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Cost of Capital Changes, the Quality of Trading Information and Market

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DOI:
10.1016/j.bar.2016.10.002

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Document Version
Peer reviewed version

Citation for published version (Harvard):
Chelley-Steeley, P & Lambertides, N 2016, 'Cost of Capital Changes, the Quality of Trading Information and Market', *The British Accounting Review*, vol. 48, no. 4, pp. 401-414. https://doi.org/10.1016/j.bar.2016.10.002

Link to publication on Research at Birmingham portal

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Checked 9/11/2016

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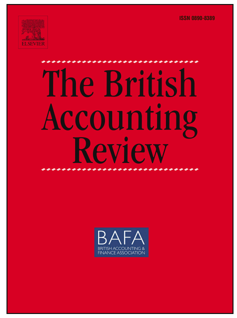

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PII: S0890-8389(16)30040-3

DOI: 10.1016/j.bar.2016.10.002

Reference: YBARE 733

To appear in: *The British Accounting Review*

Received Date: 15 November 2014

Revised Date: 7 October 2016

Accepted Date: 10 October 2016

Please cite this article as: Chelley-Steeley, P.L., Lambertides, N., Cost of capital changes, the quality of trading information and market architecture, *The British Accounting Review* (2016), doi: 10.1016/j.bar.2016.10.002.

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Cost of Capital Changes, the Quality of Trading Information and Market Architecture

ABSTRACT

In this paper, we examine whether there are cost of capital changes for stocks that migrate from a dealer to an auction trading system. We are motivated to undertake this research since there is a link between information quality and the architecture of a trading system. Moreover, recent research, such as that by Lambert et al (2007) suggests a connection between the quality of information and the cost of capital which suggests there may be a link between the trading system and the cost of capital. An opportunity to observe whether a change to the trading system influences the cost of capital presented itself in 2003, when stocks began to migrate away from SEAQ, the more opaque trading system, onto the more transparent SETSmm trading system. We use the Fama-French and implied cost of capital models to show that the cost of capital fell for firms migrating from the dealer market SEAQ to the hybrid auction system SETSmm. We estimate that the average change in Fama-French market beta equates to a reduction in the cost of capital of about 0.6%.

JEL classification: G15

Key words: cost of capital, information quality, trading system,

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Cost of Capital Changes, the Quality of Trading Information and Market Architecture[1]

1. Introduction

On November 3, 2003, the London Stock Exchange (LSE) introduced SETSmm, a hybrid trading system, which replaced the dealer system called SEAQ. SETSmm offered auction trading for smaller, less liquid securities, for the first time. However, the system also allowed designated market-makers to participate to ensure liquidity could be maintained at all times.

The aim of this paper is to examine whether the improvement in trading information, stemming from the adoption of a new trading system, influences the cost of capital. This is an important issue for the LSE because Wurgler (2000) showed that changes to the cost of capital influence the payoffs from investment decisions. These changes, in turn, affect how investment funds are allocated. As a result, there may be a connection between policy decisions made by stock exchanges about market architecture and the real economy. Although a number of studies have examined whether changes to the trading system increase market liquidity, no previous study has specifically examined whether changes to a trading system can influence the cost of capital.

We are motivated to examine this issue because a variety of papers have explored the impact that better quality accounting information can have on the cost of capital. Although these studies are important for understanding the influence that accounting information has on the

[1] We would like to thank the two anonymous reviewers of this paper. The generous contribution of their time and comments allowed us to improve the paper considerably.

cost of capital, they do not consider the connection between the cost of capital and changes to market microstructure information. Diamond and Verrecchia (1991), Leuz and Verrecchia (2000), Botosan (2000), Brennan and Tamarowski (2000) showed that the improved disclosure of accounting information led to a reduction in information asymmetry that decreased the cost of capital. This is confirmed empirically, as Hail and Leuz (2007) and Li (2010) showed that the mandatory adoption of *International Financial Reporting Standards* by European firms led to a reduction in the cost of capital. Moreover, Hail and Leuz (2009) showed that when firms cross-list and improved disclosure there was a corresponding reduction in the cost of capital. However, when firms cross-list and do not increase their level of disclosure, changes to the cost of capital were not evident. We extend this literature by examining how improved trading information, that is provided by a stock exchange can influence the cost of capital.

In Easley and O'Hara (2004), a more generalised information structure is examined to that assumed in the studies above. In particular, Easley and O'Hara (2004) extended the information structure to include microstructure information such as trading information. They showed that the quality and quantity of both accounting and trading information influences the cost of capital. In empirical work, Easley et al (2002) showed that, as informed trading increases, expected returns and, therefore, the cost of capital rise. As an example, they showed that a 10% rise in information-based trading leads to a 2.5% rise in the cost of capital.

Evidence that the quality of trading information is influenced by the trading methods of securities is provided by Pagano and Roell (1990), who compared price formation in a dealer and auction market with participating informed traders. They found that the greater transparency of auction markets led to higher levels of market liquidity[2]. Meanwhile, Biais (1993) argued that dealer markets are more fragmented than auction markets because any significant pre-trade order flow information is hidden from the market. A loss of information also arises because bilateral telephone discussions in dealer markets contribute to opaqueness. This is possible as some prices are negotiated away from the electronic trading system obscuring the information available to investors. Transparency, and therefore the quality of trading information, is also lower in a dealer market because trades can be reported with a delay causing relevant price and volume information to be obscured. Moreover, both Dutta and Madhavan (1997) and Huang and Stoll (1996) demonstrated that, in a dealer market, bid-ask spreads fail to reach competitive levels, this drives a wedge between intrinsic prices and traded prices, reducing the quality of price information. In their experimental study, Bloomfield and O'Hara (1999) showed that trade disclosure increases transparency, price efficiency and price informativeness, demonstrating that market architecture has a strong impact on the quality of trading-related information.

The quality of trading information is also influenced by market structure in other ways. Madhavan (1992) showed that information aggregation, and therefore efficiency, is higher in a call auction because traders with private information are forced to compete with each other.

[2] Gietzmann and Raonic (2014) furthered this point by showing that a change in the trading system can also lead to an increase in the amount of financial information that is disclosed. They asserted that firms migrating to SETSmm reduce information asymmetry by providing increased firm-level financial disclosure.

Such competition erodes information asymmetry between informed and uninformed traders. Pagano and Schwartz (2003) showed that the use of call auctions raises the synchronicity of prices, indicating that information from call auctions is of a higher quality. Nimalendran and Petrella (2003) examined the performance of thinly-traded stocks on the Italian Bourse and found that market liquidity is higher in hybrid markets that combine order-driven trading with market maker participation. Crucially, however, the aforementioned studies stopped short of examining whether there was a corresponding change in the cost of capital.

We use the framework of a before-and-after-event study in the same way as Christie and Huang (1994) or Bennet and Wei (2006), who examined the transfer of securities from one exchange to another. To capture possible changes in systematic risk caused by changes in information quality, we estimate risk using the framework of the three factor Fama-French (1993) model, which we augment with an illiquidity factor.

Specifically, we show that, following the introduction of SETSmm, there is a short term increase in stock returns for migrating firms and a corresponding increase in a range of information quality metrics. Using Fama-French risk coefficients in the pre and post-migration period, we have found that for migrating stocks there is a fall in market risk in the period following migration. Based on average costs of equity capital across UK companies, our results suggest that, on average, the market beta changes we identify lead to a reduction in the cost of equity capital of about 0.6%.

As a robustness check, we also calculate the cost of capital in years preceding and following the change in the trading system using the implied cost of capital model introduced by Ohlson and Juettner-Nauroth (2005) as well as the model proposed by Easton (2004). These measures of risk also show that the cost of capital following migration declines for migrating companies.

Control securities not migrating to SETSmm do not experience a fall in the cost of capital. We also find that our results are robust even after controlling for a range of factors that are commonly believed to influence the cost of capital. We examine small and large firms separately since smaller, less liquid stocks may behave differently to large firms as they are characterized by greater information asymmetry. These differences may cause diverse reactions to information asymmetry when the trading system alters. We find that small firms experience the largest reduction to risk after SETSmm is introduced.

The remainder of this paper is set out as follows. Section 2 describes the methodology we used. Section 3 discusses the link between information and the cost of capital. Section 4 sets out the data, Section 5 presents the main results, Section 6 presents some robustness tests. Finally, Section 7 provides a summary and a conclusion to the paper.

2: Empirical Methodology.

The focus of our empirical work is to discover whether information quality improved after SETSmm was introduced and whether this led to changes in the cost of capital. In the first instance we examine whether information quality improved after SETSmm is introduced. For the two years preceding and following the introduction of SETSmm, we estimate the market efficiency coefficient (MEC) introduced by Hasbrouck and Schwartz (1988) which is one of the most commonly used measures of information quality. The MEC is calculated as the ratio of the variance of two-day returns (VAR *R_2 DAY)* to two times the variance of one-day returns (*2 (VAR R_1DAY))* as follows:

$$MEC = \frac{VAR\ R_2 DAY}{2(VAR\ R_1 DAY)}. \qquad (1)$$

When returns are formed in a frictionless market, the MEC is unity indicating an absence of intervailing effects on the return variance. A MEC greater than unity implies positive serial correlation due to the sequential dissemination of information, momentum trading and undershooting in price discovery.

We also examine the responsiveness of stock returns to fluctuations in the market portfolio return, a metric introduced by Chordia and Swaminathan (2000). This statistic is denoted as DELAY and can be calculated as follows:

$$DELAY = \frac{1}{1+e^{-x}} \quad \text{where } X = \sum_{k=1}^{5} \beta_{i,t-k} / \beta_{i,t}\,. \qquad (2)$$

Where $\beta_{i,t}$ is the beta parameter estimate for the *i^{th}* security, obtained from a Dimson (1979) aggregate coefficient regression model, based on contemporaneous and market returns lagged five periods. If there are no market frictions affecting security returns, the DELAY statistic should equal 0.5. Larger deviations from 0.5 indicate greater market frictions and larger price distortions.

Black (1986) introduced the concept of noisy price adjustment, where frictions cause temporary price movements, which result in prices moving away from their intrinsic values, causing short-run changes in return. As shown by Amihud and Mendelson (1987), temporary price movements that are quickly reversed will introduce negative serial correlation into short horizon returns, while slow information diffusion, momentum and slow price discovery will lead to positive serial correlation. To measure the effect of temporary price movements on returns, we estimate the one-period daily serial correlation coefficient of stock returns, used previously to capture price efficiency by Bennett and Wei (2006). If market quality improves after migration, the serial correlation coefficient should move closer to zero after the introduction of SETSmm.

Our final measure of market quality is based on the average number of zero volume days as proposed by Lesmond, Ogden and Trzcinka (1999) and Liu (2006). This metric captures the loss of information that arises when securities fail to trade. As shown by the non-trading model of Lo and MacKinlay (1990), when a security fails to trade, important information about the true intrinsic process is hidden from the market. This happens because, in the absence of a trade, the new intrinsic price is unobservable. Moreover, as suggested by Lesmond, Ogden and Trzcinka (1999), thin trading can be a symptom of information scarcity, which deters investors from trading. The idea is that information changes investor expectations about price, and so provides opportunities to trade. If a new trading system reduces the frequency of zero volume days, then information quality improves, as more information about the return-generating process is relayed to the market. Higher trading activity in itself indicates increased information availability, thus incentivising investors to trade. We therefore calculate the mean number of zero volume days and consecutive zero volume days in the period before and after the introduction of SETSmm.

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Next, we use the framework of the Fama and French (1993) three-factor model to measure changes in systematic risk that arise between the pre and post-SETSmm periods. Recent evidence provided by Amihud (2002), Asparouhova et al (2010) and Hasbrouck (2010) strongly supports illiquidity risk as a priced risk characteristic. Moreover, as Amihud et al (1997) has shown trading systems influence illiquidity. We therefore augment the three-factor model with an illiquidity factor computed from the illiquidity ratio of the underlying firms.

We denote month t* as the effective month of migration. For each firm migrating to the hybrid SETSmm trading system, the following monthly asset pricing regression is estimated for months -36 to +36 of the new system. This is a procedure similar to that used previously by Grullon, Michaely and Swaminathan (2002) to discover whether systematic risk changes in response to variations in dividend, by Lambert et al (2007) to show that better accounting information reduces the cost of capital and by Li (2010) to show that the adoption of IFRS reduced the cost of capital.

$$r_{it} - r_{ft} = \alpha_i + \alpha_{\Delta i} D_t + b_i (r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + s_i SMB_t + s_{\Delta i} D_t SMB_t$$
$$+ h_i HML_t + h_{\Delta i} D_t HML_t + l_i ILLIQ_t + l_{\Delta i} D_t ILLIQ_t + e_{it} . \qquad (3)$$

Where D_t is a dummy variable that has a value of zero in the pre-change period but has a value of unity in the post-change period, r_{it} is the monthly stock return for firm i, r_{mt} is the monthly return to the value weighted FTSE All Share index, and r_{ft} is the monthly return to a 1-month UK T-bill. The $(r_{mt} - r_{ft})$ is the market risk premium, SMB is the difference between the return to a portfolio of small stocks and a portfolio of large stocks and is a proxy for small firm risk. HML is the difference between the returns to a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks designed by Fama and French (1993) to capture the distressed stock effect. ILLIQ is the difference between the returns on a portfolio of high illiquidity stocks and a portfolio of low illiquidity stocks.

The b_i, s_i, h_i and l_i coefficients are the factor loadings, or betas, of firm *i*, b_i is with respect to $(r_{mt}-r_{ft})$, s_i with respect to SMB, h_i for HML and l_i for ILLIQ. They therefore capture the firm's systematic risk during the dealer market period. The coefficients $b_{\Delta i}$, $s_{\Delta i}$,$h_{\Delta i}$ and $l_{\Delta i}$ capture changes to these factor loadings, or risks, in the post-migration period. The α_i is the risk-adjusted abnormal return or alpha of firm *i* during the period of dealer market trading, while $\alpha_{\Delta i}$ is the change in abnormal return after migration to the hybrid trading system.

As a robustness check, we also estimate the implied cost of capital in the years preceding and following migration using two widely employed implied cost of capital measures[3]. In each of these models, we substitute market price and earnings forecasts from I/B/E/S into the equation and back out the cost of capital. This is the internal rate of return that equates the current stock price to the expected stream of abnormal earnings. Both models are consistent with the dividend valuation model but make different assumptions that will influence estimates of the cost of capital. The first model presented below applies the growth assumptions of Ohlson and Juettner-Nauroth (2005). In their exposition of share price value detailed in equation (4) p354, the share price comprises the capitalised value of current

[3] We also apply the Claus and Thomas (2001) model and the Gebhardt, Lee and Swaminathan (2001) model. For brevity we do not report these but can confirm they show broadly similar results although cost of capital estimates vary.

earnings per share (eps) and the discounted value of future abnormal earnings per share growth. Their theoretical exposition allows the short-run and long-term growth rates of eps to diverge. Their short-run growth rate decays asymptotically at a fixed rate towards the long-run rate as $t \rightarrow \infty$. Instead of assuming short-term growth is $(eps_2\text{-}eps_1)/eps_1$, the model assumes a short-term growth rate of $eps_2\text{-}eps_1\text{-}r\,(eps_1\text{-}dps_1)$, so that abnormal earnings growth is defined as the change in earnings in excess of the return achieved on net reinvestment[4]. Short-term growth, therefore, has an adjustment for foregone earnings due to expected dividends paid at the end of the year 1 financial year (Proposition 1, Ohlson and Juettner-Nauroth (2005)). This makes the short-term growth rate as shown in Section 6 of Ohlson Juettner-Nauroth p361 $(eps_2\text{-}eps_1)/eps_1)+r(dps_1/eps_1)$ rather than $(eps_2\text{-}eps_1/eps_1)$[5] which is the long-term growth rate. These assumptions lead to their implied cost of capital formulation as shown by their adjusted equation (9) found on p359.

We employ the estimation process of Hail and Leuz (2009, p450) and extract the implied cost of capital (r_{iOJ}) for firm i from a pricing equation based on the Ohlson Juettner-Nauroth (2005) model. The Hail and Leuz (2009) estimation equation is shown below.

$$P_{it} = (x_{it+1} / r_{iOJ}).(g_{ist} + r_{iOJ} .d_{it+1} / x_{it+1} - g_{ilt})/(r_{iOJ} - g_{ilt}) \quad (4)$$

P_{it} is the current share price (P_o) of firm i[6]. Following Gode and Mohanram (2003) and Hail and Leuz (2009), we use one-year-ahead forecasted consensus I/B/E/S earnings forecasts x_{it+1} and dividends d_{it+1} per share for each security, in addition to forecasts of short- and long-term abnormal earnings growth (g_{ist} and g_{ilt} respectively). The growth rate g_{ist} (proxying for short-

[4] If dps1=eps1, then the abnormal change in earnings is simply eps2-eps1.
[5] As a result, the short-term growth rate is the long-term growth rate less $r(dps_t/eps_t)$.
[6] Stock prices and analyst forecasts are measured in month seven of the fiscal year to ensure that all financial data used is publically available and reflected in prices at the time we compute the cost of capital estimates.

term growth in the original formula of Ohlson and Juettner-Nauroth (2005)) is estimated, following Gode and Mohanram (2003), as the average of the forecasted percentage change in earnings between year t+1 to t+2 and the five year growth forecast provided by I/B/E/S. Estimated dividends are set to a constant fraction of forecasted earnings based on the average payout ratio over the previous three years. The model requires that there is a positive change in forecasted earnings to provide a numerical solution[7]. The long-term earnings growth rate is g_{ilt}. Ohlson and Juettner-Nauroth (2005 p361), assumes that growth in abnormal earnings per share beyond $t+1$ is sustainable. In the estimated model, therefore, the long-term growth rate is set equal to the expected rate of inflation, which provides a lower bound to estimates of the cost of capital[8]. Expectations of inflation are based on the median value of monthly one-year-ahead realized monthly inflation rates. Our backed-out estimates of the cost of capital for firm *i* is denoted as r_{iOJ}.

We also estimate the modified price-earnings growth (PEG) ratio model introduced by Easton (2004). The implied cost of capital from this model is a special case of the abnormal earnings growth valuation model developed by Ohlson and Juettner-Nauroth (2005). The model uses one-year-ahead and two-year-ahead earnings per share forecasts for firm *i*, along with expected dividends per share one year ahead for firm *i* in order to derive a measure of abnormal earnings growth. Dividends are set to a constant fraction of the firms forecasted

[7] If forecasts are negative, then we replace the long-run rate with the historical inflation rate estimated over the previous three years.
[8] We apply an *i* subscript because each firm migrates to SETSmm on a different date, so a uniform inflation rate is not applied to each stock.

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earnings as suggested earlier. Growth in abnormal earnings is assumed to persist in perpetuity after the first year.[9] The model we calculate is shown below.

$$P_{it} = (x_{it+2} + r_{iPEG}.d_{ti+1} - x_{it+1}) / r^2_{iPEG} . \quad (5)$$

In this model, $x_{it+\tau}$ is the I/B/E/S/ expected future earnings per share of firm *i*, r_{iPEG} is the implied cost of capital of firm *i*, calculated as the internal rate of return from solving the valuation model[10], d_{it+1} is the expected future net dividends per share of firm *i* derived as the dividend payout ratio multiplied by the earnings per share. These implied cost of capital estimates are obtained on a firm by firm basis. Both of these models have been used previously by Hail and Leuz (2009) to show that a cross-listing on another exchange leads to a reduction in the cost of capital. A detailed discussion of equation (4) and (5) is provided in Hail and Leuz (2009, p450).

3. Information and Systematic Risk

The pioneering work of Lambert et al (2007) highlighted two ways in which the quality of accounting information can influence a firm's cost of capital. Although improvements in accounting disclosure cannot alter the realised cash flows of firms, they can change the precision of expectations that investors hold regarding the distribution of cash flows. They showed that the covariance between the cash flows of different firms depends on the precision of a given firms's information. They concluded, therefore, that an improvement to

[9] The model requires positive changes in forecasted earnings to yield a numerical solution.
[10] As is usual and exemplified by Hail and Leuz (2007, 2009), we estimate the implied cost of capital iteratively until we identify a rate that causes prices to be within 0.001 of its actual value.

disclosure that reduces the measurement error of future cash flows will lead to a reduction in covariance and consequently the cost of capital. An effect that is not diversifiable[11].

Lambert et al (2007) also demonstrated that "if better information reduces the amount of firm cash flow that managers appropriate for themselves, the improvements in disclosure not only increase firm price, but in general also reduce a firm's cost of capital" (p388). This indirect effect is possible because the ratio of expected cash flows to covariance shifts[12]. Moreover, they also showed that information quality can influence real investment decisions. As a result, the ratio of expected cash flows to non-diversifiable covariance risk changes, which in turn influences the cost of capital.

Within the Lambert et al (2007) model, investors hold homogeneous beliefs, so no traders can be better informed than any other. If this assumption is relaxed, as in Hail and Leuz (2007), poor corporate disclosure can lead to the exploitation of uninformed traders. The informed, who have access to information that is not publicly available have an advantageous position. As a result, uninformed traders alter the prices at which they are willing to trade to protect themselves from unprofitable trades with the informed (reducing the price of their buy orders and raising the price of their sell orders). This affects the cost of capital, as investors expect compensation for their inferior asset allocation decisions, made as a result of the information asymmetry. Using a framework which allows for both informed and uninformed traders, Lambert et al (2011) demonstrated that it is not information asymmetry

[11] An improvement in disclosure also reduces variance because the precision of expectations increases, but this effect is asymptotically zero as the number of firms and investors increases.
[12] When increased disclosure only affects the proportion of the firm's cash flows that management appropriates, the ratio of the cash flow to covariance is unaffected. Moreover, even when the ratio is not invariant, these effects can be diversified.

per se that leads to a higher cost of capital, but rather the level of uncertainty caused by poor information quality. However, Armstrong et al (2011) showed that when markets are not fully competitive, information asymmetry re-emerges to impact the cost of capital.

O'Hara (2003), Easley and O'Hara (2004) and Hughes et al (2007) consider a more general information set that is not restricted to accounting information but also includes trading information. They argue that less informed investors recognise that they are at a disadvantage. Consequently, these investors hold fewer assets, driving down the prices of securities with high information asymmetry. The result is a reduction in the cost of capital to compensate for these costs. This suggests that trading information such as published prices, volume and the speed that trading information is presented to the market can also influence the amount of information asymmetry and the precision of information.

What all these studies cumulatively indicate is that improved information disclosure increases the element of return variation resulting from firm-specific information, (see for example Roll (1988)). A consequence of firm-specific information, becoming more important, is that the covariance between one firm and another decreases. This leads to a reduction in the covariance between a stock and the market. As a result market risk declines.

When a trading system changes and the quality of trading information improves, there is less uncertainty about current firm values. This allows investors to differentiate more effectively between firms, facilitating better asset allocation decisions. The move from SEAQ to SETSmm improves the quality of trading information. As previously noted, prices on the

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dealer system SEAQ are less transparent than those on SETSmm, as a high proportion of trades take place after telephone negotiations in dealer markets. This prevents other traders from knowing about the trade until after it has been reported. This, in turn, prevents investors from tracing out the demand and supply curves of each stock prior to a transaction. Board and Sutcliffe (1996) showed that over half of all SEAQ trades took place through telephone negotiation, which implied considerable opaqueness. In contrast, auction systems like SETSmm allow investors to view the most competitive buy and sell orders. This helps them to determine the buying and selling intensity at each price so that the demand and supply curves for each stock can be identified.

Another feature of SEAQ which reduces the amount of trading information disclosed to the market concerns reporting delays. SEAQ allows trade reporting delays of up to five days for large trades, which means that other market participants are not informed that a trade has taken place or at what price until the reporting delay has elapsed. In contrast, all auction trades are reported immediately on SETSmm[13]. During a reporting delay informed traders are able to maintain an information advantage over the uninformed until information about the trade is published. This contributes to elevated levels of information asymmetry which investors expect to be compensated for via the cost of capital.

The change to a more effective trading mechanism such as SETSmm can also increase the level of competition within a market by encouraging greater competition between traders. An

[13] Trades made through designated market makers on SETSmm are governed by special publication rules and are less opaque than on SETSmm. Transactions of 4 x NMS (Normal Market Size) need not be reported until either 80% of the trade is offset or the end of the trading day arrives, whichever is first. Trades larger than 75 x NMS have an extended publication delay of three days or 90% of the trade. NMS is approximately the median size trade.

increase in competition reduces the impact of information asymmetry on the cost of capital, as suggested by Armstrong et al (2011). Changes to the trading system that reduce non-trading will also lead to an improvement in the quality of information and reduced uncertainty.

Cost of capital adjustments will be observable through changes in market risk because better quality information increases the role of firm-specific news as the precision of information increases. As these changes take place, the covariances between firms decrease, causing a reduction in the covariance between a particular firm and the market. We therefore expect to observe that changes to the trading system that improve the quality of information should lead to a reduction in market risk. We do not envisage there being changes to the SMB or HML components, as these premiums reflect a firm size and a distressed firm component that should not be influenced by changes in the information structure. Improvements to information quality will also lead to improvements in market liquidity if the former are widespread. However, we do not envisage that market illiquidity will be impacted by a change in information quality after the introduction of SETSmm, as these changes only influence a specific segment of the market.

4: Data and Summary Information

The first stocks to migrate to SETSmm in 2003 were smaller FTSE 250 stocks that did not trade on SETS, the main LSE auction system. In July 2005, a further tranche of mid-cap stocks migrated to SETSmm, and in December 2005 a group of small companies (the components of the AIM 50 index-rising smaller companies) were also transferred. A

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distinguishing feature of AIM stocks is that they are not listed on the main market and therefore have lower reporting obligations than FTSE 250 securities[14]. In addition to these migrations, the LSE announces via its quarterly review the names of any new securities due to transfer to SETSmm[15].

Our sample consists of all the stocks transferred from SEAQ to SETSmm between November 3, 2003 and June 11, 2008. We then use data from three years preceding and three years following migration to make cost of capital estimates. This means, for estimation purposes, in total we use data from November 3, 2000 to June 12, 2011. During this period, SEAQ stocks were transferred in 18 batches, of which 14 represented quarterly adjustments. The other four reflected policy decisions made by the exchange to extend auction trading to a wider class of securities[16]. Each of these transfer days is considered an event day. Information about the securities transferred, the announcement dates and the subsequent transfer dates were obtained from the London Stock Exchange. Table 1 contains a list of announcement and effective dates associated with each group of migrations. In total, we have a sample of 365 migrating securities. Daily closing security prices, closing values of the FTSE All Share Index and the t-bill rate used in the empirical work are obtained from *Datastream.*

[14] AIM stocks, unlike main market stocks, are subject to a nominated advisor regime rather than an FCA sponsor regime as they are exchange regulated securities, not EU regulated securities. Unlike main market companies which have to provide financial accounts for at least three years, AIM stocks do not have to provide a minimum financial history.

[15] A security becomes eligible for trading on SETSmm only if its liquidity has been proven sufficient to warrant migration to SETSmm. Only a small number of firms migrated from SEAQ to SETSmm in this way, and during some quarterly reviews no migrations were announced. Since the LSE became Mifid compliant, SETSmm became a segment of SETS, the main trading system.

[16] In November 2007, stocks were still traded on SETSmm, but the system was renamed SETS. Consequently, the last two batches were transfers from SEAQ to the SETSmm segment of SETS.

The SMB and HML factors have been obtained from the website of Alan Gregory at The University of Exeter. They are comparable to the SMB and HML factors made available on the website of Kenneth French for US companies. The Gregory SMB and HML factors have been widely used in the context of UK asset pricing models, see for example Grout and Zalewska (2006), Gregory and Michou (2009) or Gregory, Tharyan and Christidis (2009).

ILLIQ is an illiquidity factor that aims to capture how illiquidity differences influence return performance. For each stock we construct the Amihud (2002) illiquidity ratio by calculating the previous year's annual average of the daily absolute return to volume ratio. This value is multiplied by 10^6 and scaled by the market ratio. Days of zero volume are excluded when calculating the illiquidity ratio. In common with Amihud (2002) and later applications using the illiquidity ratio, the sample excludes stocks from any year which does not provide return or volume data for at least 200 of its days. We divide the sample into three groups based on this illiquidity ratio (high, medium and low). We then create a monthly illiquidity, mimicking factor ILLIQ as the average return on the high illiquidity portfolio, minus the average return on the low illiquidity portfolio.

5: Results

In Table 2 we report mean, median and standard deviation summary information for the stocks in our sample. Return, r_m-r_f, SMB and HML are the monthly stock returns, the monthly market risk premiums and the SMB and HML return premiums, respectively. MV is the market value in 000's. M/B is the market-to-book ratio. Leverage is the ratio of debt to equity. Asset Growth is the change in asset values that take place between one year and another and captures the growth rate of the firm. ROA is the return on assets, Div Payout is the ratio of dividends to earnings and Volatility is the monthly return volatility of the stock. Price is the average price used in the implied cost of capital models. EPS Yr1 and EPS Yr2 are the I/B/E/S forecasts of future earnings used to obtain the implied cost of capital estimates. The value g_s is the short-term growth rate used in the implied cost of capital models, g_{lOJ} is the long-term growth rate used in the Ohlson Juettner-Nauroth model (expected inflation rate) and g_{lE} is the long-term growth rate used in the Easton model (based on the Yr 1 growth rate).

In Table 3, we report five and ten-day cumulative abnormal returns following the migration announcement. Additionally, we report pre- and post-SETSmm values for average volume, market adjusted volume[17] and the illiquidity ratio. These have been calculated using the periods 36 to 12 months preceding the event period and 12 to 36 months following the event period. Both the five- and ten-day cumulative abnormal returns (CAR 5 and CAR 10 in Table 3) indicate an increase in returns after the announcement that securities are to migrate to SETSmm. An increase in short-term returns at the time of the announcement is consistent with a fall in the cost of capital[18]. We also find that volume and market-adjusted volume rise in the period following the introduction of SETSmm. This is reflected in a reduction of the average illiquidity ratio from 0.375 prior to the introduction of SETSmm to 0.136 afterwards.

5.1 Information Quality Changes

[17]We market-adjust volume by subtracting average FTSE 100 security volume.
[18] An unexpected fall in the cost of capital leads to a rise in the share price, as future investor cash flows are deflated by a smaller discount rate. For the current share price to equal a set of discounted cash flows that are larger (due to the fall in the discount rate), the current share price must rise. The effect of this increase in the share price will lead to an increase in returns until the process of adjustment has been completed.

Next, in Table 4, we indicate that information quality has improved in the post SETSmm period by showing that the measures of information quality presented in Section 2, i.e. MEC, DELAY, autocorrelation and zero volume days all declined in the post-SETSmm period. The mean MEC value fell from 1.2237 to 1.0757, a change of over 12%. The mean DELAY coefficient fell from 0.7392 to 0.6270, a reduction of over 15%. The mean serial correlation coefficient changed from 0.1395, to -0.0330, indicative of positive serial correlation in the pre-SETSmm period but suggestive of slight return reversal in the post-SETSmm period. The number of zero volume days fell from about 40% (0.4028) to only 23% (0.2313) of trading days (a reduction of about 43%). Meanwhile, the incidence of two consecutive zero volume days fell from 23% to 15.5%.

Motivated by the increase in abnormal returns in the post-SETSmm period and the discovery that the quality of trading information improved, we next examine whether the cost of capital decreased in the post-SETSmm period. The results from the estimation of the Fama-French (1993) three factor model, augmented with an illiquidity factor, are presented in Panel A of Table 5. This model is estimated over the 36-month period before and after migration and is therefore estimated over different calendar dates for the sample stocks. This allows us to isolate the impact of changes in risk, due to an alteration in the trading system, separately from the changes that arise due to the time period being studied.

5.2 Cost of Capital Changes

The α from the Fama-French model indicates that in the pre-SETSmm period, migrating firms earn positive abnormal returns. However, in the post-SETSmm period, migrating securities earn negative abnormal returns, as α_{Δ} is negative and larger than α. The estimated pre-SETSmm market beta from the Fama-French model indicates that the mean pre-SETSmm market beta, SMB, HML and illiquidity beta are 0.9583, 0.9295, 0.0453 and 0.0470, respectively. In the post-SETSmm period, there is a significant reduction in market risk for migrating firms as the average beta falls by -0.1108, reducing the post-migration average beta to 0.8475. In the post-SETSmm period, the average value of the SMB beta falls by 0.3249. Neither the HML or the illiquidity beta changes significantly in the post-SETSmm period. Over this period, the average market risk premium was estimated to be about 5%, so a reduction in market risk of this magnitude results in a reduction in the cost of capital equivalent on average to about 0.6%.

The implied cost of capital estimates from the Juettner-Nauroth (2005) model and the Easton (2005) model are presented in panel B and C of Table 5, respectively. Panel B shows that the average Juettner-Nauroth implied cost of capital estimate is 13.89% at three years, 16.51% at two years and 13.69% at one year prior to migration, respectively. During the year of migration, the average cost of capital is 13.17%. In the year following migration, the average cost of capital falls to 11.97% and remains below Yr 0 levels three years after migration. As a check on the above, we also estimate the same implied cost of capital models using only stocks that provide cost of capital estimates in Yr 1, 0 and Yr -1. We then measure the change in implied cost of capital estimates for estimated pairs. The average change in the implied cost of capital between year 0 and +1 is -0.0096. The average difference between Yr -1 and Yr 1 is -0.0116. Both changes are statistically significant and indicate a reduction in the average implied cost of capital.

Panel C, which contains the Easton implied cost of capital estimates, presents results consistent with those of Panel B, although precise estimates of the implied cost of capital each year are not identical. Average Easton implied cost of capital estimates are lower prior to migration to SETSmm compared to Juettner-Nauroth estimates. However, implied cost of capital estimates decline and remain lower than prior-to-migration estimates in all years following migration, as was the case for Ohlson Juettner-Nauroth estimates[19]. Our analysis of paired differences shows that, on average, the change in implied cost of capital is -0.0138 between Yr 0 and Yr 1. Between Yr -1 and Yr 1, the implied cost of capital falls by 0.0078. Across all SETSmm firms, the correlation coefficient between the Ohlson Juettner-Nauroth and the Easton cost of capital measures is 0.973.

5.3. Firm Size

An important consideration when altering the trading system is the effect that these changes can have on the performance of different classes of securities. This was highlighted by Muscarella and Piwowar (2001) and Nimalendran and Petrella (2003), who showed that when a trading system changes, the benefits of such a change may be dependent on firm liquidity. Muscarella and Piwowar (2001) showed that in the case of the Paris Bourse migration of securities from a call auction to a continuous auction system, led to a rise in value of liquid firms but also a fall in value for illiquid firms. Easley et al (1996) have also argued that smaller stocks are characterized by greater informational asymmetries.

[19] Our estimates are likely to be different, as the Ohlson Juettner-Nauroth model assumes that long-term growth is equal to the expected inflation rate, while Easton assumes that long-term growth in abnormal earnings is based on the relevant year 1 growth rates. Differences in the way long-term growth rates are derived are likely to lead to differences in the implied cost of capital estimates.

In Table 6 we report the Fama-French model estimated separately for migrating small, medium and large firms, and in Table 7 we report implied cost of capital estimates for the three groups based on firm size. Table 6 shows that in the pre-SETSmm period, the mean beta of all size groupings is significant and positive. Small firms have the largest market beta (1.0224) and the smallest beta is associated with medium firms (0.9137). The largest changes in beta are associated with small firms as their average change in beta is -0.1554. The medium-sized firms do not experience a significant reduction in market beta, while for large firms the average beta falls by 0.1072 (only significant at a 10% level). This suggests that small firms benefited most from a reduction in market risk as a result of changes to the trading system. The average market risk premium to firms during this period is about 5%, so a reduction in beta of this magnitude equates to a decline in the cost of capital of about 0.78% for small firms.

Table 7 also shows that the risk of firms is related to their size. In both the Juettner-Nauroth and Easton models, we find that the magnitude of risk estimates are related to firm size. Firms in the small firm group have the largest implied cost of capital estimates and large firms tend to have the smallest. We also find that the estimated changes in risk are greatest for small firms. When applying the Juettner-Nauroth model, the implied cost of capital of small firms falls by 0.23 when measured between Yr 1 and Yr 0 and by 0.038 when measured between Yr +1 and Yr -1. Changes associated with medium and large firms are insignificant. The results suggested by the Easton model are similar, although estimated changes to the implied cost of capital are slightly smaller.

6: Robustness Tests

6.1 Control stocks

As a first robustness test, we take a sample of non-migrating securities from those stocks on SEAQ that were never transferred to SETSmm[20]. For these stocks we should observe no change in the cost of capital because trading information for these stocks did not improve. Using these control stocks, we estimate the information quality measures presented in Table 4 and find no indication that information quality improved in the post-SETSmm period (unreported). Results from the estimation of the Fama-French model are presented in Table 8 and show that there are no obvious changes to risk estimates in the post-SETSmm period[21].

6.2 Other factors influencing cost of capital changes

The cost of capital of a firm can change for reasons unrelated to the quality of information. To demonstrate more fully that our results are not driven by unrelated influences on the cost of capital, we estimate the following regression model: the dependent variable CC is the cost of capital and is either the beta from the Fama-French model or the implied cost of capital from the Ohlson Juettner-Nauroth model or the Easton model. For each security, we obtain estimates using the period three years prior and subsequent to SETSmm migration. For each stock there are, therefore, seven observations, despite the fact that the calendar years will be different across stocks because migration to SETSmm occurred at different times. The Difference-in-Difference model we estimate is described below.

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[20] We match to each security on SETSmm a security that is on SEAQ. To make an appropriate match we choose a SEAQ security that is from the same industry and most similar in size.

[21] We do notice that, as for the migrating sample, the SMB beta does fall in the post-SETSmm period. This suggests that the fall in the SMB that we observed for migrating stocks is not due to the introduction of SETSmm.

$$CC_{it} = \alpha + \partial_1 SETSmm_{it} + \partial_2 Time_{it} + \partial_3 SETSmm * Time_{it} + \beta_1 Leverage_{it} + \beta_2 Asset\ Growth_{it} + \beta_3 ROA_{it} + \beta_4 Div\ Payout_{it} + \beta_5 \mathrm{Re}t\ Volatility_{it} + \beta_6 Market_{it} + \beta_7 rf_{it} + \sum_{1}^{n=23} \gamma_n IND_{it} + \varepsilon_{it} \quad (6)$$

SETSmm is a dummy variable that takes a value of 0 if firms are control securities but has a value of unity if stocks are SETSmm stocks. The coefficient associated with this variable will determine whether migrating stocks have a higher or lower cost of capital to control stocks. *Time* is a dummy variable that has a value of 0 if the cost of capital measure is estimated prior to the stock moving to SETSmm, but has a value of unity otherwise[22]. This indicates whether the cost of capital across all stocks is higher or lower in the post-SETSmm period. *SETSmm*Time* has a value of 0, but if the stock migrates to SETSmm and is observed in the post-SETSmm period, it has a value of unity. This is the key variable as it will show whether the cost of capital estimate is higher or lower for SETSmm stocks in the post-SETSmm period compared to the control firms. For our analysis to be correct, this must be negatively signed, indicating that SETSmm securities had a lower cost of capital in the post-SETSmm period.

To allow other factors to influence the cost of capital we also include a range of control variables. The risk of a security is positively influenced by its capital structure, so we include a variable called *Leverage* which is the debt-to-equity ratio of the firm. We include *Asset Growth*, which is the change in total asset values between yr_{t+1} and yr_t to capture the growth strategy of the firm as this may influence its risk. We include the Return on Assets *(ROA)* as a measure of performance. To capture the influence of the firm's payout policy on the cost of

[22] For control stocks this variable equals the corresponding value of its counterpart.

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capital, we include the dividend payout *(Div Payout)* ratio of firms. *Ret Volatility* is the return volatility of a firm's stock return and reflects the degree of precision investors face when forming expectations. We also include the market return *(Market)* to capture the current state of the economy along with the risk free return (r_f). Since the industry a firm belongs to can also influence the cost of capital, we also include a set of 23 different industry dummies (IND) to capture industry influences (unreported for brevity).

The results from this panel regression along with p values for each variable are presented in Table 9. The results show that SETSmm stocks have a higher cost of capital than control stocks. In the post-SETSmm period, the cost of capital is higher. However, for stocks that migrate to SETSmm, the cost of capital is lower, indicating that even after we control for a whole range of factors that are known to influence the cost of capital, we still find that in the post-SETSmm period the cost of capital is lower for SETSmm securities.

Overall, we have shown that a change in the trading system can be highly beneficial to firms that migrate. One key benefit that we are the first to highlight is that migration to an improved trading system can lead to a reduction in systematic risk, as liquidity and the informativeness of prices improves. We provide the first empirical evidence to show that the transmission mechanism for such changes occurs through a reduction in systematic risk, as initially suggested by Easley and O'Hara (2004). Moreover, we find that risk reductions appear to be greatest for the smallest and least liquid firms in the sample.

7. Summary and Conclusions

Improved information disclosure increases the element of return variation derived from firm-specific information. Consequently, the return covariance between one firm and another decreases, which, in turn, reduces the covariance between a stock and the market portfolio, leading to an overall decline in market risk (Roll (1988)). We examine whether the cost of capital changed for firms after they migrated to SETSmm. Such changes are possible because SETSmm is an example of a more transparent trading system that improves the quality of trading information provided to the market. As such, it should play an important role in reducing information asymmetry between traders and increasing the precision of information.

We find that after stocks move to SETSmm, they experience an improvement in information quality as shown in our estimation of a range of information quality metrics before and after the introduction of SETSmm. We then use the framework of the Fama-French model (1993) and implied cost of capital estimates from Ohlson Juettner-Narouth (2005) and Easton (2004) to show that the cost of capital for migrating firms fell in the three years after they migrated to SETSmm. We show a decline in the market risk of firms measured by market beta in the post-SETSmm period but no corresponding change for a group of SEAQ securities (control securities) that do not migrate to the new system. We find that our results are highly robust, given our inclusion of a regression model, which controls for other factors that may alter the cost of capital. Using this regression model, we find that SETSmm securities still experience a fall in the cost of capital in the post-SETSmm period.

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Table 1: Sample of migrations to SETSmm

In this table, N is the number of securities that migrate during a specified event. *Event* documents each migration of securities from SEAQ to SETSmm. *Announced* is the announcement date of a migration to SETSmm and *Effective* is the actual transfer date. Quarterly announcements that do not lead to changes are not noted.

	N	Announced	Effective	Source
Event	189	16/6/2003	3/11/2003	LSE service announcement 36/03
Event	8	12/12/2003	22/12/2003	LSE service announcement 67/03
Event	7	15/03/2004	22/03/2004	LSE service announcement 05/03
Event	8	11/06/2004	21/06/2004	LSE service announcement 30/04
Event	8	9/09/2004	13/09/04	LSE service announcement 51/04
Event	1	9/12/2005	12/09/2005	LSE service announcement 53/05
Event	200	7/07/2005	11/07/05	LSE press release
Event	60	5/09/2005	5/12/2005	LSE service announcement 47/05
Event	100	18/10/2005	5/12/2005	LSE press release
Event	16	8/12/2005	12/12/2005	LSE service announcement 75/05
Event	7	10/03/2006	14/03/2006	LSE service announcement 08/06
Event	10	9/06/2006	13/06/2006	LSE service announcement 22/06
Event	29	12/12/2006	12/12/2006	LSE service announcement 50/06
Event	12	8/06/2007	12/06/2007	LSE service announcement LIVE 37/07
Event	1	07/09/2007	12/09/2007	LSE service announcement LIVE 67/07
Event	2	07/11/2007	11/09/2007	LSE service announcement LIVE 109/07
Event	1	05/03/2008	06/03/2008	LSE service announcement LIVE 20/08
Event	2	07/06/2008	11/06/2008	LSE service announcement LIVE 48/08

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Table 2: Summary statistics

In this table we provide mean, median and standard deviation values of the variables used in our study. *Return* is the stock return, *Illiquidity* is the Amihud illiquidity ratio, the *rm-rf* is the excess market return, *SMB* and *HML* are the monthly returns to the SMB and HML factors. *MV* is the market capitalisation of the firm in '000's, *M/B* is the market to book ratio, *Leverage* is the debt-to-equity ratio of the firm. *Asset Growth* is the change in total asset value and *ROA* is the return on assets. . *Div Payout* is the fraction of dividends to earnings, *volatility* is the variance of monthly stock returns. *Price* is the published price used in the implied cost of capital models. *EPS Yr1* and *Yr2* are the I/B/E/S EPS forecasts used in the computation of the implied cost of capital estimates, *gs* is the short-term growth rate estimate, the g_{lOJ} and g_{lE} are long-term growth rates estimated for the Ohlson, Juettner-Nauroth Model and the Easton model, respectively.

	All			SETSmm			Controls		
	mean	median	s.d.	Mean	Median	s.d.	mean	median	s.d.
Return	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Illiquidity	0.437	0.160	0.577	0.322	0.134	0.547	0.868	0.709	0.660
rm_rf	0.009	0.014	0.059	0.009	0.014	0.059	0.009	0.014	0.059
SMB	0.003	0.003	0.019	0.003	0.003	0.019	0.003	0.003	0.019
HML	0.003	0.004	0.019	0.003	0.004	0.019	0.003	0.004	0.019
MV	75.2	18.6	81.9	125.3	22.2	89.2	3.5	1.8	4.0
M/B	2.9	2.2	5.9	2.9	2.3	6.1	2.5	2.2	2.2
Leverage	0.558	0.548	0.285	0.570	0.564	0.288	0.423	0.417	0.209
Asset Growth	0.197	0.107	0.522	0.188	0.105	0.507	0.289	0.127	0.671
ROA	0.058	0.058	0.130	0.059	0.058	0.131	0.055	0.059	0.113
Div Payout	15.6	34.3	26.0	38.4	36.3	25.3	4.6	2.5	6.1
Volatility	0.020	0.017	0.012	0.019	0.017	0.011	0.030	0.031	0.015
Price	225.9	195.5	347.2	339.9	257.5	356.4	170.9	130.0	149.5
EPS Yr1	17.0	16.0	25.4	22.9	16.6	26.1	12.8	7.1	13.1
EPS Yr2	20.1	19.2	27.6	26.1	19.5	28.3	14.3	8.8	14.1
gs	0.294	0.124	1.863	0.348	0.125	1.942	0.225	0.121	0.407
g_{lOJ}	0.020	0.023	0.004	0.020	0.023	0.004	0.022	0.023	0.003
g_{lE}	0.03	0.03	0.015	0.03	0.03	0.015	0.03	0.03	0.015

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Table 3: Abnormal return and liquidity following migration to SETSmm

This table presents information about abnormal return and liquidity around the migration period. *CAR 5* is the cumulative return on day 5 and *CAR 10* is the cumulative abnormal return on day 10. *Volume* is the mean average daily trading volume of securities preceding the introduction of SETSmm (in thousands). *Market Adjusted Volume* is firm volume deflated by the average volume of the FTSE 100 securities. *Illiquidity Ratio* is the mean Amihud illiquidity ratio. Each of these variables is calculated for the pre- and post-SETSmm periods, respectively. *Prior to SETSmm* captures these values in the pre-SETSmm period and *Post-SETSmm* captures values after the introduction of SETSmm. *Difference* captures changes in these values. The *t-statistics* are shown in parenthesis.

	Prior to SETSmm	Post-SETSmm	Difference
CAR 5		0.0171	
		(1.93)	
CAR 10		0.0281	
		(2.01)	
Volume	796.00	893.78	97.78
			(2.04)
Market Adjusted Volume	0.0515	0.0578	0.063
			(2.05)
Illiquidity Ratio	0.375	0.136	0.239
			(2.14)

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Table 4: Market quality results

This table reports the results from the market quality tests we employed. *MEC* is the market efficiency coefficient, *DELAY* captures lagged and contemporaneous changes between the stock return and market returns, *Autocorrelation* is the one-period serial correlation coefficient. *% zero volume* is the percentage of zero volume days present in all available trading days. *% 2 days zero volume* is the proportion of all trading days accounted for by two consecutive zero volume days present in all available trading days. *Before* and *after* are the pre- and post-SETSmm periods. *% dif* captures percentage changes to the market quality measures. Below are the results of the t-test and p-values.

	MEC	DELAY	Autocorrelation	% Zero Volume	% 2 days zero volume
Before	1.2237	0.7392	0.1395	0.4028	0.2330
After	1.0757	0.6270	-0.0330	0.2313	0.1549
% dif	-0.1209	-0.1518	-1.2366	-0.4258	-0.3352
t-test	-5.79	-72.24	-25.39	-37.58	-20.62
p-value (mean)	0.0000	0.0000	0.0000	0.0000	0.0000

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Table 5: Cost of capital changes for SETSmm securities

The $(r_{mt} - r_{ft})$ is the market risk premium, *SMB* is the difference between the return on a portfolio of small stocks and a portfolio of large stocks and is a proxy for small firm risk. *HML* is the difference between the returns on a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks, *ILLIQ* is the return to a high illiquidity portfolio less the return to a low illiquidity portfolio. Coefficients b_{-i},s_{-i}, h_{-i} and l_{-i} are the factor loadings or betas of firm *i*, estimated using information from *t-36* to *t-1* of migration and therefore capture the systematic risk of the firm in the pre-SETSmm period. The coefficients $b_{\Delta i}$, $s_{\Delta i}$,$h_{\Delta i}$ and $l_{\Delta i}$ capture changes to risk post-SETSmm. The α_i and $\alpha_{\Delta i}$ are pre- and post-SETSmm risk-adjusted abnormal returns. Median is the median coefficient value and the p-value is the probability value. The implied cost of capital estimates using the Juettner-Nauroth (2005) model and the Easton (2005) model are presented in panels B and C, respectively. In panel B and C, *yr* is the year relative to the introduction of SETSmm for each security. *Δ +1,0* and *Δ+1,-1* are the cost of capital changes associated with matched securities between these years. The *t-statistics* are provided in parenthesis below.

Panel A Fama-French Results

	ab r	*ab r*	*(r_m-r_f)*	*(r_m-r_f)*	*SMB*	*SMB*	*HML*	*HML*	*ILLIQ*	*ILLIQ*
	α_{-i}	$\alpha_{\Delta i}$	b_{-i}	$b_{\Delta i}$	s_{-i}	$s_{\Delta i}$	h_{-i}	$h_{\Delta i}$	l_{-i}	$l_{\Delta i}$
Mean	0.0021	-0.0060	0.9583	-0.1108	0.9295	-0.3249	0.0453	0.0405	0.0470	-0.0367
Median	0.0039	-0.0048	0.9430	-0.0907	0.8138	-0.2681	0.0469	0.0457	0.0452	0.0000
p-value	0.0274	0.0000	0.0000	0.0117	0.0000	0.0000	0.1691	0.4724	0.2732	0.4645

Panel B: Ohlson Juettner-Nauroth Model

	Yr -3	Yr -2	Yr -1	Yr 0	Yr 1	Yr 2	Yr 3	Δ +1,0	Δ +1,-1
Mean	0.1389	0.1651	0.1369	0.1317	0.1197	0.1213	0.1020	-0.0096	-0.0116
Median	0.1175	0.1386	0.1143	0.1188	0.1068	0.1071	0.0955	(-2.66)	(-2.36)
Std. Dev	0.0767	0.1038	0.0859	0.0556	0.0609	0.0671	0.0449		
Min	0.0149	0.0357	0.0221	0.0160	0.0177	0.0144	0.0072		
Max	0.4588	0.7947	0.9011	0.4165	0.5687	0.5585	0.2909		

Panel C: Easton Model

	Yr -3	Yr -2	Yr -1	Yr 0	Yr 1	Yr 2	Yr 3	Δ +1,0	Δ +1,-1
Mean	0.1296	0.1470	0.1221	0.1288	0.1141	0.1135	0.0994	-0.0138	-0.0078
Median	0.1175	0.1304	0.1121	0.1190	0.1041	0.1049	0.0984	(-4.59)	(-2.38)
Std. Dev	0.0581	0.0712	0.0437	0.0474	0.0411	0.0410	0.0285		
Min	0.0041	0.0407	0.0348	0.0235	0.0264	0.0282	0.0400		
Max	0.4638	0.7802	0.3094	0.3756	0.3786	0.3837	0.2180		

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Table 6: Fama-French results by size grouping

This table presents the results from estimating the Fama-French model.

$$r_{it} - r_{ft} = \alpha_{-i} + \alpha_{\Delta i} D_t + b_{-i}(r_{mt} - r_{ft}) + b_{\Delta i} D_t (r_{mt} - r_{ft}) + s_{-i} SMB_t + s_{\Delta i} D_t SMB_t$$
$$+ h_{-i} HML_t + h_{\Delta i} D_t HML_t + l_{-i} ILLIQ_t + l_{\Delta i} D_t ILLIQ_t + e_t$$

D_t is a dummy variable that has a value of zero in the pre-change period but has a value of unity in the post-change period, r_{it} is the monthly stock return for firm *i*, r_{mt} is the monthly return to the value-weighted FTSE All Share index, and r_{ft} is the monthly return to a one-month UK T-bill. The $(r_{mt} - r_{ft})$ is the market risk premium, *SMB* is the difference between the return on a portfolio of small stocks and a portfolio of large stocks and is a proxy for small firm risk. *HML* is the difference between the returns on a portfolio of high book-to market stocks and a portfolio of low book-to-market stocks, *ILLIQ* is the return to a high illiquidity portfolio less the return to a low illiquidity portfolio. *ab r* is the average abnormal return to securities. Coefficients b_{-i},s_{-i}, h_{-i} and l_{-i} are the factor loadings, or betas, of firm *i* estimated using information from *t-36* to *t-1* of migration and therefore capture the systematic risk of the firm during the dealer market period. The coefficients $b_{\Delta i}$, $s_{\Delta i}$,$h_{\Delta i}$ and $l_{\Delta i}$ capture changes to risk in the post-migration period as reflected in the period *t=0* to *t+36* after migration. The α_i is the risk-adjusted abnormal return or alpha of firm *i* during the period of dealer market trading while $\alpha_{\Delta i}$ is the change in abnormal return after migration to the hybrid trading system.

SMALL

	ab r	*ab r*	*(r_m-r_f)*	*(r_m-r_f)*	*SMB*	*SMB*	*HML*	*HML*	*ILLIQ*	*ILLIQ*
	α_{-i}	$\alpha_{\Delta i}$	b_{-i}	$b_{\Delta i}$	s_{-i}	$s_{\Delta i}$	h_{-i}	$h_{\Delta i}$	l_{-i}	$l_{\Delta i}$
Mean	-0.0028	-0.0067	1.0224	-0.1554	1.0819	-0.4938	0.1126	-0.0580	0.0135	0.0020
Median	-0.0005	-0.0044	0.9623	-0.1124	1.0121	-0.3462	0.0470	-00180	0.0339	0.0020
p-value	0.1241	0.0028	0.0000	0.0349	0.0000	0.0000	0.1815	0.6368	0.8679	0.9833

MEDIUM

	ab r	*ab r*	*(r_m-r_f)*	*(r_m-r_f)*	*SMB*	*SMB*	*HML*	*HML*	*ILLIQ*	*ILLIQ*
	α_{-i}	$\alpha_{\Delta i}$	b_{-i}	$b_{\Delta i}$	s_{-i}	$s_{\Delta i}$	h_{-i}	$h_{\Delta i}$	l_{-i}	$l_{\Delta i}$
Mean	0.0046	-0.0076	0.9137	-0.0794	0.9212	-0.3257	-0.0447	0.2134	-0.1184	0.1587
Median	0.0063	-0.0065	0.8615	-0.0394	0.7554	-0.2933	0.0226	0.2343	-0.0211	0.1424
p-value	0.0037	0.0006	0.0000	0.3292	0.0000	0.0001	0.4563	0.0485	0.0756	0.0432

LARGE

	ab r	*ab r*	*(r_m-r_f)*	*(r_m-r_f)*	*SMB*	*SMB*	*HML*	*HML*	*ILLIQ*	*ILLIQ*
	α_{-i}	$\alpha_{\Delta i}$	b_{-i}	$b_{\Delta i}$	s_{-i}	$s_{\Delta i}$	h_{-i}	$h_{\Delta i}$	l_{-i}	$l_{\Delta i}$
Mean	0.0042	-0.0041	0.9423	-0.1072	0.7960	-0.1821	0.0640	-0.0166	0.2277	-0.2341
Median	0.0053	-0.0035	0.9643	-0.0544	0.7799	-0.1141	0.0606	0.0504	0.1602	-0.2126
p-value	0.0035	0.0315	0.0000	0.0946	0.0000	0.0003	0.0595	0.7889	0.0027	0.0084

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Table 7: Implied cost of capital changes by size groups

This table presents the implied cost of capital changes by size grouping. Panel A presents the results based on the implied cost of capital estimates using the Juettner-Nauroth (2005) model and Panel B presents the results based on the Easton (2005) model. *Δ =+1,0* and *Δ+1,-1* are the cost of capital changes associated securities between these years. t statistics are provided in parenthesis below.

Panel A: Ohlson, Juettner-Nauroth Model

Size		-3	-2	-1	0	1	2	3	Δ +1, 0	Δ +1, -1
Small	Mean	0.156	0.191	0.165	0.150	0.127	0.120	0.087	-0.023	-0.038
	Median	0.142	0.165	0.120	0.116	0.113	0.115	0.077	(-1.99)	(-2.18)
	Std. Dev	0.064	0.072	0.052	0.045	0.046	0.036	0.036		
	Min	0.034	0.098	0.072	0.065	0.054	0.034	0.059		
	Max	0.307	0.360	0.298	0.315	0.283	0.243	0.231		
Medium	Mean	0.127	0.153	0.119	0.115	0.112	0.109	0.098	-0.003	-0.007
	Median	0.117	0.134	0.111	0.113	0.101	0.102	0.098	(-0.62)	(-1.03)
	Std. Dev	0.060	0.093	0.034	0.030	0.043	0.030	0.018		
	Min	0.043	0.066	0.051	0.051	0.037	0.045	0.062		
	Max	0.464	0.780	0.223	0.225	0.379	0.199	0.125		
Large	Mean	0.114	0.118	0.110	0.106	0.105	0.103	0.094	-0.001	-0.005
	Median	0.111	0.119	0.108	0.103	0.103	0.100	0.097	(-0.93)	(-1.41)
	Std. Dev	0.039	0.032	0.034	0.051	0.024	0.022	0.021		
	Min	0.017	0.041	0.035	0.043	0.041	0.057	0.040		
	Max	0.228	0.207	0.245	0.371	0.188	0.171	0.135		

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Panel B: Easton Model

Size		-3	-2	-1	0	1	2	3	Δ(+1, 0)	Δ(+1, -1)
Small	Mean	0.164	0.195	0.154	0.143	0.125	0.120	0.191	-0.018	-0.029
	Median	0.145	0.173	0.128	0.146	0.113	0.110	0.191	(-1.99)	(-2.55)
	Std. Dev	0.084	0.071	0.086	0.049	0.047	0.043	0.140		
	Min	0.052	0.096	0.071	0.043	0.040	0.043	0.092		
	Max	0.393	0.354	0.560	0.317	0.287	0.324	0.290		
Medium	Mean	0.139	0.169	0.131	0.118	0.128	0.125	0.091	0.010	-0.003
	Median	0.117	0.148	0.114	0.112	0.102	0.109	0.092	(1.87)	(-0.29)
	Std. Dev	0.077	0.106	0.068	0.045	0.090	0.077	0.017		
	Min	0.059	0.069	0.027	0.058	0.018	0.038	0.055		
	Max	0.459	0.783	0.491	0.390	0.569	0.514	0.111		
Large	Mean	0.116	0.117	0.116	0.107	0.109	0.102	0.092	0.002	-0.007
	Median	0.115	0.119	0.105	0.128	0.104	0.096	0.094	(0.42)	(-1.22)
	Std. Dev	0.043	0.035	0.052	0.050	0.037	0.035	0.025		
	Min	0.015	0.036	0.022	0.052	0.038	0.042	0.027		
	Max	0.229	0.209	0.435	0.365	0.298	0.323	0.140		

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Table 8: Cost of capital changes for control securities

This table presents the results from estimating the Fama-French style model for a group of control securities. $(r_{mt} - r_{ft})$ is the market risk premium, SMB is the difference between the return on a portfolio of small stocks and a portfolio of large stocks. HML is the difference between the returns on a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks, ILLIQ is the return to a high illiquidity portfolio, less the return to a low illiquidity portfolio. Coefficients b_{-i},s_{-i}, h_{-i} and l_{-i} are the factor loadings or betas of firm *i* estimated using information from *t-36* to *t-1* of migration and therefore capture the systematic risk of the firm in the pre-SETSmm period. The coefficients $b_{\Delta i}$, $s_{\Delta i}$,$h_{\Delta i}$ and $l_{\Delta i}$ capture changes to risk in the post-SETSmm period as reflected in the period *t=0* to *t+36* after migration. The α_i and α_Δ is the risk-adjusted abnormal return (ab r) or alpha of firm *i* during the two periods. Median is the median coefficient value and the p-value is the probability value. The implied cost of capital estimates using the Juettner-Nauroth (2005) model and the Easton (2005) model are presented in panels B and C, respectively. In panel B and C, Yr is the year relative to the introduction of SETSmm for each security. Δ =1,0 and Δ+1,-1 are the cost of capital changes associated securities between these years, t statistics are provided in parenthesis below.

Panel A: Fama-French Cost of Capital Estimates

	ab r	*ab r*	*(r_m-r_f)*	*(r_m-r_f)*	*SMB*	*SMB*	*HML*	*HML*	*ILLIQ*	*ILLIQ*
	α_{-i}	α_Δ	b_{-i}	$b_{\Delta i}$	s_{-i}	$s_{\Delta i}$	h_{-i}	$h_{\Delta i}$	l_{-i}	$l_{\Delta i}$
Mean	-0.0025	0.0022	1.0346	0.0023	1.2349	-0.5468	0.1829	0.0638	0.0102	0.0574
Median	-0.0190	-0.0020	0.9301	0.0283	1.1754	-0.4769	0.1080	0.1713	-0.1377	0.0941
p-value	0.0000	0.4238	0.0000	0.9765	0.0000	0.0000	0.0229	0.5961	0.9115	0.6013

Panel B: Ohlson Juettner-Nauroth Implied Cost of Capital Estimates

	Yr -3	Yr -2	Yr -1	Yr 0	Yr 1	Yr 2	Yr 3	Δ +1,0	Δ +1,-1
Mean	0.1023	0.1043	0.0873	0.0570	0.0962	0.0776	0.0854	0.0505	0.0139
Median	0.0860	0.1324	0.0488	0.0000	0.1052	0.0000	0.0698	(2.48)	(0.42)
Std. Dev	0.1076	0.0989	0.0966	0.0852	0.1124	0.1219	0.1342		
Min	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Max	0.4858	0.3770	0.3127	0.2558	0.5924	0.6127	0.9424		

Panel C: Easton Model Implied Cost of Capital Estimates

	Yr -3	Yr -2	Yr -1	Yr 0	Yr 1	Yr 2	Yr 3	Δ +1,0	Δ +1,-1
Mean	0.1688	0.1541	0.1636	0.1579	0.1614	0.1695	0.1481	0.0036	0.0022
Median	0.1709	0.1551	0.1919	0.1593	0.1304	0.1357	0.1280	(0.327)	(0.137)
Std. Dev	0.0876	0.0815	0.0687	0.0626	0.1028	0.1302	0.1486		
Min	0.0793	0.0001	0.0060	0.0000	0.0060	0.1013	0.0143		
Max	0.4858	0.3770	0.3127	0.2558	0.5924	0.6127	0.9424		

Table 9: Controlling for other factors influencing the cost of capital

In this table, we provide the results from a regressing beta, or the implied cost of capital estimates, against a set of control variables. Each of the control variables are known to influence firm risk. In this regression we include a dummy variable called SETSmm, which has a value of 0 if firms are control securities and a value of unity if they are SETSmm securities. *Time Dummy* is a variable that has a value of zero in the three years preceding SETSmm and a value of unity in each of the three years following SETSmm . *SETSmm*time Dummy* has a value of 0 if firms are control securities, or are observed pre-SETSmm, but has a value equal to unity if firms are SETSmm firms and are observed after the introduction of SETSmm. *Beta* are the market risk estimates from the Fama-French model, *O-J-N cost* and *Easton cost* are the implied cost of capital estimates from the Ohlson Juettner-Nauroth and Easton models, respectively.

	Coefficient Beta	P value	Coefficient O-J-N Cost	P value	Coefficient Easton Cost	P value
SETSmm Dummy	0.285	0.02	-0.021	0.00	0.081	0.00
Time Dummy	0.439	0.00	0.002	0.75	0.012	0.16
SETSmm*Time Dummy	**-0.395**	**0.00**	**-0.015**	**0.04**	**-0.026**	**0.00**
Leverage	0.163	0.01	0.014	0.00	0.000	0.96
Asset Growth	0.057	0.09	-0.004	0.08	-0.006	0.01
ROA	-0.183	0.14	-0.040	0.00	-0.048	0.00
Div Payout	-0.002	0.00	0.000	0.00	0.000	0.00
Ret Volatility	-4.566	0.00	-0.153	0.14	-0.004	0.97
Market Return	0.550	0.80	-0.132	0.30	-0.215	0.07
Risk Free Rate	-40.689	0.03	-4.118	0.00	-2.273	0.06

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