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 – Six 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, it can be expected 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. For both the UK and Europe, the valuation premium of larger companies vs small companies has increased significantly since 2008 (by 20-40 per cent), which can be attributed to the increased value placed on liquidity post GFC.

Research limitations/implications – The sample size is relatively small, and subject to individual company influences on stock market valuation.

Practical implications – The key implications from the 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 – Previous studies have focussed on returns for measuring a liquidity premium. This study focusses on relative valuations and how the liquidity premium changes throughout the cycle.

Keywords Valuation, REITs, Liquidity premium, European listed real estate, Parallel asset pricing

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

Journal of European Real Estate Research
Vol. 7 No. 2, 2014
pp. 139-157

1753-9269
DOI 10.1108/JERER-12-2013-0026

that risk. Ibbotson *et al.* (2013) provided evidence that liquidity can be classified into four separate investment styles:

(1) market liquidity is an economically significant indicator of long-term returns;

(2) it is not a substitute for size, value and/or momentum;

(3) it has been stable historically; and

(4) 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 to 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 of 2002-2012. The largest markets in Europe (the UK and France) have adopted real estate investment trust (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 USA and Australia. However, it would be possible in a study of the Asian market.

In particular, we try to answer the following four questions:

(1) What is the most relevant way of measuring liquidity for the European listed sector?

(2) Does the European listed real estate display similar liquidity trends to the overall equity market?

(3) Is it possible to quantify a liquidity premium in valuations rather than returns?

(4) Has that valuation premium changed post GFC?

We believe that this paper differs from previous studies in the following four important ways:

(1) We use company valuation, rather than expected or required returns, which is more commonly used (Amihud and Mendelson 2002), to determine a liquidity premium. The rationale for this is first the estimation error inherent in using returns, and second our belief that corporate stock market valuations capture a consensus of current forecasts.

(2) Previous studies (Cannon and Cole 2011; Clayton and MacKinnon 2000) have focussed on US REITs. This study concentrates on the UK and European listed real estate companies, including both REITs and non-REITs.

(3) Our sample companies produce regular external valuations which are incorporated into the book value of assets, unlike USA REITs. As a result we can use the discount/premium to net asset value (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).

(4) 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

2.1 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 1990s 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 a dollar volume turnover, share price and market capitalisation. In particular, the authors suggest that daily return data are 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 securitised real estate markets: the USA, the UK, Continental Europe and Australia. They found a significant and consistent role for market capitalisation, non-retail 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 also increased at a greater rate than the skewness of non-REIT spreads.

2.2 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 multiple 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):

(1) *Tightness:* Measured by the size of bid–ask spreads.

(2) *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.

(3) *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. Table I shows the most common measures used.

While some measures are equally useful for our REITs data, such as bid–ask spread, others cannot be applied in a straightforward 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 (1996a, 1996b) estimate liquidity costs from intra-day trade and quote data. Amihud and Mendelson (2002) measures liquidity as the absolute value of the percentage price change over trading volume. Similar to Hui and Heubel (1984), we have developed a liquidity indicator specifically for the equity market (). The Hui–Heubel

Table I.
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

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 and French (1992) three factor model 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 and Mendelson (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 per cent 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, because listed real estate returns converge towards 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, as all assets, with the exception of cash in the reference currency of the investor, are subject to illiquidity in varying degrees and not homogenous. Therefore, we aim to establish a relative liquidity premium for the sector.

3. Methodology

3.1 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 per cent 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 before, during and after the GFC. Using the Consilia Capital database, we have grouped the sample companies by size, based on an initial filter of daily liquidity in the shares (as measured by value traded), and by listing regions (the UK and Europe). Table II shows the sample by groupings, with market capitalisation, daily liquidity and REIT status.

In terms of how representative our sample is, we need to look at the overall size of the UK and European markets. Our sample of 24 companies compares to a total number of

Size	Company	Market capitalisation (£m)	Average value traded (£m)	REIT/ non-REIT
UK				
Large	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
	Segro	1,633	5,276,198	REIT
Medium	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
	Capital Shopping	2,813	5,539,268	REIT
Small	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
	Helical Bar Plc	230	360,678	Non REIT
	Total	20,961		
Europe				
Large	Unibail-Rodamco SE	10,630	55,061,221	REIT
	Corio NV	2,756	14,483,731	REIT
	Klepierre	3,449	7,896,429	REIT
	Wereldhave NV	988	7,390,730	REIT
Medium	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
	Vastned Retail NV	574	1,806,051	REIT
Small	Vastned Offices/Industrial	160	632,571	REIT
	Societe de la Tour Eiffel	210	551,653	REIT
	DIC Asset AG	226	515,704	Non REIT
	Fastighets AB Balder	607	512,887	Non REIT
	Total	21,564		

Table II.
Sample companies selected for the study

532 listed real estate companies in Europe. In terms of size, the market capitalisation of our sample is £42.5 billion, which compares to a European sector market capitalisation of £139.8 billion. Therefore, by value, our sample represents around 30 per cent 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. Table III shows the size of the market for REITs and non-REITs in the UK and Europe.

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

4.1 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):

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

The percentage spread has been criticised by some academics, such as Brennan and Subrahmanyam (1996a, 1996b), 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

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

Table III.
Relative size of the market

companies the bid–ask spread is nearly negligible. During the period of 2010-2012, spreads for large firms ranged from 5 to 20 bps, medium firms from 20to 50 bps and small companies were > 50 bps some even > 100 bps (Table IV). 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 per cent 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.

Overall, we confirm that in our sample of the 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 Table V, we summarise how the spread has varied between companies with different liquidity, in the UK and Europe, before, during and after 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.

In Figures 1 and 2, 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

Table IV.
Relationship between market capitalisation and per cent spread 2002-2012

Company	Average market capitalisation	Average per cent 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 Modwen	511.9	0.6
VASTNED RETAIL	824.9	0.3
SPONDA OYJ	852.6	0.5
Shaftsbury	881.9	0.2
KUNGSLEDEN A	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
Derwent	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-RODAM	12,626.3	0.1

Size	January 2002-July 2007 pre-GFC (%)	August 2007-March 2009 GFC (%)	April 2009-December 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

Table V.
Movement in spreads over the cycle

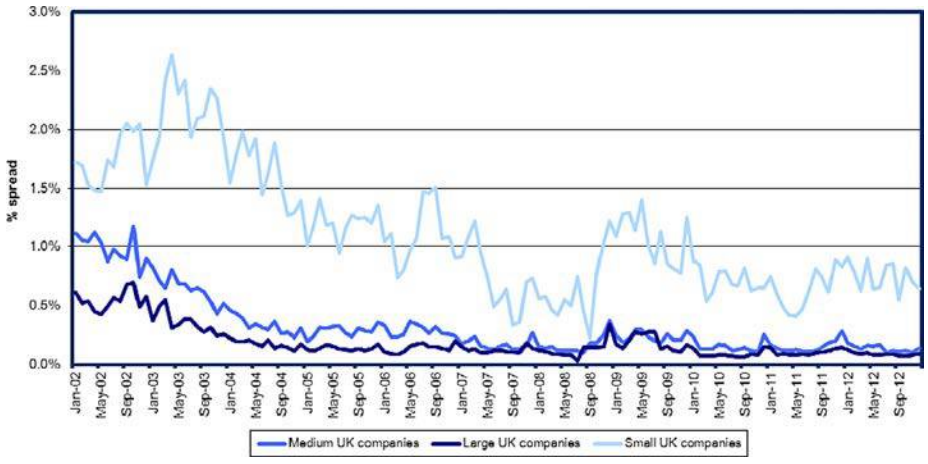

Figure 1.
Historic development of the UK bid–ask spreads 2002-2012

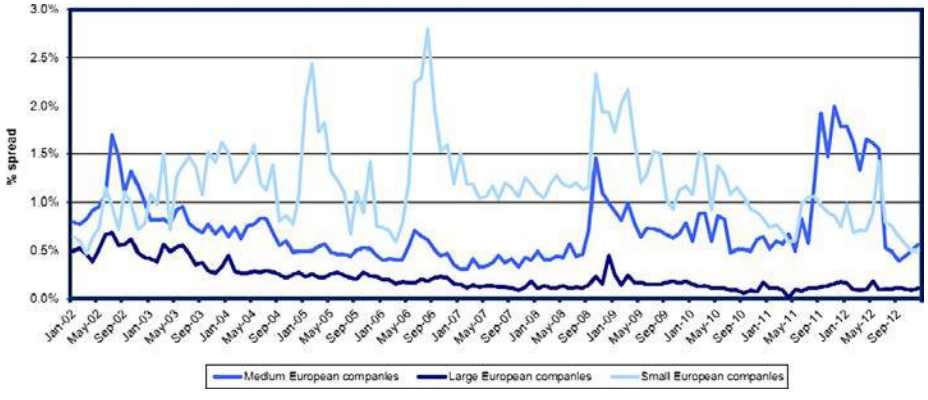

Figure 2.
Historic development of the European bid–ask spreads 2002-2012

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 after the liquidity crisis of 2007-2008.

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.

Despite the UK showing a long-term declining trend in percentage price spreads, both the UK and European samples show peaks around the periods from June to September 2006 and from October to December 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 initial public offering (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.

4.2 Market depth: stylised facts

We measure market depth in two ways. First, the simple turnover ratio defined as the number of shares traded divided by total shares outstanding is shown in equation (2):

$$V = \frac{N_t}{N_{total}} \tag{2}$$

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

$$V = \frac{V_t}{C_t} \tag{3}$$

Figure 3 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 the number of shares has decreased over the past ten 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.

Comparing Figures 3 and 4 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.

When looking at the 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

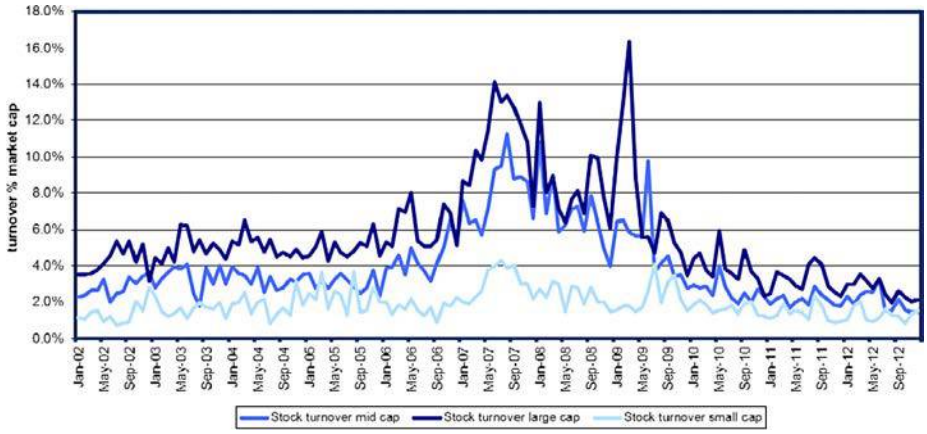

Figure 3.
Historic development of the UK turnover 2002-2012

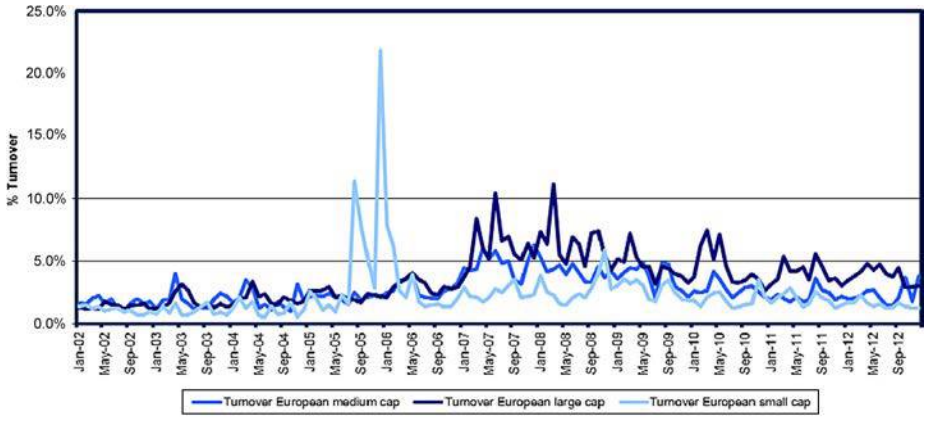

Figure 4.
Historic development of the European turnover

Securities average daily turnover in per cent of market capitalisation in 2009 was 7 per cent and declined to 2 per cent in Q1 2013, during the same period, Hammerson's turnover declined to 2.3 from 7.3 per cent. In comparison, smaller companies have only seen a decline from 2.2 to 1.5 per cent for Primary Health or 1.4 to 1.1 per cent for Development Securities.

In Table VI, we show how the turnover measure has changed for segments of our sample, over the three phases of the cycle under review.

In summary, we can draw the following three points from this analysis:

(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.

Size	January 2002-July 2007 pre-GFC (%)	August 2007-March 2009 GFC (%)	April 2009-December 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

Table VI.
Change of turnover at specific points in the cycle

(2) As the relative weighting of Europe in the Global Real Estate Securities Index declined, so has the relative level of turnover in the 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 per cent 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.

4.3 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):

$$LHH = \frac{[(P_{\max} - P_{\min})/P_{\min}]}{(V/(S * \bar{P}))} \tag{4}$$

where, P_{max} is the highest daily price over a 1-month-day period, P_{min} is the lowest daily price over the same horizon, V is the total volume of assets traded over a 1-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 Hui Heubel Liquidity Ratio (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 a per cent of total shares typically do not exceed 1-2 per cent, and volumes measured as a per cent of market capitalisation is approximately 3-4 per cent per day.

After calculating the HHLI for individual stocks, we further calculated the weighted average liquidity index for our two samples, the 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 in 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 5) 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 in 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. In Figure 5, the left hand scale represents the LHHI ratio and the right hand scale represents the VIX.

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 per cent, respectively, throughout the different cycles between 2002 and 2012.

4.4 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 out-performance of smaller, less liquid companies (Appendix 1).

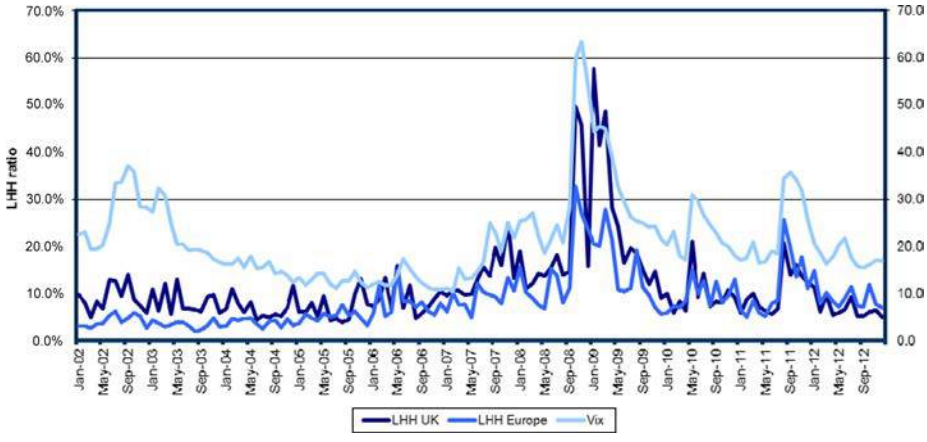

Figure 5.
Historic development of market liquidity 2002-2012

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 NAV per share. This approach has a number of advantages, namely;

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

Figure 6 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 for specific times during the UK cycle. Looking at the period from 2005-2012, correlation between the VIX and UK companies' discount/premium to NAV has been from -50 to -73 per cent depending on the company size band. Typically, a liquidity ratio of < 20 per cent indicates a discount to NAV of 5-20 per cent. When the liquidity ratio is significantly > 20 per cent and the VIX is > 30, the discount to NAV for our UK companies increases significantly > 20 per cent. In Figure 6, the left hand scale represents the premium/discount to NAV and the right hand scale represents the VIX.

Since 2010, the difference in discount to NAV between company size groups has been 3 per cent between large and small companies and 19 per cent 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 per cent and to small companies 33 per cent (Figure 7). Overall, the smaller the company, the larger the discount to NAV. In Figure 7, the left hand scale represents the premium/discount to NAV and the right hand scale the VIX.

We show in Table VII the correlations between the groups and the VIX over the cycle.

We would expect a negative correlation, i.e. the higher the VIX, the higher uncertainty then the larger the discount.

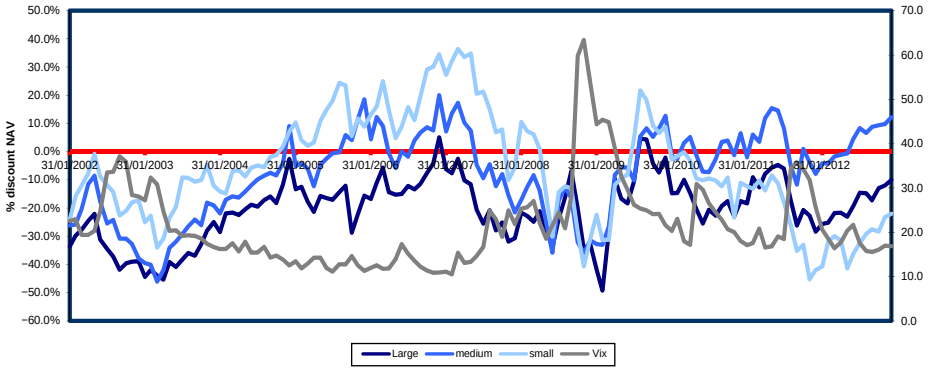

Figure 6.
Historic development of discount to NAV (UK)

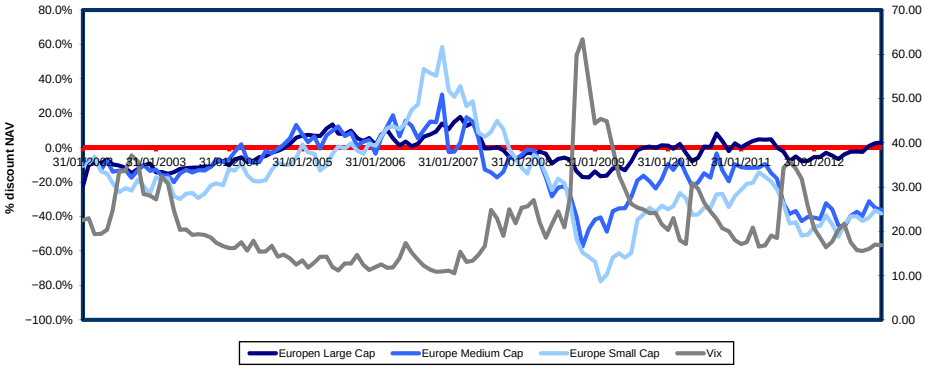

Figure 7.
Historic development of discount to NAV (Europe)

Size	January 2002-July 2007 pre-GFC (%)	August 2007-March 2009 GFC (%)	April 2009-December 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

Table VII.
Correlation between the VIX and discount/premium to NAV over the cycle

4.5 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 8 and 9 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 9-42 bps post-December 2008 and 20-60 bps for small firms (Figure 8).

The same analysis in the UK shows that small firms are trading at a liquidity premium of 10-45 bps, 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 per cent more expensive than large firms (Figure 9). 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 9).

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

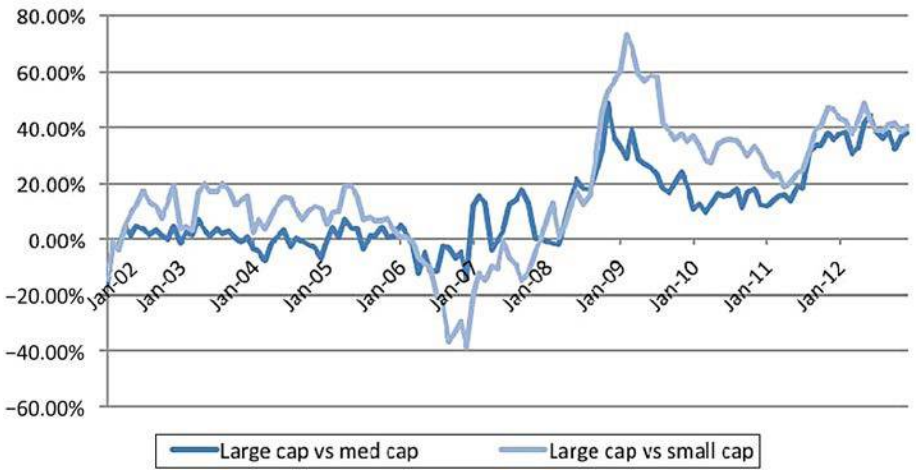

Figure 8.
Relative pricing of listed European real estate companies

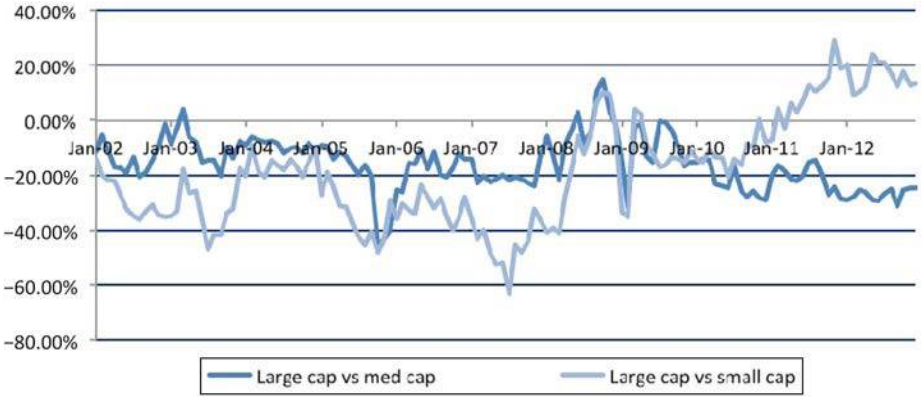

Figure 9.
Relative pricing of listed UK real estate companies

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 HHLI 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 the 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 were 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 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 HHL 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 20-40 per cent), which we can be attributed 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 20-40 per cent 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.

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Further reading

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Appendix 1

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

Table AI.
Results of the *t*-test of equal means

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