) following this suspension. The DVC is probably not the only cause because the same phenomenon has been observed in the United States.

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<sup>1</sup> All these market and liquidity categories offered to investors are defined at the end of this note.

- v. Dark pools continue to be a topic of interest for researchers. The quality of data reporting is improving, making it possible to refine the results or to extend them to dark trading in general. However, other research topics have emerged, such as the problem of fragmentation in general and its optimal balance, the growing share of less regulated and more opaque platforms (IS, OTC trading), and auction trading, which can be considered quasi-dark trading. Harmonization and consolidation of financial data related to dark trading at the French and European levels also seems to be a task that the ILB could take on with other partners.

## PART I

### 1. CAUSES OF THE EXISTENCE AND DEVELOPMENT OF DARK POOLS

Over the past 15 years, we have seen the significant development of trading platforms which, unlike traditional exchanges (lit exchanges), do not reveal the volumes and prices of buy/sell orders before execution: these platforms are called "dark pools" and are referred to as pre-trade opacity.

This evolution can be explained by three factors:

- i. The combination of a growing need for global financing and the near monopoly of traditional trading platforms (exchanges) has encouraged regulators to fragment the structure of the capital markets and thus meet the needs of investors while offering better adapted and less expensive services. The requirement for greater transparency of transactions by both European and American regulators has forced the latter to structure a system of exemptions to the principle of pre-trade transparency (demand from investors placing very large orders and fearing the deterioration of their price at execution due to the excessive transparency of quotes). Dark pools, among others, have thus naturally imposed themselves in this new ecosystem.
- ii. Technological innovations (improved communication networks, faster data processing, increased storage capacity) have allowed new trading platforms to gain in efficiency and reliability in the processing of block trades, trade routing and the development of sophisticated algorithms. As a result of this evolution, the emergence of High Frequency Trading (HFT) has contributed to the development of dark pools playing the role of ally (liquidity provider) and "scarecrow argument" (pre-trade opacity allows many investors to escape predatory HFTs) ([9][1])
- iii. In the early 2000s, US regulators reduced the tick size, followed by European regulators in the late 2000s<sup>2</sup>. The consequence in terms of microstructure was the weakening of market depth (less capacity to absorb large orders without moving prices). Dark pools have mechanically benefited from this effect, attracting investors who want to place large orders.

Due to the combination of these factors (and others), the share of dark pools in the structure of equity markets has grown continuously and strongly (from 1% in 2009 to 8% of volumes in 2016, to stabilize around 6-7% since 2019 in Europe). This new ecosystem is nonetheless very heterogeneous, gradually adapting to the environment of other trading platforms, to regulation and to the different and evolving needs of operators.

### 2. DARK POOL TYPOLOGY

The dark pool market has been constantly evolving and consolidating over the last decade. Their number is naturally limited due to the ability of this market to offer sufficient liquidity (fragmentation has its limits). We can also observe that this market is much less concentrated than the lit venue market (mainly

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<sup>2</sup> MIFID1 in Europe and RegNMS in the US.

concentrated on the primary exchange), probably because of the different services on which these dark pools are positioned (horizontal differentiation) ([22]).

In the US as in Europe, the demand for dark trading comes mainly from the advent of HFT (High Frequency Trading) and the desire of some investors to protect themselves from it. Many dark venues have therefore offered their clients flexibility on the type of orders or the size of transactions, and protection (in addition to pre-trade opacity) against these predators (HFT and prop trading). However, we notice that to date, few dark pools offer this type of protection exclusively. Many even accept the participation of HFTs, simply to meet liquidity needs: the choice of arbitrage between a dark and a lit venue is made between price quality and probability of execution. A low probability of execution can condemn a dark pool offering only protection for large scale trades for example.

This acceptance of HFTs as clients could cause controversy in the United States, because without the knowledge of other clients, the SEC had to legislate for more transparency of procedures within dark pools (2015-2016).

### 3. STATISTICS AND BENCHMARKING

We present here the data concerning dark trading volumes compared to the global volumes on the equity markets as well as other indicators that we consider relevant for the study.

NB: EU and UK data have been provided by **Big xyt. Rosenblatt Securities** provided us with US and Canadian data from 2016 to 2022. Both are reference institutions on that subject.

Finally, we were able to retrieve partial data from recent articles ([7] and [11]). They give a good idea of the situation in the US regarding the balance between regulated and non-regulated dark platforms (ATS vs. non-ATS).

#### a. EU & UK DATA

NB: Unless otherwise stated, data from 2021 onwards no longer reports data for the UK.

The first chart below shows the market share in terms of average daily volumes of the different dark pools in Europe and the UK. The market structure is relatively concentrated, with CBOE Europe, LSE, Liquidnet and ITG Posit representing 90% of the volumes traded in 2022.

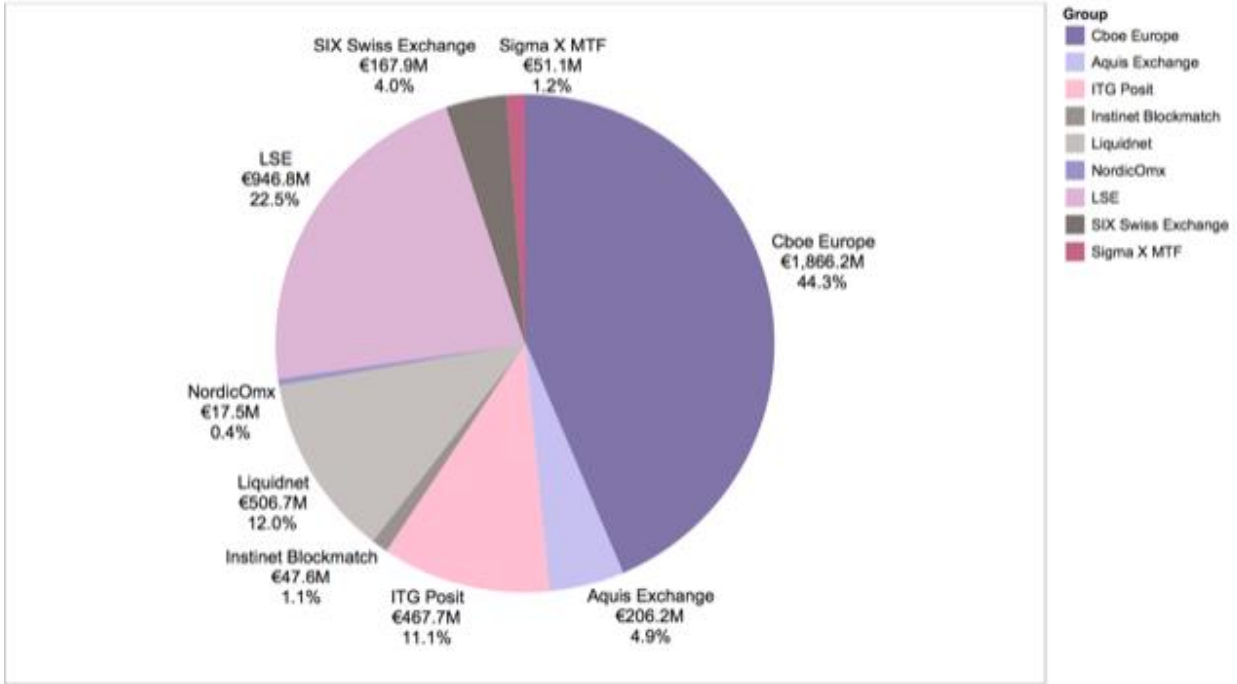


Figure 1 - Dark Pool Market Share

Source : big xyt EU Equities Market Microstructure Survey Q4 2021

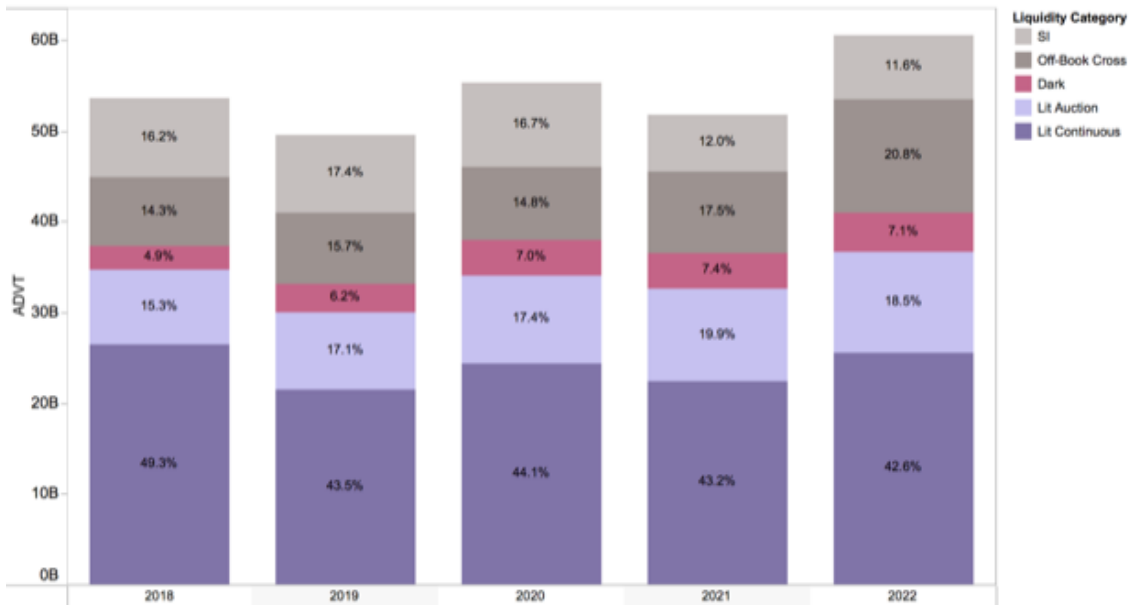


Figure 2 - Market fragmentation since 2018 – Average Daily Volume €

Source : big xyt

This second graph shows :

- i. The effect of the DVC suspension on dark trading, anticipated in 2018 and then with a normalization below 8% of average daily volumes in subsequent years.

- ii. The growing share of volumes traded in off-book cross (20% of ADV) and in lit auction (18.5% of average daily volume), the latter being linked to the increase in amounts under passive index management and therefore in volumes traded in auction au close. The volumes handled are particularly high during index reshuffling (see graph in the appendix). Nevertheless, there is a strong geographical heterogeneity (graph in annex).
- iii. The decrease in volumes processed "at risk" by IS (28% decrease between 2018 and 2022, from 16.2% to 11.6%) and on the lit continuous (13% decrease over the same period, from 49.3% to 42.6%), the latter nevertheless continuing to capture most of average daily volumes.

According to ILB's interviews with experts, the decrease in volumes handled by Systematic Internalizers, particularly banks (2/3 of SIs), since the COVID crisis could be linked to the reduction in committed capital induced by this type of transaction in the event of high market volatility. Many investors have also disengaged from these platforms and have favoured closing auctions on lit exchanges. For example, Amundi would have partially rebalanced its trades via its Direct Market Access rather than through its brokers during this period.

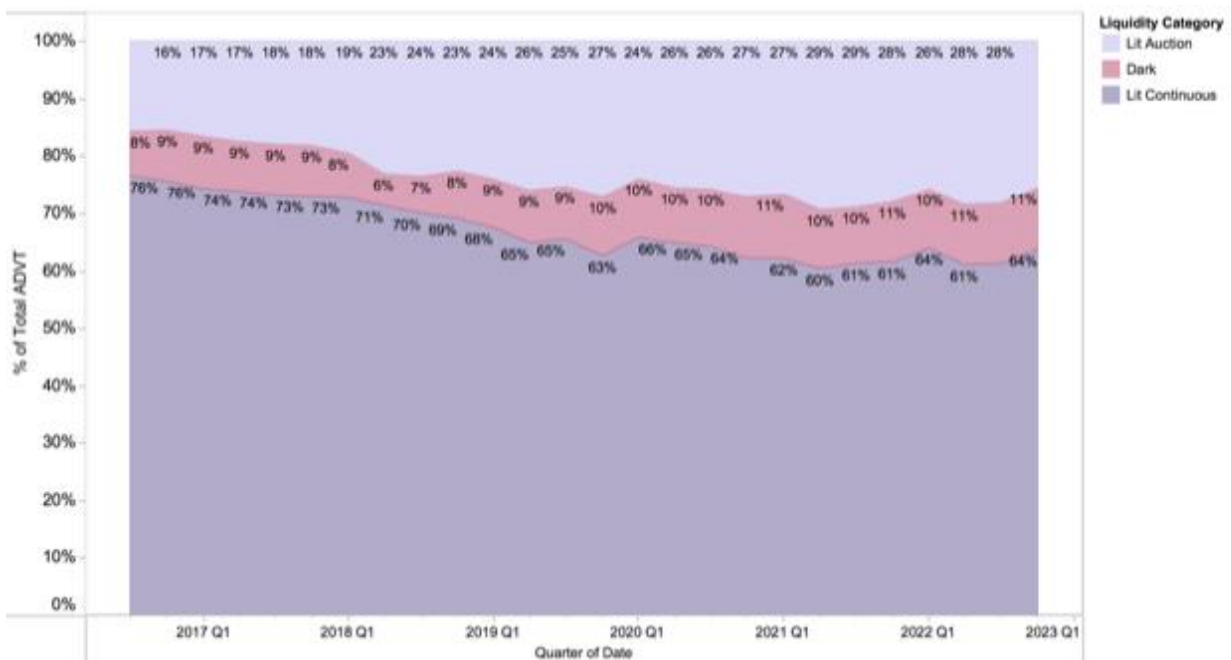


Figure 3 - Order book fragmentation

Source : big xyt

This third chart is the same as the previous one but focuses on regulated MTF-type platforms (excluding SI and off-exchange), thus expressing "the real liquidity pools". We notice a relative stability of the share of dark pools around 10% and the relatively neutral effect of MIFID II2 (except for the year of implementation). It is worth noting that the lit auction is gaining constant market share at the expense of the lit continuous.



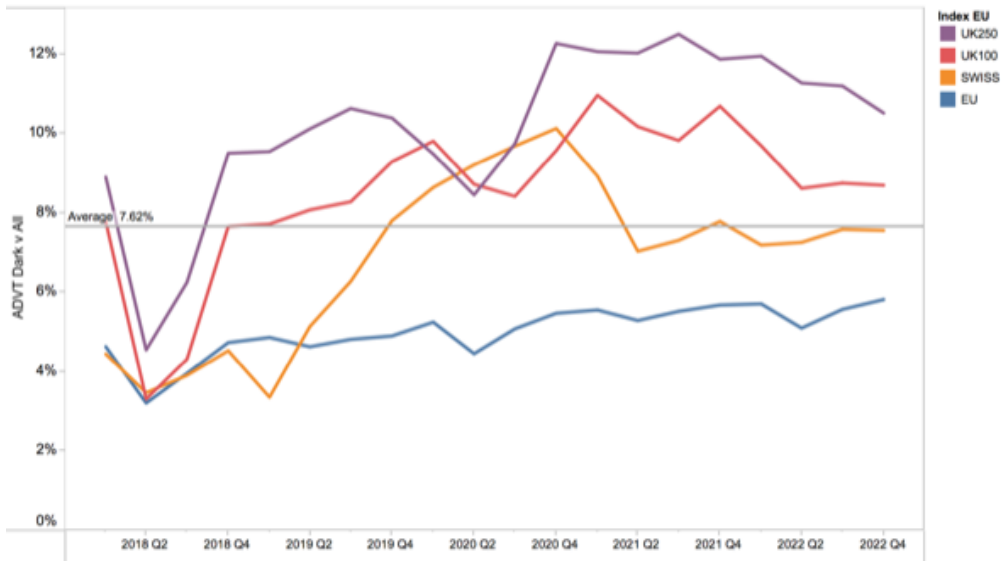


Figure 4 - Market fragmentation since 2018 – Average Daily Volume €

Source : big xyt

This fourth chart shows the evolution of the share of dark trading since Q2 2018 on European, Swiss and UK large cap and mid cap indices stocks. Since the FCA's decision in Q4 2020 to no longer apply the DVC, dark traded volumes on UK large caps and mid-caps have increased (from 8.7% to 10% or 12% of ADV, respectively). The relative share of volumes traded in dark pools for mid-caps is thus greater than for large caps.

A decline in dark pool volumes in these three geographies seems nevertheless to be underway, even in the UK where the DVC is no longer effective since 2021.

Index	2021 Q1	2021 Q2	2021 Q3	2021 Q4	2022 Q1	2022 Q2	2022 Q3	2022 ..	ADVT Dark v All
DK25	9.1%	9.3%	9.0%	8.9%	10.1%	10.1%	9.3%	10.6%	
UK250	12.0%	12.0%	12.5%	11.9%	11.9%	11.3%	11.2%	10.5%	
UK100	10.9%	10.2%	9.8%	10.7%	9.7%	8.6%	8.7%	8.7%	
DEM50	9.0%	7.2%	7.9%	7.9%	7.1%	7.2%	7.3%	8.3%	
FRM20	9.0%	8.1%	9.1%	9.0%	8.6%	7.5%	7.7%	8.2%	
CHM30	10.0%	8.2%	8.4%	8.0%	8.7%	7.9%	7.5%	7.8%	
PT20	9.5%	5.6%	9.0%	8.1%	8.2%	6.0%	7.8%	7.8%	
CH20	8.7%	6.7%	7.0%	7.7%	6.9%	7.1%	7.6%	7.5%	
IE20	10.2%	8.8%	6.9%	7.9%	7.7%	7.5%	8.1%	7.4%	
NL25	6.8%	6.5%	6.3%	6.3%	7.1%	5.8%	7.0%	7.3%	
NO25	7.3%	5.8%	6.5%	6.5%	7.0%	5.2%	6.0%	7.3%	
AT20	7.0%	6.6%	6.3%	6.7%	8.5%	6.1%	7.0%	7.2%	
FR40	7.2%	5.5%	6.3%	6.6%	6.8%	5.2%	6.7%	7.2%	
FI25	6.6%	6.4%	7.2%	7.4%	7.5%	6.4%	7.5%	7.0%	
DE40	6.3%	6.2%	6.2%	6.7%	6.4%	5.4%	6.2%	7.0%	
NLM25	10.4%	7.4%	6.5%	8.2%	6.6%	6.2%	6.5%	6.8%	
SE30	7.1%	6.7%	7.4%	7.3%	8.0%	6.9%	7.9%	6.7%	
BE20	7.6%	5.8%	7.0%	7.7%	7.7%	6.1%	6.9%	5.9%	
ES35	5.8%	5.2%	5.5%	5.4%	5.3%	4.7%	5.8%	5.3%	
IT40	4.9%	4.7%	4.7%	4.8%	4.7%	5.0%	5.3%	5.0%	

Figure 5 - Dark trading (8% Cap = midpoint)

Source : big xyt

This table presents in more detail the share of dark trading by country (UK, EU and Switzerland). We can still see, indirectly, that the share of dark trading is higher in mid-caps than in large caps (see countries with fewer large caps in their indices (Denmark, Switzerland, Portugal...) and between 2 indices in the same country). A more detailed analysis at the level of each individual stock would nevertheless be necessary to conclude definitively on this point.

b. US DATA

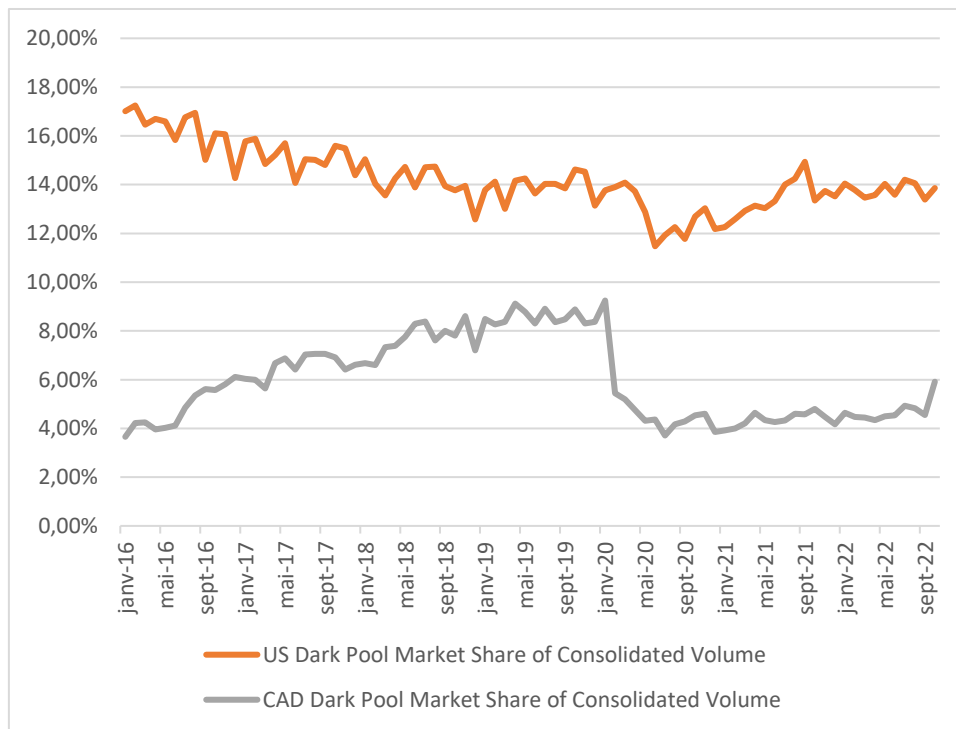


Figure 6 - Part relative des dark pool aux US et Canada

Source : Rosenblatt Securities Average daily volume

There has been a slow decline in the market share of dark pools in the US since 2016, which will accelerate in 2020 probably due to COVID (a similar phenomenon in Canada), and then a stabilization of volumes for the past two years around 14%.

In Canada, we see continued growth but at lower levels (below 10%) and then a normalization around 4% for the past two years, after a strong COVID shock.

[7] and [11] report that the share of dark pools (ATS) has been continuously decreasing in the US from 2015 to 2021.

At the same time, the share of non-ATS (the equivalent of SIs and OTC markets in Europe) has increased from 22.1% in 2016 to 37.2% in 2021, 10% more than in Europe.

**In conclusion, a similar dynamic can be observed in Europe, the USA and Canada, namely a stabilization of the volumes traded on dark pools. This stabilization is nevertheless taking place at very different levels (7.6% of ADV, 14% and 6% of consolidated volumes). On the other hand, the growth of the SI and OTC market in the USA contrasts with the decrease in volumes traded on this type of platform in Europe.**

## PART II

### 1. INTRODUCTION

The academic literature on dark pools is abundant. It is largely motivated by the growing concern of regulators and some market participants who have seen their share increase sharply since their emergence. Their presence naturally raises the question of their impact on market quality in general, i.e. liquidity, price discovery and volatility, but also incidentally on the "fair" access to trading venues "at the right price" by all traders, especially the less professional ones (or those acting on their behalf).

Although the methodologies for econometric analysis are well established, the various research papers present often contrasting results, whether they concern studies on liquidity, price formation or the impacts of regulation. Nevertheless, a general trend emerges.

This variability of results has several causes:

- i. Studies often focus on different geographical areas (mainly US, EU, UK, Australia and Canada) with different market structures and regulations that are often difficult to integrate into the models and difficult to transpose from one area to another.
- ii. The definitions of dark pools or dark trading are often vague because the boundary between dark pool (as an institution) and dark trading (as an activity) is often country-dependent and sometimes difficult for researchers to identify in the data (see Part 1 Typology).

Many articles have (rightly) used the "natural experiment" that was the SEC tick size pilot (STPE) because it incidentally presented a database covering important shifts in the share of dark trading in the markets. However, the limited universe of stocks considered in the STPE was mainly composed of small caps and the results raise questions as to their transposition to a more global market.

Finally, the quality of the raw data and its reprocessing are obviously key to a good understanding of the phenomena, and in the opinion of the researchers, this step is often laborious and causes uncertainty in the results found.

### 2. LIQUIDITY

Since the new regulatory reforms of the equity market structure at the end of the 2000s in both the US and Europe with MIFID 1 and 2 respectively, we have seen the introduction of competition between exchanges, leading to a more fragmented market, an improved range of trading services, and an increase in the number of players and volumes. This transformation has more than compensated for the uncertainties related to the possible fragmentation of liquidity in this new context. An OXERA report [21] found a net improvement in overall liquidity (in all its forms: width, depth, immediacy, resilience, and breadth<sup>3</sup>) in equity markets from 2009 to 2019.

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<sup>3</sup> Width refers to a narrow bid offer, limited transaction costs, Depth to the existence of numerous orders around the mid price, Immediacy to the speed of execution of orders and generally to the efficiency of trading, clearing and

Dark pools are one element among others of this fragmentation contributing, as such, to the overall improvement of liquidity. However, if we look at the dark pool case only, the principle of segmentation between informed traders operating on the lit and uninformed traders on the dark pools tends to negatively affect liquidity [19]. Indeed, liquidity providers in the lit come to monetize their gains by trading against uninformed traders, thereby compensating for losses against informed traders. An under-representation of uninformed traders in the lit venues would therefore tend to erode the margins of market makers and thus negatively affect overall liquidity.

Academic studies reflect this balance between the latter principle and the general increase in volumes and (new) players (especially uninformed traders) in dark pools, which has had a rather positive effect on market quality<sup>4</sup>. Studies are indeed sometimes contradictory ([12]) but do not find a significantly bad impact of the presence of dark pools on liquidity. However, [10] find a negative impact of dark trading on liquidity, but on Dutch data that can be considered as not representative.

[11], on EU/UK data, is more clear-cut. It finds no negative impact of dark trading (nor of the fragmentation of lit order books) on liquidity. This observation was already made by [5] and [12]. [6][7][14] conclude that spreads have improved on 2009 US data but that they have deteriorated, especially on large caps, starting with 2020 data.

### 3. PRICE DISCOVERY AND VOLATILITY

The analysis of the impact of dark pools on the price formation process and on market quality in general is multiple and complex. On the one hand, the effects, and counter-effects of dark pools on the market are numerous and moreover, regardless of their characteristics, it is difficult to dissociate their impact from that induced by market fragmentation.

At first glance, if dark trades contain less information than lit trades, they should, in aggregate, contribute less to the discovery of prices for the whole market. Indeed, recall that the information contained in dark orders only appears after their execution. [2][23]

However, theoretical models [23] show that the presence of dark pools tends to segment the quality of traders by attracting most uninformed traders, whereas lit exchanges would retain a majority of informed traders. Consequently, and as the article by ([8]) demonstrates, this distribution of traders according to the quality of their information tends to reduce the noise of the price formation process in the lit venues, thus leading, in a virtuous circle, to a better efficiency of prices in general. Dark pools, executing their trades according to prices established in these same venues, contribute de facto to this. ([18]). [4] confirm this principle by specifying that dark pools have a positive effect on the way new information is acquired by operators<sup>5</sup>.

However, the problem is more complex. To illustrate, let's imagine two extreme cases.

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settlement systems, Resiliency to the ability of new incoming orders to quickly correct market imperfections, Breadth means that orders are numerous and in volume with minimal impact on prices

<sup>4</sup> There is no formal definition of market quality but it generally refers to the notions of liquidity and efficiency. Some restrict it to liquidity (on the assumption that good liquidity often implies good efficiency and because it is more easily measured)

<sup>5</sup> The price discovery process is formally the coming together of two components: the acquisition of new information and the incorporation of existing information into the asset price.

First case: transparency would be maximum, with almost all operators having the same level of information, arbitrage opportunities would be rare because, in general, information held by a minority needs a large group of uninformed operators to make it monetizable. Information therefore loses its value and mechanically generates a "one-sided market" of buyers and sellers.

The second (extreme) case is when there is too much migration of uninformed traders into the dark venues. A good training process is only possible if informed traders are able to obtain information (at a cost) and integrate it into prices; they are, at the same time, rewarded by the gains they make over uninformed traders. If the presence of uninformed traders is poor in the lit venues (too large a proportion of dark traders), then there is no longer any incentive to acquire this information, which would negatively affect the price formation process. In this case, a vicious circle is created where dark traders refer to the prices of the lit venues and exacerbate, de facto, the poor quality of price formation.

These two extreme cases highlight the non-linearity of the effects between dark trading and market quality.

Some researchers believe that there is simply a threshold beyond which dark trading is detrimental to market quality. They reaffirm, however, that at the current levels observed in the US, the UK, Canada and Australia, there would be no impact, or at best a positive impact, on this same quality.

Some researchers estimate this threshold at around 15%. They caution that this value should be viewed with caution, as it is the result of "virtual" regression coefficients, estimated from data that never reveals such a high level of dark trading relative to total trade volume. Moreover, it is an estimate resulting from an aggregation of thresholds estimated on individual stocks with a high variability depending on their liquidity. ([8] and [2]).

Nevertheless, it is interesting to note this non-linearity between dark trading and market quality.

Beyond these theoretical analyses, empirical studies do not reveal any major impact of the presence of dark pools on price formation, [12] even shows a positive effect in the case of a two-sided dark market (with no effect on the one-sided dark market<sup>6</sup>) while [9] finds no impact in general. [8bis]

A legitimate concern of regulators is whether, in a stressed market environment (or high volatility), the impact of dark trading does not tend to amplify already difficult market conditions. Another way of interpreting the segmentation of informed/non-informed orders between dark and lit provides a reassuring answer to this question. Indeed, a high volatility environment often means that more information is circulating in the markets; uninformed traders therefore tend to wait (fewer trades) thus reducing the proportion of dark trading in the market. ([7] for US COVID 2020 data, [22])

Finally, a very recent paper ([11]), specific to the US market structure, establishes a link between the price discovery process (price efficiency) and the type of dark trading involved. By segmenting dark trading into 3 categories, hidden orders in lit exchanges, dark trading on exchange (ATS/dark pools) and dark trading off exchange (non ATS/brokerage internalization), they conclude that they have respectively a negative, positive and negligible impact on price discovery.

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<sup>6</sup> By one-sided dark market we mean that the reference of the price traded in the dark market is at the midpoint price (only one possible order to sell or buy, "limit order"), by two-sided dark market we mean that the reference of the price is between the bid and ask price

## 4. IMPACT DVC RÉGULATION

After MIFID I and II introduced pre-trade (and post-trade) transparency rules with some exemptions for which it is possible to opt out of this transparency, concerns have been raised that these exemptions have not been implemented consistently across different markets and venues, potentially negatively impacting the price formation process. MIFID2 has therefore decided to apply the DVC (Double Volume Cap) to limit the volumes of shares (under the RPW and NTW exemption rules<sup>7</sup>) traded in dark pools.

NB: A venue cannot use these 2 exemptions to execute a trade on a specific stock for 6 months, if it is responsible for at least 4% of the volume of this stock compared to the total volume over 12 months. Furthermore, no venue can use these 2 exemptions to execute a trade on a specific stock for 6 months if the total volume of this stock on all venues using these 2 exemptions exceeds 8% of the total volume of this stock over 12 months.

This new mechanism was implemented in March 2018. As of September 2018, ESMA counted approximately 1300 suspended shares (sharply decreasing since then, 421 in January 2020 and 205 in December 2020, figures still including UK names).

Academic research on the impact of the DVC on the proper functioning of markets is less prolific than that on the general issues of the impact of dark pools (liquidity, price formation, volatility, etc.) due to the relative primacy of this decision.

The setting up of the DVC (alongside other "natural experiments" in the US) is an empirical, life-size application of the theoretical concepts developed in chapters B and C, analysing the consequences of more or less dark pools on liquidity or the price formation process. This experiment also makes it possible to observe the nature of the changes in the flows of operators within the set of venues as well as the effects of a disturbance of an equilibrium on the problems of regulation.

**The literature focuses on the impact of DVC on liquidity and especially on transaction costs, but less on its impact on price formation.** Some papers, if not all, rely on recent data and conclude similarly about the new equilibrium between different trading venues before, during and after a limitation of dark trading.

Almost all studies ([16][20] directly address the issue), except for the ESMA study [13], do not find any particular impact on execution costs (at the time of the suspension but also at the time of its withdrawal). This can be explained by the fact that investors move to other trading venues, notably those that offer limited pre-trade transparency, such as Periodic Auctions or SIs (systematic internalizers). Lit Venues, on the other hand, recover only a minimal share of trade rebalancing (the flow ratio can be 1 to 3 between Lit Venues vs PA/SI's). Note that when the suspension is lifted, the flows return en masse (but not in totality) to the dark pools. This observation is made by all papers, without exception, dealing with the subject.

In their analysis, [20] also conclude to the homogeneity of the choice of venue switching, according to the size and/or the quantity of information of the operators, during the suspension as well as when it is lifted.

As regards price efficiency, only [21] [15] conclude that the introduction of the suspension had little impact.

In a very recent paper, [23], on broader 2018-2020 data, including several suspensions/removals and thus providing a more consistent statistical basis, deduces that suspensions in calm markets (pre-Covid type)

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<sup>7</sup> RPW : *Reference Price Waiver*; NTW : *Negotiated Trade Waiver*

tend to improve market quality (more liquidity, less volatility, etc.) while they tend to exacerbate these parameters in already volatile periods (post-Covid type). Yet it is in these latter periods that more liquidity and stability would be needed. Nevertheless, he believes (no empirical study) that operators have gradually learned about this MIFID rule and that there is a "relative" de-addiction to dark pools, an effect that regulators are ultimately seeking.



## CONCLUSION

Dark pools have become a solid part of the financial market landscape since the waves of EU and US regulation in the 2000s, opening up trading platforms to competition.

The need was real, and this decision had a positive impact on the quality of the market in general, responding to real needs (large trades) with regard to dark pools.

Academic research concludes, almost unanimously, that the presence of dark trading has a positive, if not negligible, or very little harmful impact on liquidity, volatility, or price discovery, even at current dark levels in areas (US/UK) where its proportion is highest and where no suspension mechanism exists, as in Europe.

However, some researchers warn that for certain thresholds (around 15%), dark trading is likely to be detrimental and that these volumes should at least be monitored.

It appears recently that the share of dark trading is spontaneously decreasing in favour of other alternative platforms such as auction markets, SI's or OTC (as we have already seen in the specific case of DVC). One of the reasons for this is the arrival of new operators such as HFTs (high frequency trading) or PTs (proprietary trading) which, contrary to the arguments of protection against predatory (large) traders put forward at the end of the 2000s, are now welcome as providers of liquidity for these dark pools.

Market fragmentation is complex, and its effects are multifactorial. It seems that beyond the dark pool phenomenon (a very specific element in this fragmentation), other sources of concern (in which dark pools can also play their role of interaction) have recently emerged, notably the growing importance of High Frequency Trading, the lack of transparency of SI's and other OTC platforms, the growing share of discrete trading (Fixing/Auction trading) vs. continuous trading and the consolidated databases of trade reports which, behind their obvious transparency, risk to discriminate between those capable of analysing them and others. Generally speaking, the consequences of the evolution of the market structure and its regulation on the "fair access" by all operators, in particular the end-users (savers), is a theme that is almost absent from the academic literature. These are undoubtedly topics for future research.



## DEFINITIONS

**Lit exchange** : Any platform offering a market with a continuous, public order book that offers real-time orders and quotes in full transparency.

**MTF** : trading platform, under the European MIFID II legislation, which allows the exchange of financial instruments between several parties. They are electronic systems operated by major investment banks or authorized market operators.

**Dark pools** : A trading platform that allows different traders to submit hidden orders until the trade is executed and postponed. They are a type of ATS in the US and MTF in Europe.

**Off book cross** : Bilateral transactions carried out outside exchanges, MTFs or SIs, under exemption conditions. Transactions generally carried out manually. These transactions are considered "on exchange" because they are reported in the exchanges.

**HFT** : High Frequency Trading is a trading method that uses high computing power to arbitrage and trade different markets in fractions of a second.

**PT** : Proprietary Trading refers to trading activity conducted by financial institutions that commit their own capital and not that of their clients.

**Block trade** : A block trade is a private transaction in a financial instrument that is significantly larger than the average historical volume of that instrument. They are generally broken down into a succession of small orders, off-market and on dark pool type platforms.

**Call auction** : The main platforms (Exchange and/or MTF) offer an auction mechanism at different predefined times of the day where client orders are grouped together and "matched" in specific intervals. The "best match" determines the executed price.

The auction lasts 2 to 3 minutes during which time traders can enter, modify or delete their orders. Only the aggregated information of the order book is published. Indicative prices/volumes give information about the conditions under which the auction would be traded if it ended at that moment. The auction is liquidated at the price that maximizes the volume that can be executed. By providing only indicative prices, the auctions are less transparent than on the lit exchange.

**Periodic auction** : They operate in a similar way to Call Auctions. However, they take place at non-predefined times (either specified by the venue operator or randomly). The duration of the auction is much shorter (less than one second). During this phase, indicative prices/volumes are published. This type of auction is therefore considered less opaque in terms of pre-trade information.

**SI (Systematic internalizer)** : These are trading platforms operated by broker-dealers or High Frequency Trading firms to execute orders from their own client flow. SI's are required to publish price ranges for small volumes. Although they give more guarantee in terms of pre-trade transparency than auction markets, large trades are not subject to this rule.

One-third of the SI's are independent Enhanced Liquidity Providers (ELP), which typically handle small sizes. Two-thirds are banks that handle large sizes (block trades).

**OTC Trading/Market** : Mainly concerns major dealers executing their clients' trades at their discretion. No public quotation is available. In general, OTC trading is defined as any type of trade that does not belong to the previous categories.

**ATS (Alternative Trading System)** : (US) exchange platforms that are less regulated than traditional exchanges. They are essentially composed of dark pools and ECNs (Electronic Communication Networks)

**Non ATS (Non Alternative Trading System)** : (US) exchange platforms for OTC trading or brokerage internalization

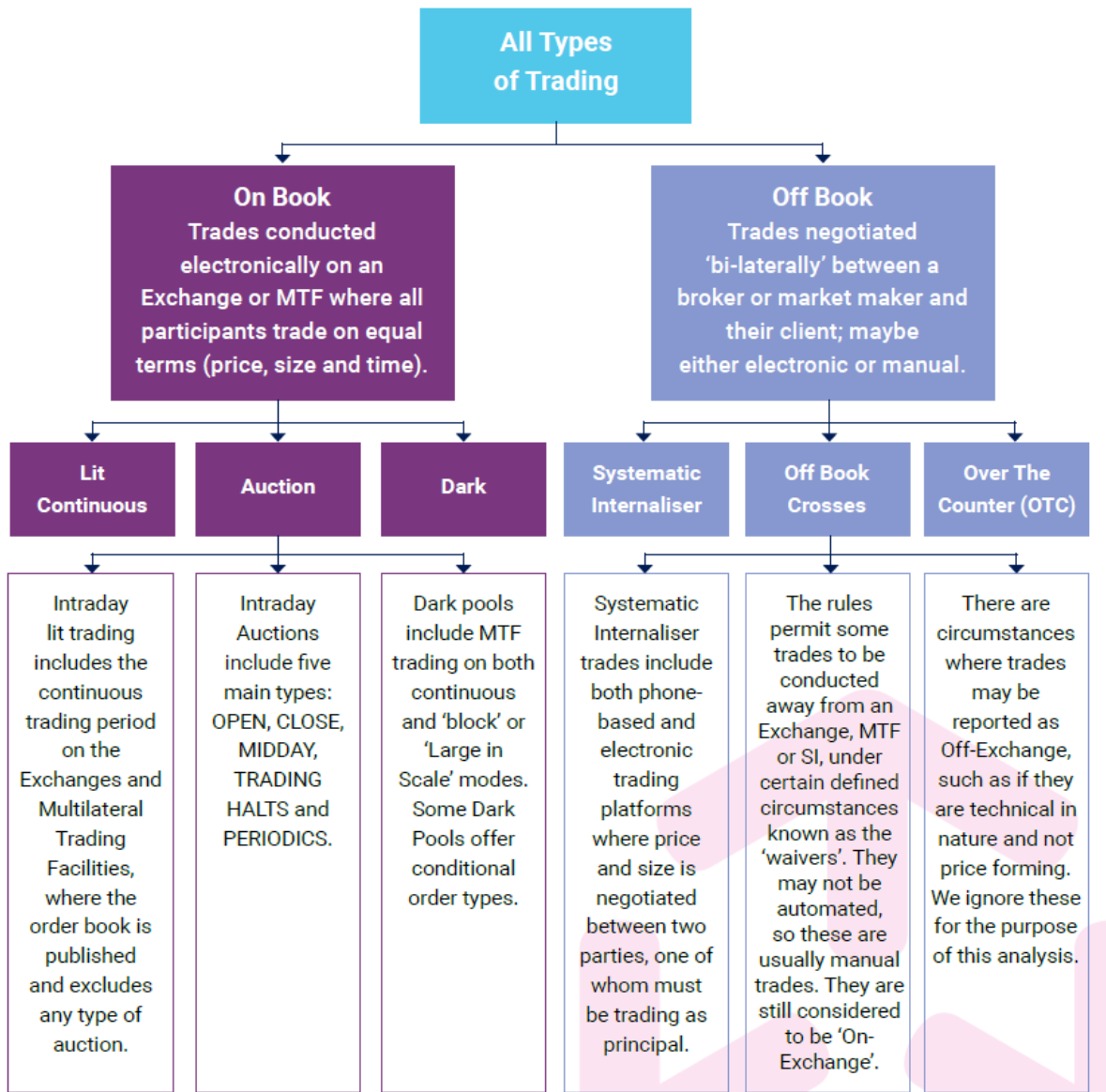


Figure 7 - Typologie des plateformes de trading

Source : big xyt

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