

ITG Submission to the Committee of European Securities Regulators

Consultation Paper entitled “Technical Advice to the European Commission in the Context of the MIFID Review - Equity Markets”

31 May 2010

Abstract

ITG appreciates the opportunity to comment on the issues raised in the Committee’s Equity Markets Consultation Paper. While the Consultation Paper requests comments on a variety of issues ITG will focus on two areas:

- a. the proposal to introduce a minimum order size for MTFs which avail of the reference price waiver, and
- b. the Committee’s proposals aimed at reducing the cost of market data.

ITG strongly objects to the proposed minimum order size for MTFs availing of the reference price waiver. ITG believes that this measure would be a regressive step in a market which is increasingly electronic, algorithm driven and in which execution venue order sizes are reducing. This measure would increase the volume traded through the more lightly regulated broker OTC channels. The measure would prevent smaller buy-side firms and retail investors from using dark pool MTFs. It would deprive institutional investors of choice and force them to execute on venues they consider less than ideal in light of the characteristics of their order. Some institutional investors would have little option but to execute on the more expensive primary exchanges. This measure would amount to a concentration rule by stealth and would give rise to a significant divergence in dark pool regulation between the US and Europe. ITG attaches to this submission a research paper entitled “*Alternative Trading Systems in Europe, Trading*

Performance by European Venues Post-MiFID" which was authored by ITG's analytics team.¹ This paper is based on a sample of European trading data, spanning primary exchanges, dark pools and displayed alternative venues, over the first three quarters of 2009 and purports to be the first performance analysis of European venues since the implementation of MiFID. The paper concludes that alternative trading markets, and dark pools in particular, add value relative to primary markets for all order types. As ITG considers investor choice to be a key consideration when reviewing this proposal, we believe that in the absence of demonstrable harm to the quality of public quotes regulators should not deprive market participants of this source of liquidity.

In relation to the Committee's proposals to reduce the cost of European market data, ITG believes that the Committee's proposals fall short of what is required in order to bring about a meaningful reduction in the cost of market data. In light of the importance of comprehensive market data in a fragmented market ITG strongly urges the Committee to recommend the adoption of stronger measures.

ITG

Investment Technology Group ("ITG") is a specialised brokerage and financial technology firm that partners with asset managers globally to improve performance throughout the investment process. ITG's client base comprises institutional buy-side investors and broker-dealers. ITG has operated the POSIT® crossing system in Ireland since 1998. Upon the introduction of MiFID in 2007, ITG was authorised by the Irish Financial Regulator to operate POSIT as a MTF. POSIT conducts crosses of unpriced orders from institutional investors and brokers on a confidential (i.e. non-displayed) basis. POSIT Match and POSIT Now cross orders at the mid-point of the current best bid and offer on the reference exchange. POSIT Now VWAP crosses orders at the day's volume weighted average price in the security on the reference exchange. POSIT operates pursuant to the reference price waiver from pre-trade transparency. POSIT takes its reference price from exchange displayed books. ITG

¹ Brandes and Domowitz, *Alternative Trading Systems in Europe, Trading Performance by European Venues Post-MiFID*, April 2010.

also provides portfolio construction and optimization tools, pre-trade and post-trade analytics, execution management systems and connectivity to clients. As an agency broker, technology provider and operator of a MTF, ITG has been involved in many of the market developments brought about by, or expedited by, MiFID including the increase in electronic and algorithmic trading, the fragmentation of liquidity post-MiFID, the more recent gradual connectivity of execution venue to execution venue and the buy-side's growing appetite for reliable post-trade analysis of their execution performance in this fragmented market. We will refer to some of these developments below in our analysis. ITG believes that this diverse background gives it a well-informed position from which to comment on the Committee's proposals.

In this submission ITG will use the term "dark pool" to refer to all forms of dark liquidity including MTFs availing of waivers from pre-trade transparency, Systematic Internalisers (SIs) and broker operated crossing systems (OTC systems)). When we use the term "dark pool MTF" we are specifically referring to a MTF availing of the reference price waiver from pre-trade transparency.

Dark Pool MTFs in Context

ITG believes that the issues surrounding dark pools and undisplayed liquidity do not exist in a vacuum and that regulators must not look at any one aspect in isolation from the market in which it exists. Regulatory changes that cause modified behavior of market participants should undergo careful evaluation before implementation. The impact of a change in regulation of dark liquidity could have consequences for many market venues. We feel it is insufficient and unhelpful to assess the appropriateness of a minimum order size solely in the context of the reference price waiver. We feel that regulators must analyze what effect proposed measures will have on the market viewed holistically. For example, the large in scale waiver was designed by policymakers in 2005 and enacted in legislation in 2006. However since the waiver took effect in 2007 market participants have struggled with it, particularly during the recent market turmoil. As it was enacted in legislation regulators and market participants lacked the flexibility to adapt to market developments and address the legitimate trading needs of market participants. With this in mind, ITG believes that the analysis of the reference price waiver must be holistic and take account of the needs of all market participants, including buy-side institutional investors.

ITG has, through its client relationships with institutional buy-side investors across the European marketplace, developed a good understanding of the needs of institutional investors in the current market. We do not claim that all our buy-side customers endorse all of our positions. In fact, not all buy-side traders agree with each other on every issue. But as a firm whose primary customer base is large mutual funds and other long-term investors, we determine our positions based on extensive discussions with buy-side traders and based on what we believe will most benefit our institutional customers, and we believe our views are generally consistent with those of our buy-side customers. If there is one theme that we hear from the institutional traders who are our primary customer base, it is that they are in the best position to determine where to trade their customers' orders.

ITG believes that the availability of multiple trading venues, including exchanges, MTFs, SIs and broker OTC pools, has had a positive impact on the markets. US research conducted following the fragmentation of the markets there showed that the emergence of multiple execution venues had no negative impact on the US market.² The US research shows that both long-term and short-term investors benefited from the innovations in trading systems that accompanied the emergence of multiple trading venues.³ Research on the European market published in April 2010 shows that:

“alternative trading markets, and dark pools in particular, add value relative to primary markets, in the sense of lowering trading costs. On average, costs in the primary markets are 71 percent greater than observed in dark pools and 20 percent greater than in the data for displayed MTFs. This qualitative result holds across countries of listing and market capitalisation categories.”⁴

² O'Hara, Maureen and Mao Ye, *Is Market Fragmentation Harming Market Quality?* (March 2009) available at http://papers.ssrn.com/so13/papers.cfr?abstract_id=1356839.

³ Angel, James J., Lawrence E. Harris and Chester S. Spratt, *Equity Trading in the 21st Century* (February 23 2010) available at <http://www.knight.com/newsRoom/pdfs/EquityTradinginthe21stCentury.pdf>.

⁴ Brandes and Domowitz (2010), p.2.

In summary, this study demonstrates what many fund-managers already know, namely that exposure to new liquidity sources, including sources of dark liquidity, reduces trading costs. As a result, fund-managers now increasingly expect their brokers to provide them with access to these new sources of liquidity. In fact, institutional investors now expect their brokers to provide systems that act as a layer of intelligence between them and the multiple sources of liquidity each with its own unique trading methodology. In addition institutional investors expect their brokers to survey and sample at least a sizeable portion of the European trading landscape. As a result, brokers have developed systems such as algorithms, smart order routers and execution management systems with consolidated pan-European market data feeds, to address this need.

Minimum Order Size and Investor Choice

ITG believes it is critical that market participants have choices about where and how to execute orders and that such choices include liquidity sources specifically tailored to their needs. As noted below, many institutional investors favour dark pool MTFs due to the reduced market impact associated with using such systems. To avoid disrupting legitimate trading strategies designed to promote best execution, we urge the Committee to refrain from recommending any action that would reduce the availability of non-displayed liquidity through MTFs unless and until there is evidence of harm to the quality of public quotes.

ITG is aware of no empirical evidence supporting the proposition that MTFs availing of the reference price waiver have adversely impacted the quality of public quotes. The conclusion that there has been no harm to the quality of public quotes despite the recent increase in dark pool activity (both dark pool MTF and other forms of dark pool) is not surprising when you consider the underlying data. According to the Committee's own statistics the total order flow executed by dark pools in Europe was 9.8 percent of all trading in EEA shares in 2008. Dark pool MTFs (i.e. dark pools availing of the reference price waiver) accounted for only 0.1% of trading in EEA shares in 2008.³ Given the very small market share held by dark pool MTFs, and the lack of evidence of any negative impact on displayed markets from non-displayed liquidity, ITG has

serious questions about the necessity and/or propriety of imposing a minimum order size on dark pool MTFs.

Minimum Order Size and Two-Tier Market

In Europe, dark trading occurs primarily in one of three types of venue; dark pool MTFs, SIs, and broker OTC pools. MiFID, as it is currently framed, imposes different standards for each venue. This difference in standards is particularly apparent between broker-operated dark pool MTFs and broker-operated OTC crossing systems. Broker crossing systems which do not operate as regulated MTFs are not subject to many of the requirements applicable to MTFs. For example, broker OTC crossing pools, unlike MTFs, are not subject to, and therefore do not require a derogation from, pre-trade transparency, need not maintain and abide by non-discretionary rules and do not normally require regulatory approval before implementing enhancements or innovations.⁵ However, dark pool crossing systems which have registered as MTFs are subject to these, and more, regulatory restrictions.

ITG notes that the Committee's Consultation Paper does not contain a proposal to impose a minimum order size on broker-operated OTC crossing systems.⁶ Accordingly, the imposition of a minimum order size restriction on dark pool MTFs would run the risk of being counter-productive and pushing orders off exchange to over-the-counter channels, as investors would look for other ways to limit market impact. Order flow would be pushed from MTFs onto the more lightly regulated broker OTC crossing systems or onto platforms located outside the European Union. ITG believes that this would not be in the interests of market participants or market integrity in general. ITG believes that the higher standards of regulation associated with authorisation as a MTF serves to increase market integrity.⁷ As a result, ITG

⁵ In the vast majority of cases, clients provide their brokers express consent to the non-publication of limit orders thereby further reducing disclosure by broker OTC platforms.

⁶ We note the Committee's proposed requirement that broker OTC systems must register as MTFs when they reach a certain volume threshold, however, we doubt that this proposal would be workable in practice.

⁷ ITG broadly agrees with the Committee's proposals designed to strengthen standards amongst MTFs such as the requirement that MTFs reduce trade reporting times and publish trading statistics.

believes that the Committee's proposals would exacerbate the already emerging two-tier market which exists between broker OTC systems and dark pool MTFs.

Minimum Order Size and Reduction of Transaction Costs by Dark Pool MTFs

The Committee states in its Consultation Paper:

“Broadly, the policy rationale for the reference price waiver remains. However, market developments have moved beyond CESR's observation in its previous technical advice to the EC in April 2005. Non-disclosure by these systems is no longer primarily due to the concern that the publication of orders, especially in the less liquid shares for which the systems were most frequently used, would increase the incentive to manipulate the continuous market before the reference price was fixed.”⁸

ITG agrees with the Committee's statement that the policy rationale for the reference price waiver remains. ITG believes that the original rationale for the reference price waiver remains valid. Institutional investors should have the choice to execute large orders in a single block size should they deem this to be the appropriate trading strategy. The Committee correctly notes that non-disclosure in this instance was originally justified by the need to reduce the risk of market manipulation on the reference market. ITG believes this justification remains today. In addition, there was, and is, another rationale for the waiver. Dark pool MTFs allow institutional investors to trade in large size while significantly reducing the adverse market impact inevitably associated with trading in such size on the exchange (or indeed a combination of exchanges and MTF displayed books). ITG believes that the aim of institutional investors to avoid natural market impact not amounting to market manipulation is a valid justification for the reference price waiver. A recent ITG research paper on the European market concludes that:

“Alternative markets, and dark venues in particular, add value relative to primary markets, based on observed trading transaction costs and

⁸ CESR Equities Consultation Paper, p11.

the risk of slippage in the execution of an order. Such qualitative results hold regardless of country of listing and market capitalization of individual securities. Controlling for stock characteristics, trading strategy, and market conditions, the difference between displayed MTFs and primary markets essentially disappears for orders that require some time to work, while the dark pool results continue to hold. Overall, this suggests that confidential crossing is the salient distinction in terms of the interplay between market mechanics and trading costs.”⁹

The research paper found that dark pools reduced costs for all orders, large and small. If an institutional investor deems it appropriate in light of the characteristics of his order to execute in a dark pool rather than on an exchange or MTF displayed order book his trading costs will be reduced by between 20 and 71%.¹⁰ In light of this research, ITG believes that investors should not be deprived of this source of liquidity for any size of order without evidence of harm to public quotes. As noted above, we are unaware of any such evidence.

Minimum Order Size and the Fragmented Market

ITG agrees with the Committee that market developments have moved beyond those as observed by CESR in 2005. However, ITG notes that the Committee did not proceed to consider whether these market developments may give rise to additional justifications for the reference price waiver. ITG believes that market developments over the past five years have given rise to new justifications for the reference price waiver.

Recent market developments in relation to US dark pools were considered by industry experts Aite Group in a research report on dark pools. According to the Aite Group:

⁹ Brandes and Domowitz (2010), p.22.

¹⁰ See Brandes and Domowitz (2010), above.

"Nothing in life stays static, and the dark pool market is no exception. What started out as an island, touting diversity of unique internal and customer flow and cost-effective, low-market-impact execution service has now evolved to something much larger and more connected, leading to the current market reality in which many of the dark pools are now connected with each other as well as with displayed markets."¹¹

The Aite Group further notes:

"The non-displayed market is not a homogeneous one. One important note is that due to the variations in business models and target client base, dark pools do not necessarily compete against one another. A dark pool that focuses on facilitating buy-side block trading, for example, might link up with a dark pool that aggregates sell-side flow to add diversity in order flow. Similarly, broker-owned dark pools might link up with one another to increase overall fill rates for their collective clients. In fact, given the growing trend of dark pool linkages, coopetition (i.e., certain level of cooperation between entities that otherwise compete) has become more common in recent months."

ITG believes, based on recent experience in the European market, these views to be equally applicable to Europe. Fund managers and brokers have an obligation under MiFID to take all reasonable steps to achieve best execution. This is a substantial challenge at a time when European equities markets are facing unprecedented fragmentation. As a result, European MTFs, SIs and brokers have begun to connect to each other. In short the European market has begun a process of re-wiring with algorithms making the decisions of where, when and how to trade. While the process has begun in Europe and is continuing apace, it is not as advanced as in the US. The Committee's proposals notably do not take account of this re-wiring of the European market. Again, ITG believes that dark pool MTFs have, in the absence of evidence of harm to the quality of public quotes, a role to play in this interconnected market for all order sizes.

¹¹ Aite Group, LLC, *Dark Pools 2009: Not so Dark Anymore....*, September 2009, p7.

Today's institutional investors rely on algorithms and smart order routing technology to sample the market across multiple venues thereby mitigating the risk of adverse selection and market impact. This has inevitably led to an increase in smaller orders and faster trading across all European equities markets, including dark pool MTFs. Today's institutional investors continue to send large parent orders to their brokers as they did in the past. However, in order to mitigate the risks of adverse selection and market impact these large parent orders are, more often than not, split into child orders and worked into the market over time by the investor's chosen broker algorithm. The Committee's proposal to impose a minimum order size on dark pool MTFs will have the effect of preventing dark pool MTFs from receiving these electronically produced child orders despite the fact that, more often than not, they formed part of a larger block order. This proposal is regressive in a market which is increasingly reliant on algorithms to overcome the problem of liquidity fragmentation. ITG questions the appropriateness of this *de facto* restriction of electronic trading on a particular execution venue. ITG believes that measures must be reviewed in the context of a holistic review of all forms of electronic trading across all execution venues.

ITG believes that the imposition of a minimum order size for dark pool MTFs would inevitably lead to the removal of dark pool MTFs from the algorithmic trading world. This would have the effect of reducing the available non-exchange algorithmic execution destinations to SIs and broker OTC platforms resulting in an increase in volume traded on these more lightly regulated platforms. In addition, this proposal would force investors to place liquidity on exchanges in circumstances where a dark pool may be a more suitable trading venue for the order. In short, this would amount to a concentration rule by stealth.

In evaluating different regulatory proposals, ITG makes an important distinction between regulatory proposals that empower investors by providing them with better information and regulatory proposals that restrict investor choice. For this reason, ITG broadly agrees with the Committee's proposals in relation to strengthening MTFs such as near instantaneous trade reporting, publication of trading statistics and improved clarity of the reference price employed by certain dark pool MTFs. However, we are

generally skeptical of proposals from industry competitors that restrict investor choice. Long-term investors should have the choice to decide how their orders are executed. Where institutional investors deem it appropriate to their trading objectives this may include sending all or part of their block order to a dark pool. In such instances, ITG believes that the investor should have the option of specifying the minimum size of order with which he is willing to interact. In other instances, the institutional investor may deem it appropriate to split the order across multiple venues. The availability of these choices will allow long-term investors to choose the execution venue they deem to be most appropriate to their order with a view to achieving best execution for their customer. In addition, a minimum order size would prevent smaller buy-side firms and retail investors using dark pool MTFs thereby depriving them of the opportunity for price improvement associated with such venues.

Today's buy-side investors submit orders to algorithms not to execution venues. They do this in the pursuit of best execution, in order to reduce opportunity risk and to reduce counterparty risk. In the absence of proven detriment to the quality of public quotes, ITG urges the Committee not to recommend this stealth concentration rule and not to deprive investors who wish to avail of algorithmic trading strategies of this source of liquidity.

Market Data

ITG welcomes the Committee's recognition that "concerns remain that the cost of real-time market data is restricting the availability of affordable consolidated European post-trade data."¹² However, we believe that the Committee's current proposals will fail to have any appreciable effect in reducing European market data costs. We believe that this is an issue deserving of further and in-depth consideration and call upon the Committee to take a comprehensive, robust approach to the issue of European market data costs in the interests of market integrity.

¹² CESR Technical Advice Equity Markets, p23

Appendix

Y Brandes and I Domowitz, *Alternative Trading Systems In Europe – Trading Performance by European Venues post-MiFID*, April 2010

Alternative Trading Systems in Europe

Trading Performance by European Venues Post-MiFID

Abstract

We analyze a sample of trading activity in Europe, spanning primary exchanges, dark pools, and displayed alternative venues over the first three quarters of 2009. This study represents the first performance analysis of European venues since the implementation of MiFID. Alternative trading markets, and dark pools in particular, are found to add value relative to primary markets, in the sense of lower trading transaction costs. The risk of slippage also is greatest in primary markets, and dark venues perform better in this respect than the displayed alternative markets. Increased participation in dark pools also is found to be beneficial, and the benefits of higher participation rates increase with the relative size of an order. The aggregate results mask differences across alternative venues, and these differences are documented across five dark venues and between four displayed alternative markets.

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I. Introduction

As recently as ten years ago, controversy still existed with respect to the future of electronic trading. Changes in market structure were viewed as a technology story. Technology was leading to declines in the cost of providing exchange trading services, while the means by which services were delivered to investors changed radically, transforming the natural industrial structure of the trading services industry.¹ Europe was viewed as being ahead of the curve, in the sense that most European exchanges were electronic, accompanied by early moves toward the demutualization of exchanges into for-profit entities. The prevailing opinion was that alternative trading systems (ATS) would never find a foothold in Europe, since established exchanges already had moved to the electronic model.

The last two years prove such predictions to be false. Depending on the survey, as much as 22 percent of European equity volume now is executed through ATS venues, mostly registered as multilateral trading facilities (MTFs).² The implementation of the Markets in Financial Instruments Directive, or MiFID, is credited with significantly altering the European playing field and breaking down the market power traditionally held by national exchanges.

The introduction of MiFID raises a variety of issues, not the least of which is whether the regulatory changes benefit the investor overall. In this paper, we take a more modest approach, and address a series of questions related most closely to MiFID's best execution criteria.³ Differentiating between dark pools, primary exchanges, and displayed alternative venues, we ask

- Does trading in European alternative trading systems add value?
- Are there differences in execution quality across dark pool venues?
- Are there differences in execution quality across displayed MTFs?
- Do the benefits of trading in alternative trading systems depend on the degree of participation in the system?
- Is there increased risk of slippage in displayed markets relative to dark pools?
- What is the opportunity cost of trading in alternative systems relative to established exchanges?

Beyond published market share statistics, answers to these questions represent the first look at the European alternative markets space, to the best of our knowledge. We find that alternative trading markets, and dark pools in particular, add value relative to primary markets, in the sense of lowering trading transaction costs. On average, costs in the primary markets are 71 percent greater than observed in dark pools and 20 percent greater than in the data for displayed MTFs. This qualitative result holds across countries of listing and market capitalization categories.

¹ See, e.g., Domowitz and Steil (1999).

² Tabb Group (2009) and Aite (2009).

³ These criteria are first proposed in Article 21 of the 2004/39/EC directive.

The aggregate results mask substantial differences across alternative venues within each type. For the five dark pools examined here, average transaction costs range between 4 and 11 basis points. The range for the displayed alternative markets is even larger, between 6 and 19 basis points of transaction cost.

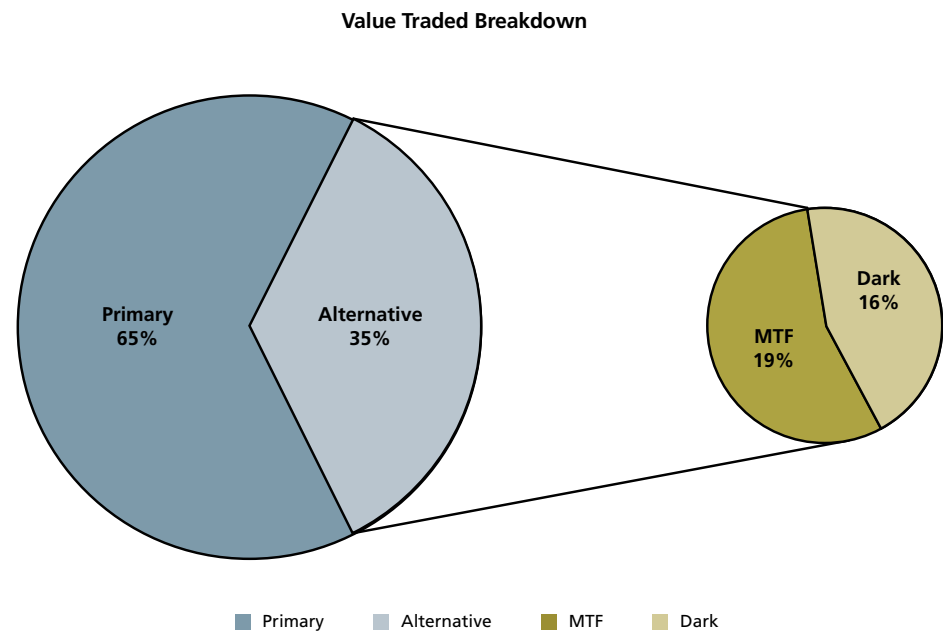
For any given order, increased participation in dark venues is beneficial on average, and the benefits of higher participation increase with the relative size of an order. Analogous results for displayed MTFs are more mixed, but are explainable through concentrations of activity in certain ranges of market capitalization.

We also find that the risk of slippage is greatest in primary markets, based on the overall spread of trading outcomes and on the range of the middle 50 percent of the data. Dark venues continue to perform better than the displayed alternative markets in this respect, but we continue to see wide variation in performance across dark pools. Generally speaking, lower average cost implies better certainty of outcome for the dark pools, while the results for displayed MTFs exhibit a tradeoff between risk and average cost.

II. One Firm's View of the European Market

The relative novelty of alternative trading venues in Europe precludes the use of a general transaction cost database for the purpose of obtaining granular trading data by venue. We rely here on order and execution data from ITG Europe. For the purpose of this study, we focus on 5 dark pools, 4 displayed MTFs, and 5 registered exchanges, over the first three quarters of 2009.⁴ The data include 451,844 orders and 5.6 million trades. Based on these data, our view of relative market share in Europe, split between primary exchanges and alternative systems, is illustrated in Figure 1.

⁴ We use the term 'dark pool' to refer to venues offering non-displayed liquidity, regardless of their registration as MTF or systematic internaliser, reserving the term MTF for alternative systems with displayed quotes. The data used for this analysis represents a subset of ITG trading over the period.

Figure 1. Primary Exchanges, MTFs and Dark Venues


The figure shows some differences in market statistics relative to those published by survey firms, but those deviations are largely limited to dark pool activity. Using 2008 data, Tabb (2009) shows a 58 percent market share held by primary exchanges in Europe, compared to Aite's (2009) figure of about 63 percent in 2009, quite close to the share reported in the figure. Similarly, Aite reports a 19.2 percent market share for MTFs, while the earlier Tabb data show 12 percent, which may simply illustrate growth in the market given the different sample periods used by the two firms.

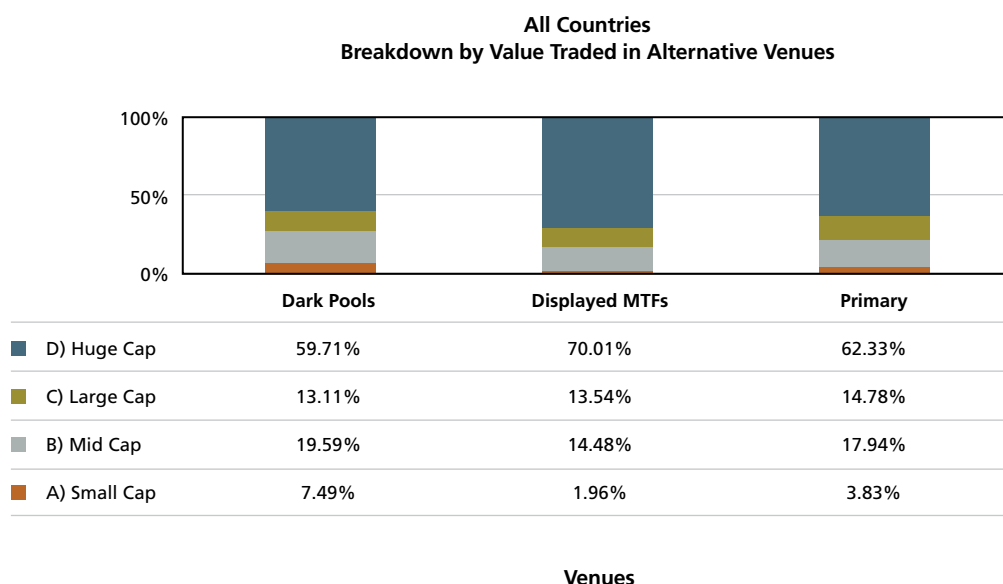
The difference between our numbers and survey information is largely in the statistics relating to dark pools. While we see a 16 percent usage rate for dark executions, volume statistics available from survey data range from 1.2 percent to around 4 percent. CESR's April consultation paper cites a 9.8 percent figure for the last quarter of 2009, the highest estimate available from public sources.⁵ The last major difference between the survey results and our market breakdown is that there is no market making activity in our sample. Such trading makes up roughly 16 to 26 percent of the data available through the surveys.⁶

⁵ See, Committee of European Securities Regulators, Technical Advice to the European Commission in the Context of the MiFID Review—Equity Markets, CESR/10-394, 13 April, 2010. There is one higher estimate, namely that of the FESE, which claims that 40 percent of European equity trading takes place in dark pools. See "Banks Attack New Dark Pool Plans," Financial News, at www.efinancialnews.com, 19 April, 2010. There is no other figure that comes remotely close to that number, however, and we have no information that would support such an estimate.

⁶ Excluding crossing activity by OTC market makers. ITG does not include Market Making in its list of direct routing destinations.

The distribution of value traded, relative to market capitalization, is not the same across venue types. Figure 2 illustrates this point.⁷

Figure 2. Value Traded by Market Capitalization



There is little difference across venue types for large capitalization issues, although MTF activity is concentrated in the huge and large cap names. Aggregating the mid cap and small cap categories reveals differences, however. Dark pool activity in these groups is 65 percent larger than that for MTFs, for example, while primary market trading in the lower capitalization names is 32 percent greater than that in the MTFs. Dark pool activity also dominates primary markets in those categories. This distribution of activity is not uniform across all countries, however. Such differences prove relevant when considering the distribution of market performance in terms of transaction costs, to which we now turn.

III. Execution Quality as Measured by Transaction Costs

Table 1 contains comparisons of dark pool, MTF, and primary market performance, measured in terms of transaction costs. Transaction costs are based on an implementation shortfall benchmark. Here, and elsewhere in the paper, negative numbers represent losses relative to the benchmark, while positive values are gains relative to the benchmark.⁸ Costs are reported in basis points.

⁷ 'Huge cap' refers to market capitalization of £10 billion or more, 'large cap' is £5 to £10 billion, 'mid cap' is £1 to £5 billion, and 'small cap' constitutes the remainder.

⁸ Unless stated otherwise, the benchmark is the midpoint of the bid-ask spread at the time the order arrives in ITG systems. All costs are calculated based on the time the order is placed with the broker, since this is the most accurate available for calculating comparisons of alternative trading mechanisms, removing any delay on the part of the buy-side desk in transmitting the order.

Table 1. Transaction Costs By Venue Type

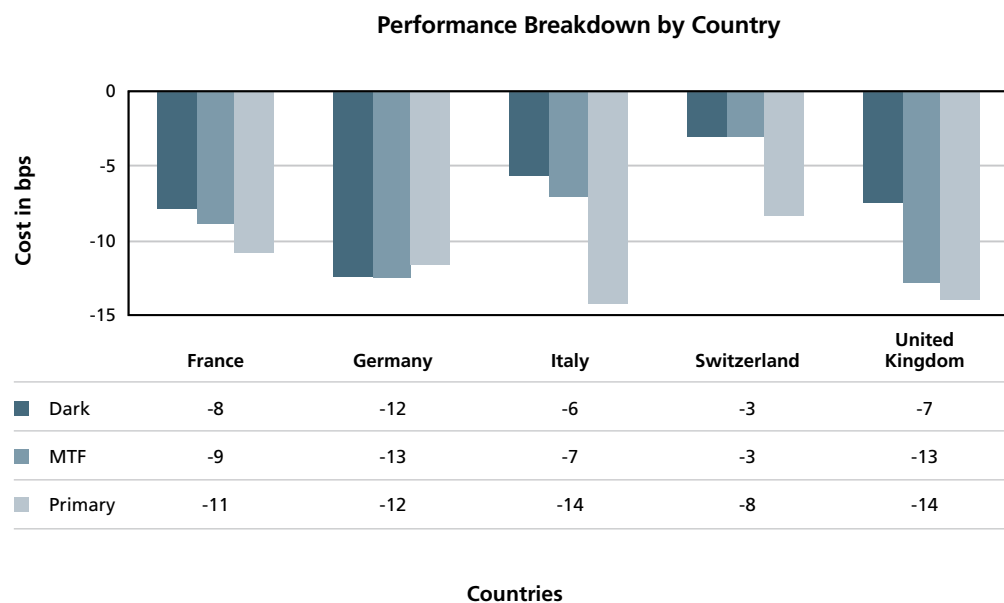
Category	Trades	Average Shares Per Trade	Cost
Dark	891,010	2,119	-7
MTF	1,419,610	1,154	-10
Primary	3,318,564	1,480	-12

Consistent with U.S. evidence, execution sizes typically are larger in dark venues.⁹ Average share count per trade is 43 percent higher in dark pools relative to primary markets, and 83 percent higher than observed in MTFs. Differences in average value traded stem from seemingly systematic variation in concentration by market capitalization between dark and primary venues. Dark pools generate larger block executions, and the data suggest that those blocks are more valuable for lower capitalization stocks, a point to which we return below.

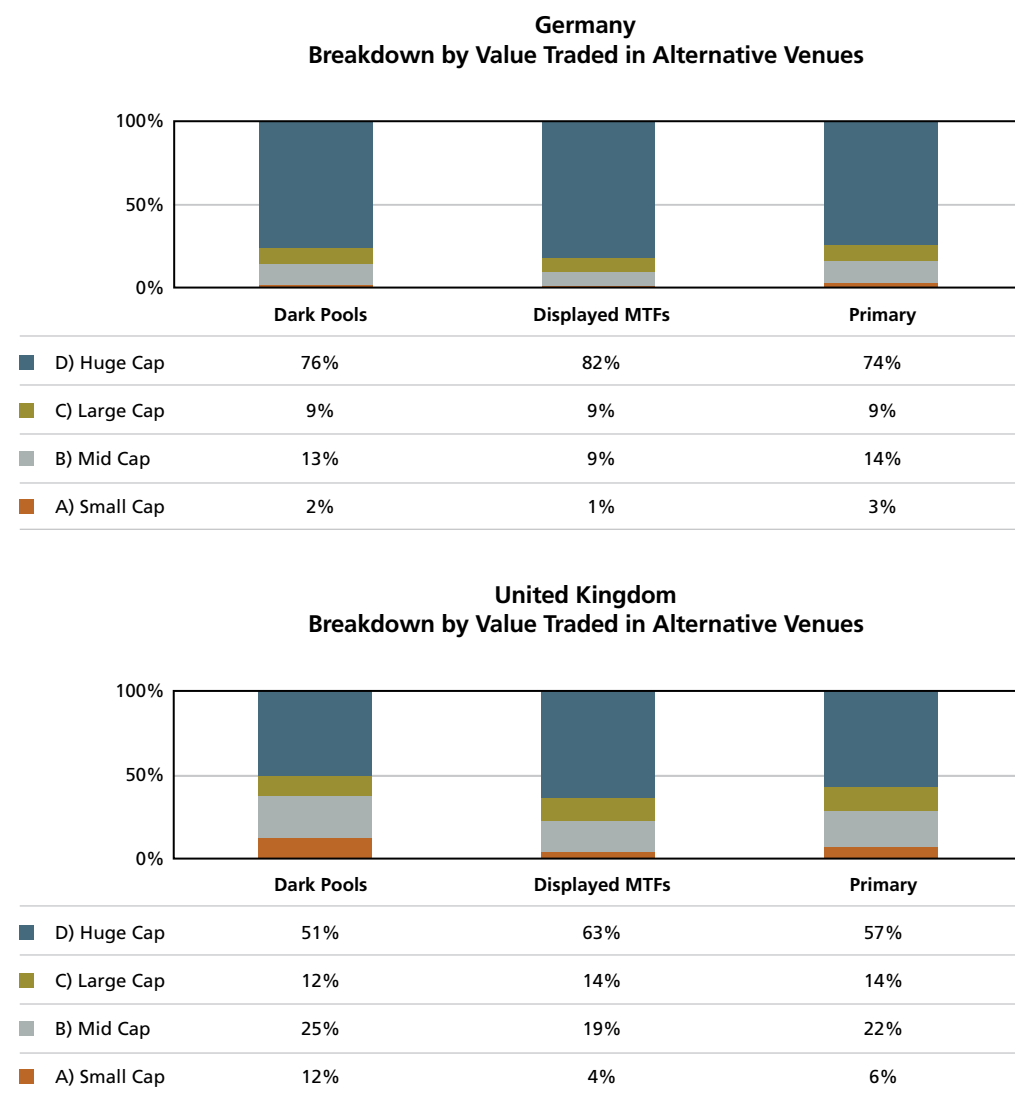
Execution costs in the MTFs are 43 percent higher than in dark venues. Primary Markets exhibit costs which are even higher, being 71 percent in excess of dark pools. Primary markets appear to be more costly than the alternative displayed markets by about 20 percent, a significant difference.

Figure 3 contains a breakdown of these overall averages by country of listing. There is variation, but the rank ordering of the results is preserved for four of the five countries studied. Results for the UK are even more striking when comparing dark executions to MTF or primary, while France, Italy and Switzerland exhibit the largest differences between displayed MTFs and primary markets. The one deviation is German-listed securities, for which differences between venue types are not significant.

⁹ See Domowitz, Finkelshteyn, and Yegerman (2008).

Figure 3. Transaction Costs by Country


One possible explanation for cross-country differences lies in market capitalization and its links to liquidity provision. We noted earlier that the distribution of activity across venue types is not uniform across country of listing. This is illustrated in Figure 4, which contains the split of value traded in the UK and Germany by capitalization.

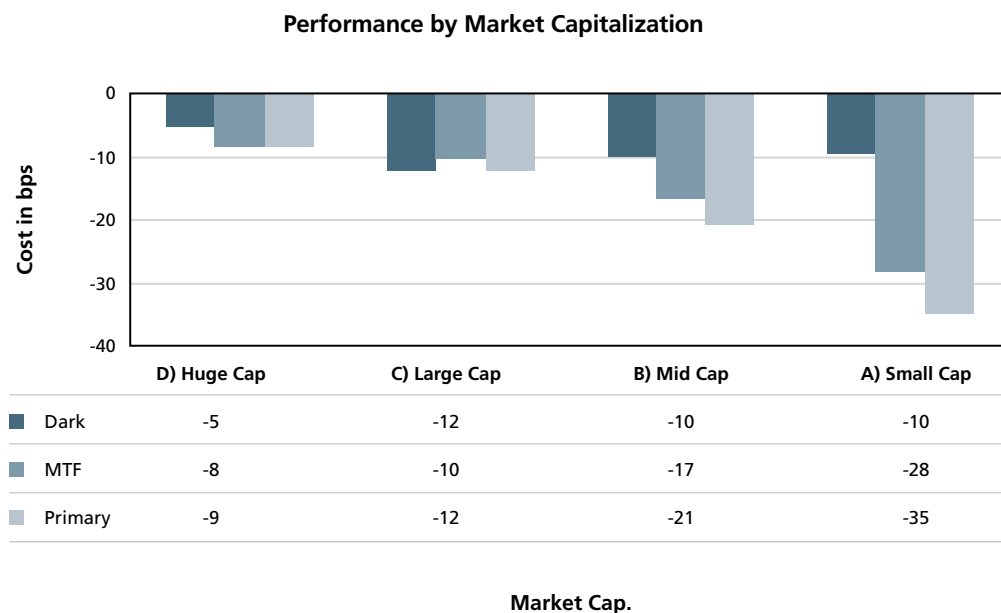
Figure 4. Value Traded by Market Capitalization


Trading in German-listed securities is dominated by the aggregate of the large and huge capitalization categories for each venue type. In contrast, dark pool trading in mid and low capitalization UK stocks is 147 percent greater than for German listings; the analogous figure for MTF activity is 130 percent. To the extent that dark pool trading may add relatively more value for lower capitalization securities, we should expect to see those effects magnified in the UK relative to Germany, consistent with the evidence.

The similarity of performance across dark pools and primary markets for German securities relative to other countries also may have roots in the distribution of value traded. In the UK, the distribution of mid and small cap value in dark pools is 32 percent greater than in primary markets. In Germany, that difference is close to zero, with 15 percent of value being done in the dark, relative to 17 percent of the value in the primary market.

A breakdown of costs by capitalization is provided in Figure 5. There is rough parity only in the large cap category. For the remainder, primary market costs exceed those observed in dark pools by 80 percent to a factor of over three in the case of small capitalization stocks. MTFs continue to outperform primary venues across all capitalization ranges, but their real value appears to lie in the small and mid cap segments, where primary market costs exceed those of MTFs by about 25 percent.

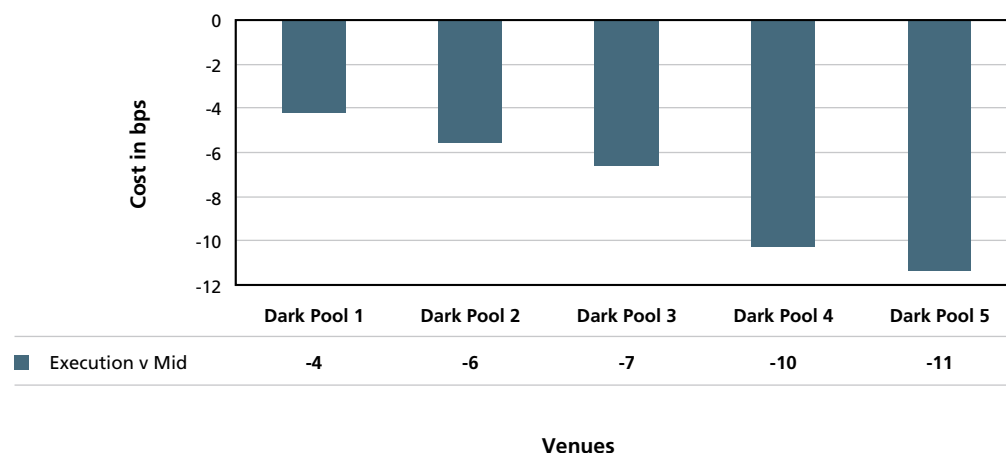
Figure 5. Transaction Costs by Market Capitalization



The aggregate data illustrate the relative rankings across primary, MTF, and dark venues. Not all dark pools are alike, however, although the mechanics of crossing are similar across venues. This observation originally was validated in the context of U.S. markets, and the evidence for Europe is presented in Figure 6.¹⁰

¹⁰ See Domowitz, Finkelshteyn, and Yegerman (2008) for U.S. evidence for ten dark pool venues. We keep the venue names confidential in Figure 6, as well as for discussions of differences in MTF execution quality to follow.

Figure 6. Performance Across Dark Venues



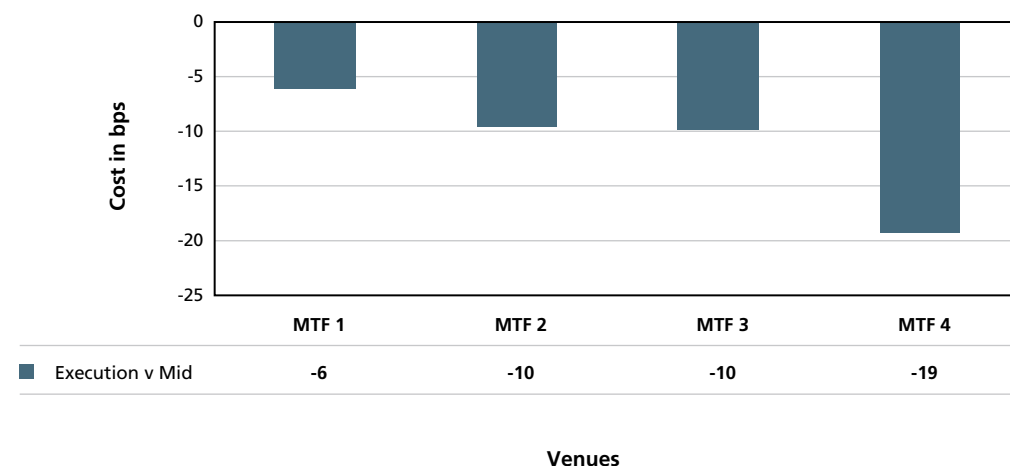
The difference between the best and worst performer in our sample is 7 basis points, a percentage increase in cost of 175 percent. In a sample of ten U.S. dark pools, the same spread is 10 basis points. The U.S. data was clustered, however, in the range of +2 to -3 basis points, a spread between best and worst of 5 basis points.¹¹

The ordering in terms of performance is largely maintained regardless of the listing jurisdiction of the security, although the individual numbers differ from the aggregate results. For example, for French stocks, Dark Pool 1 exhibits a 1 basis point cost, followed by number 2 at 4, number 3 at 6, number 4 at 10 and the worst at 15. The spread between best and worst widens in this case to 14 basis points. The exception again is Germany, for which the lowest transaction cost is 8 basis points attributable to Dark Pool 2, although the spread between best and worst provider is at the average across countries, at 7 basis points.

We also find cost differences between displayed MTFs, which are economically substantial. Results for the four MTFs in our sample are illustrated in Figure 7.

¹¹ Domowitz, Finkelshteyn, and Yegerman (2008), Table 2. The figures cited are for fills within the first 30 minutes of an order's life, which is the appropriate comparison to the European data.

Figure 7. Performance Across MTFs



The spread between lowest and highest cost providers is 13 basis points in the displayed markets. Even the number 2 ranked MTF exhibits costs that are 67 percent higher than the best in the sample. The relative performance rankings are unchanged country by country. German-listed stocks once again show clustering in trading costs across venues, ranging from 11 to 15 basis points of cost, a much lower spread between highest and lowest cost providers than the average. French stocks now exhibit the largest spread, with the lowest cost venue at 5 basis points, and the highest cost provider at 23 basis points.

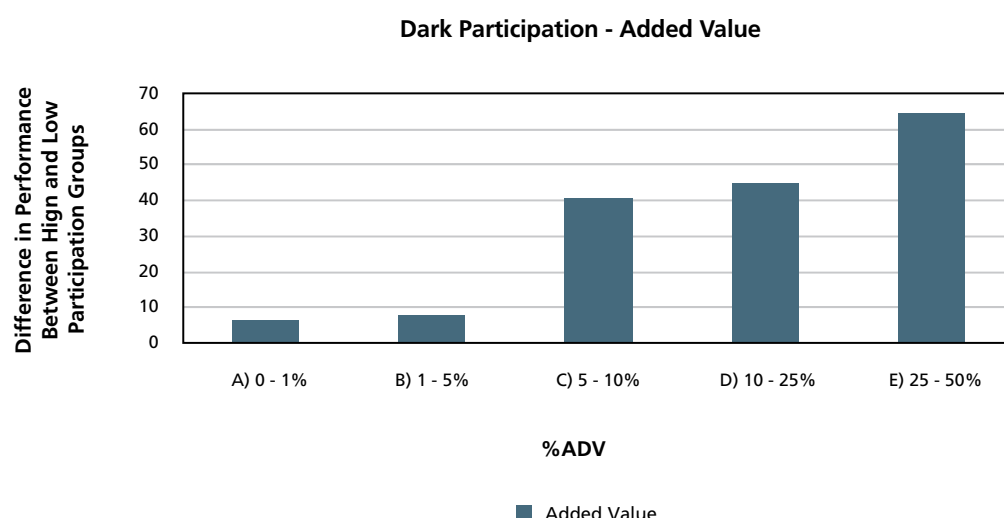
IV. Participation of an Order

One of the lessons learned from the U.S. market is that there are gains from going directly to a single dark venue relative to spreading the order around. We now ask a related question in the context of the European markets: do the benefits of trading in alternative trading systems depend on the degree of participation in the system? For dark pools, participation is defined as the percentage of the order that is done in the dark, relative to execution in displayed markets, to include both primary exchanges and MTFs. For displayed MTFs, participation is defined as the percentage of the order that is done in the alternative system, relative to execution elsewhere. We begin by describing the method for dark pool executions; the methodology for displayed MTFs is completely analogous.

Orders are segregated into groups, based on the percentage of the order executed in the dark venues. Orders that did not have any executions in dark pools are excluded from the grouping and the analysis. We define *low participation* to be the group for which up to 10 percent of the order was completed in the dark, while *high participation* is the group for which 50 to 100 percent of the order was executed in the dark.

Performance in terms of transaction costs is measured for each group. We then examine the difference in performance between the two, and label that difference, *added value*. If transaction costs are greater for lower participation, relative to greater participation in dark venues, the added value is positive. The results of this exercise for dark venues are presented in Figure 8.

Figure 8. Dark Pool Added Value by Order Size

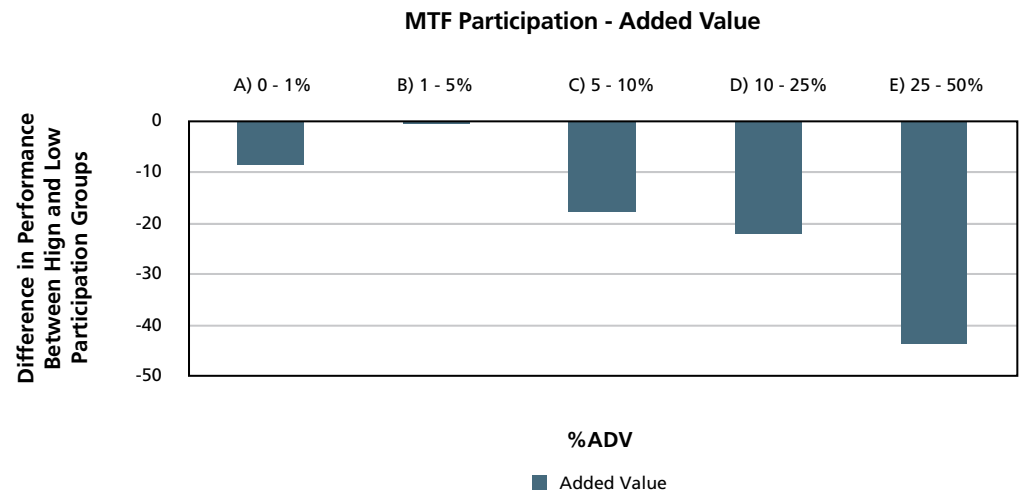


Added value is differentiated by the relative size of the order for which the degree of participation is calculated. Relative size is measured by the percentage of average daily volume (ADV) represented by the order size, and grouped in increments ranging from very small orders (up to 1 percent of ADV) up to orders ranging from 25 to 50 percent of ADV.

For every order size, greater participation equates to higher value added. Performance differences by participation level range from just under 10 basis points to over 60 basis points. The benefits of higher participation levels increase sharply with order size. This evidence is consistent with a commonly held belief, namely that crossing stock in dark venues is most beneficial for larger blocks. For large orders, done primarily in crossing systems, the benefits appear to be the greatest.

The situation is somewhat different for displayed MTFs, for which results are illustrated in Figure 9.

Figure 9. MTF Added Value by Order Size



In this case, higher participation results in negative performance, and the effect increases with relative order size. Although displayed MTFs have made great strides in capturing market share in Europe, volume itself is typically a poor proxy for liquidity.¹² In the aggregate, Table 1 illustrates that MTFs perform well relative to primary exchanges, however. One possible explanation again lies with the distribution of stock characteristics across venue types. In particular, the percentage of flow executed by MTFs in the huge capitalization category is 70 percent, almost 8 percentage points greater than observed in primary markets and 10 percentage points greater than in dark venues. A large order in terms of relative size for a huge capitalization security can easily demand more in terms of relative liquidity than for a mid cap stock, for example, and transaction costs rise relative to the smaller company.¹³

V. The Risk of Slippage

In this section, we complement the information on average transaction costs with evidence with respect to the risk of slippage across venues and venue types. The information is displayed in the form of box plots in Figures 10, 11 and 12 below. The vertical lines denote the entire range of outcomes, while the length of the box itself is the distance between the 75th percentile and the 25th percentile, also called the interquartile range. The interquartile range essentially is the range of the middle 50 percent of the data, and a smaller range denotes a tighter band of outcomes for that majority segment. The advantage of focusing on the range is that it is not affected by outliers or extreme values.

¹² See, e.g., Domowitz and Steil (2001) and the references therein.

¹³ This phenomenon is well documented, but easily illustrated: imagine the effects of a Vodafone order of 50 percent of average daily volume.

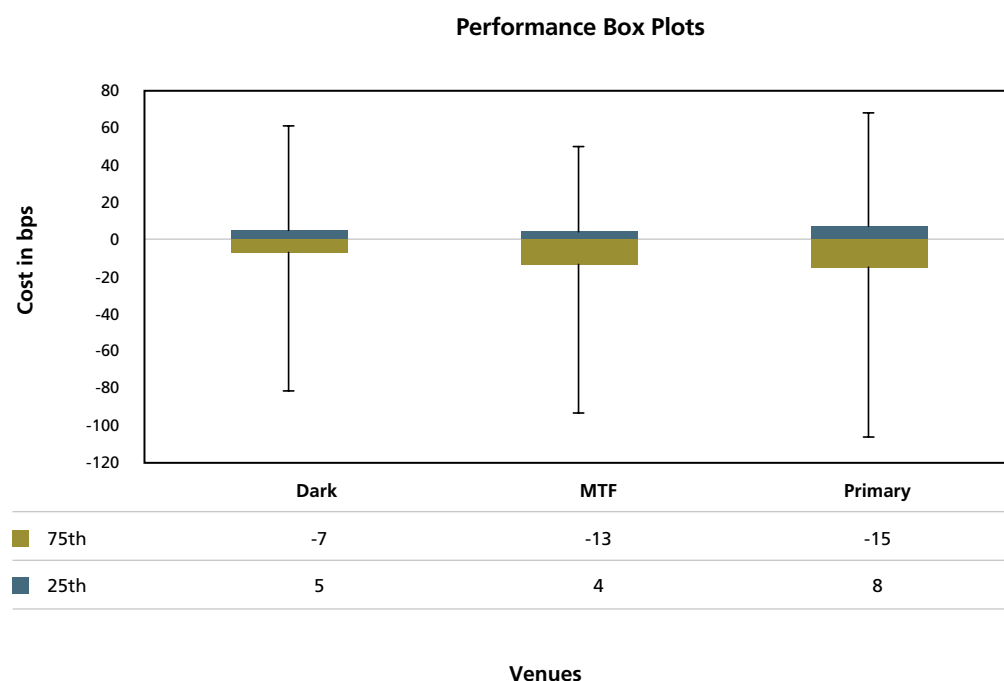
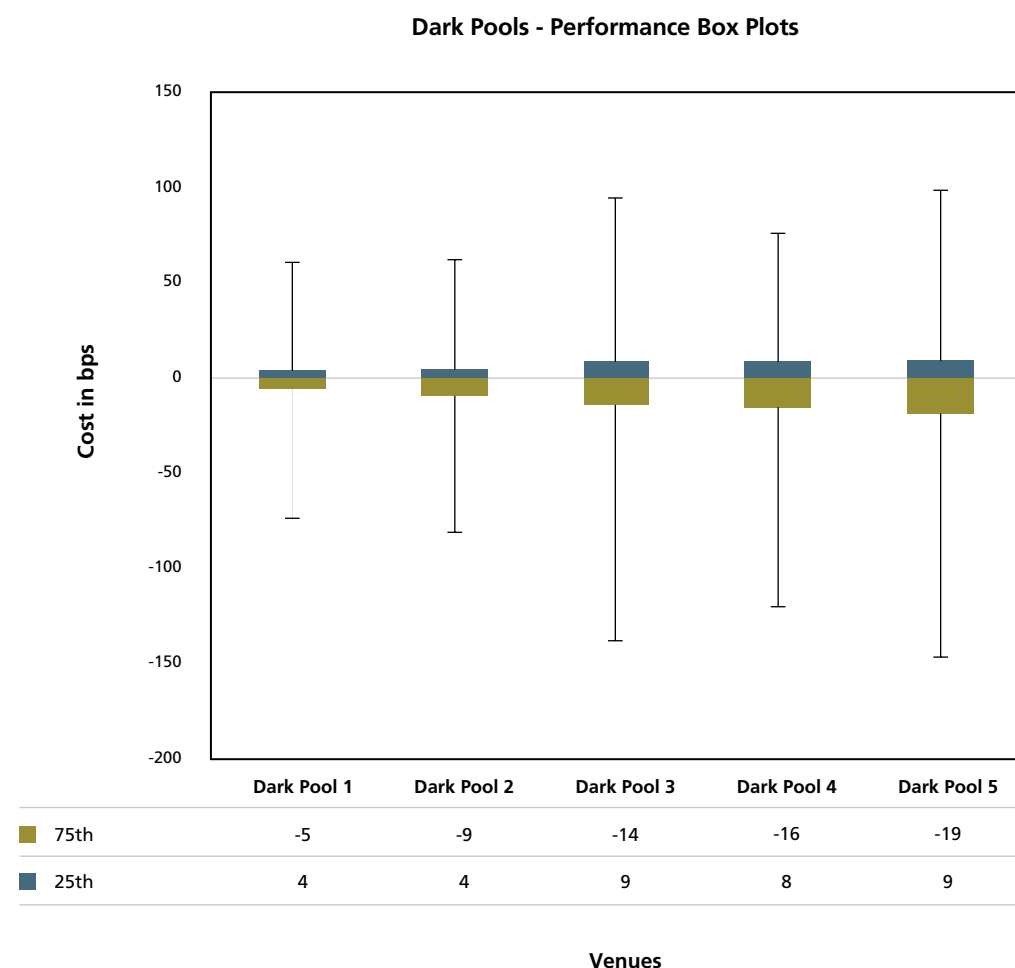
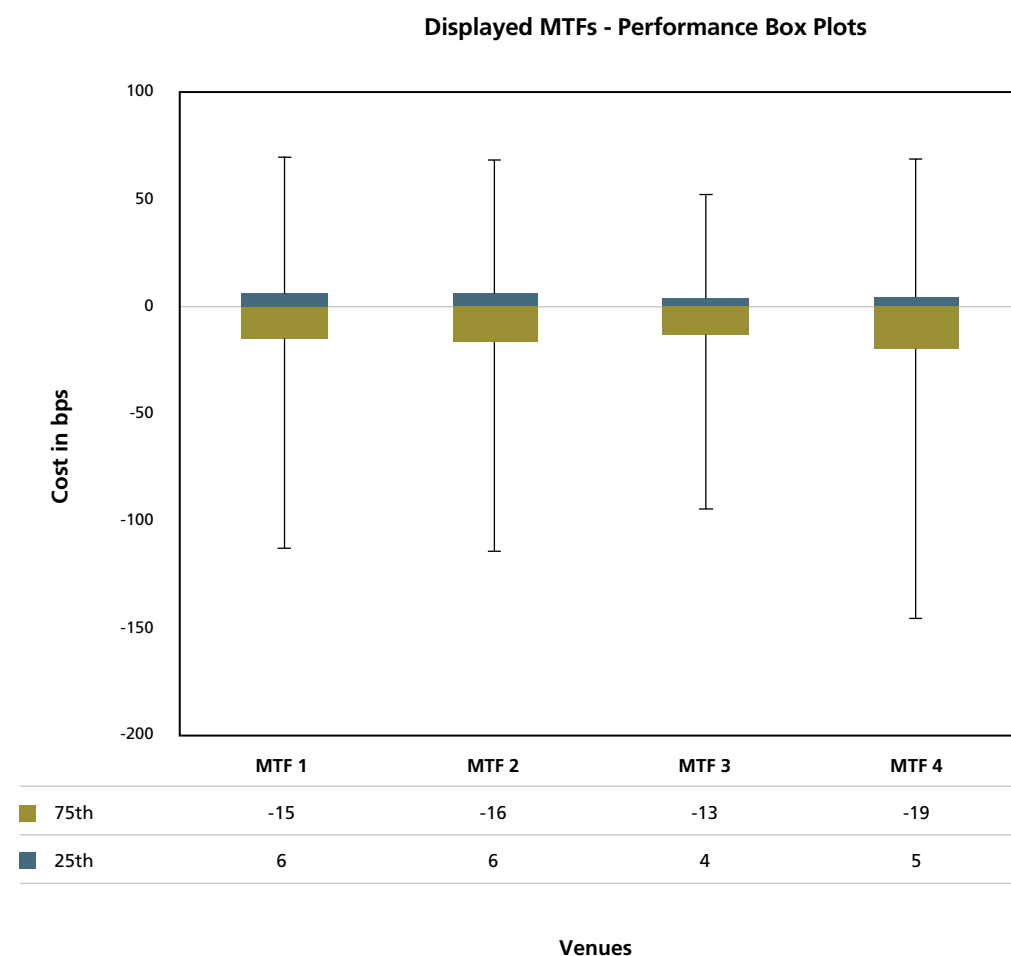
Figure 10. Distribution of Performance by Venue Type


Figure 10 contains the distributions from which the average results in Table 1 were obtained. There, we found that dark venues typically perform better than MTFs, while the displayed alternative markets did better than primary exchanges in terms of transaction costs. Those results are echoed when cast in terms of certainty of outcome. While the overall range of observed costs is similar for dark pools and MTFs, the interquartile range is 12 basis points for the former and 17 basis points for the latter. In the case of primary exchanges, the range of outcomes is greater than either of the alternative venue types, and the interquartile range grows to 23 basis points, almost double that observed for dark venues.

The aggregates mask potential differences across individual venues. The distributions of performance for the dark pools in our sample are contained in Figure 11.

Figure 11. Distribution of Performance by Dark Pool


The overall range of outcomes is quite different across dark venues, suggesting that certainty of outcome varies substantially, as does average performance. The relative rankings for the interquartile range mirror those for the averages. Dark Pool 1, for example, exhibits the lowest average costs, and also has the smallest range, at 9 basis points, as well as the tightest bounds on performance overall. In contrast, the worst average performer, Dark Pool 5, exhibits an interquartile range of 28 basis points, with the 75th performance percentile at -19 basis points and the widest range of outcomes overall.

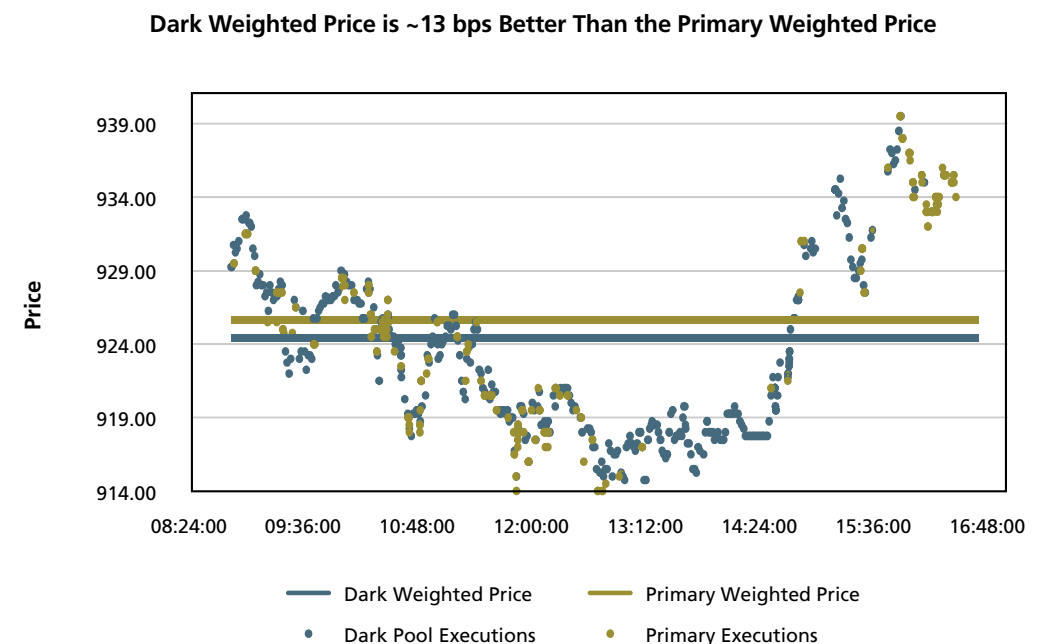
Figure 12. Distribution of Performance by MTF


A similar analysis for displayed MTFs is illustrated in Figure 12. The ordering of performance in terms of certainty of outcome does not mimic the average cost results to the same degree as with the dark venues. On the other hand, the lowest average costs are attributed to MTF 1 and the highest to MTF 4, where both the interquartile range and overall range of outcomes are quantitatively better for MTF 1. A tradeoff between average performance and the distribution of outcomes is best illustrated by MTF 3. Average transaction costs in that venue are 10 basis points, the median across MTF venues. The distribution of costs is the tightest for MTF 3, however, and the interquartile range for that venue is only 81 percent of that observed for MTF 1, which has an average cost of 6 basis points.

VI. Split Orders: A Different View of Opportunity Cost

In a world of electronic trading, smart order routers that are used to work an order operate “simultaneously” on multiple venues. Put another way, trades generally are executed from parent orders which access primary, MTF, and dark pool venues, which can mean that traders push prices in displayed markets, which in turn affects execution in dark books. As such, performance results are correlated. This concurrent execution does not fit the implicit assumptions underlying most treatments of opportunity cost, for example.¹⁴ Although standard opportunity cost analysis may not be directly applicable, there are lessons to be learned from orders that are executed in multiple venues. The juxtaposition of two examples illustrates the issue and the possibilities.

Figure 13. Concurrent Executions in Dark and Primary Venues



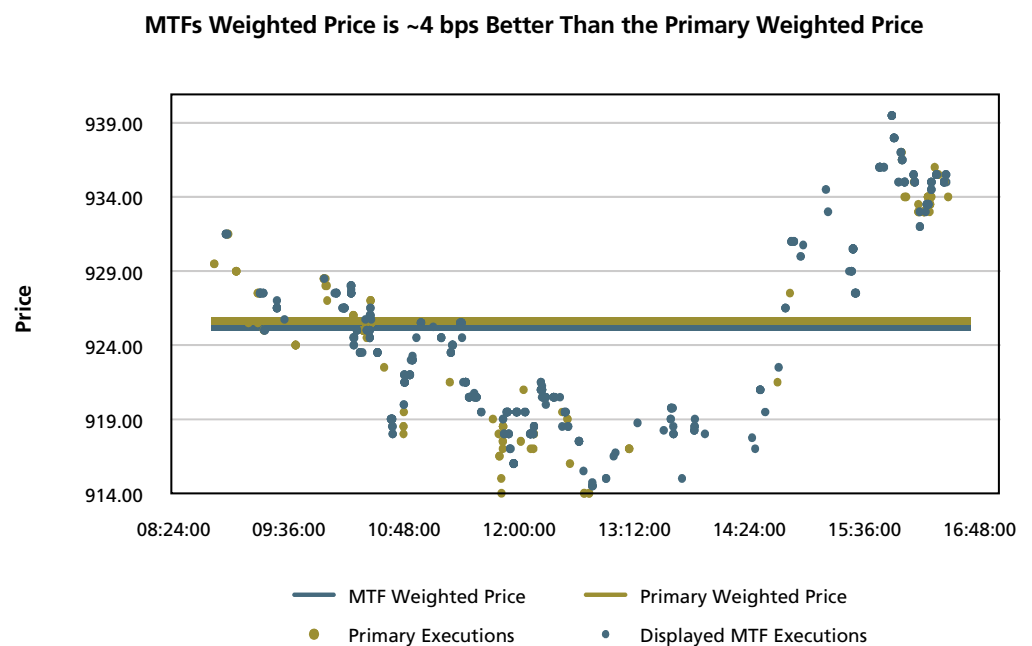
The execution of an order, split between dark venues and the primary market for the security, is illustrated in Figure 13. With the exception of a brief period in the early afternoon, partial executions of the order in both venues appear during each short interval of time. During each such period, we are looking at the same name, a very similar relative order size, and arguably the same market conditions. In other words, a comparison of venue performance in this example contains implicit controls for a wide variety of variables that might lead to differences in transaction costs. Relative liquidity

¹⁴ Opportunity cost frameworks generally assume sequential release of an order, meaning that it will initially be “parked” in a venue. The order leaves the venue to find liquidity elsewhere only if liquidity does not exist.

in the name, the mechanics of the execution mechanism, and any venue-specific tendency towards adverse selection remain. In the context of this particular example, the difference in the weighted average price of the order is 13 basis points, in favor of the dark venues. If one assumes that the primary market *could* have supplied all the liquidity required for this sequence of trades, the difference is indicative of the opportunity cost of failing to execute in the dark.

The second example is illustrated in Figure 14, which contains the life of an order split between displayed MTFs and the primary market.

Figure 14. Concurrent Executions in MTFs and Primary Venues



We see fundamentally the same type of mixed execution activity, albeit with a slightly bigger window during which only MTF executions are observed. In this case, however, the difference in the weighted execution price is only four basis points, a third of what was observed in the dark/primary comparison. A comparison of the two examples might suggest that mechanics of execution matter, for example; the first compares dark venues to a displayed market, while the second compares displayed markets. A bigger leap is the conjecture that adverse selection is minimized in dark markets relative to displayed venues.

Extending the analysis beyond these examples, we focus on orders with a minimum duration of 30 minutes. All orders analyzed had a minimum set of trades executed (an average of one trade per minute). As a result, the orders examined within this framework can be said to be large on a relative basis, taking more time to execute.

We compare the cost of executing in the primary exchange to that of executing in an off-primary venue. This is achieved through the following steps:

- a) Calculate the deviation of the weighted average execution price achieved on the primary from the mid-quote at order start time.
- b) Calculate the deviation of the weighted average execution price achieved on dark venues or displayed MTFs from the mid-quote at order start time.
- c) For every order, calculate the difference in basis points between the prices calculated in step a and step b.
- d) The aggregate difference between the performance in primary and the performance in dark pools/displayed MTFs is labeled as the *Full Opportunity Cost of Liquidity*.
- e) The aggregate difference multiplied by the relative size executed in the off-primary venue is the *Partial Opportunity Cost of Liquidity* for Dark Pools/Displayed MTFs.

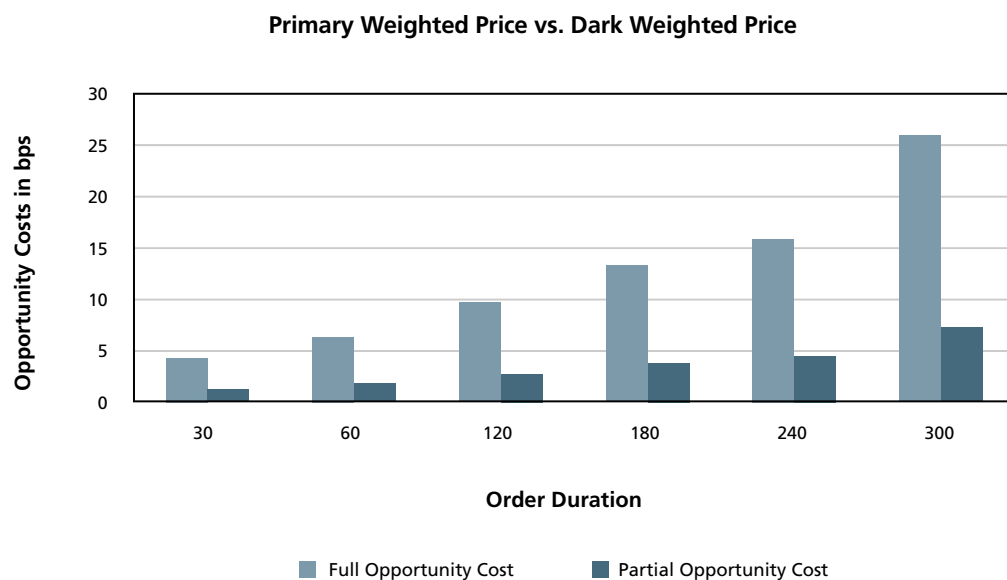
The labels reflect the assumption that the order could have been executed completely in the primary market over the same horizon as the concurrent executions. The partial opportunity cost is simply the expected cost savings for the percentage of the order actually executed in the alternative venue, based on the realized execution percentage.

We aggregate the results for different universes and display the results in the graphs below. Dark pools and displayed MTFs are analyzed separately.

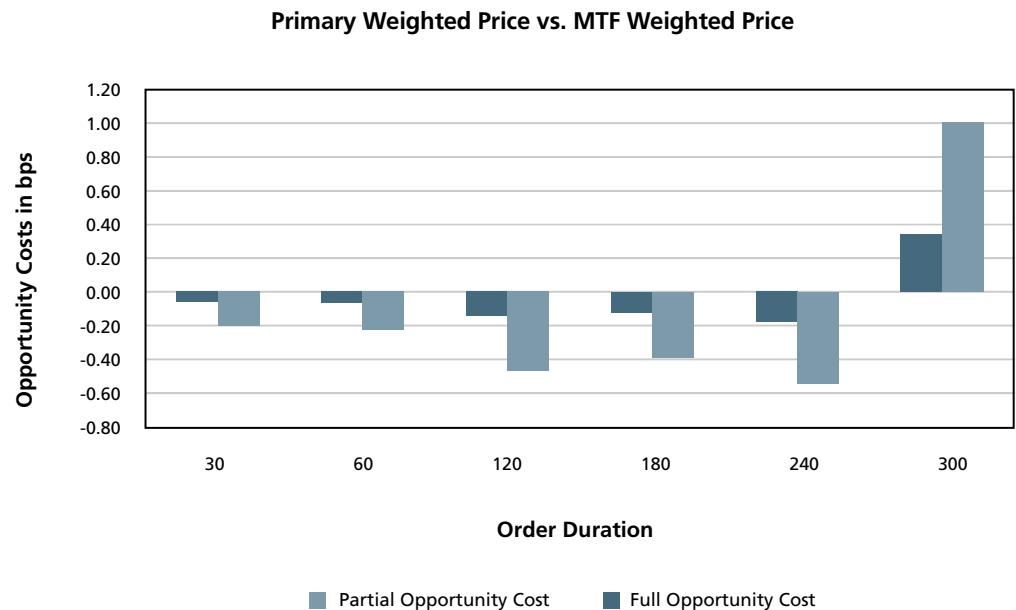
Figure 15 shows that for all orders that lasted more than 30 minutes and had executions in the primary exchange and in the dark pools, the *Full Opportunity Cost of Dark Pools* was 4.31 basis points and the *Partial Opportunity Cost* was 1.26 basis points. In other words, if it had been possible to execute all trades in dark pools, the performance would be 4.31 basis points better, relative to primary. Based on the realized ratio between the value traded in the dark pools relative to the value traded in the primary exchange, it is possible to save 1.26 basis points on average on orders that last more than 30 minutes.

On the other side of the spectrum, the Full Opportunity Cost of Dark Pools is almost 26 basis points for orders that lasted more than 300 minutes and the Partial Opportunity Cost is 7.31 basis points. It is the trend, relative to order duration, that is of interest, however. Opportunity cost is rising with order duration, and the percentage increases can be large. Such evidence is consistent with previous work on information leakage in the U.S. markets.¹⁵

¹⁵ Domowitz, Finkelshteyn, and Yegerman (2008).

Figure 15. Opportunity Costs in Primary Markets Relative to Dark Venues

The opportunity cost of MTFs looks different than that for dark pools, echoing our previous example. The scale and the differences are small. Regardless of order duration, the *Full Opportunity Cost of MTFs* and the *Partial Opportunity Cost of MTFs* are less than one basis point. This is illustrated in Figure 16. Although the numbers suggest that the opportunity cost of using MTFs is negative, the magnitudes indicate that the differences between MTFs and primary venues are basically zero.

Figure 16. Opportunity Costs in Primary Markets Relative to Displayed MTFs


Interpretation of these results can legitimately vary, but we offer the following suggestions. First, controlling for idiosyncrasies in the individual stocks, trading strategy, and market conditions over short horizons, dark pools continue to outperform primary markets with respect to execution costs. The difference between displayed MTFs and primary exchanges is negligible. This conclusion does not depend on a statistical model purporting to gauge the relative difficulty of orders. Second, adverse selection as measured by transaction costs is largely a function of the dark versus displayed market distinction. Dark venues have always claimed that adverse selection is minimized through anonymous and confidential crossing of stock, and the data appear to support this. Finally, the opportunity cost of failing to participate in dark liquidity can be substantial. This is not the typical opportunity cost calculation with respect to failure to execute an order completely in one type of venue, and relies on the assumption that sufficient liquidity exists in the primary market to complete the order. That assumption underlies the more typical opportunity cost calculation as well, and is not unique to the framework adopted here.

VII. Conclusion

With the exception of market share data, this paper represents the first quantitative look at the European alternative markets space. Electronic trading continues to grow, and as it does, the alternative market space grows in usage and importance.

According to the FESE, which represents the interest of 42 stock exchanges across Europe, dark pools should only be used for trading large orders that are in some sense unsuitable for lit trading venues.¹⁶ This concern is echoed by CESR in its recent consultation paper. In particular, "...it has been suggested that the [execution of small orders] is inconsistent with the general intention to provide protection against market impact."¹⁷ Market participants have begun to disagree with this position, noting that restrictions on dark pool trading will add to transaction costs, and prevent smaller buy-side firms from using dark pools at all.¹⁸ The results of this study support such doubts.

Alternative markets, and dark venues in particular, add value relative to primary markets, based on observed trading transaction costs and the risk of slippage in the execution of an order. Such qualitative results hold regardless of country of listing and market capitalization of individual securities. Controlling for stock characteristics, trading strategy, and market conditions, the difference between displayed MTFs and primary markets essentially disappears for orders that require some time to work, while the dark pool results continue to hold. Overall, this suggests that confidential crossing is the salient distinction in terms of the interplay between market mechanics and trading costs.

The aggregate results hide substantial differences across alternative venues, even differentiating between dark and displayed venues. We have kept the names of individual venues confidential, and have no particular insight into the composition of order flow in each individual alternative market. Nevertheless, our results suggest that venue-specific reporting of transactions could have some value in an expanded world of market data. Returning to the theme of best execution discussed in the introduction, venue-specific reporting and analysis thereof should improve institutional traders' ability to achieve best execution in a market dominated by electronic markets and associated electronic trading activity.

¹⁶ "FESE calls for further dark pool size limits," *The Trade*, at www.thetradenews.com/asset-classes/equities/4470, 14 April, 2010.

¹⁷ CESR consultation paper, 13 April, 2010.

¹⁸ For example, "I may have to pay the whole spread using an aggressive algorithm, instead of matching at the mid-point in the dark, and pay higher market impact costs. In addition, some smaller buy-side firms that do not trade blocks of stocks would not be able to use dark pools at all," by Soren Steinert, head of trading at Quoniam Asset Management, commenting on size restrictions for dark pools, in "FESE calls for further dark pool size limits," *The Trade*, at www.thetradenews.com/asset-classes/equities/4470, 14 April, 2010.

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