The impact of liquidity on the valuation of European real estate securities

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Abstract

Purpose – The purpose of this paper is to test the hypothesis that the valuations of European real estate securities are in part determined by the relative liquidity in the companies' shares.

Design/methodology/approach – 6 groups are derived for our sample of European listed real estate companies. They are split between the UK and Europe, and then both sets are categorised by liquidity, as large, medium, or small. These are then tested for market depth, market tightness and difference in valuations over the cycle 2002-2012. Intuitively we would expect that the stock market valuation premium for companies with greater liquidity increases post the Global Financial Crisis.

Findings - The key discriminating variable that drives companies' liquidity and valuations is market capitalisation. We find that across Europe companies behave in a similar way in terms of spreads, LHHI ratio, and stock turnover. For both the UK and Europe the valuation premium of larger companies vs. small companies has increased significantly since 2008 (by 20% to 40%), which we can attribute to the increased value placed on liquidity post GFC.

Research limitations/implications- The sample size is limited, and the companies 'assets are not homogenous which sometimes distorts the impact of liquidity on valuation. We also note that in the UK the companies with purest central London exposure are the most highly rated, and these happen to be in the medium size category. The key implications from our findings are the cost and quantum of new equity capital available to companies with superior liquidity, and the possibility of exclusion from portfolios for companies with low liquidity.

Originality/value – We have used company valuations rather than expected or required returns, which are more commonly used to determine a liquidity premium. Using the parallel asset pricing model of discount/premium to NAV we have been able to isolate the stock market valuation premium for companies with similar assets. This is possible for a European sample as regular revaluations of the portfolio are incorporated into the balance sheet, and thus stated NAV can be taken as an accurate measure of the underlying assets.

Keywords: Liquidity premium, European listed real estate markets, Bid-ask spread, volatility. Parallel asset pricing, discount to NAV.

Paper type Research paper

1. Introduction

Since the Global Financial Crisis (GFC) of 2008 there has been an increase in both investor attention and academic research on the impact of different aspects of liquidity on returns and valuations. Brunnermeier and Pedersen (2009) identified a positive relationship between an asset's market liquidity (i.e. the ease with which it is traded) and the traders' (of that asset) funding liquidity (i.e. the ease with which they can obtain funding). Hill et al (2012) identified a positive relationship between a company's valuation and its liquidity as measured by cash and unused credit lines, i.e. corporate liquidity. Anson (2010) provided a framework for measuring liquidity risk and calculating a premium for that risk. Ibbotson et al (2013) provided evidence that liquidity can be classified as a separate investment style, since; i) market liquidity is an economically significant indicator of long term returns, ii) it is not a substitute for size, value and/or momentum, iii) it has been stable historically, and iv) changes in liquidity are associated with changes in valuation.

In this paper we focus on one region, and one sector, namely the European listed real estate sector. Our primary purpose is to examine the relationship between the liquidity of companies' shares, and their stock market valuations. Out approach is create six groups of companies representing large, medium, and small, as measured by market capitalisation, split between the UK and Europe. These groups are analysed for market tightness, market depth and the Hui-Heubel Liquidity ratio to see if they conform to their market capitalisation constraints. We then attempt to quantify the valuation differences between the groups over the period 2002-12. The largest markets in Europe (the UK and France) have adopted REIT legislation, and the largest companies in these countries are all REITs. It has therefore not been possible, for this European sample, to add another layer of analysis, between REIT s and non-REITs, as there are no highly liquid non-REITs. This would also be the case in the US and Australia. However, it would be possible in a study of the Asian market

In particular, we try to answer four questions: i) What is the most relevant way of measuring liquidity for the European listed sector? ii) Does European listed real estate displays similar liquidity trends to the overall equity market? iii) Is it possible to quantify a liquidity premium in valuations rather than returns? iv) Has that valuation premium changed post GFC?

We believe that this paper differs from previous studies in a number of important ways:

i) We use company valuation, rather than expected or required returns, which is more commonly used (Amihud & Mendelson 2002), to determine a liquidity premium. The rationale for this is firstly the estimation error inherent in using returns, and secondly our belief that corporate stock market valuations capture a consensus of current forecasts.
ii) Previous studies (Cannon & Cole 2011, Clayton & MacKinnon 2000), have focussed on US REITs. This study concentrates on UK and European listed real estate companies, including both REITs and non-REITs.
iii) Our sample companies produce regular external valuations which are incorporated into the book value of assets, unlike US REITs. As a result we can use the discount/premium to NAV valuation methodology to determine both valuation dispersion and liquidity premiums between listed companies, and the private real estate market (the parallel asset pricing model).
iv) We have smoothed the published NAV data from one reporting period to the next at equal increments. This provides a far more realistic and up to date equity market valuation than using purely external data points, which can be 6-12 months out of date.

2. Literature review:

REIT specific studies

Clayton and MacKinnon (2003) investigated changes in REIT liquidity since the dramatic growth of the market in 1993. They used trade-by-trade data to estimate and compare Kyle's (1985) measure of inverse liquidity for the 1993 and 1996 time periods. They found a significant increase in REIT liquidity in terms of the median price impact of trades, with the increase in adverse-selection costs due to more informed traders more than offset by the increase in market breadth as a result of an increase in the number of uninformed (liquidity) traders.

Cannon and Cole (2011) looked at US REIT liquidity over the 1988-2007 period focussing on measures that did not require micro-structure data. They found that REIT liquidity improved during the early and mid-1990s, deteriorated during the late 1990's, and then improved dramatically during 2000-2006, with the notable exception of 2007. They confirmed the results of Bhasin et al. (1997) that the percentage spread is a positive function of the volatility of stock returns, and a negative function of dollar volume turnover, share price and market capitalisation. In particular, the authors suggest that daily return data is not qualitatively different from market micro-structure data.

Brounen et al (2009) investigated the magnitude and determinants of share liquidity over the 1990-2007 period in the world's four largest securitized real estate markets: the US, UK, Continental Europe and Australia. They found a significant and consistent role for market capitalisation, nonretail share ownership and dividend yield as drivers of liquidity across markets, and also found that share price liquidity is multifaceted and that reliance on one measure may be misleading. Although some evidence of a connection between liquidity and firm value was found, it was less conclusive than previous studies.

Niskanen and Falkenbach (2012) split their sample of European listed real estate companies into REITs and non-REITs alternatively known as Real Estate Operating Companies, ("REOCs") and found that REITs were significantly more liquid than REOCs, implying*, ceteris paribus*, that REITs are a preferred investment vehicle.

Blau et al (2013) examined the variability and skewness of liquidity. Their multivariate tests showed that, consistent with prior literature, average bid-ask spreads were higher for REITs than non-REITs, and that the skewness of REIT bid-ask spreads has not only increased across time, but increased at a greater rate than the skewness of non-REIT spreads.

Approaches to measure market liquidity

Brunnermeier and Pedersen (2009) show that in times of market stress, both the level of illiquidity and the market price of liquidity appear to rise. This is consistent with the microstructure theory outlined by O'Hara (1995) which is concerned with the trading mechanisms and processes of markets and how they affect transaction costs and other characteristics of markets.

The literature identifies and tests the usefulness of various proxy measures of trading costs as a factor of illiquidity including dealing spreads, measures of individual trade impact and activity, asset size and asset volatility. All of these turn out to be helpful in quantifying real-world liquidity premia. We note that there are different concepts of asset liquidity, different measures of liquidity focus on alternative aspects of the measurement problem. As mentioned above, there are multiply liquidity studies on equity markets using the so-called microstructure approach. The microstructure of a market is reflected in three main characteristics of market liquidity as identified by Kyle (1985):

- Tightness: measured by the size of bid-ask-spreads;
- Depth/Breadth: measured by the volume of trades possible without affecting current prices; a market is deep when there are orders both above and below the trading price of an asset

- Resilience: measured by the speed at which the price impact of trade dissipates. A market is resilient if there are many orders in response to price changes. There is a lack of resiliency when the order flow does not adjust quickly in response to price swings.

Distinguishing between market depth and breadth is often difficult. Mostly market depth is perceived as a sufficiently large number of orders priced below and above the market closing price and breadth characterises the condition of the market facilitating large-volume trades at existing prices.

Figure 1. Summary of common liquidity measures across asset classes

Measure	used for	Bond markets	Equity markets	REITS/REOC markets
Bid-ask spread	tightness, breadth, depth	data available for selected maturities	data available for individual securities and indices	data available for individual securities and indices
Turnover ratios	breadth, depth	data often available for the market and individual securities	Data available for the market and individual securities	Data available for the market and individual securities
Market Efficiency Coefficient	resiliency, depth	data available for benchmarked and selected indices	data available for individual securities and indices	data available for individual securities and indices

While some measures are equally useful for our REITs data, such as bid-ask spread, others cannot be applied in a straight forward way, such as measures of market resilience which requires order flow data. Overall the connection between liquidity and the magnitude of the bid-ask spread is well established as an indicator of market tightness, and we use it as one indicator of liquidity in our analysis. Some studies demonstrate that the larger the spread, the more highly valued the security. This has been successfully demonstrated by Boothe (1988) and Gwilym, et al (1998).

Whilst some liquidity measures concentrate on the role of volume and transaction size, others are related to the execution-cost aspect. . Measures based on volume information are related to the price impact of transactions. For example, Brennan and Subrahmanyam (1996) estimate liquidity costs from intraday trade and quote data. Amihud (2002), measures liquidity as the absolute value of the percentage price change over trading volume. Similarly to Amihud Hui and Heubel (1984) have developed a liquidity indicator specifically for the equity market (). The Hui–Heubel liquidity indicator (”HHLI”) seeks to incorporate the market breadth dimensions that link the transaction volumes with their impact upon both the prices and the market resilience. The HHLI can be calculated for individual stocks or for a group of stocks and we are using this indicator as a measure of market resiliency.

Studies on equity markets such as Hasbrouck and Seppi (2001) typically refer to intra-day trading information and market order books to analyse market depth, tightness and resilience. Because we are evaluating liquidity in respect to valuations, we are less concerned with the intra-day efficiency of a particular stock exchange; therefore we take a slightly modified approach by looking at daily (end of day) liquidity data and company valuations.

In addition, in common with Xiong et al (2012) we recognise that the price of liquidity changes through time. The dataset allows for distinguishing liquidity on a three dimensional scale; over time, by company size and by geographic market.

Additional literature is concerned with the relationship between liquidity and stock performance. Amihud and Mendelson (1989) have shown that liquidity is an important factor in asset pricing because expected returns on stocks increase with illiquidity as measured by the bid-ask spread proxy. The estimated liquidity effect was strong, significant and persisted after controlling for systematic risk, size and unsystematic risks. In a separate study of liquidity premia, Amihud and Mendelson (2002) provided further cross-sectional and time-series evidence that excess equity returns at least partly represented an illiquidity premium.

The Fama-French three factor model (1993) highlights the concept that less liquid stocks yield higher returns. Similarly the endowment model, which was pioneered by Swensen (2000) emphasised investing in illiquid alternative asset such as real estate to improve longer term incremental returns.

Another dimension of liquidity is given by differentiating between larger and smaller companies.
Much of this so-called small-cap effect (the out performance of small companies over long horizons) is attributed to their relative illiquidity compared to larger companies. Amihud (2002) shows that over time expected market illiquidity positively affects *ex ante* stock excess return, i.e. there is an illiquidity premium. According to Hibbert et al (2009) these equity market liquidity premia have been estimated at 3-8% p.a. across different equity markets. We investigate if the same is true for listed real estate companies, or if there are other characteristics than size that determine illiquidity of specific companies

Finally, since listed real estate returns converge toward direct real estate returns over the longer term (Hoesli and Oikarinen 2012) longer term returns will be driven by asset values, whilst current stock market valuations will be liquidity driven to a significant extent. Our hypothesis is that the liquidity premium for a European listed real estate company can be expressed as a valuation driver. For example, the (absolute) liquidity premium for any given security can be thought of as being the price discount or excess return/yield offered by the security relative to some hypothetical, perfectly liquid security with otherwise equivalent characteristics. In practice these absolute liquidity premia are difficult to measure since all assets, with the exception of cash in the reference currency of the investor, are 1) subject to illiquidity in varying degrees, and 2) not homogenous. Therefore we aim to establish a relative liquidity premium for the sector.

3. Methodology

Sample companies

Our sample comprises European real estate stock market data from the UK and Europe for 24 companies, which were initially selected according to the value of their daily liquidity. The reason for selecting 24 was to give an equal number (4) per size category for the UK and Europe. The small sample size is driven by the lack of highly liquid companies which can be classified as large in global terms, as the European listed sector is small relative to the global listed real estate market. At the end of May 2013 Europe represented only 13.6% of the FTSE/EPRA/NAREIT Developed Global Index, the most widely used benchmark. The dataset consists of daily data on trading volumes, prices, NAVs, market capitalisation over a period of 10 years (2002 – 2012), effectively pre, during, and post the Global Financial Crisis. Using the Consilia Capital database we have grouped the sample companies by i) size, based on an initial filter of daily liquidity in the shares (as measured by value traded), and ii) by listing region (UK and Europe). Figure 2 shows the sample by groupings, with market capitalisation, daily liquidity and REIT status.

Figure 2. Sample companies selected for the study

	UK			
	Company	Market Cap. (£m)	Ave value traded (£m)	REIT/Non REIT
	Land Securities Group PLC	4,979	22,530,690	REIT
	British Land Co PLC	4,231	19,082,540	REIT
	Hammerson Plc	2,691	14,015,260	REIT
Large	Segro	1,633	5,276,198	REIT
	Derwent London	1,461	3,737,038	REIT
	Great Portland Estates Plc	1,063	3,426,748	REIT
	Shaftesbury Plc	1,167	2,071,750	REIT
Medium	Capital Shopping	2,813	5,539,268	REIT
	Primary Health Properties PLC	225	406,704	REIT
	Development Securities PLC	232	396,726	Non REIT
	ST Modwen Properties Plc	235	380,387	Non REIT
Small	Helical Bar Plc	230	360,678	Non REIT
	Total	**20,961**		
	Europe			
	Company	**Market Cap. (US$m)**	**Ave value traded (£m)**	
	Unibail-Rodamco SE	10,630	55,061,221	REIT
	Corio NV	2,756	14,483,731	REIT
	Klepierre	3,449	7,896,429	REIT
Large	Wereldhave NV	988	7,390,730	REIT
	Wihlborgs Fastigheter AB	628	2,069,567	Non REIT
	Beni Stabili SpA	650	1,964,410	REIT
	Sponda OYJ	686	1,832,664	Non REIT
Medium	Vastned Retail NV	574	1,806,051	REIT
	Vastned Offices/Industrial	160	632,571	REIT
	Societe de la Tour Eiffel	210	551,653	REIT
	DIC Asset AG	226	515,704	Non REIT
Small	Fastighets AB Balder	607	512,887	Non REIT
	Total	**21,564**		

In terms of how representative our sample is we need to look at the overall size of the UK and European market. Our sample of 24 companies compares to a total number of 532 listed real estate companies in Europe. In terms of size, the market capitalisation of our sample is £42.5bn, which compares to a European sector market capitalisation of £139.8bn. Therefore by value, our sample represents around 30% of the total market. It should be remembered, however, that because large companies will only represent a third of our sample there is a natural constraint to the percentage of the market covered. In addition our sample has a greater percentage of REITs than the overall market. Figure 3 shows the size of the market for REITa and non-REITs in the UK and Europe.

Figure 3. Relative size of the market

	UK	Europe
Total number listed RE companies	140	392
Market Capitalisation (£m)	36.2	103.6
Noumber of REITs	21	109
REITs Market Capitalisation (£m)	22.7	49.7
REITs by number	15%	28%
REITs by market capitalisation	63%	48%

Source: Consilia Capital, Bloomberg

Given the sample size we are aware that results can be distorted by stock specific factors. Ideally, the underlying assets of the companies would be homogenous so that the liquidity premium could be isolated easily, however in practice this is not the case. Typically, we would expect that post GFC (2008) the most liquid stocks would command superior valuations. However, this valuation premium for liquidity may not be linear or graded, and indeed the impact may be binary, i.e. only companies with a minimum level of liquidity are included in portfolios and can easily raise further equity capital.

4.Analysis

Market tightness: Stylised Facts

The literature identifies three main components of the bid-ask spread. These arise from order processing, adverse information and inventory costs. A high level of competition between intermediaries allows for a reduction of the order processing component and improves the liquidity condition of the market. The informational component of the bid-ask spread sheds light on the degree of efficiency due to the presence of hidden information or insider trading. We are calculating the bid-ask spread as shown in equation 1.

$$Spread = \frac{(P_{t+1} - P_t)}{(P_t + P_{t+1})/2} \qquad (1)$$

The percentage spread has been criticized by some academics, such as Brennan and Subrahmanyam (1996), as measuring only the "tightness" of the market. However, we argue that the percentage spread is also measuring the depth of the market when considering the number of bid-ask spreads by different brokers in the market.

We use bid-ask spreads to understand the daily price liquidity and price efficiency. On a cross-sectional basis that separates both samples into small, medium and large companies, spreads are typically wider for smaller companies, while for the largest companies the bid-ask spread is nearly negligible. During the period 2010 - 2012 spreads for large firms ranged from 5bps - 20bps, medium firms 20bps – 50bps and small companies were >50bps some even >100bps (figure 4). In our sample of 24 companies we note two outliers, Beni Stabili, which has a considerably high spread for the overall company size which is due to the shareholding structure, with fellow listed company Fonciere des Regions owning 51% of the issued share capital.

The second outlier in the sample is Vastned Offices, which has a very low spread despite being very small by market capitalisation.

Figure 4. Relationship between market capitalisation and % spread 2002-2012

Company	Average market cap	average % spread
Primary Health	152.2	1.5%
Dev Sec	237.8	1.4%
VASTNED OFFICE	284.0	0.4%
STE DE LA TOUR	334.3	0.8%
DIC ASSET AG	389.2	1.1%
Helical bar	411.5	0.5%
FASTIGHETS AB	439.8	0.7%
St Modw en	511.9	0.6%
VASTNED RETAIL	824.9	0.3%
SPONDA OYJ	852.6	0.5%
Shaftsbury	881.9	0.2%
KUNGSLEDEN AB	923.3	0.5%
Gr Portland	1,014.6	0.2%
BENI STABILI SPA	1,215.7	1.3%
WERELDHAVE NV	1,425.7	0.2%
Derw ent	1,546.4	0.2%
SGRO	2,489.6	0.2%
Hammerson	3,359.9	0.1%
Capital Shopping	3,560.7	0.1%
CORIO NV	3,567.6	0.1%
KLEPIERRE	4,822.2	0.2%
British Land	5,356.0	0.1%
Land Sec	6,933.4	0.1%
UNIBAIL-RODAMC	12,626.3	0.1%

Overall, we confirm that in our sample of UK and European listed real estate companies smaller companies (as classified by the daily value of shares traded) are indeed slightly less liquid, as measured by percentage price spread.

In Figure 5 we summarise how the spread has varied between companies with different liquidity, in the UK and Europe, pre, during and post the GFC. As can be seen spreads for the more liquid companies have continued to decline post GFC, whilst spreads for smaller and medium sized companies have increased post GFC.

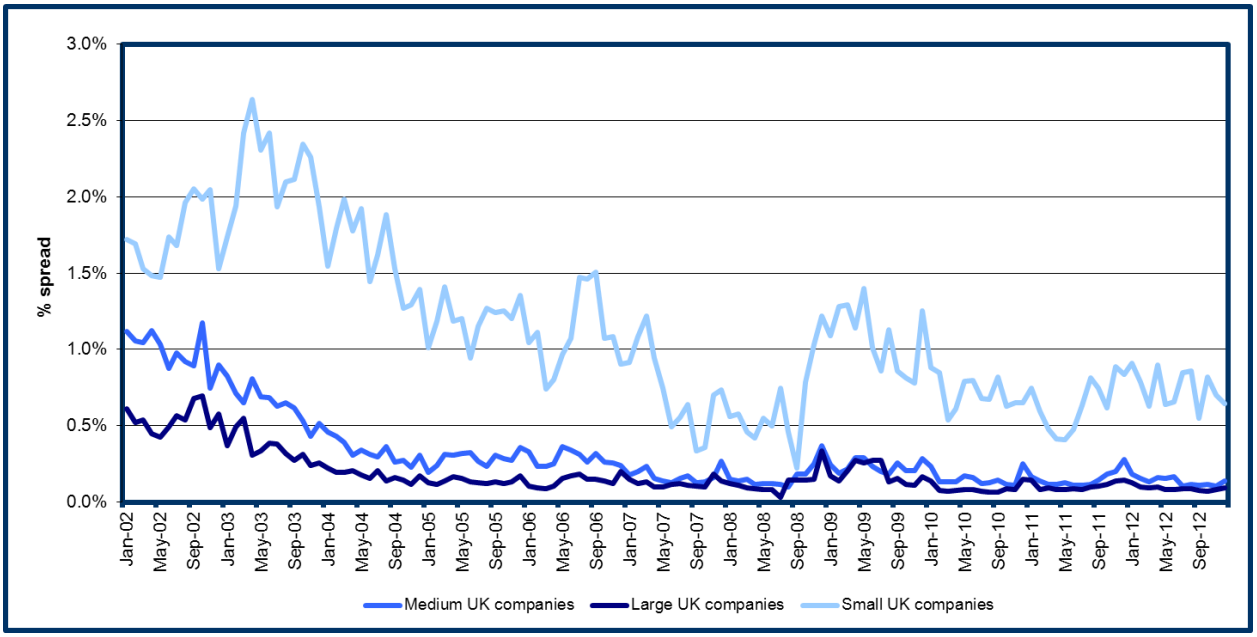
Figure 5. Movement in spreads over the cycle

	Jan 02-July 07 **Pre GFC**	Aug 07-Mar 09 **GFC**	April 09 Dec 2012 **Post GFC**
UK Large	0.25%	0.13%	0.11%
European Large	0.32%	0.16%	0.11%
Average Large	**0.28%**	**0.15%**	**0.11%**
UK medium	0.47%	0.18%	0.17%
European medium	0.68%	0.63%	0.88%
Average medium	**0.57%**	**0.40%**	**0.52%**
UK small	1.49%	0.17%	0.76%
European small	1.22%	1.42%	0.98%
Average small	**1.36%**	**0.79%**	**0.87%**

In Figures 6 and 7 we show graphically how bid ask spreads have moved over the last ten years. Across all size bands, and regions (the UK and Europe), there has been a downward trend in bid ask spreads reflecting, *inter alia*, increased competition amongst market participants. As expected, it is also true that throughout the period the percentage bid ask spread reflects the overall liquidity of the stock, i.e. more liquid stocks have lower bid ask spreads. The downward trend in bid ask spreads has been most consistent in the UK market , which, *inter alia*, reflects the higher profile of the medium sized sample in particular. For the UK these happen to be all Central London specialists, which has been the sub-sector of the market that has been subject to the greatest level of investor interest post the liquidity crisis of 2007-8.

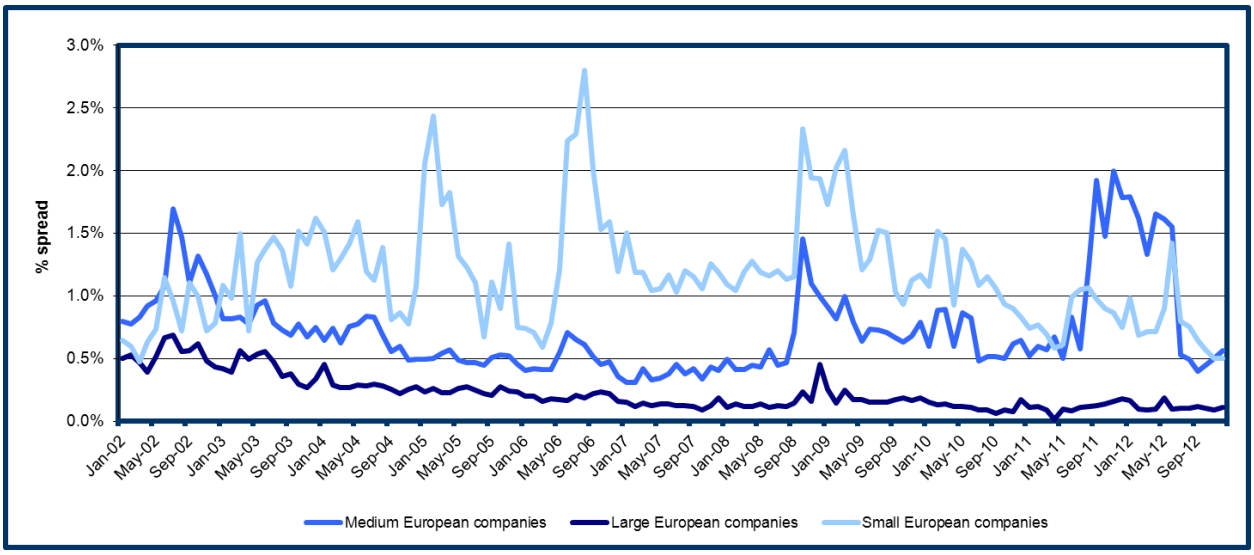
As expected this general downward trend was interrupted from August 2008 until February 2009 which reflects the period from the collapse of Lehman Brothers until the announcement of the first rescue rights issues required to recapitalise the listed real estate sector. The European sector also saw a general increase in spreads starting in the summer of 2011, reflecting investor concerns regarding the Euro crisis.

Figure 6. Historic development of UK bid-ask spreads 2002-2012



Despite the UK showing a long-term declining trend in percentage price spreads, both the UK and European samples show peaks around the periods June – Sept 2006 and Oct – Dec 2008. In the first period this can be explained by anecdotal evidence of specialists either selling, or diverting new cash flow from, existing holdings to take up the range of IPOs and secondary issues that were prevalent at that time. This was a sector specific issue. In the second period this was just after Lehman collapsed and reflects a general widening of spreads at that time.

Figure 7. Historic development of European bid-ask spreads 2002-2012



Market depth: Stylised Facts

We measure market depth in two ways. Firstly the simple turnover ratio defined as number of shares traded divided by total shares outstanding shown in equation 2.

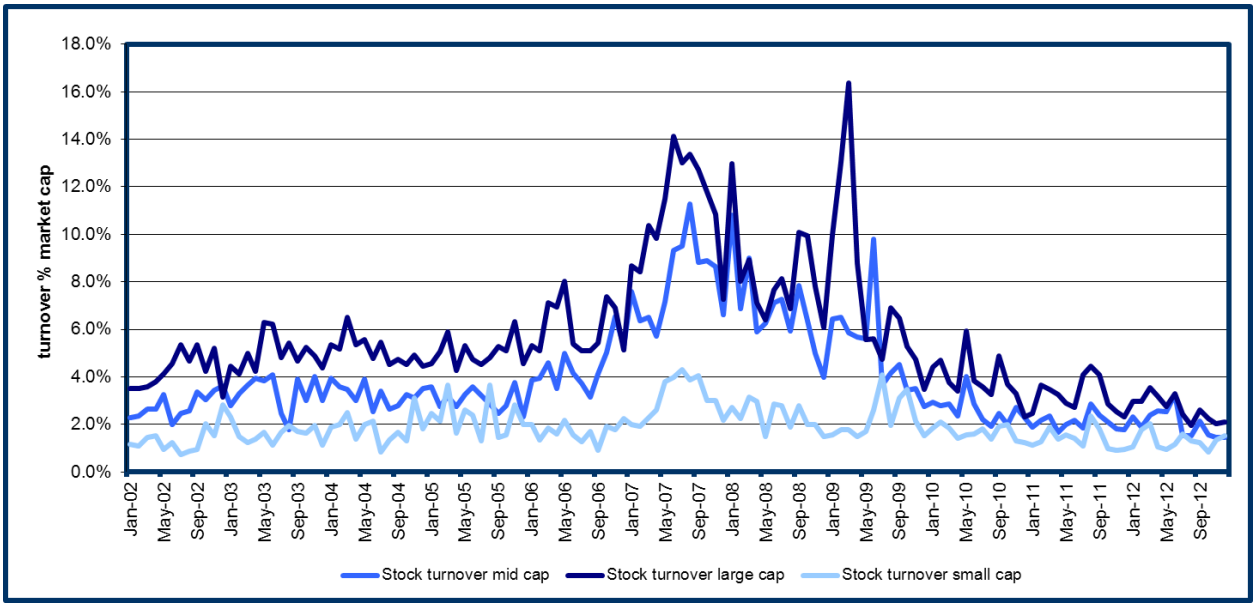
$$V = \frac{N_t}{N_{total}} \qquad (2)$$

Secondly, we can calculate the market depth in terms of total traded value over the market capitalisation of the stock. Formula (3) calculates the daily traded value as a percentage of market capitalisation.

$$V = \frac{V_t}{C_t} \qquad (3)$$

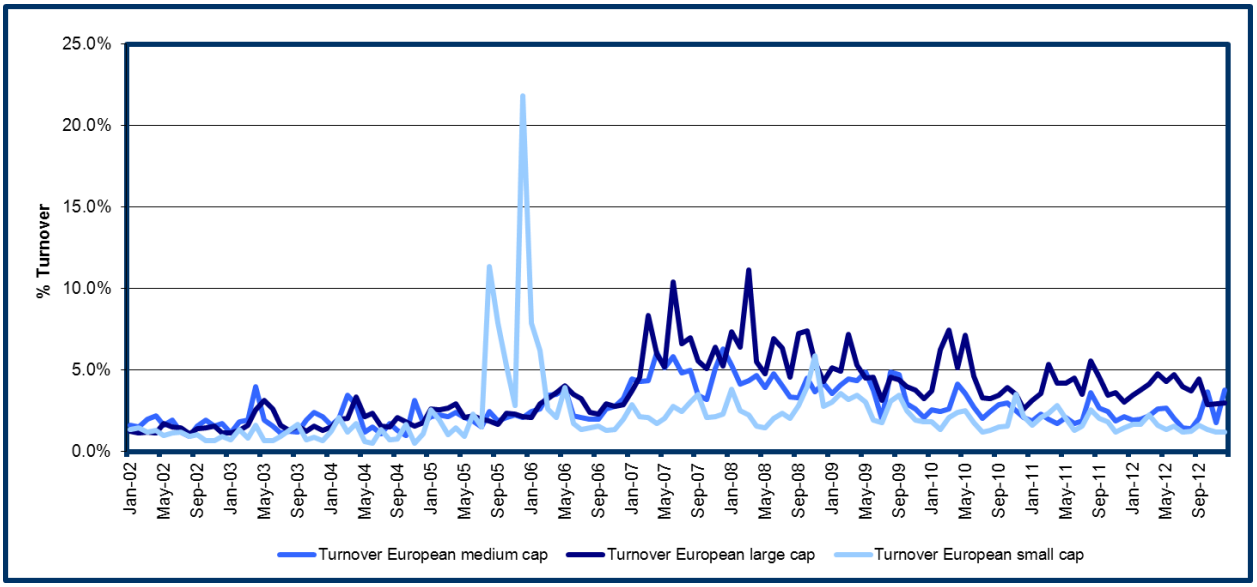
Figure 8 shows that the overall amount of shares traded in the UK has decreased after 2006 and (with the exception of 1Q 2009) never recovered to pre-crisis levels. As a result trading volume in number of shares has decreased over the past 10 years. We have constructed a composite index using monthly averages of daily trading volumes as a percentage of market capitalisations for large, medium and small companies. The three trading turnover indices show significant differences between large, medium and small firms. While trading turnover for large firms as a percentage of market capitalisation has increased during the market upturn, smaller companies did not benefit as much from a rising market.

Figure 8. Historic development of UK turnover 2002-2012



Comparing figures 8 and 9 shows that trading turnover in the UK peaked in May 2009 at the time of the rescue rights issues while in Europe, where property value falls were significantly lower than the UK, trading turnover peaked in May 2008 ahead of Lehman's collapse and equity refinancings.

Figure 9. Historic development of European turnover



When looking at UK firms alone, we find that larger firms were more affected by a decline in daily trading volumes over firm market capitalisation. For example Land Securities average daily turnover in % of market capitalisation in 2009 was 7% and declined to 2% in Q1 2013, during the same period Hammerson's turnover declined to 2.3% from

7.3%. In comparison smaller companies have only seen a decline from 2.2% to 1.5% for Primary Health or 1.4% to 1.1% for Development Securities.

In Figure 10 we show how the turnover measure has changed for segment of our sample, over the three phases of the cycle under review.

Figure 10. Change of turnover at specific points in the cycle

	Jan 02-July 07 **Pre GFC**	Aug 07-Mar 09 **GFC**	April 09 Dec 2012 **Post GFC**
UK Large	5.69%	9.76%	3.77%
European Large	2.53%	6.20%	4.15%
Average Large	**4.11%**	**7.98%**	**3.96%**
UK medium	3.80%	7.27%	2.76%
European medium	2.36%	4.27%	2.65%
Average medium	**3.08%**	**5.77%**	**2.71%**
UK small	1.49%	2.48%	1.66%
European small	2.22%	2.82%	1.94%
Average small	**1.86%**	**2.65%**	**1.80%**

In summary we can draw from this analysis the following:

1) We can use this measure of liquidity (daily traded volumes divided by market capitalisation) to gauge the extent to which generalist investors are active in the sector, particularly in the UK. As such the peaks in volume for the UK were in the first few months of 2007 when a number of generalists were exiting their holdings in the sector, and the first quarter of 2009 when they re-entered the market via the heavily discounted rights issues.
2) As the relative weighting of Europe in the Global Real Estate Securities Index declined, so has the relative level of turnover in UK listed real estate stocks.
3) In Europe the position is less cyclical, and more consistent. It should be noted however that the growth in the % turnover since 2002 for larger companies mainly reflects the increased weighting and relative importance of one stock, Unibail, in that period. The results can not necessarily be taken to represent the underlying changes in European larger companies as a whole

Hui-Heubel Liquidity Ratio results

Our main aim is to determine market-level liquidity as the ability of a market to absorb temporary demand and supply fluctuations with a minimum price impact, therefore we need to link volume based trading figures with the price impact of the same time horizon. We analyse market depth and resilience by calculating the HHLI ratio, which is calculated by using monthly price changes and trading volumes over monthly periods for individual stocks. The ratio is calculated using the following equation (4):

$$LHH = \frac{\left[\left(P_{\max} - P_{\min}\right) / P_{\min}\right]}{\left(V / \left(S * \ddot{P}\right)\right)} \qquad (4)$$

where Pmax is the highest daily price over a 1month-day period, Pmin is the lowest daily price over the same horizon, V is the total volume of assets traded over a one month-day period, S is the total number of assets outstanding and P denotes the average closing price. The liquidity ratio ranges from 0 – 1. A higher value for the index LHH implies lower liquidity.

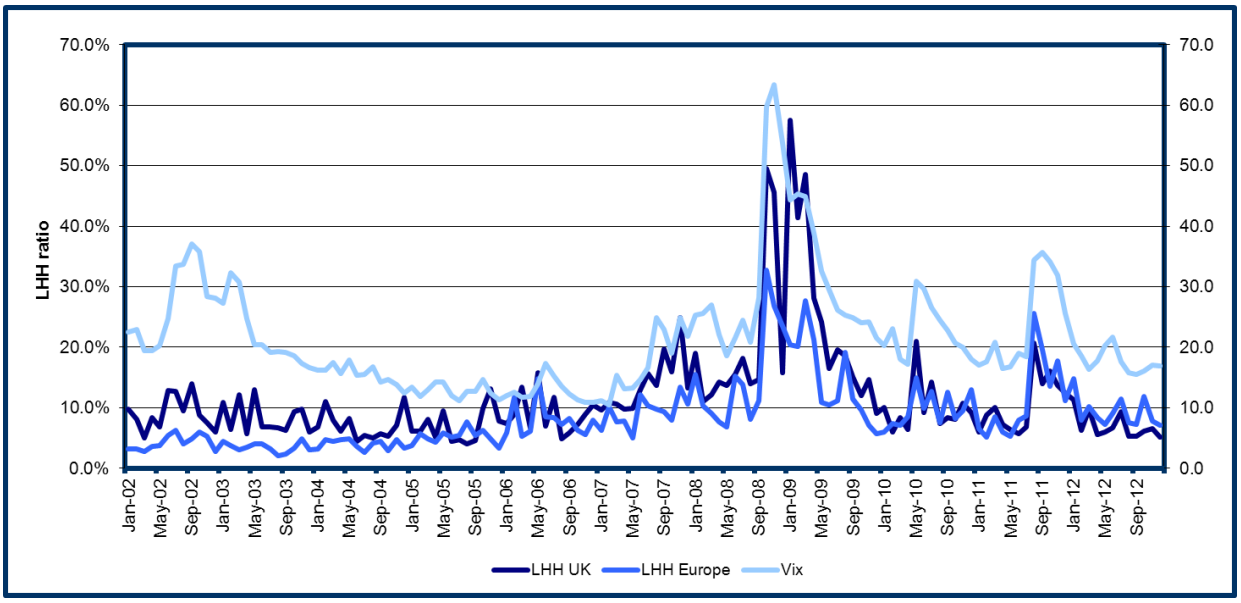
The HHLI could be distorted where a buyer or a seller suddenly decide to purchase or sell financial instruments that account for the major part of such instruments in the market. This would cause a significant change in the price, reflecting primarily new information spread in the market; however, price fluctuations should not be perceived as an indicator of market illiquidity. This concern is mitigated by the fact that daily trading volumes as % of total shares typically don't exceed 1-2% and volumes measured as % of market capitalisation is approximately 3-4% per day.

After calculating the HHLI for individual stocks, we further calculated the weighted average liquidity index for our two samples UK and Europe.

Our analysis of the HHLI ratio shows no significant differences in the sample of small, medium and large firms. We use a simple t-test for the equality of two means, to show any sample difference. We accept the null hypothesis when there are no differences between the liquidity our EU and UK composite HHLI indices and we reject the null hypothesis if the two samples are significantly different. Results show that we can confirm our null hypothesis (t-test -1.96, critical t = 2.2), the EU and UK LHH indices are not significantly different.

Our historic analysis (Figure 11) shows that overall liquidity is relatively high and the sector specifically manages to improve its liquidity up to end 2006, confirming the findings of Cannon and Cole (2011). . During the crisis 2007 – 2010 the liquidity ratio has doubled compared to pre-crisis levels during the period of 2002 – 2006 and peaked in October 2008 with an index value of 58, indicating a less liquid market. This coincides with the measure we use for market volatility , the Chicago Board Options Exchange Market Volatility Index (VIX) being at its highest points before decreasing again in 2011. During 2011 and 2012 liquidity has returned to pre-crisis levels reaching a new low of 6 in January/February 2010, followed by two smaller peaks in June 2010 and September 2011 (Figure 11). In the graph the Left Hand scale represents the LHHI ratio, and the right hand scale the VIX Index.

Figure 11. Historic development of market liquidity 2002-2012



In addition we find a high correlation presented through the Pearson product-moment correlation coefficient between VIX and the LHH UK/EU liquidity indices of 74% and 68% respectively throughout the different cycles between 2002 – 2012.

Market liquidity as a valuation driver

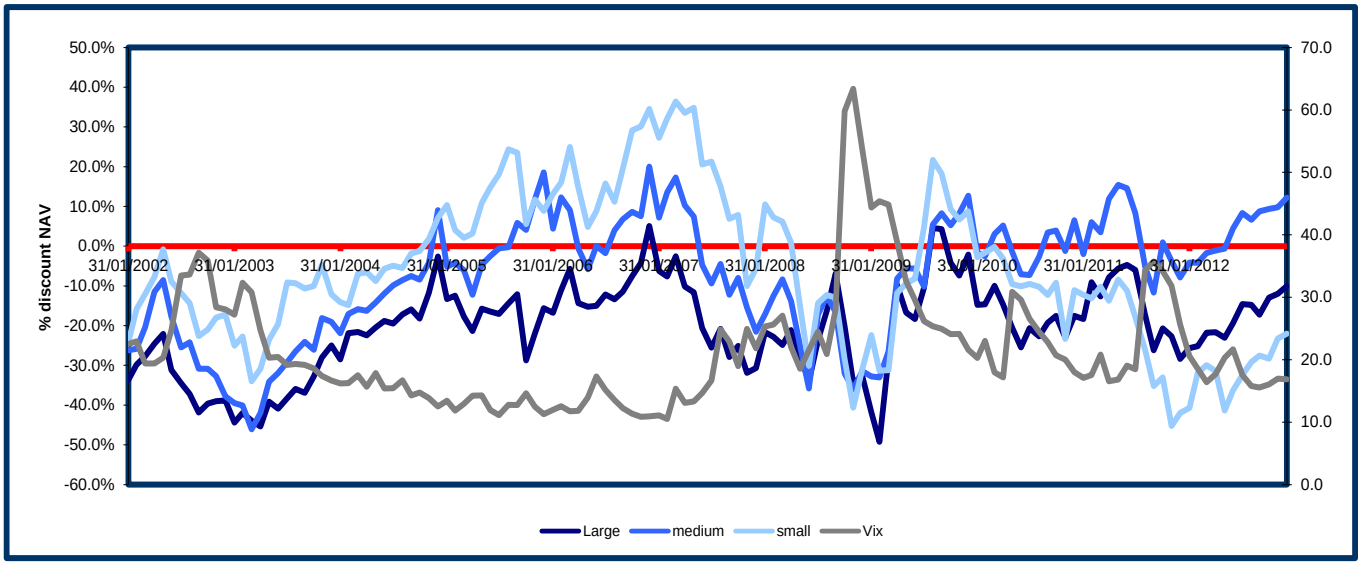
The final step of our research investigates the relationship of valuations and market liquidity. Generally we would expect that performance (as measured by total return) is larger for smaller, less liquid companies and smaller for larger, highly liquid companies. However, our return analysis shows that there are no significant differences in performance and there is no outperformance of smaller, less liquid companies (see Appendix 1).

The alternative approach to examining returns (be it required, estimated, or actual) for liquidity premia is to examine current valuations, in particular the premium / discount of the share price to Net Asset Value ("NAV") per share. This approach has a number of advantages, namely;

1) Stock market valuations capture expected returns, and are therefore an accurate reflection of aggregate expectations
2) By using NAV as a benchmark we can establish an absolute rather than a relative level for stock market vs. direct market valuations.

Figure 12 shows the discount to NAV of our aggregated UK stocks. We have aggregated our companies into large, medium and small caps. We find that firms discount to NAV is negatively correlated with the HHLI and VIX Indices for specific times during the UK cycle. Looking at the period from 2005 – 2012 correlation between the VIX Index and UK companies' discount/premium to NAV has been -50% to -73% depending on company size band. Typically a liquidity ratio of <20% indicates a discount to NAV of 5 – 20%. When the liquidity ratio is significantly >20% and the VIX is >30 the discount to NAV for our UK companies increases significantly >20%. In Figure 12 the left hand scale represents the premium/discount to NAV and the right hand scale the VIX Index.

Figure 12. Historic development of discount to NAV (UK)

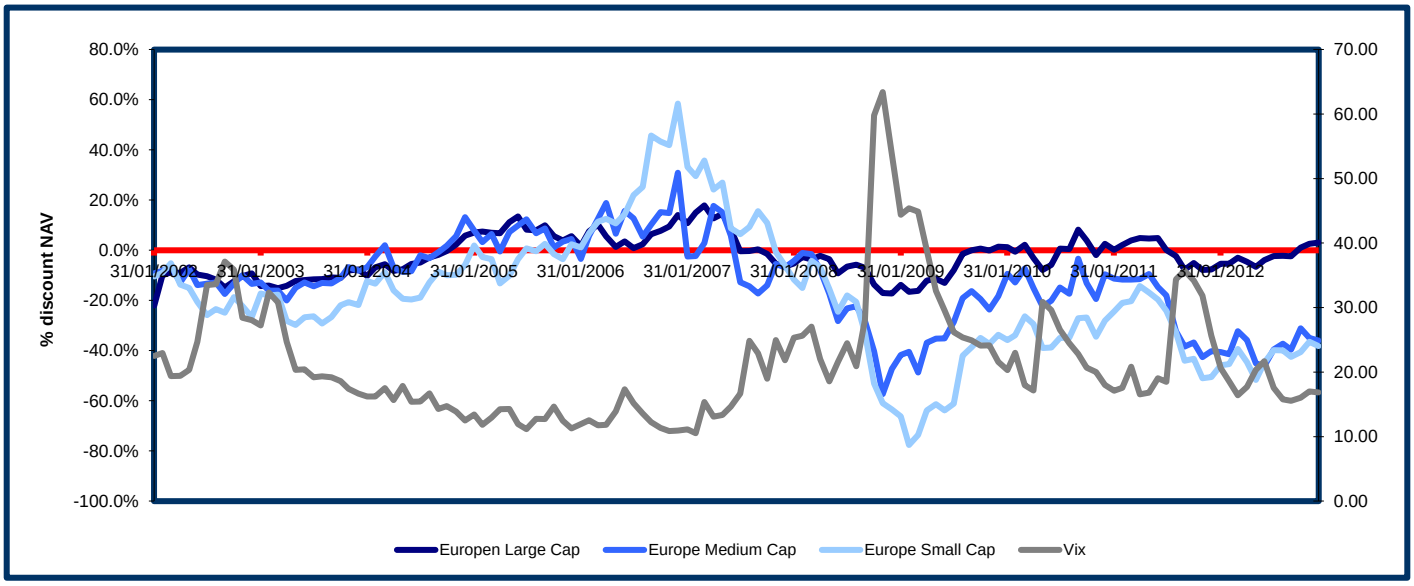


Since 2010 the difference in discount to NAV between company size groups has been 3% between large and small companies and 19% between large and medium size companies in the UK sample. However, we have an inverse

relationship in the discount/premium to NAV in the UK between large and medium companies, where medium sized companies have been trading at a premium since 2009.

In Europe the discount to NAV between large and medium size companies is 23% and to small companies 33% (Figure 11). Overall the smaller the company the larger the discount to NAV. In Figure 13 the left hand scale represents the premium/discount to NAV and the right hand scale the VIX Index.

Figure 13. Historic development of discount to NAV (Europe)



We show in Figure 14 the correlations between the groups and the VICX over the cycle.
We would expect a negative correlation i.e. the higher the VIX the higher uncertainty then the larger the discount.

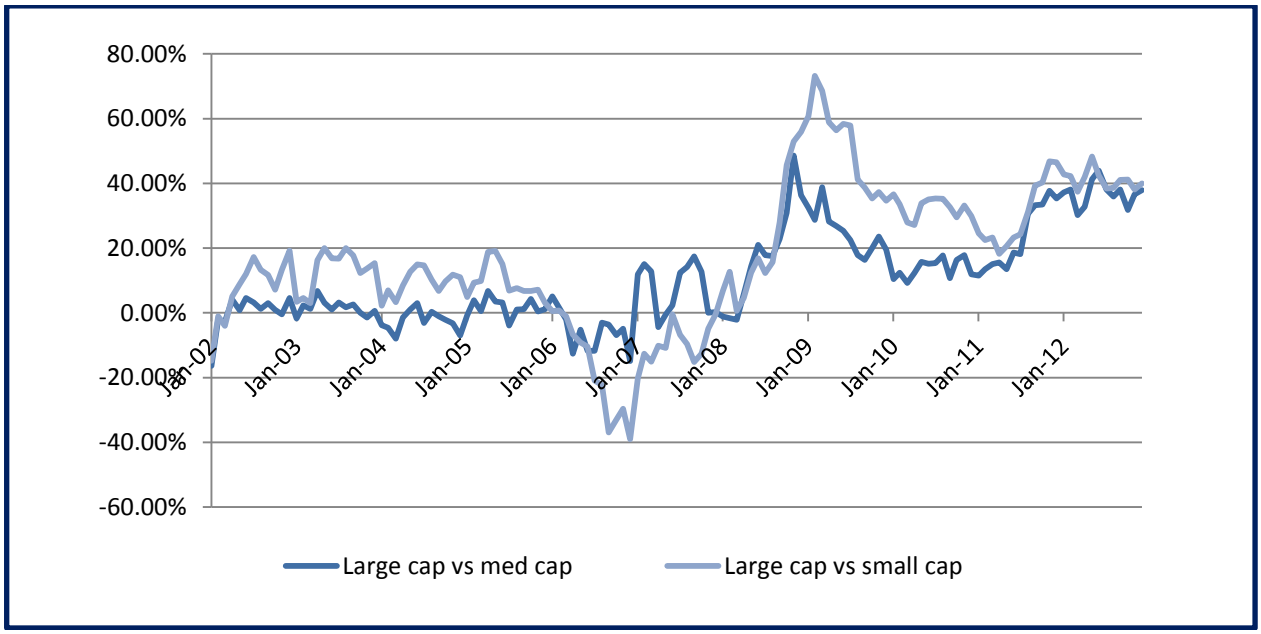
Figure 14. Correlation between the Vix Index and Discount/Premium to NAV over the cycle

	Jan 02-July 07 **Pre GFC**	Aug 07-Mar 09 **GFC**	April 09 Dec 2012 **Post GFC**
UK Large	-82.26%	-37.32%	-18.41%
European Large	-76.65%	-87.00%	-56.18%
Average Large	**-79.46%**	**-62.16%**	**-37.29%**
UK medium	-80.66%	-69.91%	-64.09%
European medium	-73.08%	-82.68%	-20.56%
Average medium	**-76.87%**	**-76.30%**	**-42.33%**
UK small	-75.21%	-71.57%	-20.76%
European small	-59.95%	-79.94%	-46.36%
Average small	**-67.58%**	**-75.76%**	**-33.56%**

Quantifying the Liquidity Premium

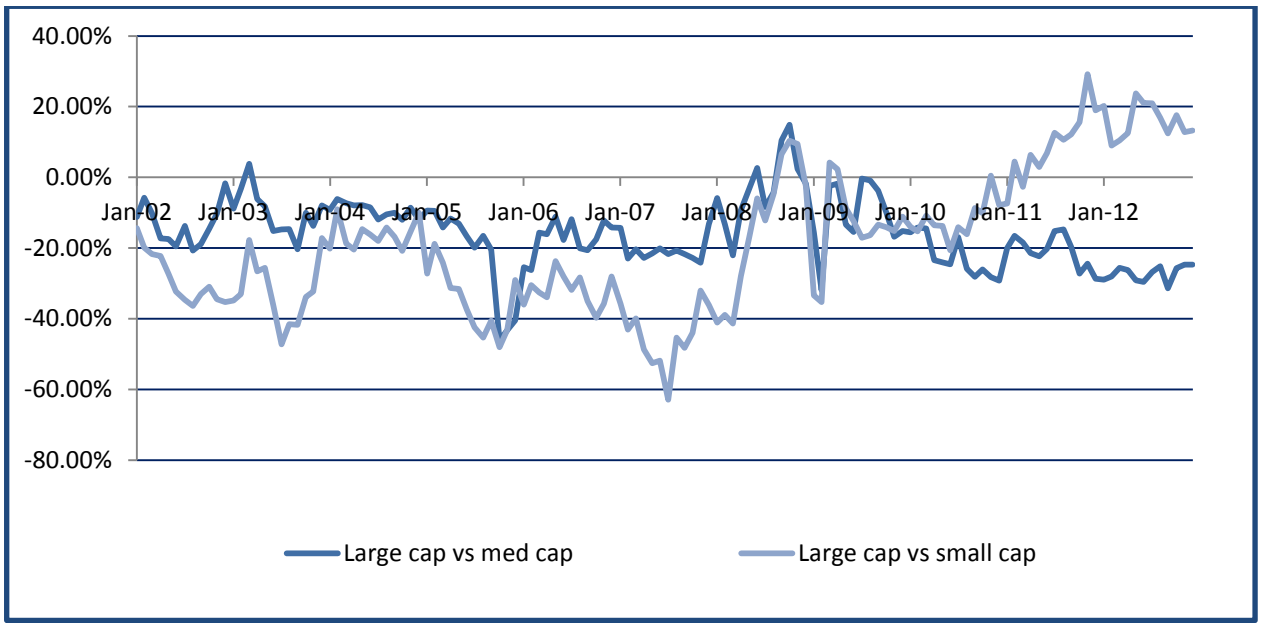
We can look at the liquidity premium on a relative basis, by taking the larger company sample average discount to NAV as a benchmark, and comparing the medium and small samples to this benchmark. Figures 15 and 16 show the relative liquidity premium for medium and small companies over time. We find that the liquidity premium for European mid-cap firms has ranged from 9-42bps post Dec 2008 and 20-60bps for small firms (figure 15).

Figure 15. Relative pricing of listed European real estate companies



The same analysis in the UK shows that small firms are trading at a liquidity premium of 10-45bps, while the relationship between mid-cap firms and large firms has been reversed with mid-cap firms trading at a premium to NAV and with that 15-20% more expensive than large firms (Figure 13). This means that their cost of equity capital is significantly reduced allowing a clear competitive advantage in acquiring assets and expanding the company's size.

Figure 16. Relative pricing of listed UK real estate companies



5.Conclusions and implications

We have used more than one measure of liquidity to investigate the impact of stock liquidity on valuations. Three market liquidity proxies dominate the literature; bid-ask spreads, stock turnover and price impact measures. We have seen that market liquidity is a multi-faceted concept and many of the various dimensions of the characteristics of market liquidity – tightness, depth, breadth, and resiliency can be covered by these traditional liquidity measures and can also be calculated for real estate stocks. We have used three key measures; bid-ask spread, turnover volume by market capitalisation and the HHLIndices as a price impact measure to determine stock liquidity and their relationship to firms discount to NAV and firm size over time.

Our tests have shown that the key discriminating variable that drives companies' liquidity and valuations is market capitalisation. This is true for both samples of UK and European listed real estate firms. However, due to the small sample size, our companies are not homogenous which sometimes results in skewed results for our test variables. Where data was not available, we have replaced data with group means. We also note that due to the inverse trading relationship of discount to NAV for large and medium size companies in the UK, results have been slightly skewed.

Despite these data exceptions, we can make general conclusions on the relationship between discount/premium to NAV and trading liquidity. We find that across Europe companies behave in a similar way in terms of spreads, LHHI ratio, stock turnover and return. There is a good degree of differentiation between large, medium and small companies when it comes to spreads, discount to NAV and turnover volume reflecting different levels of liquidity. Further results are conclusive when evaluating the correlation of the VIX Index and HHLI. It appears that the VIX is a good indicator for illiquidity in the market and the trading price of a company measured as discount/premium to NAV. The HH liquidity ratio also appears highly correlated with the standard deviation of daily returns, meaning when standard deviation of returns is high, liquidity is low.

We find that for both the UK and Europe the valuation premium of larger companies vs. small companies has increased significantly since 2008 (by 20% to 40%), which we can attribute to the increased value placed on liquidity post GFC.

There are important implications for real estate investment strategy from these findings for all participants. If companies with similar assets are valued with a difference of 20% to 40% in the stock market this gives an enormous competitive advantage to companies with higher liquidity. If more liquid companies have a far lower cost of equity capital by definition they will be able to offer more for assets than smaller companies. Similarly it will be a constraint on small property company IPOs and secondary market issuance. From the specialist investors' viewpoint it is clear that the decision to invest in certain sectors of the market (Central London offices, French shopping centres etc.) can be mitigated by the stock market valuation premium according to more liquid companies and discount applied to illiquid companies. For the generalist investor who is not necessarily a permanent holder of the stocks it means that the investable universe is initially constrained to companies that meet a minimum liquidity threshold. Finally, to follow the argument to its conclusion, the greater the liquidity premium the more the companies' short term share price performance will reflect equity market variables rather than movements in the underlying real estate assets of the company.

References

Acharya, V. and Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics*, 77:375–410.

Amihud, Y. and Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics*, 17(223–249).

Amihud, Y. and Mendelson, H. (1989). The effects of beta, bid-ask spreads, residual risk and size on stock returns. *Journal of Finance*, 44:479–486.

Amihud, Y. and Mendelson, H. (1991). Liquidity, maturity and the yields on U.S. government securities. *J. Finance*, 45:1411–1426.

Amihud, Y. and Mendelson, H. (2002). Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets*, 5:31–56.

Anson M (2010) *Measuring a Premium for Liquidity Risk: The Journal of Private Equity* Vol 13 No 2 pp 6-16

Bhasin V, Cole R, Kiely J (1997) Changes in REIT Liquidity 1990-1994 : Evidence from intra-day transactions *Real Estate Economics pp 615-630*

Bessembinder H and Kaufman H. M. (1997): „ A comparison of trade execution costs for NYSE and NASDQ-listed stocks“, *Journal of Financial and Quantitative Analysis*, Vol. 32, pp. 387 – 407

Blau B, Nguyen N, Whitby R The Distribution of REIT liquidity (2013) Working Paper

Brounen D, Eicholtz P and Ling D (2009) The Liquidity of Property Shares : An International Comparison Real estate Economics 37 pp 413-445

Boothe P. (1988), “Exchange rate risk and bid-ask spread: A seven Country comparison“, *Economic Inquiry*, 26, pp. 485-492

Brennan M.J. and Subrahmanyam A. (1996): “ Investment analysis and price formation in Securities markets*”, Journal of Financial Economics*, Vol 38. pp. 361-381.

Brennan, M.J., Subrahmanyam, A., 1996. Market microstructure and asset pricing:
on the compensation for illiquidity in stock returns. *Journal of Financial Economics 41*,
441–464.

Brunnermeier M. K and Pedersen, L. H. 2009: Market liquidity and funding liquidity, *The Review of Financial Studies*, Vol22, Issue 6, pp. 2201 – 2238, 2009

Cannon S, Cole R 2011; Changes in REIT Liquidity 1988-2007: Evidence from Daily Data *Journal of Real Estate Finance and Economics vol 43 pp 258-280*

Clayton J, MacKinnon 2000: Measuring and explaining changes in REIT liquidity: moving beyond the bid-ask spread: *Real Estate Economics vol 28 pp 89-115*

Fama, E. F. and K. R. French (1992), “The Cross-Section of Expected Stock Returns”,
Journal of Finance, Vol. 47, No. 2, 427-465.

Gwilym O, Clare A. Thomas S. (1998) “ Price clustering and bid-ask spreads in international futures*” Journal of International Financial Markets, Institutions and Money* Vol 8 Issues 3-4 pp 377-391

Hasbrouck J, Seppi D (2001) Common factors in prices, order flows, and liquidity *Journal of Financial Economics 59, pp 383-411*

Hibbert J, Kirchnor A, Krotzschmar, McNeil A (2009) Liquidity Premium – Literature Review of theoretical and empirical evidence

Hill M, Kelly W. Hardin W 2012 *Market Value of REIT Liquidity Journal of Real estate Finance and Economics* 45 pp 383-401

Hui, B., and B. Huebel, (1984), "Comparative Liquidity Advantages Among Major U.S. Stock Markets*", DRI Financial Information Group Study Series*.

Ibbotson R, Chen Z., Kim D. Hu W. (2013) Liquidity as an Investment Style Financial Analysts Journal 69 pp 30-44

Kyle, A. S. 1985. Continuous Auctions and Insider Trading. *Econometrica* 53:1315–35.

O'Hara M. Market Microstructure Theory (1995) Published by Blackwell

Niskanen J, and Falkenbach H (2012) Liquidity of European real estate equities: REITs and REOCs *International Journal of Strategic Property Management 16 pp 173-187*

Swensen D (2000) Pioneering Portfolio Management, Published by Simon & Schuster

Xiong J., Sullivan R, Wang P (2012) Liquidity –Driven Dynamic Asset Allocation *Journal of Portfolio Management pp 102-113*

Appendix

Appendix 1: Results t-test of equal means

Group mean	UK	EU	T-test	T critical	Ho
LHH	8.3%	10.7%	-2.0	2.2	Accept
Trade turnover	2.0%	2.5%	-1.3	2.2	Accept
Discount NAV	-14.2%	-33.4%	2.6	2.2	Reject
	Large	**Small**			
Return	25.5%	25.2%	1.0	3.2	Accept