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DARK LANDSCAPE: SHIFTING BETWEEN DARK AND BLOCK TRADING

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Abstract

Concerns about the growing proportion of dark trading activity and its implications for market quality have led to widespread calls to limit the right of participation in dark markets. This paper analyses two such corrective actions employed by regulators. We analyse the dual introduction of minimum price improvement rules for the dark in conjunction with more flexible block trading thresholds. We find a significant drop in dark trading activity associated with minimum price improvement rules, which is offset by increases in on-exchange and block trading. We show that the creation of tier thresholds encourages a substitution effect from the dark to the upstairs market. We conclude that uniform block trade thresholds can be prohibitive to uninformed investors, particularly for low turnover securities.

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Introduction

Dark pools have received a significant amount of coverage in the last decade with the ongoing fragmentation of financial trading venues. The emergence of dark pools in financial markets has made it possible to facilitate better execution for large asset managers by providing anonymity and avoiding slippage costs. In the U.S. it is estimated that dark pools account for over 16% of total trading, and though European dark trading is estimated at just over half this amount, dark venues have grown rapidly to become a significant concern for their market regulators (Petrescu and Wedow, 2017). Among the concerns expressed about dark pools is the damaging impact on market quality (Weaver, 2011; Degryse et. al., 2011) and price discovery (Zhu, 2014; Comerton-Forde and Putnins, 2015).[2] Integrity concerns have also arisen, with a string of recent enforcement actions against some of the largest broker/dealer-operated dark venues.[3] With evidence of a continued migration away from traditional exchanges, regulators globally have been exploring ways to ensure that they remain a reliable trading venue for all investors, without harming overall market welfare. Recently in Australia, new rules prioritising displayed liquidity and requiring genuine price improvement for trades to qualify in the dark were introduced.[4] At the same time, regulators also amended the 'block trade' exception to pre-trade transparency to provide an alternative avenue for trades previously executed in the dark.[5] In this paper we focus on the changes in the Australian regulatory environment to assess how investors respond to rules that are designed to curb dark trading.

With the impending introduction of MiFID II in 2018, which seeks to put limits on order flow executed via the dark, a key question will be how investors go about locating liquidity. In a trader survey conducted by SIX Swiss Exchange in 2017, 35% of respondents remained undecided as to whether the limits placed on dark trading would push them to trade in larger block sizes.[6] A further survey of the buy-side, conducted by dark pool operator Liquidnet, found that 45% of respondents would adopt a "wait and see" approach in seeing how to respond to new regulations.[7] The introduction of regulations in Australia in 2013 to limit dark trades of a certain size to those that could display price improvement, whilst also reducing the minimum size requirements for block trades, provides an ideal setting to investigate where these displaced dark trades will go. In this

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[2] The European Commission (2010) and the International Organization of Securities Commission (2011) additionally expresses concerns about price discovery and market quality.

[3] In January 2016, Barclays Capital Inc. and Credit Suisse Securities agreed to settle separate cases finding that they violated federal securities laws while operating dark pools. This follows settlements by ITG and UBS Securities in 2015, and Liquidnet in 2014. https://www.sec.gov/news/pressrelease/2016-16.html

[4] These rules became effective in May 2013. In Canada, the Canadian Securities Administrators (CSA), in conjunction with the Investment Industry Regulatory Organization of Canada (IIROC), announced a revised framework for dark liquidity that became effective in October 2012.

[5] ASIC Market Integrity Rules Rule 4.21 (Competition)

[6] https://www.six-swiss-exchange.com/news/overview_en.html?id=trader_survey

[7] Healey, Rebecca (2017) The New Dark Age, Liquidnet Survey

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study, we exploit changes in the regulation of block trading to investigate the interaction of upstairs block trading activity and downstairs dark trading. We conduct two empirical analyses to examine this interaction. The first section exploits a regulatory change to the definition of block thresholds and meaningful price improvement rules to investigate whether block thresholds affect institutional investor's ability to utilise blocks in less liquid stocks. Our second section uses a series of quarterly revisions to block thresholds to understand to what extent participants switch between the dark and upstairs market. Each quarter, the Australian Securities and Investment Commission (ASIC) reviews block threshold applied to each security based on turnover of the previous quarter. These revisions provide an opportunity to apply a unique experimental design. We implement a difference-in-difference regression model by comparing block and dark trading activity around these quarterly revisions for both a group of treatment and control stocks. The treatment group consists of stocks that were re-assigned to different block tiers post the revision date and the control group consists of stocks that remain in the same block tier pre and post the revision date.

Our findings may be summarised as follows. First, consistent with previous studies (Foley and Putniņš, 2016), we document that price improvement rules for the dark leads to a significant reduction in dark volumes, which fall by over a third following this rule change. We show that this turnover is offset by an increase in trading activity in the lit market. Second, we show that a reduction in block trade thresholds for small-to-medium size securities, as determined by their level of turnover, in addition to the enforcement of price improvement rules, results in a material decline in dark activity and an economically significant increase in block and lit trading activity. Taken together, these findings provide evidence that lower block thresholds encourage switching away from dark pools into other pools of liquidity. The results furthermore suggest that certain trading strategies utilised around these dark venues were made redundant in the post-regulatory environment.

Our study relates and makes a number of useful contributions to the existing literature on fragmentation and transparency in equities markets (Baldauf and Mollner, 2016, Foley and Putniņš, 2016, Hatheway, Kwan and Zheng, 2017). First, we provide empirical evidence that previous block thresholds constrained the use of block trading in all stocks, particularly low turnover stocks. By lowering the threshold, ASIC has encouraged the use of blocks trades in the upstairs market. A number of recent studies have documented the rise in dark trading and decline in block trading in equity markets over the past decade. Most studies attribute this shift to increased use of algorithmic trading as a low cost alternative to upstairs markets. Our results show that binding block thresholds could be another factor contributing to the decline in block trading, providing a potential explanation as to why there has been such a significant divergence in block and dark trade sizes and a motivation for the growth in dark trading turnover.

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Our second set of results utilises a time series of quarterly revisions to block thresholds in individual stocks to further examine the interaction between block and dark trading. We find that allowing block thresholds to vary according to trading activity has positive and significant implications for participants in their discovery for liquidity. We show that the marginal change in block turnover is higher (lower) around quarterly decreases (increases) to the block threshold for treatment firms. For firms in the treatment sample, a quarterly increase in block threshold from Tier 2 to Tier 1, lowers the percentage block turnover by 3.17%. This compares to a 1.1% increase in block turnover, where there is no Tier change increase. The decline in block turnover is almost completely offset by an increase in trading in the lit market, with no visible increase in dark trading. We find that the decline in block percentage turnover is replaced by a rise in on-market trading.

Finally, this study contributes to our understanding of fragmentation between upstairs and downstairs markets and the interaction of different forms of non-transparent trading. Understanding the relationship between block and dark trading and the impact regulation has on trading is important to assess whether the regulation has had the intended impact on the market and whether any unintended consequences resulted because of the changes. Execution costs have become an increasingly important justification for how fund managers chose to route order flow. It also represents a significant cost for some proprietary trading strategies alpha capture. This study also provides support for evidence based regulation which is topically given the MiFID II regulation that will be effective from January 2018 and substantial change the microstructure landscape in Europe and in particular the use of both block and dark trading.[8]

The remainder of the article is structured as follows. Section 1 contains a review of the literature. Section 2 describes the hypotheses. Section 3 contains the description of the data. Section 4 reports the empirical results. Finally, our conclusions are presented in Section 5.

1. Literature Review and Hypothesis Development

There are a number of distinct methods for executing large block transactions. Participants have the option of transacting in the downstairs lit market, routing their order through a dark pool, using the pre-negotiated upstairs market, or some combination of the aforementioned. A distinguishing factor of the first two options, relates to the immediacy and anonymity that is provided at these venues.

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[8] In 2018 the European financial regulator will introduce Markets in Financial Instruments Directive II (MiFID II). One proposal under MiFID II is the introduction of a double cap on dark trading. That is, dark trading on single venues will be capped at 4% and an 8% cap will apply to total dark trading across all venues. If dark trading exceeds one of these caps, dark trading in that stock will be restricted for 6 months across all venues. Rosenblatt Securities Inc. estimates that 94% of FTSE 100 Index constituents will be restricted from trading in dark pools if the regulation was to be implemented in May 2017.
Dark-Pool Clampdown Seen Ensnaring 74% of European Equities, Bloomberg (2017)

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Since upstairs markets operate as search-brokerage mechanisms, price certainty is prioritised over speed of execution and anonymity. In some of the earliest theoretical work on the subject, Seppi (1990) shows that a liquidity trader, facing a choice between trading in the upstairs or downstairs (lit) market, would elect to trade a block rather than transacting is a series of smaller trades if they could credibly signal that they were uninformed. Such theories are supported in the empirical work of Madhavan and Cheng (1997), however, with the evolution that has taken place in financial markets, traders now have a greater selection of options.

In the current environment, block executions are quickly becoming less significant than non-block dark executions, due to market participants increasing use of algorithms to execute dark trades (Tuttle, 2013; Comerton-Forde and Putnins, 2015). Nevertheless, despite the fact that trading in dark pools or the upstairs market represent different forms of dark trading, the two are not necessarily substitutes. Block trades executed in the upstairs market are facilitated by brokers who take on the role of an 'information repository' to tap into unexpressed liquidity that may not have otherwise been expressed in the limit order book (Grossman, 1992; Bessembinder and Venkataraman, 2004). Though such an explanation does not preclude the possibility that traders will substitute between the two dark venues, it does indicate that the upstairs market has a continued role in order execution. Such a conclusion is reached in Comerton-Forde and Putnins, 2015) who find that not all dark trading has the same effects on price discovery. Block trades, in fact are reported to have no detrimental impact on price discovery.

There also exist positive liquidity externalities of executing blocks through the upstairs market since blocks are generally clustered in time, potentially around an event and by participant. On the other hand, dark pools are automated but fragmented across multiple participants. The use of algorithmic trading allows brokers to address the fragmentation of order flow by slicing large orders into parcels and routing to multiple venues at once, resulting in a greater number of smaller executions. As a result, dark trades might be used as a substitute for block trades as brokers increase their use of algorithms. If block and dark trades are indeed complementary, we would expect to see an increase (decrease) in the block trading activity when dark trading increases (decreases).

To choice between placing a block order in the upstairs market versus other available options may be influenced by regulatory structures. As regulators around the world seek to drive dark trading back onto exchanges, block trade thresholds will play some role in facilitating this shift in order flow. [9] If they are seen as being too restrictive, then regulators face the prospect of increasing

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[9] Under MiFID II the European Commission excludes 'large in scale' trades from the caps placed on dark trading.

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execution risk owing to price or fill risk. Our second hypothesis, therefore, examines the role of institutional structures play in affecting order flow placement.

2. Institutional Detail

2.1 Market Structure

The Australian Equities market is amongst the largest and most liquid in the world. According to the World Federation of Exchanges (WFE), the equities market ranked in the top fifteen in the world, with a domestic market capitalization of $US 1.3 trillion dollars.[10] Prior to 2011, all Australian equities and other financial securities were listed, traded, and settled on the Australian Securities Exchange (ASX) without competition. On the 31st October 2011, Chi-X entered the Australian market, conducting a staggered introduction over a 2-year period until it had become eligible for trading the full universe of ASX securities. Both the ASX and Chi-X Australia compete for lit and dark order-flow.

2.2 Dark Trading

Dark trading in the current landscape represents a broad collection of options. Dark liquidity refers to orders with reduced levels of pre-trade transparency before they are matched as executed trades. As such, they can occur on exchange markets (e.g. ASX Centre Point and 'hidden orders' on Chi-X's order book), in dark venues operated by market participants (i.e. crossing systems) and by manual matching of market participant order flow (e.g. block trades).[11] There are a number of key differences between the market for block trades and other dark markets. Principally, block trades have a minimum size requirement, and can occur at any price without any requirement to interact with the centralised limit order book. On the other dark trades executed in ASX-operated dark pools (including exchange-based and broker-operated), must occur at or within the prevailing best bid or offer price.

2.3 Market Integrity Rule Changes

The Australian Securities and Investments Commission (ASIC) enacted two significant changes to its Market Integrity Rules (MIR) in May, 2013.[12] The first of these was to introduce a 'meaningful price improvement' rule ("price improvement rule") and the second was to replace the uniform

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[10] WFE Annual Statistics Guide 2016, (https://www.world-exchanges.org)
[11] ASIC (2015), REPORT 452: Review of high-frequency trading and dark liquidity, para. 171
[12] http://asic.gov.au/about-asic/media-centre/find-a-media-release/2014-releases/14-105mr-asic-reports-on-dark-liquidity-rules/

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AU$1 million threshold for block trades with a tiered model to more closely link large trades with liquidity factors. The price improvement rule required dark venues to provide improvement on the NBBO of at least one price increment. In the event that the spread was constrained to one price increment, the order would have to be executed at the mid-point of the national best bid-offer (NBBO). ASIC's intention was to encourage orders to be executed on the lit market and to protect displayed orders.

The second change was an amendment to the definition of block trading. MIR provide for exceptions from the pre-trade transparent public limit order book for block trades. On the 26th of May 2013, ASIC amended the block trade size thresholds to allow less liquid stocks to execute large trades without pre-trade transparency. ASIC created three block tiers for traded equities, having previously required block orders to exceed $1million in turnover. For Tier 1 stocks (the most liquid stocks) the block sized remained unchanged at $1 million. For Tier 2 and Tier 3 stocks the block threshold was to be reduced to $500,000 and $200,000, respectively. Trades that exceed these thresholds may be negotiated at prices outside the quoted spreads. Trades that are executed without pre-trade transparency are still required to be reported immediately.

3. Data Description

3.1 Sample Selection

Each quarter the ASIC publishes a list of stocks[13] assigned to Tier 1 (block trade threshold of $1 million) and Tier 2 (block trade threshold of $500,000).[14] We collect the quarterly revisions for the 13 quarters between 26 May 2013 and 11 July 2016. The number of changes to each Tier for each quarter are reported Table 1. The first section of our analysis focuses on the initial changes made to block thresholds. Our sample consists of the S&P / ASX 100 stocks, of which 19 stocks maintained a block threshold of $1 million, 21 stocks were assigned to Tier 2 with a block threshold of $500, 000 and 60 stocks were assigned to Tier 3 with a block threshold of $200, 000.[15]

<Insert table 1 here>

Our second analysis conducts an event study around the quarterly block trade tier revisions. The sample includes all S&P / ASX 100 stocks that experienced a change over the sample period. This

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[13] Changes to block tiers can be found on the ASIC website http://www.asic.gov.au/block-trade-tiers.
[14] All other stocks are assigned to tier 3 with a block trade threshold of $200, 000.
[15] The S&P / ASX 100 index was used as our sample as most block trades are concentrated within the largest market cap stocks.

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resulted in 22 stocks that moved from Tier 1 to Tier 2, 31 stocks that moved from Tier 2 to Tier 1, 26 stocks that move from Tier 2 to Tier 3 and 65 stocks that moved from Tier 3 to Tier 2.[16] We collect transaction data from the Thomson Reuters Tick History Database for the 50 trading day's pre and post quarterly.

The Thomson Reuters Tick History execution data contains all trades executed on all ASX or Chi-X trading venues and off-market trades reported to either exchange. A qualifier associated with each trade indicates whether the trade was executed on a lit venue or off-market as a crossing or block trade. We aggregate trades into three categories, lit trades executed on market with pre-trade transparency, dark trades, including all trades executed without pre-trade transparency (ASX Centre Point, Chi-X hidden and broker crossing network trades) and block special trades. These blocks represent trades negotiated by the broker between clients, typically occurring outside prices quoted on exchange. The qualifiers allow us to differentiate trades that take advantage of the block regulation and those trades that are 'crossed up' by broker cash traders.[17]

3.2 Matching Stocks

To control for changes in stock characteristics that may affect the level of dark or block trading we match each treatment stock to a control stock. Treatment stocks are defined as stocks that are re-assigned to a new block tier and treatment stocks remain in the same tier. We select matching firms that have the same industry classification as the sample firms and are similar in turnover in the period preceding the change in tier threshold, change in turnover from quarter – 2 to quarter -1, and percentage dark turnover in quarter – 1. In the first step of our matching procedure we match identify firms with a) the same 2-digit GICS industry code as the sample firms; b) with a level of turnover between 80% and 120% of the sample firm's level in quarter – 1; c) with a change in turnover between 80% and 120% of the sample firm's change between quarter – 2 and quarter – 1; and d) with a dark percentage of turnover between 80% and 120% of the sample firm's ratio in quarter – 1. If more than one firms meets the matching criteria for a single firm, we choose the one that minimises the sum of squared relative differences using a method similar to Huang and Stoll (1996):

$$MatchingScore = \left[\frac{x_j^T - x_j^C}{(x_j^T - x_j^C)/\ 2} \right]^2 \qquad (0\text{-}1)$$

The superscript T indexes each treatment stock, and the superscript C indexes control stocks. If we are unable to find any firm satisfying the conditions (b-d) then we further relax these conditions

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[16] We exclude stocks that change tiers as a result of a demerger, IPO or delisting, these stocks are reported Table 9-6
[17] We exclude late and booking purpose trades, auction trades and portfolio trades.

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within +/-0.01 of the sample firm. If no match is found within the constraints of this criteria, we match independently from the sample firm's industry.

4. Empirical Analysis

We first examine the impact of a change in the block tier threshold in a univariate settling. We then explore the impact by employing various multivariate analyses. We begin by analysing the effect of a market wide change to block change thresholds. While these results are suggestive of an effect, we seek to further examine their robustness by examining the effect of firms being moved into a higher (lower) block threshold during the sample period. To better assess the causal link between block and dark trading, we match these firms against a peer group that did not experience a change in block thresholds. We similarly investigate the link between on- and off-exchange trading.

4.1 Analysis of Initial Block Threshold Change

Prior to the amendments in MIR in May 2013, all stocks had a block threshold of $1 million. 19 stocks were unaffected by the amendments to the block thresholds,[18] 21 stocks had the block threshold reduced to $500,000 while the remaining stocks had the block threshold lowered to $200,000. These regulatory changes provide a unique natural experimental design. Figure 5-1 shows the fraction of total daily dollar volume[19] executed as either block or dark trades for the twelve weeks surrounding the amendment to the block thresholds. As intended by the minimum price improvement regulation, dark trading declines across all stocks, with the most dramatic decline observed in stocks that move into the second tier from Tier 3. Both tiers have a higher fraction of pre amendment dollar volume executed on dark venues than the higher turnover Tier 1 stocks. This finding is consistent with model predictions from Buti, Rindi, and Werner (2017), which suggest that dark pool activity is lower with a higher stock price and therefore a relatively smaller tick size. Block trading increases for tier 2 and tier 3 stocks, supporting the notion that a reduction in the block threshold encourages higher block activity.

Although the changes in minimum price improvement could potentially have shifted some dark volume towards blocks, the increase in block trading does not appear to offset the decline in dark trading suggesting the regulation has resulted in a net migration of order flow to lit trading venues.[20]

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[18] However, these stocks would still have been affected by the minimum price improvement rule change.

[19] Opening auction, closing auction, late and portfolio trades have been excluded.

[20] These results are consistent with the findings of ASIC report 452. ASIC's report 452 reports block trades had increased from 10.3% of total turnover in the September quarter 2012 (prior to the amendments) to 14.9% of total turnover in the March quarter 2015 (subsequent to the amendments).

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<Insert figure 1 here>

Table 2 presents the trading activity around the introduction of lower block thresholds. Panel A, B and C present the results for stocks in tiers 1, 2 and 3, respectively. Tier 1 stocks are only affected by the dark pool minimum price improvement rules, as the block trade threshold remains unaffected. We do not therefore expect to see any changes to block trading activity. Figure 5-1 shows dark trading decreases markedly post the changes for all three stock tiers as expecteFd. The mean stock-day fraction of dark trading declines by 25-35% depending on the tier. The most economically significant results are observed in Tier 2 and Tier 3 stocks. For these securities, the proportion of overall value executed in upstairs markets rises by 14.4% and 33.0%, respectively, to a level of approximately 10% of total turnover. Although these results support the hypothesis that a lower block threshold will encourage more block trading activity, it also consistent with conclusions reached by Tuttle (2013), who notes that although some dark (pool) trading is likely to be the result of the shredding of large orders, it is generally not the principle vehicle for market participants looking to execute larger orders.

<Insert table 2 here>

Figure 2 shows the distribution of block trades by trade size around the new regulations. The large concentration of block trades sized between $1 and $2 million before the amendments clearly shows the block trades being constrained by the threshold. Following the lowering of thresholds, we observe between 600 blocks between $500,000 and $1 million for Tier 2 stocks and over 1,600 block trades between $200,000 and $1 million for Tier 3 stocks. Approximately 1,000 of these blocks are between the $200,000 (the new threshold) and $500,000 the threshold for the next largest tier. In these distributions, we also observe that stocks with higher turnover (Tier 1 stocks) have higher levels of large block trades (>$10 million).

In the post regulation period, 52% of block trades in Tier 2 stocks are below the $1 million. While 70% of block trades in Tier 3 stocks are below $1 million, 44% of block trades in are also below the new Tier 2 threshold of $500,000. Panel B of Figure 2 focuses on the distribution of large dark trades

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not recorded as blocks. Prior to the new regulation less than 0.40% of dark trades exceeded the lowest block threshold. This declines post-regulation to less than 0.22%. Despite the small proportion of dark trades exceeding block size, in trade number terms, they represent a significant amount. Panel B of Figure 2 depicts the high concentration of large dark trades between $200,000 and $1 million and the dramatic shift away from these sized trades post regulation.

<Insert figure 2 here>

Figure 3 presents a series of stock-day dollar volume distributions executed as a block (panel A) or in a dark pool (panel B). Figure 3 shows that block trading is heavily skewed, indicating that it is concentrated in a few stock-days. This relationship is strongest for the lowest turnover stocks with approximately 80% of stock-days experiencing less than 5% of turnover executed via blocks. For high turnover stocks, only 55% of stock days have less than 5% block trading. The concentrations becomes much less pronounced post the amendments with a noticeable increase in stock days with greater than 5% of block turnover and much fewer stock days with less than 5% block turnover. Prior to the amendment the distribution of dark trading was much less skewed and both Tier 2 and Tier 3 stocks had stock days with large fractions of dark trading (>30%). The regulations has resulted in volume moving away from dark venues as documented by the leftward shift in distributions.

<Insert figure 3 here>

Table 3 reports a number of control variable stock descriptive statistics around the change in regulations. Across all tiers, there is a positive and significant increase in volatility of stocks of between 19 and 26 basis points. This heightened volatility is associated with an increase in turnover in the top tier category of securities. There is no discernible change in the price of securities over the event window.

<Insert table 3 here>

We examine the impact of the new regulations on block and dark trading activity separately for each block tier by estimating the following regression:

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$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_3 Turnover_{it} + \beta_4 Price_{it} + \beta_5 Volatility_{it} + \varepsilon_{it} \quad (\,0\text{-}2)$$

The dependent variable (y_{it}) is one of three measures of interest: 1) the percentage of total volume executed as block / dark; 2) the log of block / dark dollar turnover; or 3) the number of block / dark trades. D_t^{POST} is a dummy variable with a value of 0 prior to the regulation amendments and 1 in the period after. The other control variables are: $Price_{it}$, $Turnover_{it}$ (the natural log of traded dollar volume), $Volatility_{it}$ (the stock-day's high-low price range divided by the time-weighted midquote). Standard errors are clustered by both stock and date.

Tables 4 to 6 show the results of the impact of regulation change on block and dark trading activity across Tier 1-3 stocks, respectively. The results in Table 4 reveal that minimum price improvement rules substantially reduce the level of dark trading for Tier 1 securities, a finding consistent with Foley and Putniņš (2014). This decline is associated with efforts from regulators to move liquidity back onto the centralised and transparent limit-order book, and is further revealed by the positive and significant coefficient on our dummy variable for the 'lit' percent turnover specification. Although there is a positive and significant increase in block dollar value and trade count, as a proportion of total turnover, the increase is not economically significant. Overall, the results are consistent with our expectations that traders will shift their trading to the lit market with the imposed minimum price improvement rules.

<Insert Table 4 here>

Tables 5 and 6 present the results of the combined change in price improvement and block tier threshold for Tier 2 and 3 stocks, respectively. Unsurprisingly, we see a significant drop-off in dark trading. The magnitude of the decline is between 2.0-2.5 times as large for these lower tier stocks relative to the former category, indicating that the regulation amendments had a far larger impact on these lower turnover stocks (reference?). Interestingly, the extent of the substitution that takes place following these amendments is far more diffuse than that experienced in Tier 1 stocks. The percent of total turnover attributable to block trades, as well as block dollar turnover, and trade count are all, on average, significantly higher for Tier 2 and 3 stocks, providing evidence of some substitution between the dark and pre-negotiated block trade market. The results also provide indicative evidence that the uniform block threshold held for all stocks prior to the amendment change may have been too restrictive for some traders. These restrictions ultimately force participants to move away from the centralised limit order book in search for liquidity in dark pools as they seek to minimise their price impact costs. This idea is further explored in the next section.

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<Insert table 5 and 6 here>

4.2 Analysis of Quarterly Block Trade Tier Revisions

This section analyses the effect on trading activity associated with a change in block trade thresholds. We specifically examine the effect of thirteen quarterly revisions to the block tiers between October 2014 and October 2016. Recall that these revisions are to stocks based on executed turnover in the previous quarter. Therefore, stocks can move into higher (or lower) tiers based on prior trading activity. We seek to examine how traders respond to lower (higher) block threshold and use this evidence to further understand the dynamic between alternative market venues for order execution.

F plots the average daily block and dark percentage turnover around increases (panel A) and decreases in block thresholds around the quarterly revision dates (panel B). As expected, we observe a marked decline in block trading with increases in the block thresholds, and increases in block trading when the threshold decreases. The relationship between block thresholds and dark trading is less clear. For a decline in block thresholds the percentage of dark trading of Tier 1 stocks moving to Tier 2 remains relatively unchanged while for stocks moving from Tier 2 to Tier 3 we observe a decline in dark trading. This suggests some substitution between block and dark trading. For increases in block thresholds, we also see a decline in dark trading.

<Insert figure 4 here>

Figure 5 shows the distributions of block trade sizes prior to and following the quarterly revisions. Panel A, of Figure 5 presents distributions for stocks that experience an increase in the block thresholds and panel B presents distributions for stocks that have experienced a decrease in the block thresholds post quarterly revisions. Panel A, of Figure 5 shows a large number of block trades in the $0.5-$1 million and $0.2-$0.5 million size categories prior to the quarterly revisions. Post quarterly revisions, these stocks have a higher block threshold and as a result we no longer observe any block trades in the $0.5-$1million and $0.2-$0.5 million size category. However, we do not see any noticeable increase in block trades just above the new threshold, indicating these trades may have shifted to the dark or lit markets. Panel B of Figure 5 shows a high proportion of pre-revision block trades are sized just above the threshold ($1 million), indicating that the threshold may constrain the use of block trades. Increases in block trades sized just above the new threshold ($0.5 million)

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immediately after the quarterly revisions supports this finding. We also observe a similar number of block trades sized between one and two million dollars both pre and post the revisions. This suggests the increase in $0.5-$1 million block trades could be a result of dark trading activity being shifted back to blocks. We observe a similar relationship with lower turnover stocks (right side panels); following a decrease in the block threshold we observe fewer larger block trades and more smaller ($0.2-$0.5 million) block trades. These results suggest the block threshold may constrain the use of block trades.

<Insert figure 4 and 5 here>

Table 77 reports descriptive statistics for trading activity of stocks assigned to tiers with higher block thresholds. Each panel presents results for the 50 trading days pre and 50 trading days post quarterly revisions. The means and medians of each metric are computed across stock-events. The final two columns present the differences in pre and post means and medians, respectively. Panel A (B) aggregates stocks across all quarterly revisions that have a pre revision block threshold of $0.5 ($0.2) million and a post revision threshold of $1 ($0.5) million. The results show a statistically significant decline in the number of block trades, dollar volume of executed blocks and fraction of total dollar volume executed as blocks. On average the number of block trades decreases by around a third, from 120 trades to 80 trades for higher turnover stocks and 69 to 47 for mid turnover stocks. The revised higher block thresholds have a larger impact on block trading for less liquid stocks with dollar volume declining by an average of $22 million (1.89%) and $56 million (2.83%) respectively for high and low turnover stock. The number and dollar value of dark trades declines post the quarterly revisions for both groups of stocks. This result is consistent with a decline in the total trading activity. Moreover, the increase in fraction of total turnover executed as dark trades and the decrease in fraction of block trades after the increase in the block threshold is indicative of partial substitution of block trading for dark trades.

<Insert table 7 here>

Table 8 presents descriptive statistics for trading activity in stocks that moved into lower block thresholds tiers following a quarterly revision. Panel A aggregates stocks across all quarterly revisions that experience a change in block threshold from $1 million pre revision to a post revision threshold of $0.5 million. Panel B aggregates stocks across all quarterly revisions that have a pre

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revision block threshold of $0.5 million and a post revision threshold of $0.2 million. Table 8 shows a reduction in the block threshold increases the number of block trades, on average, from 59 to 81 per day (37% increase) for liquid stocks and 38 to 53 per day (39% increase) for less liquid stocks. Increases in block volume are also observed. Dark trading activity, both number of trades and dollar volume, increase post the quarterly revisions. However, the fraction of total turnover executed as dark trades declines. Although not statistically significant, the direction of the change in fraction of total turnover executed as blocks and dark trading suggests that block trading is used as a partial substitute for dark trading.

<Insert table 8 here>

4.3 Difference-in-Difference Methodology

In the preceding sections analysed the effect of the initial market integrity rules changes, in addition to the quarterly revision to block thresholds. In this section, we compare stocks that have undergone a tier change with a matched sample of stocks.[21] We use a difference-in-difference regression methodology to estimate the effects of the revision to block thresholds on dark and block trading activity.

The difference-in-difference model identifies the effect of the change in block size thresholds on block and dark trading activity. The trading activity variables are represented by y_{it}. These trading activity variables include fraction of total dollar turnover executed as block (dark) trades, log of block (dark) dollar turnover and block (dark) trade count. The regression model is estimated separately for stocks that are reassigned to a Tier with a higher block threshold (Tier 2 to Tier 1 or Tier 3 to Tier 2) or stocks that are reassigned to a tier with a lower block threshold (Tier 1 to Tier 2 or Tier 2 to Tier 3):

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 D_i^{TREAT} + \beta_3 (D_t^{POST} \times D_i^{TREAT}) \qquad (0\text{-}3)$$
$$+ \beta_4 Turnover_{it} + \beta_5 Price_{it} + \beta_6 Volatility_{it} + \varepsilon_{it}$$

Where D_t^{POST} takes the value of 1 for the period after the Revisions and 0 prior to the Revisions, D_i^{TREAT} takes the value of 1 for stocks that experience a change in block threshold and 0 otherwise. The coefficient β_3 reports the effect of the interaction term $(D_t^{POST} \times D_i^{TREAT})$ between the post period and treatment stocks. It captures the effect of changes in the block thresholds on block and

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[21] For robustness, we additionally compare our sample to a match panel of securities based on market sector, market capitalisation, and volatility as these characteristics are potentially important determinants of trading volume.

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dark trading activity. A number of additional control variables are included to account for differences in trading conditions around the quarterly revisions.

Table 8 reports the results of the impact of a decrease in block thresholds on block and dark trading activity. For both groups of stocks stocks block trading activity increases. Block and dark trading as a percentage of total dollar turnover increases by 0.99% and 1.48% respectively, while only block trade count and block dollar volume increase post revision. Similar results are shown in for stocks reassigned from Tier 2 to Tier 3 with percentage block turnover increasing by 0.43% and percentage dark trading increasing by 1.03%.

Table 9 reports the results of the impact of an increase in the block thresholds on block and dark trading activity. Block trading activity decreases across both groups of stocks. Interestingly, dark trading also decreases with the new change. For stocks that move from Tier 2 to Tier 1 we observe a decline in percentage of block trading of 3.29%, dollar volume of $12.5 million and 0.87 block trades per stock day. Dark trading on the other hand declines by 2.04% of total dollar turnover, $1.16 million dollars and 100 dark trades per stock day.

<center><Insert table 8 and 9 here></center>

<center><Insert table 10 and 11 here></center>

Conclusion

Financial markets have evolved at an unprecedented rate over the last decade. At the centre of this movement are regulatory reforms designed to offer greater protection for investors in an increasingly more complex trading environment. This paper address three research questions, (1) are block thresholds binding? (2) does a lower block threshold encourage more block trading? and (3) to what extent are block and dark trading substitutes or complements? In this chapter we conduct two distinct but related analyses of block and dark trading around regulatory changes to answer these questions. First we empirically examine the regulatory change introduced on the 26 May 2013 to lower the block trading thresholds together with the introduction of minimum price improvement for dark trades. We then examine a series of quarterly revisions to block trade thresholds to provide casual evidence on the interaction between dark and block trading.

The main findings of this paper can be summarised as follows (1) block thresholds constrain the use of block trading; and (2) block and dark trading tend to be substitutable forms of trading. These results suggest that a 'one-size-fits-all' block thresholds can be a limiting factor for block trading and a reduction in the size requirements of block trades can encourage block trading. Our results

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show that lower block thresholds tend to increase block trading activity and lower dark trading activity. While increases in block thresholds tend to have the opposite effects.

In Australia, both block and dark trading provide an important function in the market, specifically the ability to minimise price impact by trading opaquely. Our results show block and dark trading are complementary, and any changes to regulation that may affect either form of trading could potentially affect the other. Since the reduction of dark and block trading can have differing impact on market participants it is cautioned that the interconnectedness between these two types of opaque trading be taken into consideration before further regulatory changes are implemented.

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Figure 1: Trading Activity Around Amendment Date

This figure shows the fraction of dollar volume executed in block or dark venues for the 6 week pre and post the amendments to the block size thresholds. The sample consists of S&P/ASX100 index constituents segmented into three groups. Prior to the amendments all stocks had a threshold of $1 million. The right panel shows stocks that have a post amendment threshold of $1 million, the middle panel shows stocks that have a post amendment threshold of $500, 000 and the left panel shows stocks that have a post amendment block threshold of $200, 000. Each observation represents an average calculated across the sample for each day.
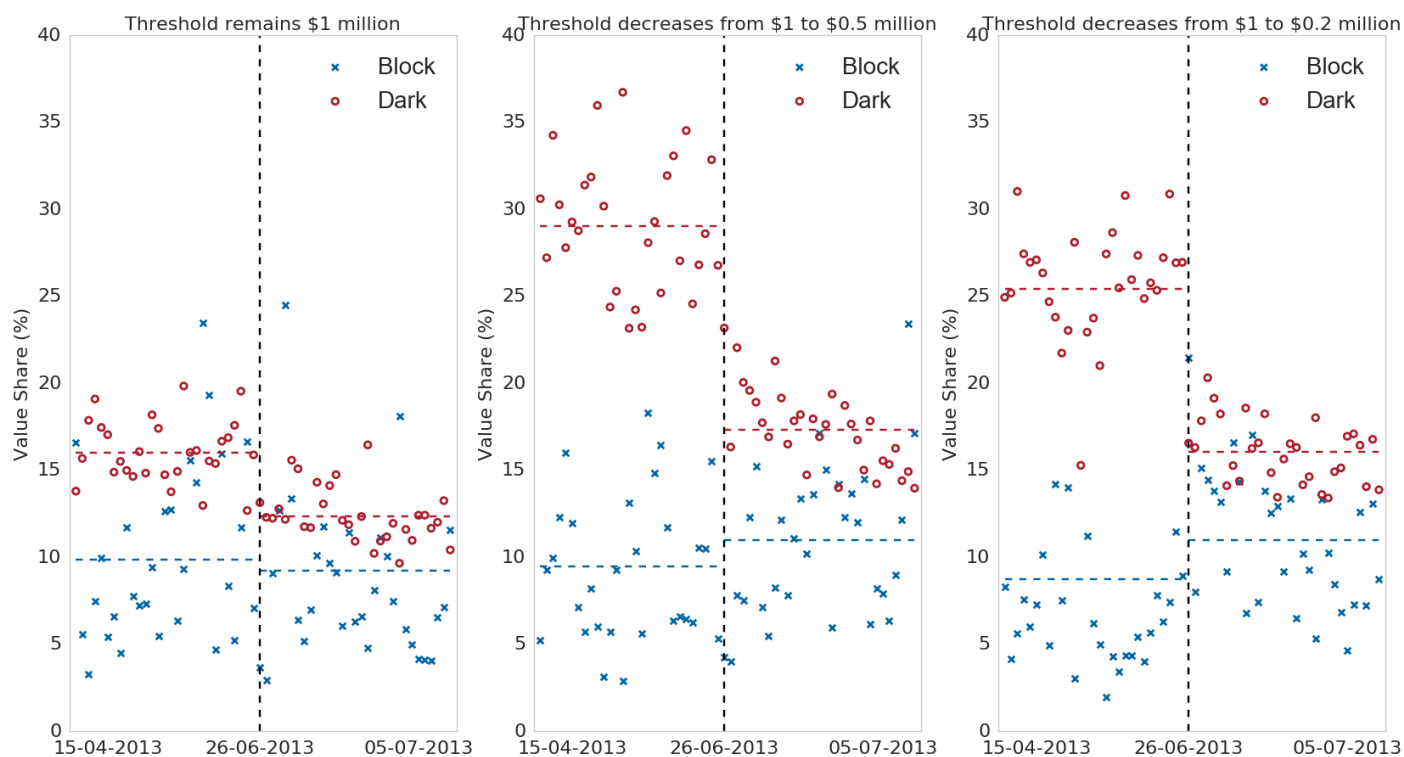
Figure 2: Block Size Trading Around Regulation Date

This figure shows the distribution of large block size trades before / after the 26th May 2013 regulations. Panel A shows block trading and Panel B shows dark trades. The blue (red) distribution shows the number of trades (pooled across stock-days) executed in each trade size bucket in the 6 weeks prior to (post) the amendments for the S&P / ASX100 index constituents. Stocks are segmented into three tiers based on the ASIC block thresholds with each tier presented separately.

Panel A: Distribution of Block Trade Sizes
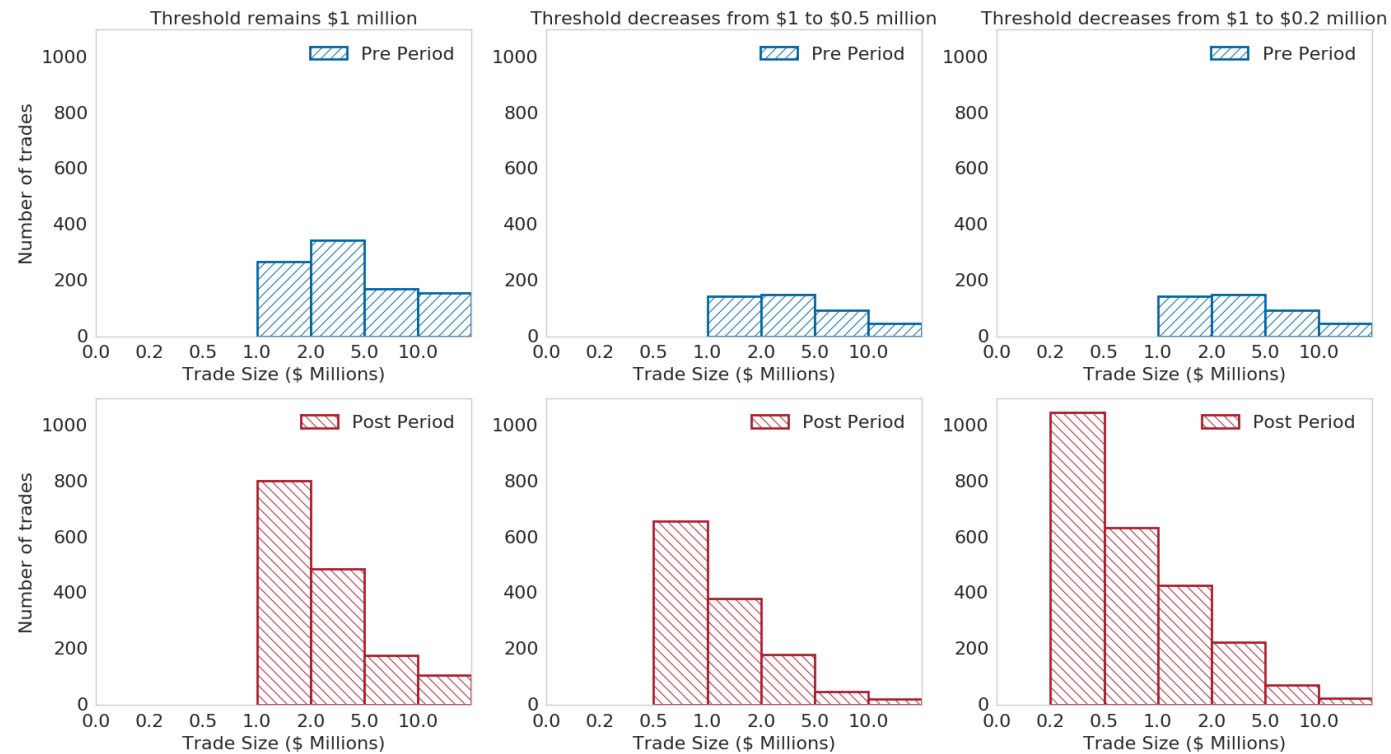
Panel B: Distribution of Dark Trade Sizes
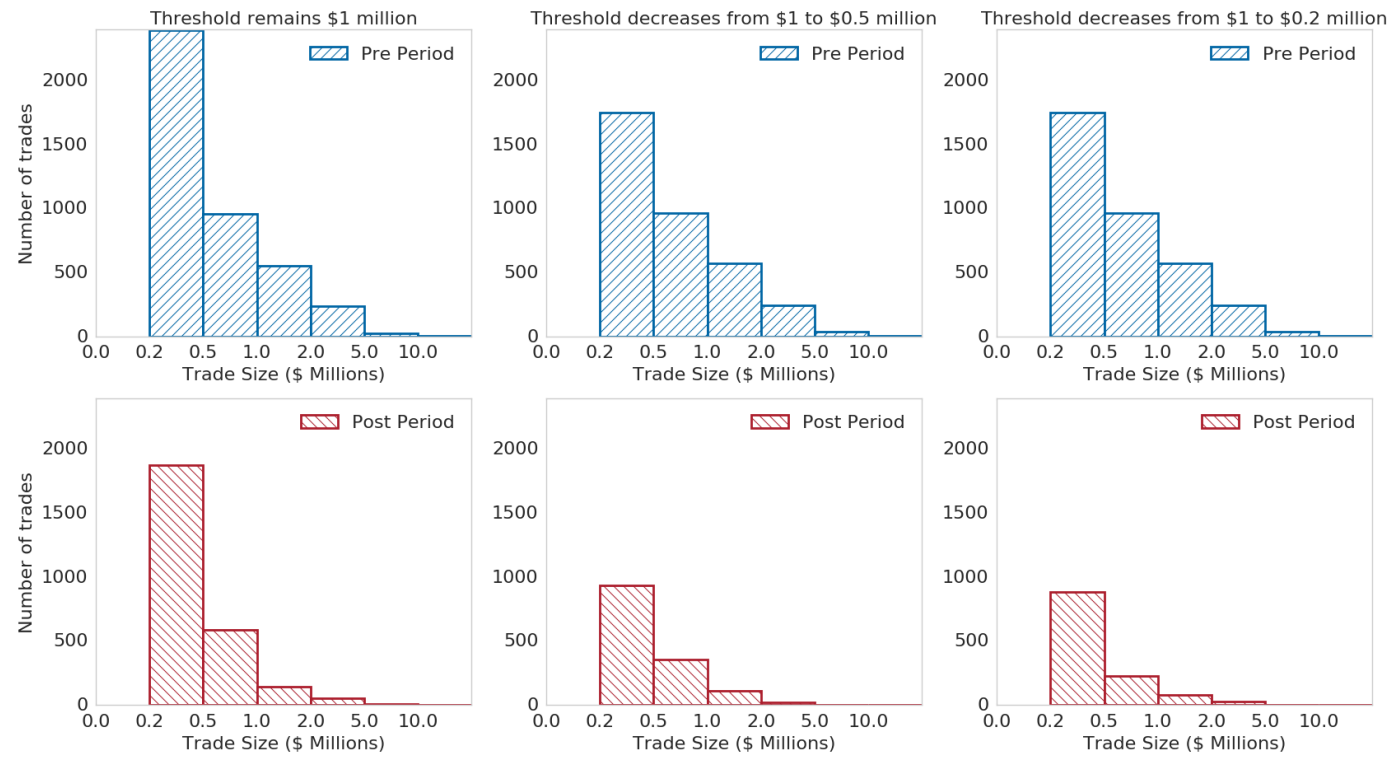
Figure 3: Stock-Date Trading Distribution Around Amendments

This figure presents the distribution of stock-day trading for the 6 weeks before / after the 26th May 2013 regulation changes. Where block (dark) trading is calculated as the fraction of total dollar volume executed as block (dark) trades during continuous trading. The first row of each panel presents the distribution for the three tiers pre-amendment and the second row presents the distriubtions for the three tiers post amendments.

Panel A: Distribution of Block Trading Market Share
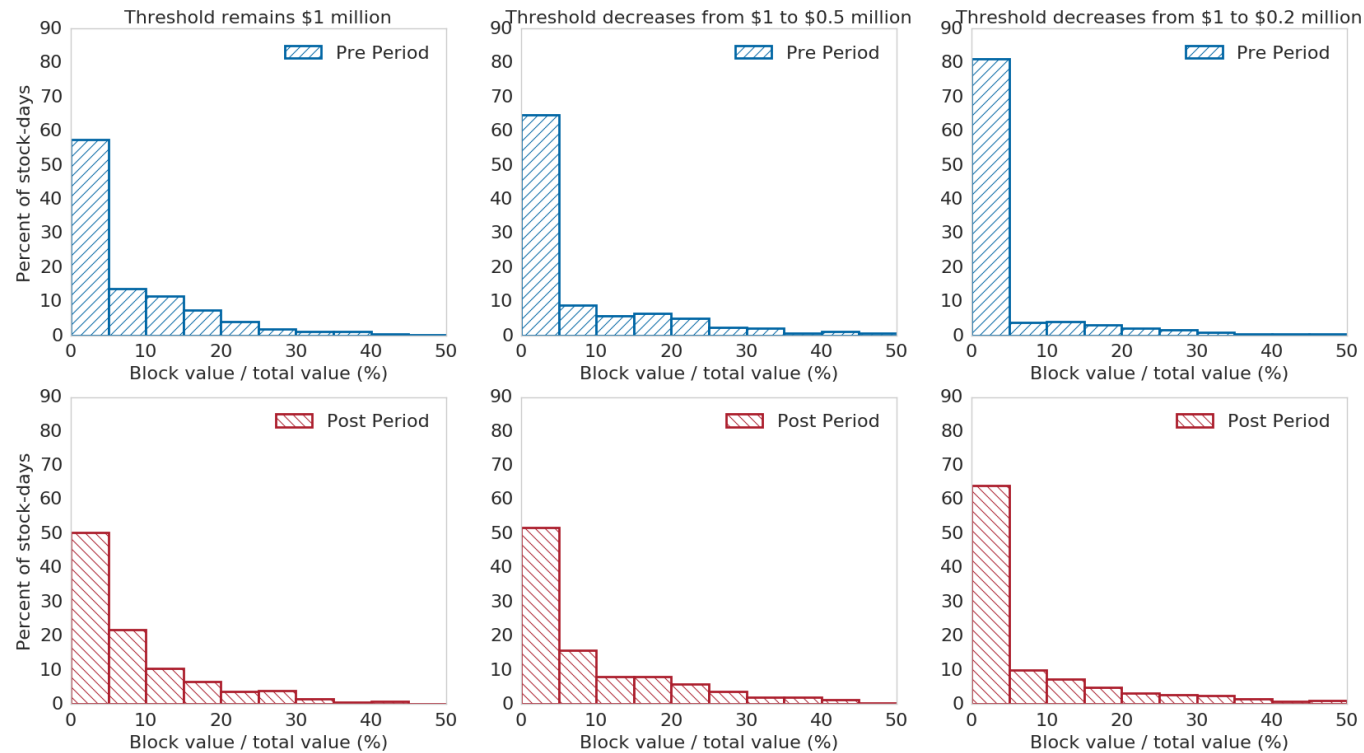
Panel B: Distribution of Dark Trading Market Share
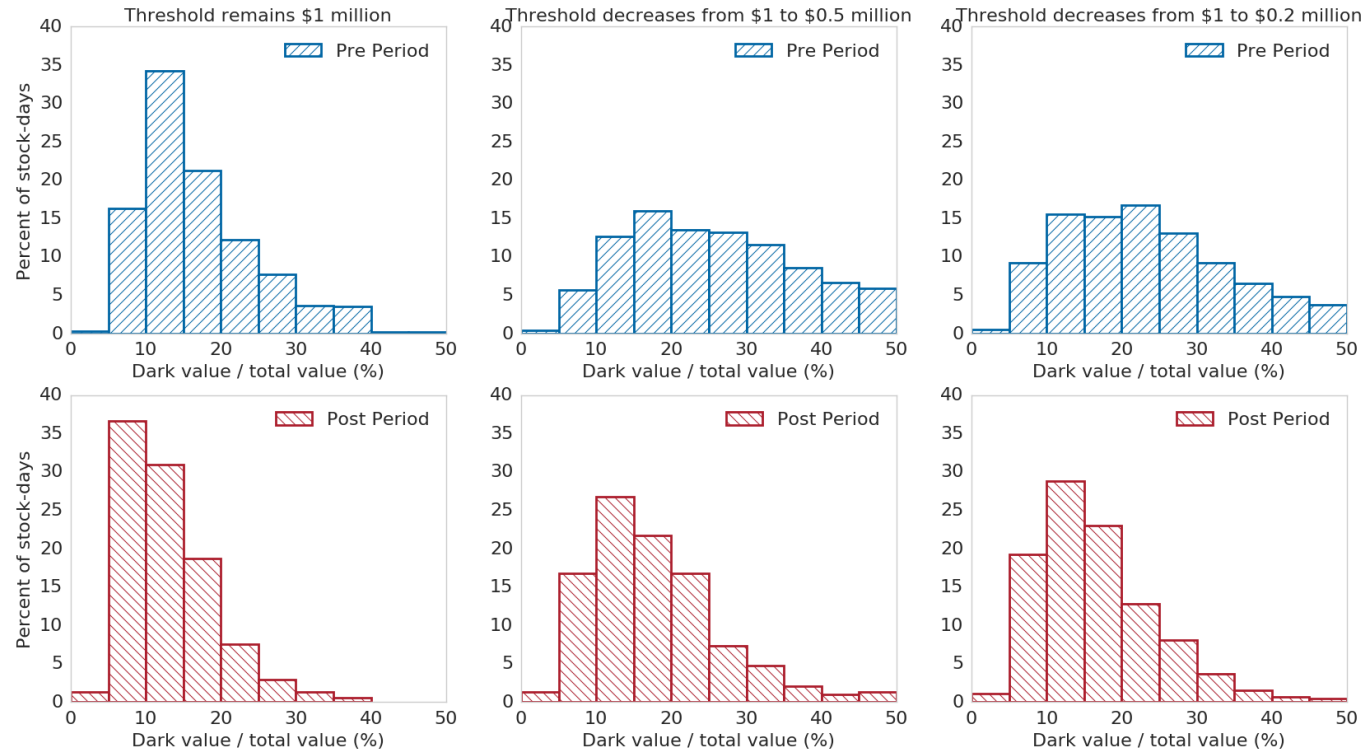
Figure 4: Block and Dark Trading Around Quarterly Revisions

This figure shows the fraction of total dollar volume executed as block or dark for the 50 trading days prior to and post the quartertly revisions to stock tiers. Panel A shows S&P/ASX100 constituents that are reassigned a lower block threshold post revision. Panel B shows S&P/ASX100 constituents that are reassigned a higher block threshold post revision. The dashed horizontal lines represent the mean daily values calculated pre and post quarterly revisions.

Panel A: Increases in Block Trade Thresholds
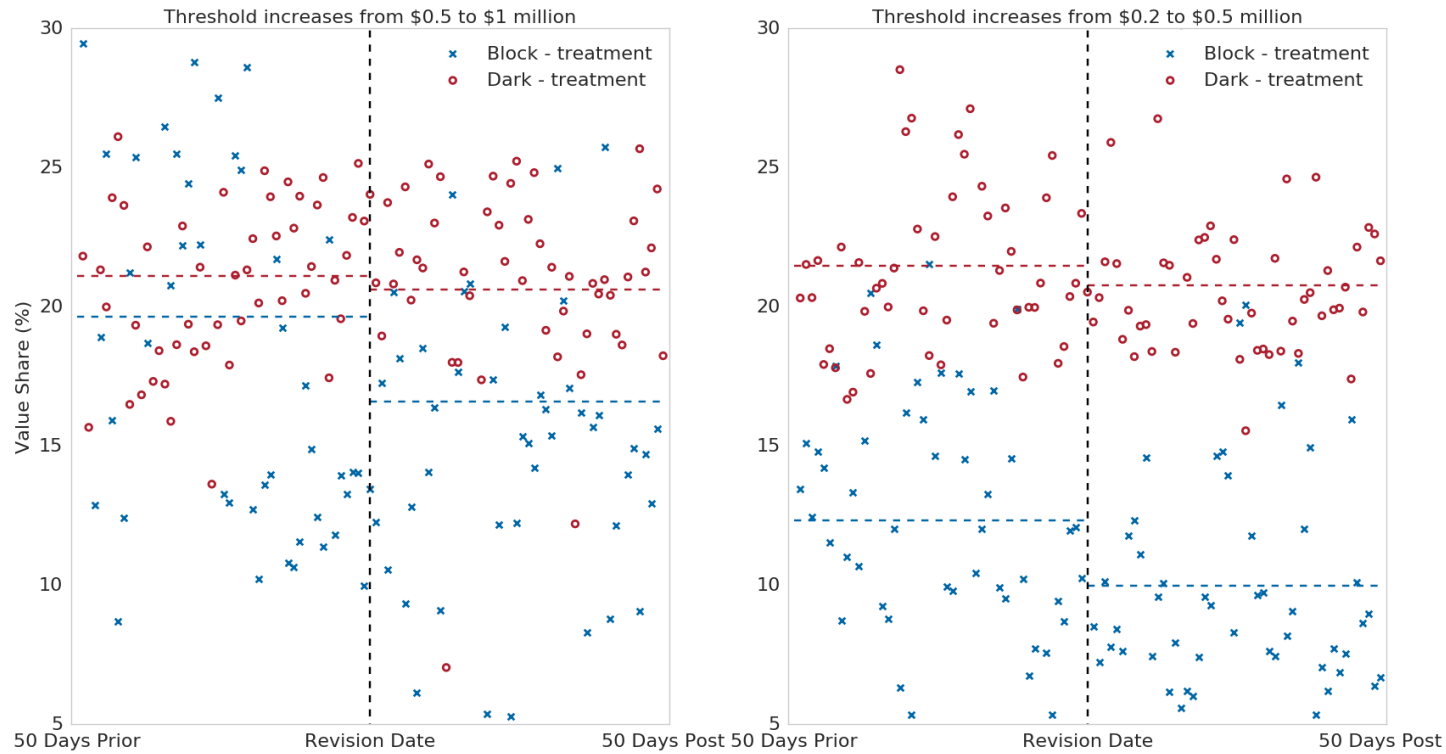
Panel B: Decreases in Block Trade Thresholds
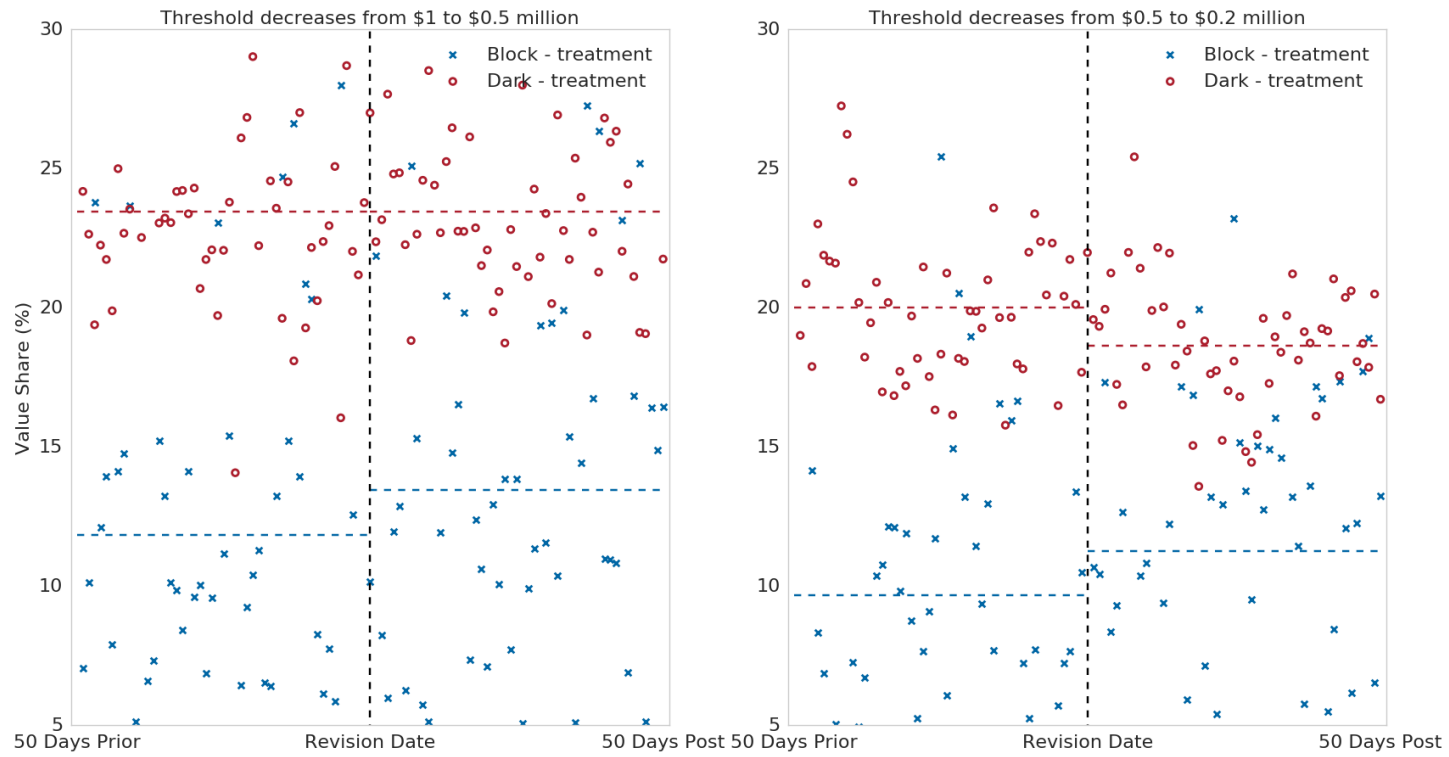
Figure 5: Constrained Block Trading Around Quarterly Revisions

This figure shows the distribution of block trade for 50 days around the quarterly revisions to block tiers. Panel A shows the distribution for the S&P / ASX100 index constituents that have an increase in block thresholds. Panel B shows the distribution for the S&P / ASX100 index constituents that experience a decrease in block thresholds. Block trade counts are aggregated across stocks-days and pre / post periods. The top sub-figures shows the pre revision distribution and bottom sub-figures shows the post revision distribution.

Panel A: Distribution of Block Trade Sizes around Increases in Thresholds
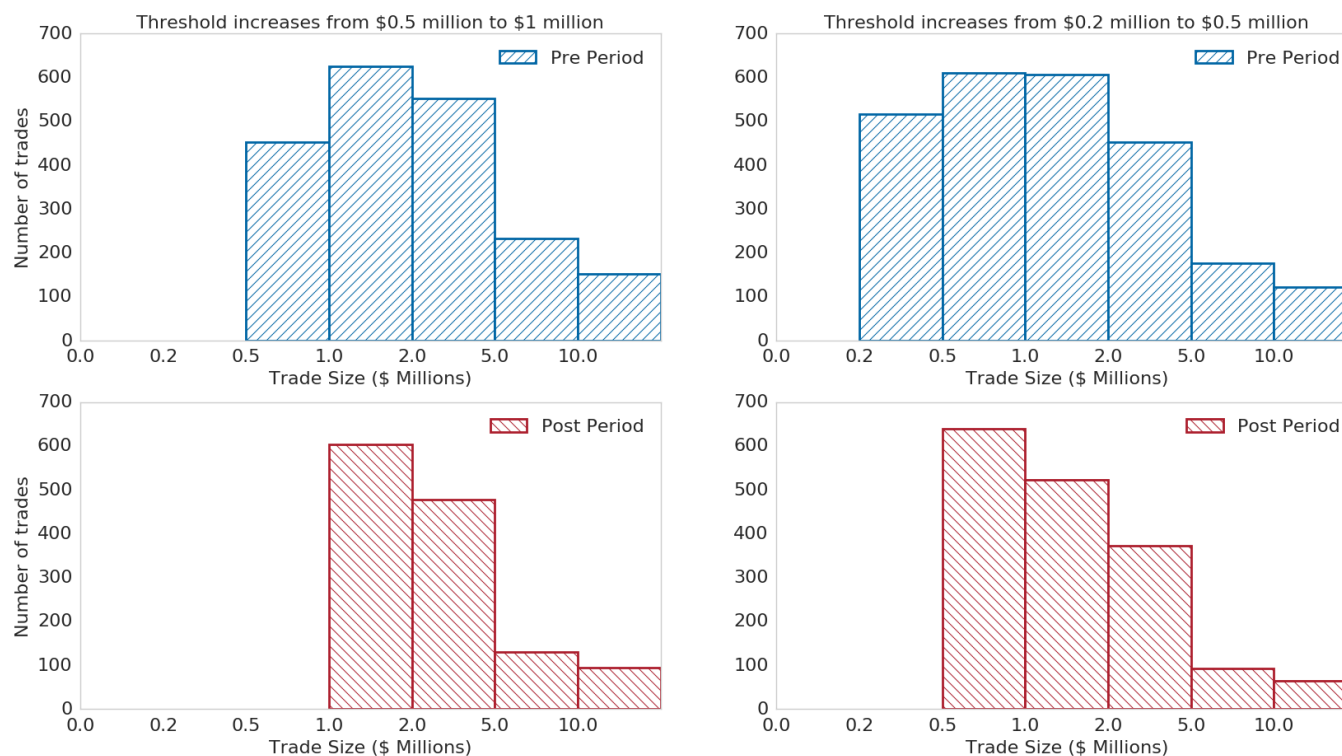
Panel B: Distribution of Block Trade Sizes around Decreases in Thresholds
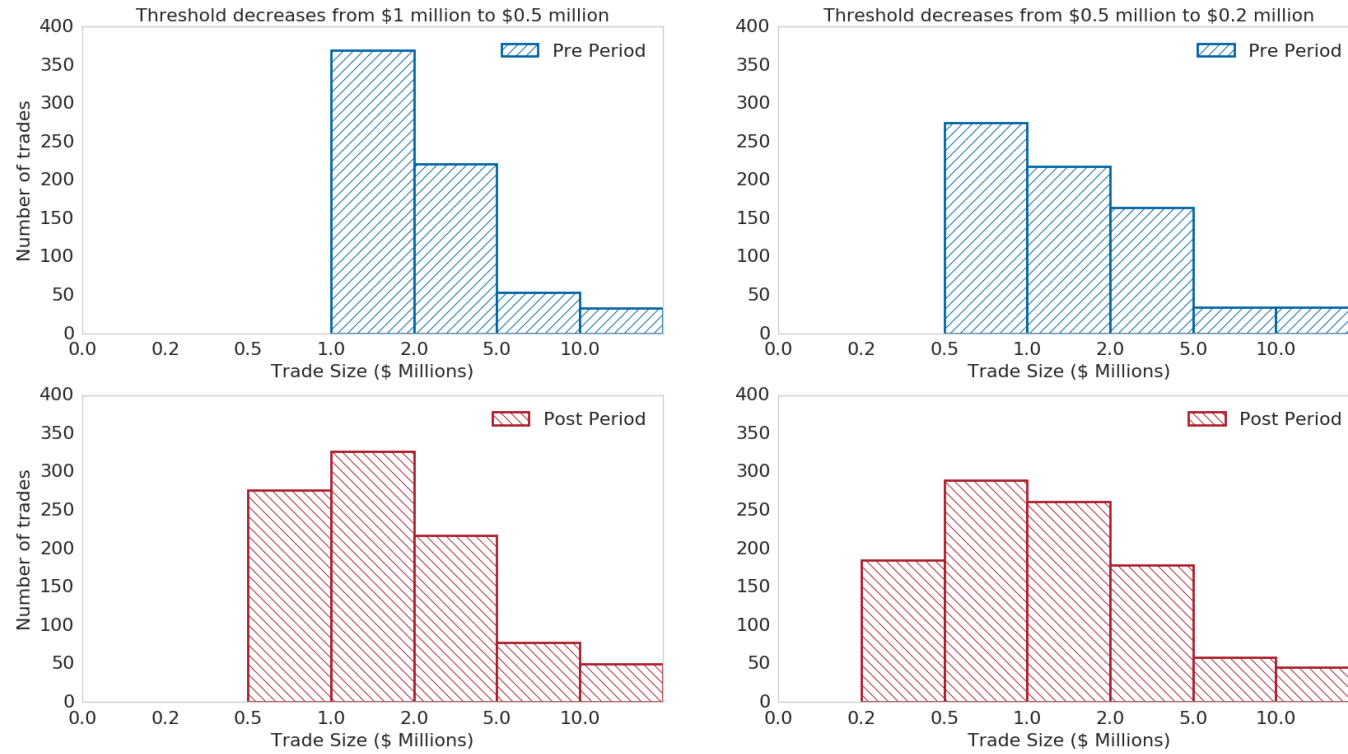
Figure 6: Constrained Dark Trading Around Quarterly Revisions

This figure shows the distribution of large dark trade for 50 days around the quarterly revisions to block tiers. The sample includes S&P / ASX100 index constituents that experience an increase in block thresholds. Dark trade counts are aggregated across stocks-days in the pre / post periods. The top rows show the pre revision distribution and bottom rows show the post revision distribution.

Panel A: Distribution of Dark Trade Sizes around Increases in Thresholds
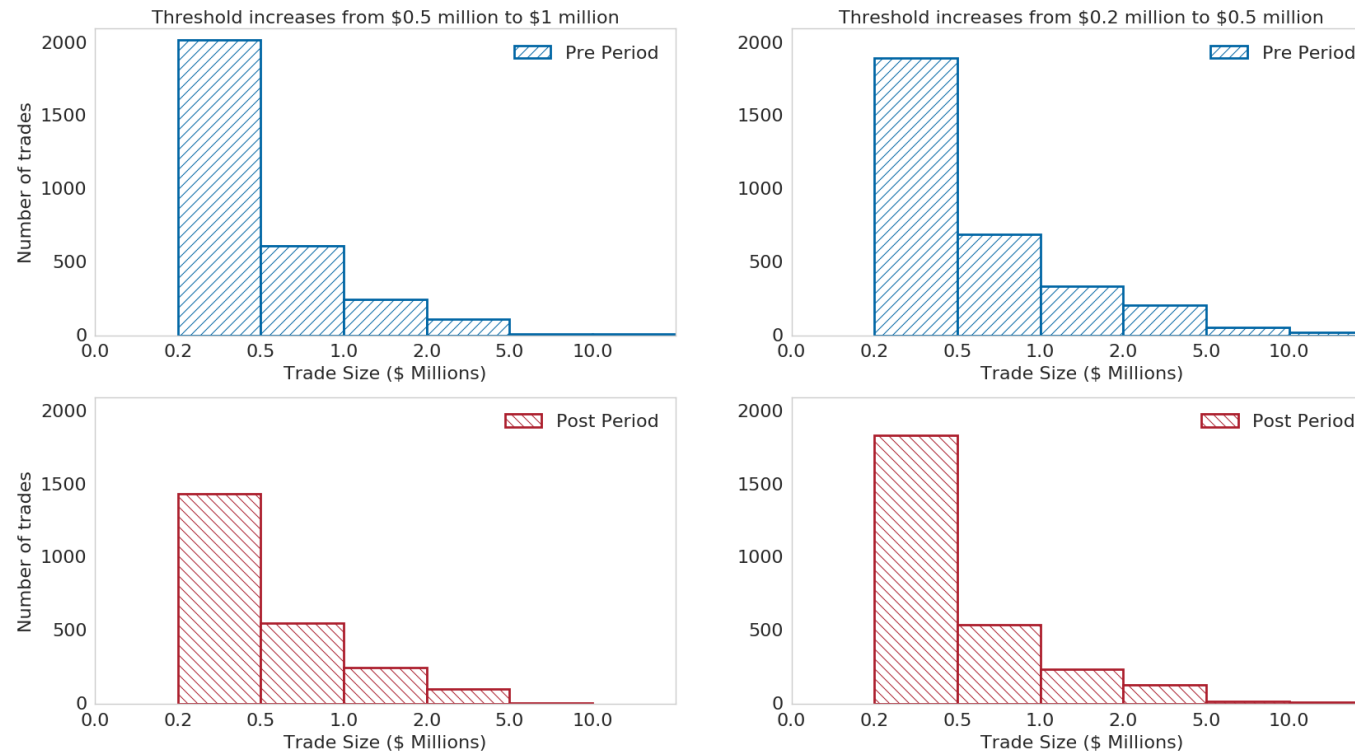
Panel B: Distribution of Dark Trade Sizes around Decreases in Thresholds
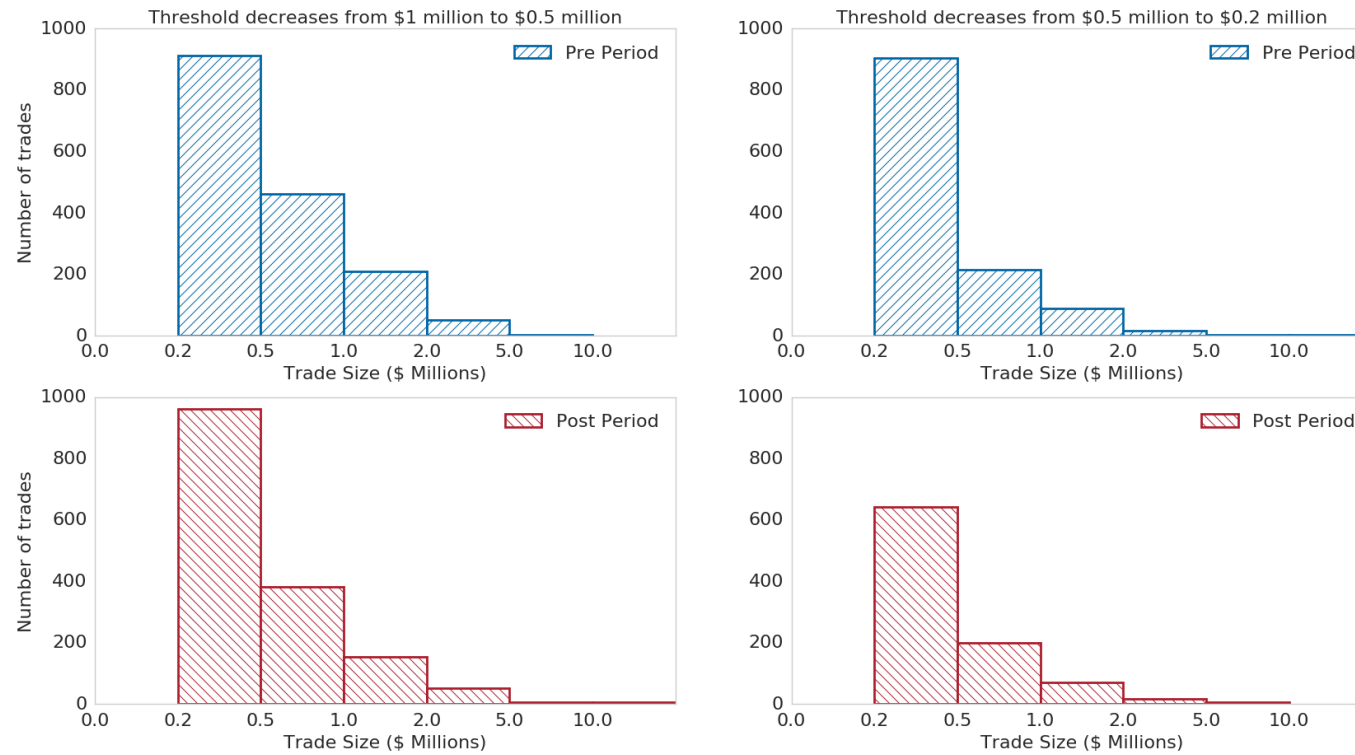
Table 1: Summary of Changes to Block Trade Tiers

This table presents a summary of changes to block tiers. Panel A presents results for the initial block threshold change on the 26th May 2013 and panel B presents results for the 13 quarterly block trade tier revisions between 8th May 2013 and 11th July 2016. The first section presents the number of stocks assigned to each block tier published by ASIC. The second section presents the number of stocks that are assigned to a new tier each quarter. The first two columns report the number of stocks that are assigned to tiers with higher block thresholds and the second two columns report the number of stocks that are assigned to tiers with a lower block threshold. The final row shows the average number of stocks assigned to each tier and the total number stocks that changed Tiers for the 13 quarterly revisions.

Published Date	Effective Date	Assigned Tier 1	Assigned Tier 2	Threshold Increase		Threshold Decrease	
				Tier 2 - Tier 1	Tier 3 - Tier 2	Tier 1 - Tier 2	Tier 2 - Tier 3
Panel A: Initial Block Threshold Change							
8-Mar-13	26-May-13	19	21			21	60
Panel B: Quarterly Block Trade Tier Revisions							
7-Jun-13	8-Jul-13	27	27	8	14	0	0
6-Sep-13	4-Oct-13	27	31	2	4	3	0
6-Dec-13	8-Jan-14	25	31	1	1	3	0
7-Mar-14	4-Apr-14	23	28	1	0	4	0
6-Jun-14	7-Jul-14	23	27	1	5	1	6
5-Sep-14	3-Oct-14	24	28	1	5	0	2
5-Dec-14	7-Jan-14	26	29	3	7	1	5
6-Mar-15	7-Apr-15	29	29	3	3	0	1
5-Jun-15	6-Jul-15	33	30	3	0	2	1
11-Sep-15	12-Oct-15	37	29	5	4	1	1
11-Dec-15	13-Jan-16	35	32	0	4	2	3
11-Mar-16	12-Apr-16	36	35	3	7	2	3
10-Jun-16	11-Jul-16	33	45	0	11	3	4
		29.08	30.85	31	65	22	26

Table 2: Descriptive Statistics for Dark and Block Trading Activity

This table presents descriptive statistics calculated across the S&P/ASX 100 for the 6 weeks pre and 6 weeks post the amendments to block trading thresholds and minimum price improvement regulation on the 26th May, 2013. Each panel presents results on stocks grouped by their post-amendment tiers. Panels A, B and C presents results for tier 1, 2 and 3 stocks respectively. For each metric the trade count, dollar volume and fraction of total volume is calculated for block and dark trades. Dark trade count is reported in thousands and both dark dollar volume and block dollar volume are reported in millions. The mean and median are calculated across all stock-days in the pre and post amendment periods. The last two columns present the difference in pre and post amendment means (medians) using a two sided t-test (Wilcoxon test). ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

| | Pre Regulation | | Post Regulation | | | |
	Mean	Median	Mean	Median	Diff Mean	Diff Median
Panel A: Tier 1 Stocks (Block Trade Size Threshold Remains $1 Million)						
Dark Count (thousands)	105.34	90.66	98.29	89.50	-7.05	-1.16
Dark Value ($ million)	543.99	430.54	428.67	341.19	-115.31	-89.35
Dark Value (%)	17.59	17.09	13.15	12.79	-4.44**	-4.30***
Block Count	52.33	41.50	87.56	71.00	35.22**	29.50**
Block Value ($ millions)	319.22	184.07	335.20	253.75	15.98	69.67
Block Value (%)	8.32	8.11	9.43	8.86	1.11	0.74
Total Count	474.08	473.88	559.96	516.03	85.87	42.15
Total Value ($ million)	3401.62	2434.56	3464.12	2433.45	62.50	-1.11
Panel B: Tier 2 Stocks (Block Trade Size Threshold Reduced to $0.5 Million)						
Dark Count (thousands)	60.20	61.28	49.53	48.39	-10.68**	-12.89**
Dark Value ($ million)	305.41	268.10	166.56	151.51	-138.85***	-116.59***
Dark Value (%)	29.48	27.02	17.97	17.41	-11.52***	-9.60***
Block Count	20.86	18.00	61.43	53.00	40.57***	35.00***
Block Value ($ millions)	99.57	82.05	105.36	86.93	5.79**	4.88*
Block Value (%)	9.31	9.05	10.65	10.15	1.34*	1.10*
Total Count	213.47	190.97	227.42	199.66	13.96	8.68
Total Value ($ million)	1052.21	995.81	960.43	872.30	-91.78	-123.51
Panel C: Tier 3 Stocks (Block Trade Size Threshold Reduced to $0.2 Million)						
Dark Count (thousands)	39.67	39.96	34.85	34.39	-4.82**	-5.57**
Dark Value ($ million)	117.34	99.84	71.07	66.91	-46.26***	-32.93***
Dark Value (%)	25.98	26.02	16.76	16.70	-9.22***	-9.32***
Block Count	8.44	7.00	39.97	30.00	31.52***	23.00***
Block Value ($ millions)	40.27	20.44	48.67	36.41	8.40*	15.97
Block Value (%)	7.51	4.54	9.99	9.26	2.48***	4.72*
Total Count	147.21	132.29	160.08	137.07	12.87	4.77
Total Value ($ million)	449.76	416.06	439.03	379.00	-10.73	-37.06

Table 3: Stock Characteristics Around Regulation

This table presents descriptive statistics for the 6 weeks pre and 6 weeks post the change to block trading thresholds on the 26th May 2013. Panels A / B / C presents results for Tier 1 / 2 / 3 stocks respectively. *Price* is the average closing price. *Volatility* is the daily high-low price range divided by the midpoint computed in basis points. *Turnover* is the natural logarithm of the dollar value of trades executed. The average, median and standard deviation is calculated across all stock / days in the pre and post amendment periods. The final columns present the difference in pre and post amendment means and the two sided t-tests. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Pre Regulation		Post Regulation		Difference Mean	Difference Median
	Mean	Median	Mean	Median		
Panel A: Tier 1 Stocks (Block Trade Size Threshold Remains $1 Million)						
Volatility	203.73	176.65	228.91	203.15	25.19***	26.51***
Turnover	18.34	18.36	18.50	18.44	0.16***	0.07***
Price	28.77	31.31	27.24	28.01	-1.52**	-3.30
Panel B: Tier 2 Stocks (Block Trade Size Threshold Reduced to $0.5 Million)						
Volatility	208.42	193.21	227.46	214.35	19.04***	21.14***
Turnover	17.19	17.17	17.22	17.25	0.03	0.08
Price	10.80	7.73	10.31	7.87	-0.50	0.15
Panel C: Tier 3 Stocks (Block Trade Size Threshold Reduced to $0.2 Million)						
Volatility	292.33	251.76	318.83	285.91	26.49***	34.15***
Turnover	16.29	16.31	16.32	16.29	0.02	-0.02
Price	9.59	4.30	8.96	4.05	-0.63***	-0.25

Table 4: Impact of Regulation on Tier 1 Stocks (Block Trade Threshold Remains $1 Million)

This table presents estimates for the ordinary least squares regressions of trading activity around the changes to block and dark regulation. The sample consists of S&P/ASX100 index stocks 6 weeks pre and 6 weeks post the changes to the block trading thresholds and dark pool price improvement on the 26th May 2013. The model is estimated for each stock tier with the following specification:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 Turnover_{it} + \beta_3 Price_{it} + \beta_4 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents either the percentage of turnover executed as block, the log dollar value executed as block or the trade count of block trades. Our variable of interest D_t^{POST} is a dummy variable that takes a value of 0 before the amendments and 1 after. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume executed. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
D_t^{POST}	0.51	1.79***	0.82***	-3.92***	-0.33***	-0.56***	3.41***	-0.02*	2.25***	-0.07***	1.70***
	(0.57)	(0.40)	(0.16)	(0.38)	(0.03)	(0.09)	(0.63)	(0.01)	(0.24)	(0.01)	(0.29)
$Turnover_{it}$	3.14***	4.75***	2.03***	0.02	0.92***	1.86***	-3.16***	0.88***	5.30***	0.93***	7.16***
	(0.50)	(0.25)	(0.20)	(0.27)	(0.02)	(0.07)	(0.49)	(0.01)	(0.21)	(0.01)	(0.25)
$Price_{it}$	-0.05***	-0.03***	-0.02***	-0.17***	-0.01***	-0.02***	0.21***	0.00***	0.15***	-0.00***	0.13***
	(0.02)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
$Volatility_{it}$	-0.01***	-0.00*	0.00	-0.01***	-0.00**	0.00	0.02***	0.00***	0.01***	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Intercept$	-47.01***	-75.75***	-34.76***	23.11***	-0.09	-29.97***	123.90***	1.67***	-91.02***	1.27***	-121.03***
	(8.81)	(4.53)	(3.60)	(4.81)	(0.43)	(1.30)	(8.66)	(0.24)	(3.70)	(0.21)	(4.52)
$Observations$	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080
$Adjusted\ R^2$	0.06	0.24	0.23	0.26	0.68	0.47	0.14	0.91	0.7	0.92	0.68

Table 5: Impact of Regulation on Tier 2 Stocks (Block Trade Threshold Reduced to $0.5 Million)

This table presents estimates for the ordinary least squares regressions of trading activity around the changes to block and dark regulation. The sample consists of S&P/ASX100 index stocks 6 weeks pre and 6 weeks post the changes to the block trading thresholds and dark pool price improvement on the 26th May 2013. The model is estimated for each stock tier with the following specification:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 Turnover_{it} + \beta_3 Price_{it} + \beta_4 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents either the percentage of turnover executed as block, the log dollar value executed as block or the trade count of block trades. Our variable of interest D_t^{POST} is a dummy variable that takes a value of 0 before the amendments and 1 after. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume executed. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
D_t^{POST}	1.88***	3.10***	1.32***	-9.85***	-0.53***	-0.39***	7.97***	0.04***	0.76***	-0.10***	0.38***
	(0.65)	(0.38)	(0.12)	(0.57)	(0.03)	(0.04)	(0.73)	(0.01)	(0.10)	(0.01)	(0.13)
$Turnover_{it}$	5.78***	5.65***	1.56***	4.15***	1.14***	0.83***	-9.92***	0.79***	1.81***	0.96***	2.64***
	(0.59)	(0.31)	(0.15)	(0.60)	(0.03)	(0.04)	(0.67)	(0.02)	(0.10)	(0.01)	(0.12)
$Price_{it}$	-0.29***	-0.17***	-0.05***	-0.68***	-0.04***	-0.02***	0.97***	0.01***	0.22***	-0.01***	0.20***
	(0.04)	(0.03)	(0.01)	(0.04)	(0.00)	(0.00)	(0.05)	(0.00)	(0.01)	(0.00)	(0.01)
$Volatility_{it}$	-0.02***	-0.01***	-0.00*	-0.03***	-0.00***	0.00*	0.04***	0.00***	0.01***	0.00	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	-85.07***	-87.92***	-25.32***	-31.05***	-3.26***	-12.22***	216.12***	2.87***	-30.09***	0.81***	-42.34***
	(9.52)	(5.15)	(2.43)	(9.83)	(0.50)	(0.66)	(11.16)	(0.26)	(1.63)	(0.24)	(2.05)
Observations	1255	1255	1255	1255	1255	1255	1255	1255	1255	1255	1255
Adjusted R^2	0.08	0.21	0.22	0.33	0.65	0.32	0.31	0.85	0.67	0.89	0.62

Table 6: Impact of Regulation on Tier 3 Stocks (Block Trade Threshold Reduced to $0.2 Million)

This table presents estimates for the ordinary least squares regressions of trading activity around the changes to block and dark regulation. The sample consists of S&P/ASX100 index stocks 6 weeks pre and 6 weeks post the changes to the block trading thresholds and dark pool price improvement on the 26th May 2013. The model is estimated for each stock tier with the following specification:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 Turnover_{it} + \beta_3 Price_{it} + \beta_4 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents either the percentage of turnover executed as block, the log dollar value executed as block or the trade count of block trades. Our variable of interest D_t^{POST} is a dummy variable that takes a value of 0 before the amendments and 1 after. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume executed. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
D_t^{POST}	3.24***	3.29***	1.02***	-8.22***	-0.43***	-0.17***	4.98***	0.02***	0.50***	-0.06***	0.33***
	(0.37)	(0.20)	(0.06)	(0.34)	(0.02)	(0.02)	(0.44)	(0.01)	(0.05)	(0.01)	(0.06)
$Turnover_{it}$	5.97***	4.56***	1.20***	2.68***	1.08***	0.56***	-8.65***	0.83***	1.68***	0.97***	2.25***
	(0.40)	(0.16)	(0.10)	(0.30)	(0.02)	(0.02)	(0.39)	(0.01)	(0.06)	(0.01)	(0.07)
$Price_{it}$	-0.16***	-0.09***	-0.03***	-0.34***	-0.02***	-0.00***	0.50***	0.01***	0.13***	-0.00***	0.12***
	(0.02)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)
$Volatility_{it}$	-0.01***	-0.00***	-0.00***	-0.01***	-0.00***	-0.00***	0.02***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Intercept$	-89.24***	-69.55***	-18.83***	-11.84**	-2.55***	-7.78***	201.08***	2.24***	-25.43***	0.45***	-33.23***
	(6.32)	(2.56)	(1.56)	(4.70)	(0.27)	(0.33)	(6.11)	(0.15)	(0.98)	(0.13)	(1.18)
$Observations$	3656	3656	3656	3656	3656	3656	3656	3656	3656	3656	3656
$Adjusted\ R^2$	0.12	0.23	0.19	0.24	0.64	0.27	0.23	0.88	0.71	0.93	0.67

Table 7: Trading Activity Around Quarterly Increases to Block Thresholds

This table presents descriptive statistics for trading activity in treatment stocks for the 50 trading days around the quarterly revisions to block trading tiers between 2013 Q3 and 2016 Q3. Panel A presents results for stocks that are to Tier 1 from Tier 2 (block threshold increases from $500, 000 to $1,000,000). Panel B presents results for stocks that are reassigned to Tier 2 from Tier 3 (block threshold increases from $200,000 to $500,000). Trade count, dollar volume and fraction of total volume is calculated for block and dark trades. Total count and total value include all lit, dark and block trades. Dark trade count is reported in thousands and both dark dollar volume and block dollar volume are reported in millions. Means and medians are calculated across pooled stocks-events. The final two columns present the difference in pre and post means (medians) and the two sided t-test (Wilcoxon test). ***, **, and * indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Pre Revisions | | Post Revisions | | | |
	Mean	Median	Mean	Median	Diff Mean	Diff Median
Panel A: Block threshold increases from $0.5 million to $1 million						
Dark Count (thousands)	81.65	77.00	77.43	72.04	-4.23	-4.96
Dark Value ($ million)	459.07	443.37	399.03	404.92	-60.04	-38.44
Dark Value (%)	20.60	20.09	21.90	21.15	1.30	1.06
Block Count	119.29	105.00	80.81	86.00	-38.48**	-19.00*
Block Value ($ millions)	512.00	342.74	490.55	282.34	-21.45*	-60.40*
Block Value (%)	20.49	20.61	18.59	13.44	-1.89*	-7.17
Total Count (thousands)	312.55	297.68	311.55	291.25	-1.00	-6.40
Total Value ($ millions)	2213.87	2158.85	2082.61	2076.66	-131.26	-82.20
Panel B: Block threshold increases from $0.2 million to $0.5 million						
Dark Count (thousands)	76.63	68.60	68.70	62.02	-7.93	-6.58
Dark Value ($ million)	290.44	200.17	229.90	192.67	-60.55	-7.50
Dark Value (%)	20.55	18.20	21.77	18.96	1.22	0.75
Block Count	69.44	43.50	46.64	29.50	-22.81**	-14.00*
Block Value ($ millions)	169.59	139.65	113.26	90.06	-56.33*	-49.58*
Block Value (%)	12.63	13.59	9.80	8.54	-2.83**	-5.05*
Total Count (thousands)	359.84	334.64	336.81	303.92	-23.04	-30.70
Total Value ($ millions)	1340.19	1141.44	1108.06	1048.68	-232.13	-92.80

Table 8: Trading Activity Around Quarterly Decreases to Thresholds

This table presents descriptive statistics for trading activity calculated across treatment stocks for the 50 trading days around quarterly changes to the block trading tiers. Panel A presents results for stocks that are reassigned from Tier 1 to Tier 2 (block threshold decreases from $1,000, 000 to $500,000) and panel B presents results for stocks that are reassigned from Tier 2 to Tier 3 (block threshold decreases from $500,000 to $200,000). Trade count, dollar volume and fraction of total volume is calculated for block and dark trades. Total count and total value include all lit, dark and block trades. Dark trade count is reported in thousands and both dark dollar volume and block dollar volume are reported in millions. Each metric is computed for each stock, for each quarterly change, for the pre and post periods. The mean and median are calculated across pooled stocks-events. The final two columns present the difference in pre and post means (medians) and the two sided t-test (Wilcoxon test). ***, **, and ∗ indicate statistical significance at 1%, 5%, and 10% levels, respectively.

	Pre Revision		Post Revision			
	Mean	Median	Mean	Median	Diff Mean	Diff Median
Panel A: Block threshold decreases from $1 million to $0.5 million						
Dark Count (thousands)	78.44	70.52	79.53	72.83	1.08	2.31
Dark Value ($ million)	334.32	264.42	356.85	340.66	22.53	76.23
Dark Value (%)	23.04	22.58	21.85	21.25	-1.19	-1.33
Block Count	59.00	51.00	77.50	81.50	18.50*	30.50*
Block Value ($ millions)	209.71	146.85	213.03	184.18	3.32	37.32**
Block Value (%)	15.01	11.41	15.01	16.31	1.30	2.35**
Total Count (thousands)	305.07	266.73	267.38	308.06	2.99	0.70
Total Value ($ millions)	1444.10	1292.12	1522.01	1362.53	77.91	70.40
Panel B: Block threshold decreases from $0.5 million to $0.2 million						
Dark Count (thousands)	65.48	55.78	67.96	60.26	2.48	4.48
Dark Value ($ million)	179.67	140.99	180.91	156.23	1.24	15.23
Dark Value (%)	20.28	18.00	18.68	17.05	-1.60	-0.95
Block Count	37.55	33.50	52.74	44.00	15.19**	10.50*
Block Value ($ millions)	91.34	73.89	114.15	95.69	22.81**	21.80*
Block Value (%)	9.70	9.20	11.34	10.69	1.64*	1.49
Total Count (thousands)	320.79	275.24	344.67	300.33	23.88	25.10
Total Value ($ millions)	898.20	751.14	977.06	830.10	78.86	79.00

Table 0-9: DID Regressions around Quarterly Decreases in Block Thresholds (Tier 1 to Tier 2)

This table presents estimates for the difference-in-difference regressions of block, dark, lit and total trading activity. The regression models are estimated for the 50 trading days around quarterly block threshold revisions. The sample consists of stocks across the 13 quarterly revisions that move from tier 1 to tier 2. The regression specifications utilised is:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 D_i^{TREAT} + \beta_3(D_t^{POST} \times D_i^{TREAT}) + \beta_4 Turnover_{it} + \beta_5 Price_{it} + \beta_6 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents the percentage of total dollar turnover executed as block, dark or lit trades, dollar volume of block, dark, lit or total trades or the number of block, dark, lit or total trades. The dependent variable D_t^{POST} is a dummy variable that takes a value of 0 before the revisions and 1 after. D_i^{TREAT} is a dummy variable that takes a value of 1 for a stock that changed block tiers and zero otherwise and $D_t^{POST} \times D_i^{TREAT}$ is the interaction between the two variables and constitutes our variable of interest. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
$D_t^{POST} \times D_i^{TREAT}$	1.02	0.96*	0.50***	-1.08	0.00	-0.03	0.06	0.08**	0.39***	0.13**	0.47***
	(0.99)	(0.50)	(0.13)	(0.72)	(0.05)	(0.04)	(1.01)	(0.04)	(0.11)	(0.05)	(0.16)
D_t^{POST}	-0.8	-0.19	-0.19**	1.36***	0.00	-0.01	-0.56	-0.09***	-0.32***	-0.13***	-0.44***
	(0.66)	(0.32)	(0.08)	(0.44)	(0.03)	(0.03)	(0.67)	(0.02)	(0.08)	(0.03)	(0.11)
D_i^{TREAT}	0.37	0.25	-0.04	1.21**	0.00	-0.03	-1.58**	-0.07***	-0.21***	-0.36***	-0.90***
	(0.74)	(0.37)	(0.09)	(0.52)	(0.03)	(0.03)	(0.74)	(0.02)	(0.08)	(0.03)	(0.11)
$Turnover_{it}$	7.63***	5.90***	1.63***	2.45***	1.26***	0.60***	-10.08***	0.91***	1.71***		
	(0.64)	(0.23)	(0.09)	(0.40)	(0.04)	(0.02)	(0.60)	(0.03)	(0.06)		
$Price_{it}$	-0.03	0.00	0.00	-0.42***	-0.03***	-0.01***	0.46***	0.00	0.19***	-0.01***	0.17***
	(0.03)	(0.02)	(0.00)	(0.02)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
$Volatility_{it}$	-0.02***	-0.01***	-0.00***	-0.02***	-0.00***	0.00	0.04***	0.00***	0.01***	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	-117.09***	-92.53***	-26.20***	-12.98*	-5.94***	-8.67***	230.07***	0.84*	-28.11***	16.89***	2.43***
	(10.69)	(3.90)	(1.52)	(6.88)	(0.68)	(0.34)	(10.17)	(0.44)	(0.94)	(0.04)	(0.17)
Observations	3267	3267	3267	3267	3267	3267	3267	3267	3267	3267	3267
Adjusted R^2	0.08	0.17	0.19	0.14	0.55	0.26	0.19	0.56	0.66	0.15	0.44

Table 0-10: DID Regressions around Quarterly Decreases in Block Thresholds (Tier 2 to Tier 3)

This table presents estimates for the difference-in-difference regressions of block, dark, lit and total trading activity. The regression models are estimated for the 50 trading days around quarterly block threshold revisions. The sample consists of stocks across the 13 quarterly revisions that move from tier 2 to tier 3. The regression specifications utilised is:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 D_i^{TREAT} + \beta_3(D_t^{POST} \times D_i^{TREAT}) + \beta_4 Turnover_{it} + \beta_5 Price_{it} + \beta_6 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents the percentage of total dollar turnover executed as block, dark or lit trades, dollar volume of block, dark, lit or total trades or the number of block, dark, lit or total trades. The dependent variable D_t^{POST} is a dummy variable that takes a value of 0 before the revisions and 1 after. D_i^{TREAT} is a dummy variable that takes a value of 1 for a stock that changed block tiers and zero otherwise and $D_t^{POST} \times D_i^{TREAT}$ is the interaction between the two variables and constitutes our variable of interest. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
$D_t^{POST} \times D_i^{TREAT}$	-4.34***	-2.53***	-0.87***	-0.37	-0.15***	-0.10**	4.71***	-0.07*	0.02	-0.14***	-0.09
	(1.03)	(0.50)	(0.19)	(0.58)	(0.05)	(0.04)	(1.00)	(0.04)	(0.12)	(0.04)	(0.15)
D_t^{POST}	1.17*	0.64**	0.11	0.86**	0	0.01	-2.02***	-0.07***	-0.08	-0.03	-0.08
	(0.61)	(0.32)	(0.11)	(0.38)	(0.03)	(0.03)	(0.64)	(0.02)	(0.09)	(0.03)	(0.10)
D_i^{TREAT}	4.54***	2.09***	0.79***	-0.02	0.30***	0.22***	-4.52***	0.22***	0.25***	0.30***	0.47***
	(0.73)	(0.34)	(0.14)	(0.40)	(0.03)	(0.03)	(0.70)	(0.02)	(0.08)	(0.03)	(0.10)
$Turnover_{it}$	0.27***	0.12***	0.05***	-0.01	0.00	0.02***	-0.27***	0.00	0.01		
	(0.08)	(0.04)	(0.02)	(0.05)	(0.00)	(0.00)	(0.08)	(0.00)	(0.01)		
$Price_{it}$	-0.06***	-0.05***	-0.01***	-0.27***	-0.01***	-0.00***	0.32***	0.01***	0.15***	0.00***	0.15***
	(0.02)	(0.01)	0.00	(0.01)	0.00	0.00	(0.02)	0.00	(0.01)	0.00	(0.01)
$Volatility_{it}$	-0.02***	0.00	0.00	-0.01***	0.00***	0.00***	0.03***	0.00***	0.01***	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	9.02***	6.86***	0.76***	26.69***	15.37***	0.92***	64.30***	16.27***	0.84***	16.81***	2.19***
	(1.39)	(0.71)	(0.29)	(0.93)	(0.07)	(0.06)	(1.45)	(0.04)	(0.19)	(0.03)	(0.11)
Observations	3873	3873	3873	3873	3873	3873	3873	3873	3873	3873	3873
Adjusted R^2	0.03	0.02	0.02	0.12	0.07	0.05	0.11	0.15	0.53	0.09	0.44

Table 0-11: DID Regressions around Quarterly Increases in Block Thresholds (Tier 2 to Tier 1)

This table presents estimates for the difference-in-difference regressions of block, dark, lit and total trading activity. The regression models are estimated for the 50 trading days around quarterly block threshold revisions. The sample consists of stocks across the 13 quarterly revisions that move from tier 2 to tier 1. The regression specifications utilised is:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 D_i^{TREAT} + \beta_3 (D_t^{POST} \times D_i^{TREAT}) + \beta_4 Turnover_{it} + \beta_5 Price_{it} + \beta_6 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents the percentage of total dollar turnover executed as block, dark or lit trades, dollar volume of block, dark, lit or total trades or the number of block, dark, lit or total trades. The dependent variable D_t^{POST} is a dummy variable that takes a value of 0 before the revisions and 1 after. D_i^{TREAT} is a dummy variable that takes a value of 1 for a stock that changed block tiers and zero otherwise and $D_t^{POST} \times D_i^{TREAT}$ is the interaction between the two variables and constitutes our variable of interest. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
$D_t^{POST} \times D_i^{TREAT}$	0.62	1.13***	0.33***	-1.53***	-0.06	-0.04	0.91	0.01	0.09	0.04	0.16
	(0.78)	(0.40)	(0.09)	(0.55)	(0.04)	(0.03)	(0.84)	(0.02)	(0.08)	(0.03)	(0.11)
D_t^{POST}	0.61	-0.19	-0.12	0.86**	0.07**	0.06**	-1.47**	0.01	0.06	-0.01	0.01
	(0.55)	(0.28)	(0.08)	(0.39)	(0.03)	(0.02)	(0.60)	(0.02)	(0.06)	(0.02)	(0.08)
D_i^{TREAT}	-1.62***	-1.55***	-0.36***	-0.4	-0.19***	-0.07***	2.02***	-0.13***	-0.20***	-0.20***	-0.35***
	(0.53)	(0.28)	(0.08)	(0.39)	(0.03)	(0.02)	(0.59)	(0.02)	(0.06)	(0.02)	(0.07)
$Turnover_{it}$	1.75***	1.24***	0.28***	0.40***	0.20***	0.11***	-2.15***	0.15***	0.28***		
	(0.35)	(0.22)	(0.06)	(0.12)	(0.04)	(0.02)	(0.42)	(0.03)	(0.06)		
$Price_{it}$	-0.01	0.00	-0.00**	-0.22***	-0.01***	-0.00***	0.23***	0.01***	0.08***	0.00***	0.08***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
$Volatility_{it}$	-0.00***	0	0.00*	-0.01***	0.00***	0.00***	0.01***	0.00***	0.01***	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Intercept$	-19.82***	-14.35***	-3.90***	18.48***	11.42***	-0.71**	101.34***	13.27***	-2.92***	16.29***	2.82***
	(5.70)	(3.61)	(1.07)	(1.95)	(0.64)	(0.32)	(6.90)	(0.47)	(0.98)	(0.02)	(0.09)
$Observations$	5030	5030	5030	5030	5030	5030	5030	5030	5030	5030	5030
$Adjusted\ R^2$	0.02	0.05	0.05	0.11	0.17	0.1	0.08	0.27	0.45	0.09	0.36

Table 0-12: DID Regressions around Quarterly Increases in Block Thresholds (Tier 3 to Tier 2)

This table presents estimates for the difference-in-difference regressions of block, dark, lit and total trading activity. The regression models are estimated for the 50 trading days around quarterly block threshold revisions. The sample consists of stocks across the 13 quarterly revisions that move from tier 3 to tier 2. The regression specifications utilised is:

$$y_{it} = \beta_0 + \beta_1 D_t^{POST} + \beta_2 D_i^{TREAT} + \beta_3(D_t^{POST} \times D_i^{TREAT}) + \beta_4 Turnover_{it} + \beta_5 Price_{it} + \beta_6 Volatility_{it} + \varepsilon_{it}$$

The dependent variable y_{it} represents the percentage of total dollar turnover executed as block, dark or lit trades, dollar volume of block, dark, lit or total trades or the number of block, dark, lit or total trades. The dependent variable D_t^{POST} is a dummy variable that takes a value of 0 before the revisions and 1 after. D_i^{TREAT} is a dummy variable that takes a value of 1 for a stock that changed block tiers and zero otherwise and $D_t^{POST} \times D_i^{TREAT}$ is the interaction between the two variables and constitutes our variable of interest. The model includes the following control variables: $Price_{it}$ is the stock-day closing price. $Turnover_{it}$ is the natural log of stock-day total dollar volume. $Volatility_{it}$ is the stock-day high-low price range divided by the midpoint computed in basis points. Standard errors are clustered both by stock and date are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Block			Dark			Lit			Total	
	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Percent Turnover	Dollar Value	Trade Count	Dollar Value	Trade Count
$D_t^{POST} \times D_i^{TREAT}$	-2.54***	-1.40***	-0.44***	0.38	-0.26***	-0.13***	2.09***	-0.24***	-0.25***	-0.29***	-0.42***
	(0.59)	(0.30)	(0.07)	(0.44)	(0.04)	(0.03)	(0.69)	(0.03)	(0.07)	(0.03)	(0.09)
D_t^{POST}	0.79*	0.42**	0.12***	0.35	0.13***	0.04**	-1.15**	0.09***	0.13***	0.11***	0.17***
	(0.41)	(0.20)	(0.05)	(0.28)	(0.03)	(0.02)	(0.46)	(0.03)	(0.05)	(0.03)	(0.06)
D_i^{TREAT}	0.90**	1.01***	0.35***	0.75**	0.45***	0.12***	-1.98***	0.39***	0.50***	0.45***	0.67***
	(0.43)	(0.21)	(0.06)	(0.31)	(0.03)	(0.02)	(0.50)	(0.02)	(0.05)	(0.02)	(0.06)
$Turnover_{it}$	0.30***	0.23***	0.06***	0.08	0.08***	0.04***	-0.47***	0.06***	0.10***		
	(0.07)	(0.04)	(0.01)	(0.05)	(0.01)	0.00	(0.08)	(0.01)	(0.01)		
$Price_{it}$	-0.03***	-0.02***	-0.01***	-0.18***	-0.01***	0.00	0.24***	0.01***	0.08***	0.01***	0.09***
	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
$Volatility_{it}$	-0.00***	0.00***	0.00***	-0.01***	0.00***	0.00***	0.02***	0.00***	0.01***	0.00***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Intercept$	3.80***	1.29**	-0.31*	23.44***	13.13***	0.29***	73.19***	14.44***	-0.19	15.89***	2.19***
	(1.12)	(0.59)	(0.16)	(0.87)	(0.14)	(0.06)	(1.33)	(0.11)	(0.17)	(0.03)	(0.07)
$Observations$	9730	9730	9730	9730	9730	9730	9730	9730	9730	9730	9730
$Adjusted\ R^2$	0.01	0.01	0.03	0.08	0.07	0.06	0.05	0.14	0.45	0.07	0.36

Table 0-13: Trading Around Quarterly Decreases in Block Thresholds

This table presents the coefficient of the interaction term $D_t^{POST} \times D_i^{TREAT}$ from several difference-in-difference regressions. The sample includes stocks that are reassigned to a tier with a lower block threshold post quarterly revisions. Each row represents the different dependent variables and each column represents the different regression specifications. Specification (1) is our base case including control variables with no fixed effects. Specification (2) is identical to specification (1) with stock fixed effects. Specification (3) is identical to specification (1) with quarterly fixed effects. Specification (4) is identical to specification (1) excluding control variables. Specification (5) is identical to specification (2) excluding control variables. Specification (6) is identical to specification (3) excluding control variables. Standard errors are clustered both by stock and date in each regression specification. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Quarterly Decreases from Tier 1 to Tier 2						
Block Percent Turnover	1.02	0.04	0.71	1.36	1.36	1.2
Block Dollar Value	0.96*	0.55	0.87*	1.24**	1.38***	1.23**
Block Trade Count	0.50***	0.35***	0.47***	0.58***	0.60***	0.57***
Dark Percent Turnover	-1.08	-0.78	-1.09	-1.03	-0.63	-0.95
Dark Dollar Value	0.00	0.08*	0.02	0.05	0.19***	0.09
Dark Trade Count	-0.03	-0.01	-0.02	0.00	0.05	0.02
Lit Percent Turnover	0.06	0.74	0.38	-0.32	-0.72	-0.26
Lit Dollar Value	0.08**	0.13***	0.10***	0.12**	0.21***	0.15***
Lit Trade Count	0.39***	0.40***	0.44***	0.51***	0.61***	0.55***
Total Dollar Value	0.08**	0.12***	0.10***	0.13**	0.23***	0.16***
Total Trade Count	0.37***	0.39***	0.42***	0.51***	0.66***	0.56***
Fixed Effects	No	Stock	Quarterly	No	Stock	Quarterly
Control Variables	Yes	Yes	Yes	No	No	No
Panel B: Quarterly Decreases from Tier 2 to Tier 3						
Block Percent Turnover	0.62	0.33	0.51	1.02	0.81	1.02
Block Dollar Value	1.13***	1.00**	1.05***	1.54***	1.39***	1.54***
Block Trade Count	0.33***	0.32***	0.31***	0.46***	0.44***	0.47***
Dark Percent Turnover	-1.53***	-1.07**	-1.59***	-1.52***	-0.94*	-1.48***
Dark Dollar Value	-0.06	0	-0.07*	0.03	0.07*	0.03
Dark Trade Count	-0.04	-0.02	-0.05*	0.01	0.02	0.01
Lit Percent Turnover	0.91	0.74	1.09	0.49	0.13	0.46
Lit Dollar Value	0.01	0.04**	0	0.09***	0.10***	0.09***
Lit Trade Count	0.09	0.05	0.08	0.32***	0.25***	0.31***
Total Dollar Value	-0.01	0.03	-0.02	0.08**	0.09***	0.08**
Total Trade Count	0.05	0.02	0.03	0.33**	0.27**	0.32**
Fixed Effects	No	Stock	Quarterly	No	Stock	Quarterly
Control Variables	Yes	Yes	Yes	No	No	No

Table 0-14: Trading Around Increases in Block Thresholds

This table presents the coefficient of the interaction term $D_t^{POST} \times D_i^{TREAT}$ from several difference-in-difference regressions. The sample includes stocks that are reassigned a tier with a higher block threshold post quarterly revisions. Each row represents the different dependent variables and each column represents the different regression specifications. Specification (1) is our base case including control variables with no fixed effects. Specification (2) is identical to specification (1) with stock fixed effects. Specification (3) is identical to specification (1) with quarterly fixed effects. Specification (4) is identical to specification (1) excluding control variables. Specification (5) is identical to specification (2) excluding control variables. Specification (6) is identical to specification (3) excluding control variables. Standard errors are clustered both by stock and date in each regression specification. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Quarterly Increases from Tier 2 to Tier 1						
Block Percent Turnover	-4.34***	-4.68***	-4.49***	-4.65***	-4.87***	-4.76***
Block Dollar Value	-2.53***	-2.72***	-2.62***	-2.57***	-2.70***	-2.63***
Block Trade Count	-0.87***	-0.93***	-0.90***	-0.87***	-0.90***	-0.89***
Dark Percent Turnover	-0.37	-0.07	-0.45	-0.67	-0.19	-0.77
Dark Dollar Value	-0.15***	-0.15***	-0.16***	-0.15***	-0.12***	-0.15***
Dark Trade Count	-0.10**	-0.13***	-0.11**	-0.09*	-0.11**	-0.09**
Lit Percent Turnover	4.71***	4.75***	4.94***	5.32***	5.06***	5.53***
Lit Dollar Value	-0.07*	-0.07**	-0.07*	-0.04	-0.04	-0.03
Lit Trade Count	0.02	-0.04	0.03	0.23	0.09	0.28*
Total Dollar Value	-0.14***	-0.14***	-0.14***	-0.12***	-0.12***	-0.12***
Total Trade Count	-0.09	-0.17	-0.08	0.14	-0.02	0.19
Fixed Effects	No	Stock	Quarterly	No	Stock	Quarterly
Control Variables	Yes	Yes	Yes	No	No	No
Panel B: Quarterly Increases from Tier 3 to Tier 2						
Block Percent Turnover	-2.54***	-2.60***	-2.51***	-2.61***	-2.64***	-2.61***
Block Dollar Value	-1.40***	-1.45***	-1.37***	-1.53***	-1.56***	-1.52***
Block Trade Count	-0.44***	-0.44***	-0.43***	-0.48***	-0.49***	-0.48***
Dark Percent Turnover	0.38	0.66*	0.45	0.48	0.67*	0.52
Dark Dollar Value	-0.26***	-0.24***	-0.24***	-0.30***	-0.28***	-0.29***
Dark Trade Count	-0.13***	-0.13***	-0.12***	-0.15***	-0.15***	-0.15***
Lit Percent Turnover	2.09***	1.84***	2.00***	2.12***	1.96***	2.08***
Lit Dollar Value	-0.24***	-0.23***	-0.22***	-0.28***	-0.26***	-0.27***
Lit Trade Count	-0.25***	-0.27***	-0.25***	-0.34***	-0.36***	-0.35***
Total Dollar Value	-0.27***	-0.26***	-0.25***	-0.31***	-0.29***	-0.30***
Total Trade Count	-0.38***	-0.39***	-0.38***	-0.50***	-0.51***	-0.50***
Fixed Effects	No	Stock	Quarterly	No	Stock	Quarterly
Control Variables	Yes	Yes	Yes	No	No	No