KU LEUVEN

Two Shades of Opacity

Hidden Orders versus Dark Trading

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The Development of Securities Markets: Trends, Risks and Policies

Università Bocconi & CONSOB

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Overview

Introduction and Motivation

Starting observation 1

Market transparency has increased sharply

- Electronic limit order books
- More real-time quotes and depth
- MiFID and Reg NMS
- Algos, SORTs and low latency

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- MiFID and Reg NMS
- Algos, SORTs and low latency

In turn, this increased **exposure costs**, especially for large orders

- price impact
- predatory traders
- picking-off risk
- competition for order execution

Introduction and Motivation

Starting observation 2

As a reaction, several **opaque trading** alternatives have been developed

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  - Iceberg or reserve orders
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- On lit venues (i.e. exchanges): *hidden* order types
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  - Completely hidden orders
- Away from the lit market (i.e. off-exchange): *dark trading venues*
  - Dark pools
  - Internalization
  - Negotiated trades

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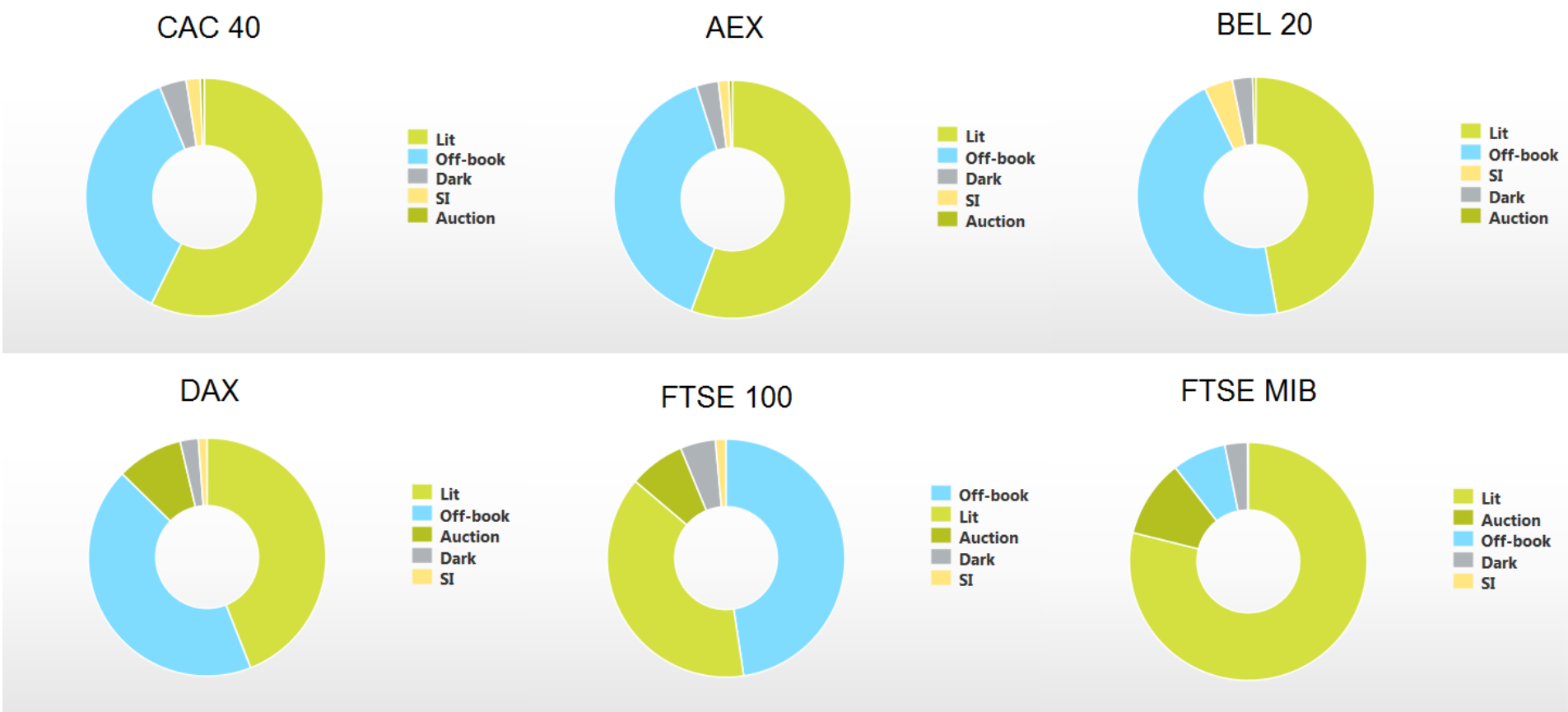
Introduction and Motivation

Fragmentation of trading: lit, dark and hidden order trading



Reference period: Jan-Dec 2014 (Source: Fidessa Fragulator®)

- Currently volume in **dark venues** is between 10.33% and 53.85% depending on index
- About 34% of volume is dark in our sample

Introduction and Motivation

Fragmentation of trading: lit, dark and hidden order trading

- De Winne and D'Hondt (2007) and Bessembinder et al. (2009) estimate that around 45% of order volume *submitted* on Euronext is **hidden**
- In our sample around 5.35% of volume on lit venues is *executed* against hidden orders

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- In our sample around 5.35% of volume on lit venues is *executed* against hidden orders
- Academics and practitioners are aware that both types of opaque trading share similarities

  see claims in *e.g.*, Hautsch and Huang (2012), Boulatov and George (2013), Buti and Rindi (2013), Buti et al. (2011) and Foley et al. (2013)
- No research exists that examines the interaction between both types of opaque trading

Introduction and Motivation

Contributions

Key Question 1

What **market conditions** drive both types of opaque trading?

- Segmentation of trading into **visible** and **opaque** trading
- Segmentation of opaque trading into **hidden order** and **dark** trading
- Segmentation of hidden order trading into **different lit trading venues**

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Key Question 2

Are **hidden order** trading and **dark** trading **complements** or **substitutes**?

- **Complements**: both opaque trading tools are used alongside
- **Substitutes**: traders select one over the other, depending on *e.g.*, personal preferences or market conditions

Introduction and Motivation

Relevance

Regulators are increasingly worried about the consequences of rising levels of **dark trading** on market quality

The European Commission proposes a double cap on dark trading in MiFID II, while Canada and Australia only allow non-block dark trades at a price improvement

Empirical research finds that **dark trading** could indeed harm market quality

- Reduces **liquidity** (Degryse et al. 2014; Weaver 2014; Nimalendran and Ray 2014), **price discovery** (Comerton-Forde and Putniņš 2015) or both (Hatheway et al. 2014)
- Dark venues **cream-skim** uninformed order flow (Zhu 2014)
- However, Buti et al. (2011) show a benign effect, while Gresse (2014) finds mixed results

Introduction and Motivation

Relevance

Research finds no harmful effect of **hidden orders** on market quality

See, *e.g.*, Aitken et al. (2001), Moinas (2010), Boulatov and George (2013), Buti and Rindi (2013), Gozluklu (2014), and Bloomfield et al. (2014)

The relation between hidden order trading and dark trading has implications for **regulation**

- If hidden order trading is a substitute for dark trading, regulation aimed at reducing dark trading could bring opaque trading to lit venues
- If not, then such regulation might harm some classes of investors who now use dark venues

Introduction and Motivation

Preview of results

We distinguish between regular-sized **dark** trades and **block** trades

Key Question 1

What **market conditions** drive both types of opaque trading?

- Volume, visible depth, quoted bid-ask spread and the use of smart order routers are market conditions that segment opaque trading into hidden order trading and dark trading
- Algorithmic trading negatively affects opaque trading in general
- Traders substitute hidden orders on venues with higher visible depth for hidden orders on venues with lower visible depth

Key Question 2

Are **hidden order** trading and **dark** trading **complements** or **substitutes**?

- Hidden order trading and dark trading are substitutes
- Dark trading is a better substitute for hidden order trading than the other way around
- The differences between hidden orders and dark orders could make hidden orders poor alternatives to dark orders

Literature

Why trade opaquely?

- The **exposure decision**: how, where, when and to who should trading intentions be revealed? (Harris 1997)
- In electronic markets **opaque** or non-displayed **orders** reduce exposure
- Order exposure entails a **trade-off**

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  - (+) Increase execution priority

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(–) Induces competitive behavior (Buti and Rindi 2013)
(–) Risk of being front-run (Harris 1997; Brunnermeier and Pedersen 2005)
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Drawbacks of exposure lead to **exposure costs**

Literature

Hidden Order or Dark Trading?

Similarities between hidden orders and dark venue orders

- Reduction in exposure
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Differences between hidden orders and dark venue orders

- Hidden orders interact with aggressive orders on lit venues, and therefore more easily detectable (less opaque)
- Dark orders only interact with similar dark orders, so other traders need to 'ping' separate dark venues to detect them
- Dark trading is restricted to traders who have access to these venues

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Lit market **liquidity/competition** may drive substitution between hidden orders and dark trading

- Patient traders are more likely to substitute limit orders on a lit venue for dark orders when the order book is more liquid (Buti et al. 2014)

What is opaque trading?

Definition

Opaque trading is all trading volume that is the result of trading against an order that is not visible to the market, i.e. that is not pre-trade transparent

- On **lit venues**: trading against hidden orders
- On **dark venues**: volume in dark pools , internalizers and the OTC market
- Both types of opaque trading volume are driven by:

- **Order routing/submission choice**: choice to use a opaque order type
- **Order execution probability**: probability that an order of opposite sign matches the opaque order

- **Hidden orders** face a better execution probability when market orders on the opposite side are more **aggressive**
- **Dark** orders face better execution probability when there is an increased dark trading desire on the opposite side (balanced market)

Data

- Thomson Reuters Tick History
  - Intraday transaction records
  - Intraday limit order book updates
  - Both time-stamped to the millisecond
- 27 Dutch large cap stocks
- 738 trading days from November 2007 until September 2010
- 4 lit trading venues
  - Euronext, Chi-X, Turquoise, BATS Europe
  - LOB updates
  - Transaction reporting
- 7 trade reporting facilities
  - Transaction reporting of dark pool trades, internalized orders and over-the-counter (OTC) trades

Data

Trading Volume

4 components of trading volume

	$VisV_{i,t}$	€ volume against **visible** part of book on lit venues
+	$HidV_{i,t}$:	€ volume against **hidden** part of book on lit venues
+	$DarkV_{i,t}$	€ volume on **dark** venues
+	$BlockV_{i,t}$	€ volume of **block** trades
=	$TotV_{i,t}$	Total € volume executed

- i refers to stocks, t is days
- Exclude *blocks* from main analysis:
  - All trades eligible for delayed reporting
  - All trades larger than 1% of ADT (block trades)
- Remove trades outside opening hours
- Winsorize at 1% level

Data

Market Characteristics

- $Volat_{i,t}$ is the standard deviation of five-minute midquote returns
- $QSpread_{i,t,l}$ is the time-weighted quoted bid-ask spread on venue l
- $VisDepth_{i,t,l}$ is visible depth on venue l within 50 basis points around the midquote of the consolidated market

$$
\begin{aligned}
DepthAsk(X) &= P_j^{Ask} Q_j^{Ask} \mathbb{1}\{P_j^{Ask} < M(1+X)\} \\
DepthBid(X) &= P_j^{Bid} Q_j^{Bid} \mathbb{1}\{P_j^{Bid} > M(1-X)\} \\
Depth(X) &= DepthAsk(X) + DepthBid(X)
\end{aligned}
$$

Data

Market Characteristics

- $AT_{i,t,l}$ is a proxy for algorithmic trading on venue l (Hendershott et al. 2011)
- $SORT_{i,t}$ is a proxy for the fraction of traders using SORT (Kervel 2014), estimated as

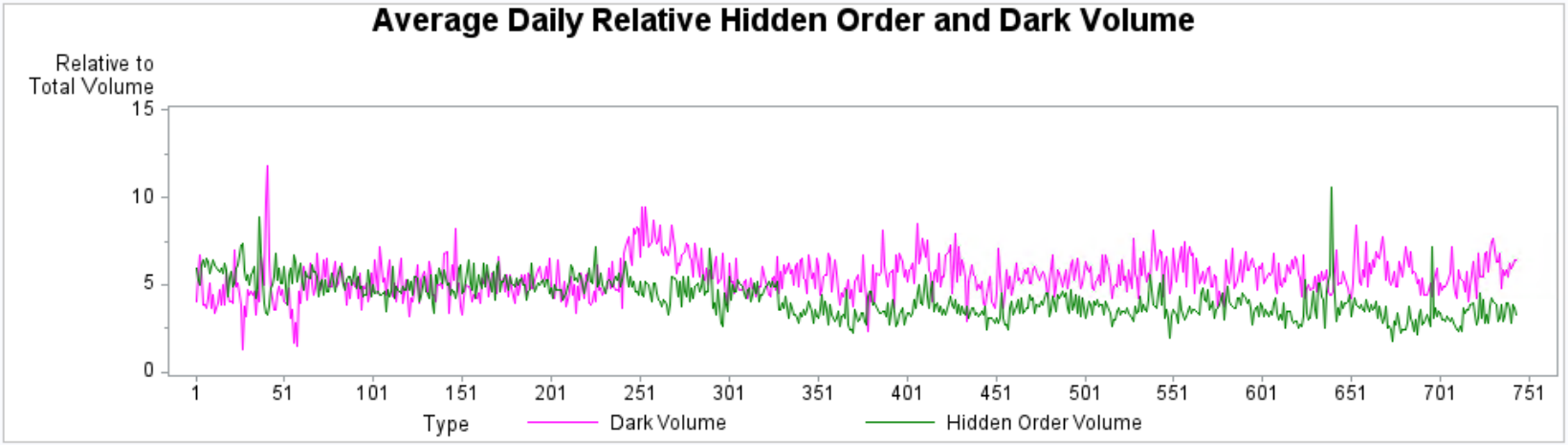
$$S_{i,t,k} = SORT_{i,t} P(x > T)_{i,t,k} + \epsilon_{i,t,k}$$

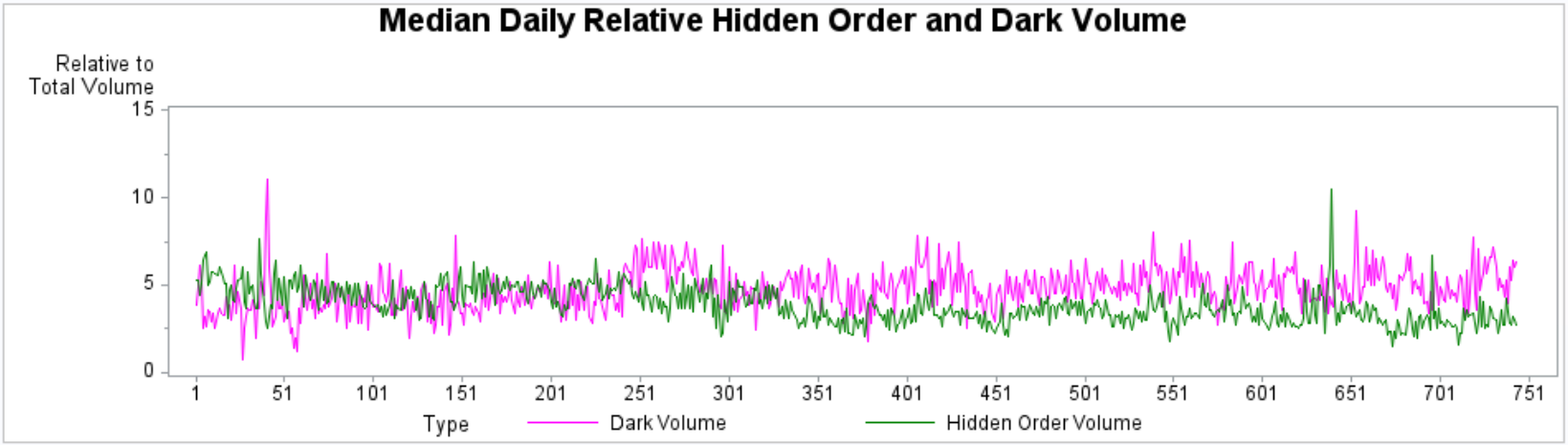
in a daily trade-by-trade regression with

- $S_{i,t,k}$ a dummy equal to 1 when a trade is "simultaneous"
- $P(x > T)_{i,t,k} = exp(\frac{-T_{i,t,k}}{\phi_{i,t}})$ the probability that an order of size x exceeds quoted depth on the most liquid venue

Data

Descriptive statistics





Hidden Order Trading

$$\%HidV_{i,t,l} = \gamma' \mathbf{X}_{i,t,l} + \lambda' \mathbf{Z}_{i,t,l} + \eta_{i,t,l} \quad (1)$$

- Variables standardized by stock and quarter (Buti et al. 2011; Hasbrouck and Saar 2013)
- 2SLS Estimation procedure
- $\mathbf{X}_{i,t}$ and $\mathbf{Z}_{i,t}$ contain market characteristics affecting (opaque) trading behaviour assumed : $Volume_{i,t}$, $VisDepth_{i,t}$, $QSpread_{i,t}$, $Volat_{i,t}$, $AT_{i,t}$ and $SORT_{i,t}$
- $Volume_{i,t}$, $VisDepth_{i,t}$, $QSpread_{i,t}$, $Volat_{i,t}$ are endogenous, and **instrumented** by the daily averages across the sample stocks excluding stock i and stocks in the same industry (Buti et al. 2011; Hasbrouck and Saar 2013; Degryse et al. 2014)

Hidden Order Trading

Panel A: Consolidated Hidden Order Trading

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Relative to *TotV*				Relative to *LitV*		
$Volume_{Tot}$	0.271***	0.302***		0.288***				
	(10.59)	(13.78)		(14.99)				
$Volume_{Lit}$					0.252***	0.285***		0.271***
					(9.99)	(13.14)		(14.20)
Volat	0.029	-0.032	0.244***		0.032	-0.031	0.233***	
	(1.18)	(-1.38)	(12.73)		(1.36)	(-1.36)	(12.25)	
$VisDepth_{Lit}$	-0.118***	-0.140***	-0.065***	-0.124***	-0.119***	-0.142***	-0.070***	-0.125***
	(-5.17)	(-6.24)	(-2.78)	(-5.48)	(-5.20)	(-6.29)	(-2.99)	(-5.56)
$Qspread_{Lit}$	-0.144***	-0.151***	-0.188***	-0.132***	-0.142***	-0.150***	-0.184***	-0.129***
	(-5.97)	(-6.25)	(-7.54)	(-6.06)	(-5.96)	(-6.28)	(-7.43)	(-5.93)
AT_{Lit}	-0.131***		-0.246***	-0.126***	-0.138***		-0.245***	-0.133***
	(-8.80)		(-25.24)	(-9.05)	(-9.34)		(-25.25)	(-9.57)
SORT	-0.078***		-0.066***	-0.078***	-0.076***		-0.065***	-0.076***
	(-9.32)		(-7.73)	(-9.32)	(-9.09)		(-7.66)	(-9.08)
N	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416
R^2	0.123	0.102	0.076	0.125	0.119	0.097	0.075	0.121

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(–) SORT reduces hidden order executions

Hidden Order Trading

	Main	Alt
$Volume_l$	0.275***	0.000
	(8.71)	(0.00)
$Volat$	0.018	0.004
	(0.74)	(0.18)
$VisDepth_l$	-0.219***	-0.070**
	(-9.86)	(-2.43)
$VisDepth_{l' \neq l}$	0.079***	-0.031
	(3.31)	(-1.19)
$Qspread_l$	-0.068***	-0.120***
	(-3.01)	(-5.25)
AT_l	-0.180***	-0.212***
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N	15,564	15,564
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- On the main listing exchange, visible depth from alternative venues reduces hidden order executions, but not the other way around

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- On alternative venues, hidden order executions are not affected by volume
- On the main listing exchange, visible depth from alternative venues reduces hidden order executions, but not the other way around
- The other variables have a similar effect on the main listing exchange and alternative venues

Dark Trading

$$\%DarkV_{i,t} = \gamma' \mathbf{X}_{i,t} + \lambda' \mathbf{Z}_{i,t} + \nu_{i,t} \quad (2)$$

$$\%BlockV_{i,t} = \gamma' \mathbf{X}_{i,t} + \lambda' \mathbf{Z}_{i,t} + \zeta_{i,t} \quad (3)$$

- Variables standardized by stock and quarter (Buti et al. 2011; Hasbrouck and Saar 2013)
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Dark Trading

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dark Volume				Block Volume			
$Volume_{Tot}$	-0.196***	-0.167***		-0.178***				
	(-7.48)	(-7.42)		(-9.28)				
$Volume_{Tot+Block}$					0.359***	0.328***		0.148***
					(12.39)	(13.05)		(6.32)
$Volat$	0.030	-0.003	-0.126***		-0.307***	-0.277***	-0.088***	
	(1.23)	(-0.13)	(-6.84)		(-11.94)	(-11.26)	(-4.33)	
$VisDepth_{Lit}$	0.015	0.008	-0.023	0.009	-0.050**	-0.041*	0.022	0.019
	(0.72)	(0.39)	(-1.11)	(0.46)	(-2.28)	(-1.91)	(0.94)	(0.88)
$Qspread_{Lit}$	0.021	0.013	0.053**	0.033	0.025	0.031	-0.031	-0.116***
	(0.92)	(0.59)	(2.34)	(1.63)	(1.02)	(1.31)	(-1.24)	(-5.45)
AT_{Lit}	-0.075***		0.009	-0.069***	0.073***		-0.058***	0.023
	(-5.20)		(0.94)	(-5.29)	(5.11)		(-5.77)	(1.54)
$SORT$	0.030***		0.022**	0.031***	-0.020**		-0.008	-0.023***
	(3.37)		(2.47)	(3.39)	(-2.52)		(-0.83)	(-2.66)
N	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416
R^2	-0.017	-0.016	0.000	-0.014	0.227	0.214	0.002	0.107

Dark Trading

	Dark	Block
$Volume_{Tot}$	-0.196***	
	(-7.48)	
$Volume_{Tot+Block}$		0.359***
		(12.39)
$Volat$	0.030	-0.307***
	(1.23)	(-11.94)
$VisDepth_{Lit}$	0.015	-0.050**
	(0.72)	(-2.28)
$Qspread_{Lit}$	0.021	0.025
	(0.92)	(1.02)
AT_{Lit}	-0.075***	0.073***
	(-5.20)	(5.11)
$SORT$	0.030***	-0.020**
	(3.37)	(-2.52)
N	17,416	17,416
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Dark Trading

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(+) Block trading increases in volume

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No evidence that liquidity drives dark trading

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(/) The **quoted spread** does not impact trading off lit venues

No evidence that liquidity drives dark trading

(–) Dark trading decreases when there is more **AT**

(+) When AT is more heavy, so is block trading

(+) **SORT**usage increases volume on dark venues

(+) Block trading is decreasing in SORT usage

Hidden Order versus Dark Trading

- Panel system of simultaneous equations

$$\begin{aligned} DarkV_{i,t} = &\quad \beta_{1,1} HidV^*_{i,t} + \beta_{1,2} VisV^*_{i,t} + \alpha_1 DarkV_{i' \neq i,t} + \gamma_1' \mathbf{X}_{i,t} + \lambda_1' \mathbf{Z}_{i,t} + \upsilon_{i,t} \\ HidV_{i,t} = &\quad \beta_{2,1} DarkV^*_{i,t} + \beta_{2,2} VisV^*_{i,t} + \alpha_2 HidV_{i' \neq i,t} + \gamma_2' \mathbf{X}_{i,t} + \lambda_2' \mathbf{Z}_{i,t} + \eta_{i,t} \\ VisV_{i,t} = &\quad \beta_{3,1} DarkV^*_{i,t} + \beta_{3,2} HidV^*_{i,t} + \alpha_3 VisV_{i' \neq i,t} + \gamma_3' \mathbf{X}_{i,t} + \lambda_3' \mathbf{Z}_{i,t} + \omega_{i,t} \end{aligned} \tag{4}$$

- Variables standardized by stock and quarter
- 2SLS Estimation procedure
- The same $\mathbf{X}_{i,t}$ and $\mathbf{Z}_{i,t}$ as before, using the same instruments
- We interpret $\beta_{1,1}$ and $\beta_{2,1}$ as an indication whether both types of dark trading are complements or substitutes

Hidden Order versus Dark Trading

	(1)			(2)			(3)		
	DarkV	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*
DarkV		-0.043	-0.041		-0.037	-0.017		-0.043	-0.039
		(-1.23)	(-1.04)		(-0.97)	(-0.41)		(-1.24)	(-1.00)
HidV	-0.127**		-0.212***	-0.048		-0.032	-0.140***		-0.246***
	(-2.37)		(-3.29)	(-0.96)		(-0.62)	(-2.70)		(-3.83)
VisV	0.150***	0.175***		0.177***	0.229***		0.154***	0.174***	
	(3.58)	(4.88)		(4.29)	(6.61)		(3.73)	(4.89)	
$Qspread_{Lit}$	0.022	-0.004	0.053**	0.007	-0.025	0.022			
	(1.10)	(-0.22)	(2.57)	(0.34)	(-1.43)	(1.11)			
$VisDepth_{Lit}$	0.038*	0.018	0.068***	0.016	-0.023	0.017	0.029*	0.019	0.047***
	(1.91)	(0.99)	(3.38)	(0.82)	(-1.25)	(0.81)	(1.69)	(1.22)	(2.59)
Volat	0.129***	0.176***	0.282***	0.016	0.010	0.026	0.140***	0.175***	0.313***
	(5.77)	(8.70)	(11.82)	(0.82)	(0.55)	(1.31)	(6.62)	(8.76)	(14.33)
AT_{Lit}	-0.256***	-0.377***	-0.583***				-0.257***	-0.378***	-0.589***
	(-14.41)	(-20.25)	(-17.07)				(-14.40)	(-21.05)	(-17.07)
SORT	0.031***	-0.033***	0.037***				0.030***	-0.033***	0.035***
	(3.65)	(-4.92)	(4.59)				(3.55)	(-4.91)	(4.32)
$V_{i' \neq i}$	0.596***	0.542***	0.870***	0.604***	0.615***	0.919***	0.597***	0.543***	0.878***
	(23.04)	(14.99)	(22.51)	(23.47)	(16.40)	(22.67)	(23.01)	(15.32)	(22.71)
N	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416
R^2	0.185	0.465	0.404	0.172	0.347	0.238	0.183	0.465	0.395

Hidden Order versus Dark Trading

	(1)			(2)			(3)		
	DarkV	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*
DarkV		-0.043	-0.041		-0.037	-0.017		-0.043	-0.039
		(-1.23)	(-1.04)		(-0.97)	(-0.41)		(-1.24)	(-1.00)
HidV	-0.127**		-0.212***	-0.048		-0.032	-0.140***		-0.246***
	(-2.37)		(-3.29)	(-0.96)		(-0.62)	(-2.70)		(-3.83)
VisV	0.150***	0.175***		0.177***	0.229***		0.154***	0.174***	
	(3.58)	(4.88)		(4.29)	(6.61)		(3.73)	(4.89)	
$Qspread_{Lit}$	0.022	-0.004	0.053**	0.007	-0.025	0.022			
	(1.10)	(-0.22)	(2.57)	(0.34)	(-1.43)	(1.11)			
$VisDepth_{Lit}$	0.038*	0.018	0.068***	0.016	-0.023	0.017	0.029*	0.019	0.047***
	(1.91)	(0.99)	(3.38)	(0.82)	(-1.25)	(0.81)	(1.69)	(1.22)	(2.59)
Volat	0.129***	0.176***	0.282***	0.016	0.010	0.026	0.140***	0.175***	0.313***
	(5.77)	(8.70)	(11.82)	(0.82)	(0.55)	(1.31)	(6.62)	(8.76)	(14.33)
AT_{Lit}	-0.256***	-0.377***	-0.583***				-0.257***	-0.378***	-0.589***
	(-14.41)	(-20.25)	(-17.07)				(-14.40)	(-21.05)	(-17.07)
SORT	0.031***	-0.033***	0.037***				0.030***	-0.033***	0.035***
	(3.65)	(-4.92)	(4.59)				(3.55)	(-4.91)	(4.32)
$V_{i' \neq i}$	0.596***	0.542***	0.870***	0.604***	0.615***	0.919***	0.597***	0.543***	0.878***
	(23.04)	(14.99)	(22.51)	(23.47)	(16.40)	(22.67)	(23.01)	(15.32)	(22.71)
N	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416
R^2	0.185	0.465	0.404	0.172	0.347	0.238	0.183	0.465	0.395

Hidden Order versus Dark Trading

	(4)			(5)			(6)	
	DarkV	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*	*DarkV*	*HidV*
DarkV		-0.040	-0.033		-0.030	-0.024		-0.031
		(-1.17)	(-0.82)		(-0.88)	(-0.54)		(-0.91)
HidV	-0.151***		-0.263***	-0.125**		-0.243***	-0.166***	
	(-2.92)		(-3.97)	(-2.34)		(-3.07)	(-3.18)	
VisV	0.171***	0.182***		0.222***	0.272***		0.262***	0.296***
	(4.36)	(5.35)		(5.53)	(8.92)		(6.89)	(10.43)
$Qspread_{Lit}$	0.005	-0.011	0.025	0.075***	0.069***	0.200***		
	(0.29)	(-0.76)	(1.28)	(4.02)	(3.98)	(8.92)		
$VisDepth_{Lit}$				0.012	-0.018	0.012		
				(0.61)	(-1.10)	(0.54)		
Volat	0.120***	0.170***	0.276***					
	(5.46)	(8.94)	(11.22)					
AT_{Lit}	-0.258***	-0.373***	-0.605***	-0.236***	-0.348***	-0.631***	-0.223***	-0.322***
	(-14.43)	(-21.15)	(-17.18)	(-14.40)	(-20.07)	(-14.66)	(-14.43)	(-22.35)
SORT	0.031***	-0.033***	0.039***	0.031***	-0.033***	0.044***	0.024***	-0.040***
	(3.67)	(-4.89)	(4.63)	(3.70)	(-4.93)	(4.73)	(2.94)	(-6.23)
$V_{i' \neq i}$	0.600***	0.536***	0.903***	0.602***	0.544***	1.028***	0.604***	0.530***
	(23.17)	(15.43)	(22.70)	(23.27)	(14.59)	(19.00)	(23.40)	(14.83)
N	17,416	17,416	17,416	17,416	17,416	17,416	17,416	17,416
R^2	0.183	0.471	0.368	0.189	0.480	0.238	0.190	0.495

Hidden Order versus Dark Trading

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	DarkV	*HidV*	*VisV*	*DarkV*	*HidV*	*VisV*	*DarkV*	*HidV*
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HidV	-0.151***		-0.263***	-0.125**		-0.243***	-0.166***	
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$VisDepth_{Lit}$	0.038*	0.018	0.068***
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AT_{Lit}	-0.256***	-0.377***	-0.583***
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- Dark trading and hidden order trading are substitutes
- Specifically, orders on dark venues substitute for hidden orders
- Hidden orders are less likely substitutes for dark orders

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Hidden Order versus Dark Trading

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- Dark trading and hidden order trading are substitutes
- Specifically, orders on dark venues substitute for hidden orders
- Hidden orders are less likely substitutes for dark orders
- Visible orders are also substitutes for hidden orders on lit venues
- Hidden order trading and dark trading are complementary to visible trading

Hidden Order versus Dark Trading

	(1)			
	DarkV	*HidV*	*VisV*	*BlockV*
DarkV		-0.031	-0.016	0.088*
		(-0.83)	(-0.38)	(1.88)
HidV	-0.131**		-0.204***	-0.049
	(-2.45)		(-3.18)	(-0.74)
VisV	0.147***	0.176***		0.025
	(3.51)	(4.93)		(0.50)
BlockV	0.051	-0.038	-0.077**	
	(1.21)	(-1.11)	(-1.97)	
$Qspread_{Lit}$	0.023	-0.005	0.051**	-0.003
	(1.16)	(-0.28)	(2.46)	(-0.14)
$VisDepth_{Lit}$	0.033*	0.021	0.074***	0.049**
	(1.66)	(1.14)	(3.63)	(2.25)
Volat	0.129***	0.175***	0.279***	0.053**
	(5.80)	(8.64)	(11.71)	(2.25)
AT_{Lit}	-0.249***	-0.381***	-0.587***	-0.177***
	(-13.06)	(-19.74)	(-17.11)	(-9.11)
SORT	0.031***	-0.034***	0.036***	-0.005
	(3.67)	(-5.00)	(4.47)	(-0.56)
$V_{i' \neq i}$	0.587***	0.544***	0.871***	0.578***
	(21.57)	(14.88)	(22.50)	(18.63)
N	17,416	17,416	17,416	17,416
R^2	0.192	0.461	0.400	0.103

- Results are robust to including block volume

Hidden Order versus Dark Trading

	(1)			
	DarkV	*HidV*	*VisV*	*BlockV*
DarkV		-0.031	-0.016	0.088*
		(-0.83)	(-0.38)	(1.88)
HidV	-0.131**		-0.204***	-0.049
	(-2.45)		(-3.18)	(-0.74)
VisV	0.147***	0.176***		0.025
	(3.51)	(4.93)		(0.50)
BlockV	0.051	-0.038	-0.077**	
	(1.21)	(-1.11)	(-1.97)	
$Qspread_{Lit}$	0.023	-0.005	0.051**	-0.003
	(1.16)	(-0.28)	(2.46)	(-0.14)
$VisDepth_{Lit}$	0.033*	0.021	0.074***	0.049**
	(1.66)	(1.14)	(3.63)	(2.25)
Volat	0.129***	0.175***	0.279***	0.053**
	(5.80)	(8.64)	(11.71)	(2.25)
AT_{Lit}	-0.249***	-0.381***	-0.587***	-0.177***
	(-13.06)	(-19.74)	(-17.11)	(-9.11)
SORT	0.031***	-0.034***	0.036***	-0.005
	(3.67)	(-5.00)	(4.47)	(-0.56)
$V_{i' \neq i}$	0.587***	0.544***	0.871***	0.578***
	(21.57)	(14.88)	(22.50)	(18.63)
N	17,416	17,416	17,416	17,416
R^2	0.192	0.461	0.400	0.103

- Results are robust to including block volume
- Visible trading can substitute for block trading
- Block trading is complementary to dark trading

Conclusion

1. We identify market characteristics that drive traders into using one or the other type of opaque order
   - **Volume** positively impacts hidden order trading, while dark trading is affected negatively
   - **Visible depth** and **quoted spread** negatively affect hidden order trading, but have no significant effect on dark trading
   - The use of **SORT** reduces hidden order trading, but increases dark trading
   - **Algorithmic trading** reduces both types of opaque trading
   - **Volatility** bears no relation to opaque trading
2. **Dark** trading substitutes for **hidden order** trading, but less so the other way around

   It is questionable whether regulatory initiatives to curb dark trading can bring dark volumes back to the exchange, without harming some classes of investors who rely on dark venues

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Thank You!

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