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THE CHANGING NATURE OF TRANSACTIONS ACTIVITY AND LIQUIDITY IN UK COMMERCIAL PROPERTY

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ABSTRACT. This paper examines changing transactions activity and liquidity over thirty years in the UK. It reviews the multi-dimensional concept of liquidity analysis and demonstrates that it is not just a function of the time necessary to sell an asset, a typical real estate perspective. Instead liquidity is defined in terms of transactions activity. The paper then hypothesises that urban change and an increased information base has contributed to a more active management of real estate portfolios and increased liquidity. Superimposed on this long term trend it is also hypothesised that property cycles create rise and falls in liquidity. The empirical core quantifies the changing nature of liquidity and transactions activity over thirty years from 1981 based on the IPD database. It confirms the hypothesised substantial rise in liquidity but increasing variability in the level of transactions activity from one year to the next queries the cyclical liquidity hypothesis. This is supported by causality tests. Over the last two decades a short term opportunity driven real estate investment culture appears to have emerged stimulated by the increased churn of properties, partly the consequence of the pace of urban change. It has brought greater volatility to the commercial real estate market.

KEYWORDS: Liquidity; Investment; Urban change; Information; Transactions; Volatility

1. INTRODUCTION

The goal of this paper is to explain and quantify the changing nature of liquidity and transactions activity in the commercial property market. While it is widely accepted that liquidity in the real estate market is variable there has been no systematic study of the phenomenon. The paper argues that changes in liquidity can be differentiated into trend and cyclical effects. In particular it is hypothesised that urban change and an increased information base has contributed to a more active management of real estate portfolios and increased liquidity. Superimposed on this long term trend it is also hypothesised that property cycles create rise and falls in liquidity. These hypotheses are assessed by examining transactions activity in the UK over thirty years from 1981 based on the IPD database.

The paper begins by reviewing the definition of liquidity. It then looks at property as an investment and argues why liquidity (trend) is likely to have increased over the study period. Next it considers the potential implications property cycles have for transactions and liquidity patterns. The latter part of the paper explains the research method and presents a time-series analysis of transactions activity and liquidity in the UK commercial and industrial property market. This analysis draws out and quantifies the distinctions between cyclical and trend components of transactions and liquidity using the Hodrick-Prescott (HP) filter. Based on this analysis the trend and cycle hypotheses are assessed, the latter with the support of causality tests.

2. LIQUIDITY DEFINITION

Liquidity of a real estate investment has been defined in terms of the time, and the cost of selling a property close to its market value (Baum, Crosby 1995). In these narrow terms time/ease of sale is sometimes distinguished from "marketability", measuring the ease with which an asset can be

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bought or sold in the market without affecting its price (Fraser 1993). More generally liquid assets are those that can be easily bought or sold, and so liquidity can influence the attractiveness of an investment and its value. Financial economics for example identifies that the establishment of a corporate entity creates value by making a collection of illiquid assets liquid (Benveniste *et al.* 2001). In the context of real estate this can be seen in the liquid securities and units created by REITs, property companies and other indirect property investment vehicles, compared to the illiquidity of the properties they own.

Initial research on real estate liquidity in the UK reflected perceptions that it was very illiquid relative to stock market securities because of the market imperfections, and sought to quantify the time periods involved in selling a property. McNamara's (1998) ground breaking research on this issue took the standard textbook approach above, and considered components of the disposal process distinguishing between marketing, due diligence and settlement. Due diligence is found to be the most variable component as during this phase problems may be identified, market conditions evolve and funding issues emerge. Based on agents' estimates of typical periods the total selling times varied between 10 weeks for a retail unit up to 22 weeks for a shopping centre (as reported in Crosby, McAllister 2004).

Subsequent research by Crosby and McAllister (2004) based on 187 actual transactions in 2000 and 2002 found a longer median disposal time of 26 weeks, with again considerable variation between classes. Scofield (2013) subsequently examines how this time to complete a sale has changed over time. Based on data from four financial institutions he finds that the time taken from price agreement to sale completion fell between 2000 and 2008. Devaney and Scofield (2014) extend this research with the most extensive dataset to date of 578 transactions between 2004 and 2013. They demonstrate a strong, significant relationship between market state and time to transact but the research is hampered by the brief time period that also suffered from severe market instability. In addition this approach to the measurement of liquidity requires vast detailed data, suffers from substantial variation in transaction times between types of properties and transactions thereby limiting its ability to examine the variation in liquidity over time.

It is apparent that these statistics are dependent on market conditions with properties easier and quicker to sell in a market upturn than in a downturn (Scofield 2013). Market conditions are also reflected in the price achieved. Real estate markets exhibit highly variable liquidity over time partly because capital flows are such that there is a much higher volume of trading in a boom than in the bust although there is no research to date that explains these patterns (Fisher *et al.* 2003). The dynamics of this are discussed in more detail below. In contrast there is arguably constant or much more stable liquidity in other asset markets because stock markets facilitate quicker price adjustment, partly due to a "central" market place and the homogeneous nature of the basic transaction unit. These real estate studies of liquidity take a very different perspective than studies in other markets.

Kyle (1985) describes liquidity as a slippery and elusive concept. More standard definitions of liquidity in the wider financial literature are linked not to the transaction process but to the level of transactions in the market, the relationship between transactions and capital value, and the difference between buy and sell prices, the bid-ask spread. There is no accepted definition of liquidity as it is clearly multi-dimensional but elements of this broad approach have been applied in a series of papers on REITs/property company shares over the last decade or more. Historic studies are usefully reviewed by Brounen *et al.* (2009). In a more recent publication, Niskanen and Falkenbach (2012) consider dimensions of liquidity in specific indirect real estate vehicles by correlating stock transactions and turnover rates. They conclude that REITs demonstrate a higher level of liquidity than real estate companies. Such work further demonstrates the complexities of liquidity as a concept and it proves variable even when assessing indirect investment vehicles with comparable equity-like characteristics (such as homogeneity, low transaction costs and management fees, traded in one central market place).

Not all of these dimensions are easily applicable to direct property investment markets, notably the bid-ask spread. Only one study by Buckles (2008) seeks to assess this dimension of liquidity over time by considering the difference between "reservation" price indices of buyers and sellers. This research is based on transactions based indices estimated using hedonic regression that relate to US residential and commercial/industrial properties (Fisher *et al.* 2007). The results of the Buckles study are limited probably reflecting the aggregated nature of these estimated indices (covering all

commercial and residential) on which this research is built. The price impact of liquidity is difficult to isolate for direct real estate investment.

This study therefore concerns itself only with the dimension of liquidity relating to transactions activity. The precise argument is that when investments are actively traded it is easier to buy and sell and so transactions activity can be a measure of liquidity. This measure relates to the market itself not individual properties so even in a very liquid market some assets, e.g. "trophy assets", may transact infrequently but are easy to sell when they go on the market. It follows Fisher *et al.* (2003: 271) who define liquidity simply as "the rate of asset transaction volume". Other REIT studies have encompassed the number of shares traded, the money volume of shares traded and turnover, generally defined as the number of shares traded divided by the number of shares outstanding (Brounen *et al.* 2009).

The use of transactions activity to measure liquidity was also applied by Bond *et al.* (2004) in the UK for direct property investment based on a range of data sources for 2002. This study finds that around 5% of the non-residential property stock as a whole turned over in that year. Transaction rates for properties owned by financial institutions are found to be around 12–15%. Their results are only cross-sectional and produced in summary form but the authors find substantial variation for liquidity in terms of geography, use sectors and asset values. This paper extends the quantification and understanding of transactions activity/liquidity over time by differentiating the role of trends and cycles. It defines liquidity as transactions sales as a percentage of aggregate value and focuses on the period from 1981 when comprehensive statistics became available via the Investment Property Databank (IPD).

3. PROPERTY INVESTMENT TRENDS AND TRANSACTIONS ACTIVITY

Over the following thirty years property investment has been subject to a number of developments:

- There has been a growing role for indirect property investment vehicles that depend for their existence on attracting (new) investment funds (Forster 2013). This represents the emergence and the widespread practice of external fund management. Today these fund managers are under competitive pressures to deliver agreed portfolio strategies and target returns for their clients, often over relatively short timescales. This has been encouraged by a benchmarking culture made possible by IPD information (Henneberry, Roberts 2008).
- A major "urban development cycle" occurred (see Barras 1987), that was initially impelled by the impact of car travel and then by the rapidly developing ICT technology. Cities have undergone massive changes in spatial structure, intra-urban land use patterns and new property forms fashioned by decentralisation pressures. The early 1980s for example saw the arrival of purpose built retail warehouses and office parks as well as out of town shopping centres (Jones 2009, 2010).
- This has inevitably meant a substantial restructuring of the portfolios of financial institutions as shown in Table 1. Between 1981 and-the end of the millennium retail warehouses emerged as an investment class in their own right. There was effectively zero institutional investment in retail warehouses at the beginning of the 1980s but they comprise almost a fifth of property portfolios by 2010. While the contribution of shopping centres to the institutional portfolio doubled high street shops halved in the period 1995–2006 (Jones 2010).

The increased velocity of property market adjustment has been reflected in tenants requiring flexibility and shorter lease terms (ODPM 2004). These forces of change have also led to active property portfolio management in terms of buying and selling. Collett *et al.* (2003) find from an analysis of unpublished IPD sale transactions data between 1986 and 1998 that the average holding period of properties bought between 1981 and 1985 was 12 years but this drops to 10 years for properties bought after that date. By the late 1990s the study reports the median holding period is less than 8 years. A later study undertaken for Gerald Eve (2005) reviewed 5000 sales of offices between 1983 and 2003, and found that the average holding period had fallen to around 5 years by the end of the study. Indeed a quarter of offices sold in any one year had been held for less than three years, and in 2003 75% of offices sold had been held for 6.5 years or less. The evidence suggests that holding periods have been falling over time reflecting active fund management.

Individual properties, especially offices, have been subject to depreciation/obsolescence and many adapted to meet continuing technological advancements through refurbishment while oth-

Table 1. Changing structure of the institutional portfolio 1981–2010 (source: IPD 2010)

Property type	1981 %	2010 %
Standard shop	15.2	10.3
Shopping centre	9.4	17.9
Retail warehouse	0.6	19.4
Dept./Variety store	1.9	1.3
Supermarket	0.7	3.8
Other retail	0.3	0.8
Standard office	56.2	27.8
Office park	–	3.4
Standard industrial	15.0	11.9
Distribution warehouse	0.5	3.3

ers have been demolished (Crosby, Devaney 2011; Jones 2013). Active management of the physical real estate through refurbishment and redevelopment has become the norm and many properties' sales occurring just before or after redevelopment (GVA Grimley 2010). Shorter holding periods are not just the consequence of the financial drivers toward increasing short termism but are also a reflection of a substantial upheaval in cities.

All of these underlying forces give rise to the hypothesis – improved information, greater short term investment horizons and urban change have together contributed to a long term trend increase in transactions activity and liquidity.

4. PROPERTY MARKET CYCLES AND TRANSACTIONS ACTIVITY

Modern neo-classical models of property market cycles have development lags at their core. It is difficult to quantify these lags but they can be substantial, for example Barras (2005) estimates that just the office construction lag time alone from start to completion is between two and three years in the City of London. The essence of the property cycle is then that supply is slow to respond to demand because of these lags and the cycle as a consequence adopts a form of cobweb dynamic (Key *et al.* 1994; Wheaton 1999). Barras (1994) extends the model of a cycle to connect together the variability in credit, the property market and the macroeconomy.

These cycles have a simple core of rental change and lags in the development process but property yields/capital values are also an implicit part of the magnification of the cyclical adjustment processes. Investment activity plays a key role in shaping these cycles through not least (forward) purchase of developments but also more generally through capital availability, i.e. the weight of investment funds (Dunse *et al.* 2007). Cycle dynamics therefore extend beyond simply the consequences of the interaction of development constraints and occupation demand to encompass investment or transactions activity. During the upturn in the "Barras property cycle" there may be speculative investment funds supported by the availability of credit that could inflate capital values and transaction activity. Liquidity in the property market increases during this period with rising values and positive investment sentiment so that selling will be relatively easier encouraging profit taking (Collett *et al.* 2003). Some at least of the initial unwilling sellers will be assuaged by the rising values. In the downturn credit constraints stifle all forms of development and investment, and although some "fire selling" will occur liquidity will be at the low ebb of the cycle (Devaney, Scofield 2014). Buckles (2008) discussed earlier also suggests a statistical cyclical dimension to liquidity as reflected in the bid-ask spread. Our second hypothesis is hence that transactions activity/liquidity is a function of property cycles. Combining the two hypotheses together the thesis is that there is cyclical transactions activity, with property booms associated with high liquidity and the reverse in the busts, superimposed on a long term upward trend in liquidity. The next sections set out to quantify the trend and cyclical components of transactions activity in the UK.

5. RESEARCH METHOD AND DATA

The focus of this empirical research is on annual transaction activity based on the IPD Digest database of properties owned by "institutional investors". As of 2010 it contained 11,276 properties across 283 investment funds with a total capital value of £135.4bn (IPD 2010). The database has traditionally been weighted toward properties owned by insurance companies and pension funds but also includes the portfolios of some of the larger property companies. It approaches almost complete coverage for some major categories of institutional property owner, and although the composition of funds has changed over time the data has always been an essential representation of the institutional investment market (IPD 2012). Initial weaker coverage of the market in early years was augmented by backtracking data as institutions joined. By 2013 Mitchell (2014) estimates that IPD's UK database covers around 70% of the investment universe with the rest of the stock

owned primarily by unlisted property companies or overseas investors.

As a portrait of transactions activity it is incomplete because of leakages, in the sense that a sale by one investor may not necessarily be matched by a purchase from another investor in the same IPD universe. This is inevitable as the foregoing analysis of the importance of sales linked to refurbishment/redevelopment acknowledges. In addition towards the end of the study period many City of London offices were bought by foreign investors and some taken out of the IPD database (Lizieri 2011; Lizieri, Kutsch 2006). The global financial crisis led to central London being seen as a safe haven for international real estate investors and as a mecca for office investment. The impact on the IPD database was after years of relative stability to see the number of offices in the City of London fall by 60% between 2007 and 2013 as institutional investors took advantage of the high prices achievable (IPD 2013). As these transactions are recorded this does not hinder the analysis of market activity presented here but note for the reasons set out above that sales do not equate to purchases. The impact on liquidity of overseas investment is considered later after the empirical analysis.

The analysis is based on the period, 1981–2010 covering the booms and busts of the late 1980s and 2000s. The year, 1981, is a useful point to start as it was the bottom of an economic cycle. The research enables both a long term perspective on trends in sales/purchases activity over thirty years as well as a review of cyclical activity. The time series analysis for individual property sectors is divided into three elements – numerical transactions and their value, plus transactions as a percentage of aggregate capital value. The basic statistical analysis is in the form of annual indices, and where appropriate these are expressed in real terms, deflated by the retail price index. These indices are suitable for the research of long term trends which contrast with the daily liquidity/transactions data on REITs in the studies above. Intuitively quarterly indices might seem more appropriate for cyclical analysis but the IPD Quarterly Index data is also only available from 2001 and the period is dominated by the instability created by the global financial crisis (IPD 2013). The appendix summarises the findings from a parallel analysis based on this quarterly data. It is a useful supporting analysis to the main paper and we have included it as an appendix. This quarterly analysis at one level confirms the results of the annual data for the decade up to 2010.

To quantify and isolate the cyclical components of transactions activity the paper estimates the underlying trend. The Hodrick-Prescott (1997) (HP) filter is applied to undertake the task. The HP Filter is an established statistical procedure used to separate the cyclical component from the long term trend in a time series of raw data. The conceptual framework is that for a given time series, y_t is the sum of a trend component τ_t and cyclical component, c_t. That is:

$$y_t = \tau_t + c_t . \quad (1)$$

Hodrick and Prescott (1997) suggest a way to isolate c_t from y_t is by the following penalised minimisation equation (2), where λ is the penalty parameter:

$$\min \sum_{t=1}^{T} ((y_t - \tau_t)^2 + \lambda((\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}))^2) . \quad (2)$$

The first term, sum of squared deviations, $y_t - \tau_t$, (the deviation from the trend) is commonly referred to as the cyclical component and minimising this term penalises the variance of the cyclical term, c_t. The second term is a multiple λ of the sum of the squares of the trend component's second differences and penalises variations in the growth rate of the trend component, τ_t. The larger the value of λ, the higher is the penalty. As λ approaches to zero, the trend component becomes equivalent to the original series and as λ diverge to ∞, the trend component approaches to the linear trend.

As originally suggested by Hodrick and Prescott it is appropriate to set λ to 1600 for quarterly data (Ravn, Uhlig 2002). However, in this study we are using annual data and there has been some debate amongst the academic literature as to the value of λ for annual data. Correia *et al.* (1992) and Cooley and Ohanian (1991) use a value of 400, whereas Backus and Kehoe (1992) use a value of 100. The latest evidence finds that the value should be considerably lower. Baxter and King (1999) apply a value of around 10, a result broadly supported by Maravall and del Rio (2007) who recommend to use $6 < \lambda < 14$. Ravn and Uhlig (2002) draw a similar result stating that λ should vary by the fourth power of the frequency observation ratio ($1600/4^4$); thus, λ should be equal to 6.25 for annual data. In accordance with this conclusion we report the results for a λ of 6.25 although for comparison we also tested the higher values of 25, 100 and 400. The higher the λ the smoother the trend and the element of cyclicity is reduced. Higher values also bring the

turning points in the trend forward so that for example peak values occur in the early 2000s rather than just before the credit crunch. This finding supports the use of the low value for λ.

6. BACKGROUND STATISTICAL ANALYSIS OF TRANSACTIONS ACTIVITY

6.1. Numerical transactions

The analysis initially provides an evidence base by a comparison of purchases and sales' time series through the decades as set out in Figures 1 and 2 respectively. For ease of exposition the paper refers to "churning" as the combined *aggregate* incidence of buying and selling in the market. Looking first at trends in the 1980s' property boom retail property purchases in 1988 were 2.5 times greater while sales were higher by almost an order of 4 compared with 1981. Over this property upturn offices purchases rose 80% and sales to eight times their 1981 level. These upward trends of purchases are less marked for industrial property but much more dramatic for sales. Overall these figures are prima facie evidence of the importance of increased "churning" in the 1980s. Following then a drop off in activity in the subsequent recession the level of "churning" appears to continue its long term rise until turnover levels measured in terms of both purchases and sales level off in the early 2000s.

The HP trend lines for numbers of sales and purchases of retail property in 2005/6 were 70% and 35% above those in the early 1980s respectively. Sale numbers of offices rose by three times over this period and purchases by almost double. The highest increase in 'churning' judged in this way occurred in the industrial sector were sales and purchases both rose by the order of four times. This is further prima facie evidence for the rise of "churning" with the long term growth of both forms of transactions across all three sectors.

These figures must be set against an aggregate institutional portfolio represented by the IPD database that saw a fall in the number of individual properties. There was a growth in the numerical portfolio during the 1980s for offices and shops but then falling numbers from 1994. By 2006 the number of retail properties was just under a fifth of the total in 1981. The number of offices fell by 9% (by 2010 it was a quarter). However, the much smaller industrial sector had seen the number of properties grow by more than 50% (IPD 2010).

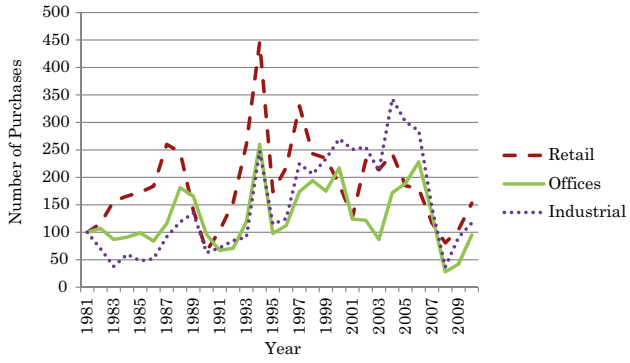

Fig. 1. Indices of the annual number of purchases by investment property sector 1981–2010 (1981 = 100)

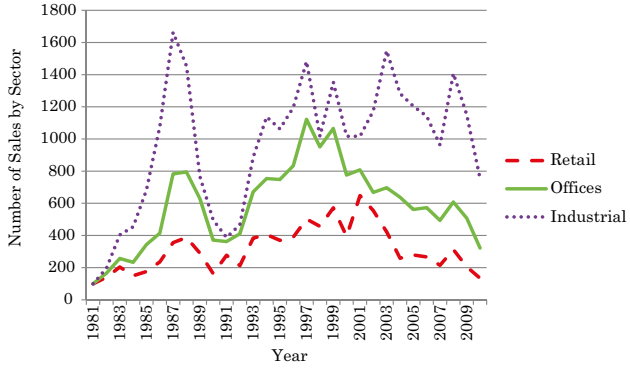

Fig. 2. Indices of the annual number of sales by property sector 1981–2010 (1981 = 100)

All these statistics indicate that the UK real investment market has experienced dramatic long term change over thirty years. There is also considerable variation from year to year and between sectors confirming a potential cyclical component to purchases' and sales' activity. Over the study period the number of property transactions has risen substantially not only in absolute terms but also relative to the numerical size of the stock which has been falling. The expansion of both purchases and sales demonstrates a rise in "churning" although the larger increase in sales could suggest an overall disinvestment, especially as numbers of retail and office properties have fallen. This potential conclusion can be quickly countered by reference to an overall rise of 4.5 times in real values in the database (IPD 2010). This is probably partly because there has been long term growth in the size of the IPD database caused by increased membership, although its impact is difficult to quantify as records are backdated each time.

While there has been some modest sales leakage of top quality properties to overseas investors, and only at the end of the study period, a more likely

explanation of the "discrepancy" can be attributed to the recent urban development cycle. As part of the restructuring of cities asset sizes are rising and smaller properties are being redeveloped, often to be incorporated into large new schemes or parks. Larger properties are arguably easier to manage. During this process properties may be sold to investors/developers outside the IPD database before subsequent new developments "re-enter". At the very least the broad implication is that there has been restructuring of real estate portfolios toward higher value/larger real estate units.

6.2. Value of transactions

Simply looking at numbers of sales/purchases ignores the important dimension of value. On average the value of each investment will have increased over time in real terms, for example by the selling off of high street shops and the growth in importance of shopping centres to the institutional portfolio. The indices in Figures 3 and 4 quantify these real rises in the value of purchases and sales respectively. As with the numbers of transactions there is evidence of cyclical influences with the real value of purchases and sales rising every year from 1982 to 1988 in the boom of that decade for each property sector (except industrial in 1988). However, clear cycles subsequently disappear and 1994 stands out as an unusual year of a high value of purchases (and to lesser extent sales) in the modest upward trend in the 1990s. Ultimately the peak point for the value of transactions is the mid-2000s. The credit crunch brings a sudden drop off in purchases from 2007, although sales continue, albeit at less than half the previous level.

These statistics confirm the conclusions on numerical transactions activity. The dominant influence is the upward trend in the value of transactions although there are "rogue" years. Looking at the trends from the HP filter analysis there are no clear downturns except in the recessions of the end of the 1980s and after the international financial crisis (for low order λs). Beyond these extremes and a modest fall back in transactions at the turn of the millennium the upward trend swamps any potential down cyclical effects. Indeed Figures 5 and 6 demonstrate the scale of the rise of the real value of "churning" based on the trends for each

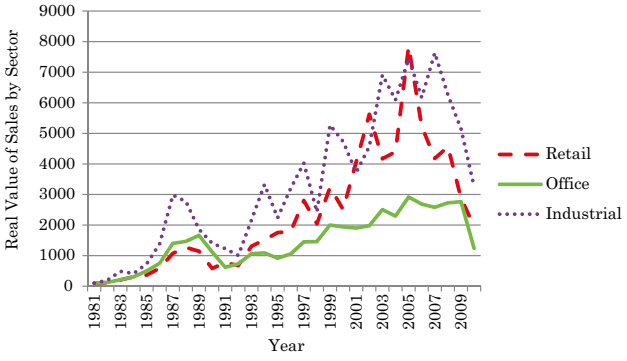

Fig. 4. Indices of the annual real value of sales by property sector 1981–2010
(figures deflated by the Retail Price Index)

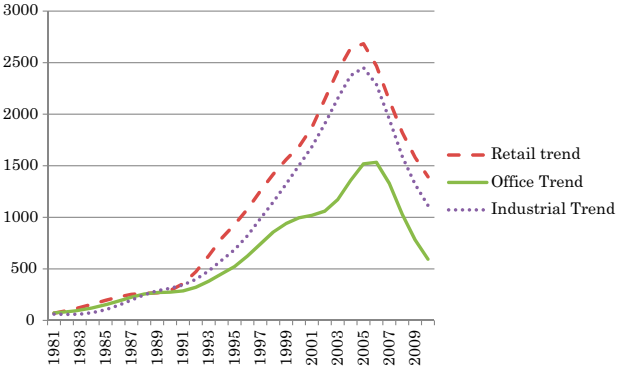

Fig. 5. Trends in the real value of purchases based on HP filter (λ = 6.25)
(figures deflated by the Retail Price Index)

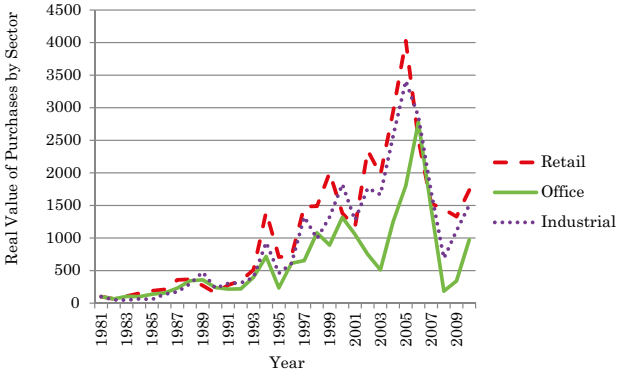

Fig. 3. Indices of the annual real value of purchases by property sector 1981–2010
(figures deflated by the Retail Price Index)

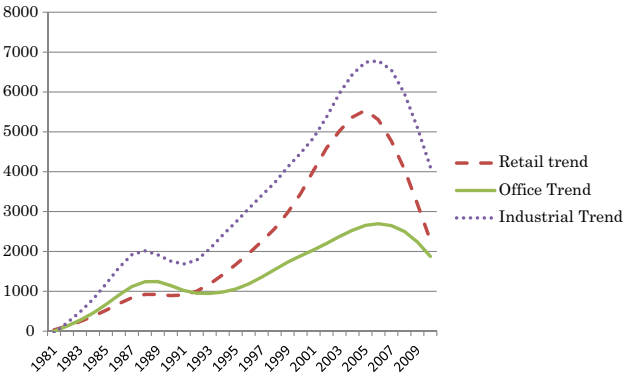

Fig. 6. Trends in the real value of sales based on HP filter (λ = 6.25)
(figures deflated by the Retail Price Index)

sector. This statistical method only identifies the credit crunch as a significant negative impact on the long term rise that sees real purchases and sales rise by the order of between 12 and 30 times over the thirty year period despite the fall back following the international financial crisis. These statistics compare with the 4.5 times rise in the real value of the portfolio.

7. EVIDENCE ON TRENDS IN LIQUIDITY

The trends outlined above partly reflect the rise in real value of the institutional property portfolio over the period. The precise implications for liquidity are now considered, where liquidity is defined as noted earlier as sales as a percentage of capital value. Trends in liquidity broken down by property sector are presented in Figure 7. For retail liquidity there is a substantial positive trend from sales of 1% in 1981 up to over 9.5% in the first half of the 2000s. The equivalent trend line of sales in the office sector is of the order of 1% in 1981 rising to 10% in 2005, before rising again to almost 12% in 2009 (although sales fell/capita values fell even more). The liquidity of industrial property has seen a similar upswing reaching an upward bound of just above 8%. The recession of the late 1980s causes a significant dip in sales activity and there is a 'staggered' break in trends at the end of the nineties, probably reflecting the phased substantial rise in stamp duty at that time over four years from 1 to 4%.

The equivalent trends for relative purchases shown in Figure 8 reveal less of an upward trend in the 1980s and for the first half of the 1990s (with the exception of 1994). The latter half of the 1990s sees an upward shift that continues into the 2000s before a flattening off. The result is that by the mid-2000s the HP trend analysis gives a spread of annual average purchases as a percentage of capital value of between 9.5 and 11.4%. This represents a doubling for the retail sector, an increase of more than three times for offices and a quadrupling for industrial properties since the early 1980s. The credit crunch brings a falling away in purchases as a proportion of capital values. Overall these trend statistics for sales (and purchases) clearly demonstrate a long term and continuing rise in liquidity even though the financial crisis has ameliorated this rise.

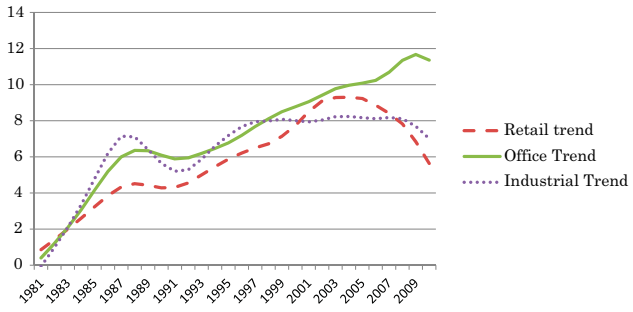

Fig. 7. Trends in sales as a percentage of capital value of the stock based on the HP filter (λ = 6.25)

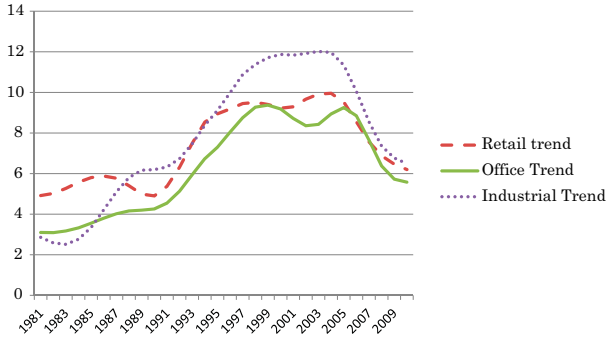

Fig. 8. Trends in purchases as a percentage of capital value of the stock based on the HP filter (λ = 6.25)

8. EVIDENCE ON CYCLES OF TRANSACTION ACTIVITY

The analysis to date overwhelmingly confirms the long term increasing trend in "churning" and liquidity. The position is less clear with regard to cycles. To recap the discussion identified that transactions could be a function of property cycles with activity expanding during the upturn and falling away in the downturn. This section examines in more depth to what extent a cyclical pattern in liquidity exists in practice. It is based on deviations from the underlying long term trend derived from the HP Filter.

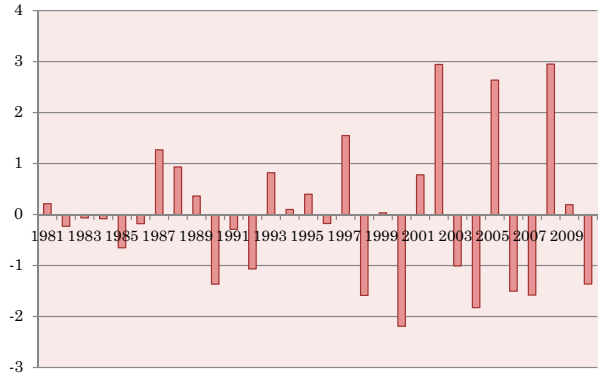

Fig. 9. Retail sales receipts as percentage of capital value – deviations from the HP filter trend (λ = 6.25)

The sales deviations for the retail sector are presented in Figure 9 which shows that the positive and negative deviations over time do not fit an obvious cyclical pattern throughout the whole study period. The latter half of 1980s through to the mid-1990s can be said to exhibit a cyclical path with the small aberrations of 1991 and 1985. However, subsequently there is more of a yoyo path with consistent positive and negative deviations from the trend only at most for two consecutive years, There is a lack of stability and the deviations have become larger over time up to three per cent (the trend is also higher).

The pattern for office sales, given in Figure 10, is similar but arguably less marked at least initially with deviations of less than 2% for every year until 2006. The cyclical nature of deviations again breaks down in the mid-1990s. The deviations from the trend become extreme with the onset of the credit crunch. Industrial property sales are the most volatile over the entire 30 year period. Figure 11 demonstrates a cyclical path for such sales in the first half of the period followed by the staccato effect but perhaps a hint of a cycle following the credit crunch. The breakdown in cyclical effects is reinforced by comparison of the three individual time series that reveals no consistency in the timing and scale of positive and negative deviations across sectors. Prior to the global financial crisis these absolute deviations were the order of 2% or less except for three years for this sector.

The increasing variability between years especially from the mid-2000s queries the "cyclical hypothesis". This is reinforced by the findings from the quarterly analysis discussed in the appendix. The analysis therefore now undertakes Granger causality tests to shed more light on the underlying processes. Variability in transactions activity is hypothesised to be at the heart of cycles but the causal relationships are complex; expected falling yields and willing buyers pushing activity during the upward trajectory but arguably the weak level of transactions on the downside contributes more to rising yields.

The Granger causality (GC) analysis focuses on this two way relationship between changing yields and absolute deviations from the HP sales trends for each sector. First of all some prerequisites are necessary. The relationships to be considered need to be stationary. For all three sectors the results for the ADF (Augmented Dickey Fuller) unit root tests on these variables are all much larger than the 1% critical value so that non-stationary relationships can be strongly rejected. This is in accordance with (Fuller 1976): if the calculated ratio (value) of the coefficient is less than critical value, then y is said to be stationary. VAR models are then estimated for each sector. A VAR is a statistical model that is used to capture the linear interdependencies between multiple time series. Tests for prediction error indicate that all these structural models have minimum discrepancy and so can be adopted for the Granger analysis. Based on the platform provided by the estimated VAR model GC tests are completed for each sector and presented in Table 2.

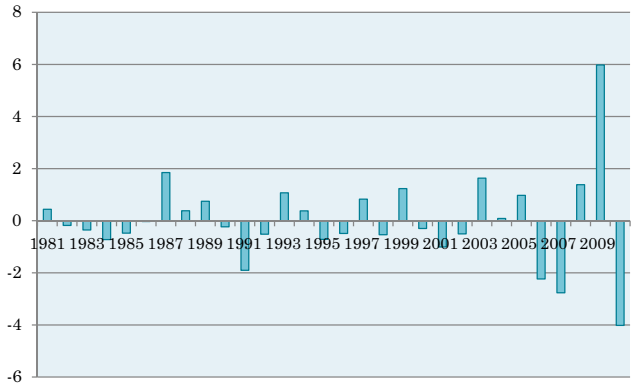

Fig. 10. Office sales receipts as percentage of capital value – deviations from the HP filter trend (λ = 6.25)

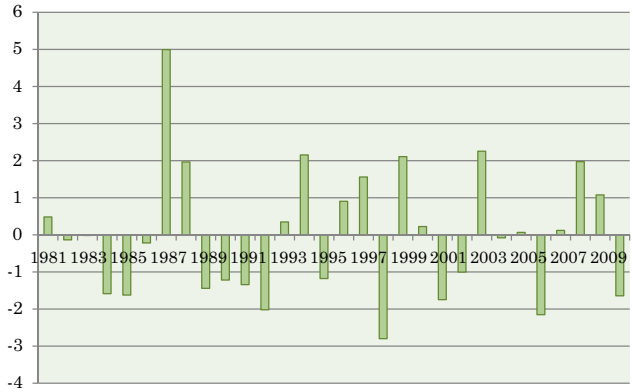

Fig. 11. Industrial sales receipts as percentage of capital value – deviations from the HP filter trend (λ = 6.25)

The test developed by Granger (1969) ascertains the causal relationship between two variables; if past values of *x* improve the prediction of *y*, then we say *x* Granger causes *y*. Conversely, if past values of y contribute to the future value of x than we say *y* Granger causes *x*. Column 2 shows the significance of the (statistical) causal relationships from deviation in sales from trend to individual yield variable and then Column 3 gives it in the reverse direction. The null hypothesis in each case is of no causality. The significance of GC tests is that while ordinarily regressions will reflect a

Table 2. Results of Granger causality tests between yield changes and deviation in sales from HP trends for each sector

Sector	Cycle deviation → yield shift statistical significance	Yield shift → cycle deviation statistical significance	Direction of causality summary
Retail	0.270	0.000	One direction Yield shift → cycle deviation
Offices	0.022	0.040	Both directions
Industrial	0.264	0.361	No direction

correlation input; GC tests differ in the sense that they reveal causality between variables.

The internal dynamics outlined above would imply the GC test causality relationship in both directions but this holds only for office property. In the case of retail the GC test provides evidence of only a causal relationship from yield (change) to cyclical deviations in sales. For industrial properties the test results are sufficiently insignificant that we can accept the null GC hypothesis in both directions. While overall the evidence only fully supports the cycle hypotheses for the office sector which attunes with the visual evidence from Figure 11 it is partially supportive for retail. These results may be partly a reflection of the hypothesised complex causal relationships as noted above which reverse between the upturns and the downturns.

A further possible explanation is that recent volatile annual sales activity identified by the HP analysis is that it can no longer be explained in terms of cycles but reflects opportunities to sell which in turn could partly reflect short term sentiment. Investors who find that there are willing purchasers prepared to pay (significantly) above the internal valuation take the sales opportunity. So, for example, if market sentiment is such that there are many investors in the market looking to buy shopping centres then the current owners can take the chance to realise these assets. This effect can also be seen vividly in the impact of overseas purchasers seeking central London offices during times of international turbulence, and this has led to unanticipated high sales activity since the global financial crisis (Lizieri 2011). These purchasers have been paying on average 1½–2½ times that paid by UK investors (Mitchell 2014). Overseas investors have been driving transaction activity by paying high prices and thereby create liquidity/transactions patterns that have little to do with the internal fundamentals of the commercial property market.

9. CONCLUSIONS

The concept of real estate liquidity has traditionally been seen as linked to the imperfections of the market, and measured in time (and implicitly the cost) required to sell. This is a very narrow perspective as liquidity is much more complex, encompassing influences ranging from the responsiveness of price to sales and the depth of the market. It is logically multi-dimensional and difficult to quantify. There are a range of definitions applied in equities research reflecting these different dimensions. This study is the first analysis of changing real estate liquidity that has followed this wider perspective by measuring the depth of institutional markets. Future research should be expanded to encompass other segments of the real estate market such as secondary locations/properties.

This paper initially hypothesises that liquidity in the real estate market is influenced by trend and cyclical components. The long term trend has been influenced by the growth of information/benchmarking and an urban development cycle driven by new technologies. The last thirty years has seen substantial change in the urban environment so that economic functional obsolescence of real estate has become commonplace with associated redevelopment. Together with greater short term investment horizons these all typically have, it is argued, contributed to a more active restructuring of property investment portfolios and a long term rise in transactions activity and liquidity. The statistical evidence is consistent with these predictions. Liquidity increases broadly tenfold across the sectors over the twenty five years from 1% in 1981. Scofield's (2013) research shows that the time to complete sales has fallen mirroring this trend in transactions activity.

The stylised analysis of the anatomy of property cycles identified analogous transactions' patterns and hence equivalent variations in liquidity. These anticipated cyclical patterns are hypothesised to be overlain on the long upward trend in transac-

tions activity. The statistical analysis including GC tests does not lead to a definitive conclusion, which most likely reflects the complex interaction of the forces at work. While the recession of the late 1980s sees a significant dip in sales activity, it seems subsequent cyclical influences on transactions activity and liquidity are swamped by increasing variability from one year to the next. This is true for all three sectors on a similar scale up to the global financial crisis although the scale of the deviations is highest in the retail sector. It is possible that the long term increase in transactions activity has impinged on cyclical patterns, so that these phenomena become ultimately diluted.

One potential explanation is that over the last two decades a short term opportunity driven real estate investment culture may have emerged stimulated by the increased "churn" of properties, which in turn is partly the consequence of the pace of urban change. This explanation is speculative but there is greater volatility to the commercial real estate market. The impact of the credit crunch on the one hand dampened the level of transaction activity but not the volatility. With the ramifications of the credit crunch still to fully unwind it is unclear whether this is a long term sea change in volatility or whether it was a product of the UK real estate market of the 2000s. The story is complicated by the role of overseas investors who have been driving sales especially in the South East.

Overall the research demonstrates a long term increase in liquidity that can be seen as a positive for real estate investment relative to other assets. However, the increased market volatility observed recently is a negative feature of the market, as risk is augmented. Each of these market phenomena can be seen to stem partly from increased short termism, and arguably neither is in the ultimate interest of real estate as an institutional investment medium.

REFERENCES

Backus, D. K.; Kehoe, P. J. 1992. International evidence on the historical properties of business cycles, *American Economic Review* 82(4): 864–888.

Barras, R. 1987. Technical change and the urban development cycle, *Urban Studies* 24(1): 5–30. http://dx.doi.org/10.1080/00420988720080021

Barras, R. 1994. Property and the economic cycle: building cycles revisited, *Journal of Property Research* 11(3): 183–197. http://dx.doi.org/10.1080/09599919408724116

Barras, R. 2005. A building cycle for an imperfect world, *Journal of Property Research* 22(2–3): 63–96. http://dx.doi.org/10.1080/09599910500453905

Baum, A.; Crosby, N. 1995. *Property investment appraisal*. London: Routledge.

Baxter, M.; King, R. G. 1999. Measuring business cycles: approximate band-pass filters for economic time series, *Review of Economics and Statistics* 81(4): 575–593. http://dx.doi.org/10.1162/003465399558454

Benveniste, L.; Capozza, D.; Seguin, P. 2001. The value of liquidity, *Real Estate Economics* 29(4): 633–660. http://dx.doi.org/10.1111/1080–8620.00026

Bond, S.; Crosby, N.; Hwang, S.; Key, T.; Lizieri, C.; Matysiak, G.; McAllister, P.; Ward C. 2004. *Liquidity in commercial property markets,* Working Paper No. 5. Investment Property Forum, London.

Brounen, D.; Eichholtz, P.; Ling, D. 2009. The liquidity of property shares: an international comparison, *Real Estate Economics* 37(3): 413–445. http://dx.doi.org/10.1111/j.1540–6229.2009.00247.x

Buckles, B. W. 2008. Liquidity dynamics in commercial real estate, *Journal of Real Estate Portfolio Management* 14(4): 307–323.

Collett, D.; Lizieri, C.; Ward, C. 2003. Timing and holding periods of institutional real estate, *Real Estate Economics* 31(2): 205–222. http://dx.doi.org/10.1111/1540–6229.00063

Cooley, T. J.; Ohanian, L. E. 1991. The cyclical behavior of prices, *Journal of Monetary Economics* 28(1): 25–60.

Correia, I. H.; Neves, J. L.; Rebelo, S. T. 1992. Business cycles from 1850–1950: new facts about old data, *European Economic Review* 36(2/3): 459–467. http://dx.doi.org/10.1016/0014–2921(92)90103–4

Crosby, N.; Devaney, S. 2011. *Depreciation of commercial property in the UK*. Investment Property Forum, London.

Crosby, N.; McAllister, P. 2004. *Liquidity in commercial property markets: deconstructing the transaction process*. Department of Land Management and Development. University of Reading. Reading.

Devaney, S.; Scofield, D. 2014. *Time to transact: measurement and drivers*. Investment Property Forum, London.

Dunse, N.; Jones, C.; White, M.; Trevillion, E.; Wang, L. 2007. Modelling urban commercial property yields: exogenous and endogenous influences, *Journal of Property Research* 24(4): 335–354. http://dx.doi.org/10.1080/09599910801916261

Fisher, J.; Gatzlaff, D.; Geltner, D.; Haurin, D. 2003. Controlling for the impact of variable liquidity in commercial real estate indices, *Real Estate Economics* 31(2): 269–303. http://dx.doi.org/10.1111/1540–6229.00066

Fisher, J.; Geltner, D.; Pollakowski, H. 2007. A quarterly transactions-based index (TBI) of institutional real estate investment performance and movements in supply and demand, *Journal of Real Estate Finance and Economics* 34(1): 5–33. http://dx.doi.org/10.1007/s11146–007–9001–6

Fuller, W. A. 1976. *Introduction to statistical time series*. New York: John Wiley.

Forster, S. (Ed.) 2013. *Developing property as an asset class*. Investment Property Forum, London.

Fraser, W. D. 1993. *Principles of property investment and pricing*. 2nd ed. London: Macmillan.

Gerald Eve. 2005. *Holding periods: analysis for UK office investors*. Gerald Eve, London.

Granger, C. W. J. 1969. Investigating causal relationship by econometric models and cross spectral methods, *Econometrica* 37(3): 424–438. http://dx.doi.org/10.2307/1912791

GVA Grimley. 2010. *UK offices: redelopment vs. refurbishment*. GVA Grimley, London.

Henneberry, J.; Roberts, C. 2008. Investment in the UK calculated inequality? Portfolio benchmarking and regional office property, *Urban Studies* 45(5–6): 1217–1241. http://dx.doi.org/10.1177/0042098008089866

Hodrick, R.; Prescott, E. C. 1997. Postwar US business cycles: an empirical investigation, *Journal of Money, Credit, and Banking* 29(1): 1–16. http://dx.doi.org/10.2307/2953682

Investment Property Databank (IPD). 2010. *IPD UK Digest*. IPD, London.

Investment Property Databank (IPD). 2012. *Change to British land valuation frequency leads to removal of British land from IPD UK quarterly and annual indices from Q2 2012*. IPD, London.

Investment Property Databank (IPD). 2013. *IPD UK quarterly Q2 2013*. IPD, London.

Jones, C. 2009. Remaking the monopoly board: urban economic change and property investment, *Urban Studies* 46(11): 2363–2380. http://dx.doi.org/10.1177/0042098009342450

Jones, C. 2010. The rise and fall of the high street shop as an investment class, *Journal of Property Investment and Finance* 28(4): 275–284. http://dx.doi.org/10.1108/14635781011058884

Jones, C. 2013. *Office markets and public policy*. Oxford: Blackwell-Wiley. http://dx.doi.org/10.1002/9781118554302

Jones, C.; Dunse, N.; Cutsforth, K. 2015. The changing relationships between government bond yields and capitalisation rates: evidence from the UK, USA and Australia, *Journal of European Real Estate Research* 8(2): 153–171. http://dx.doi.org/10.1108/JERER-05–2015–0023

Key, T.; MacGregor, B. D.; Nanthakumaran, N.; Zarkesh, F. 1994. *Understanding the property cycle*. Royal Institute of Chartered Surveyors, London.

Kyle, A. S. 1985. Continuous auctions and insider trading, *Econometrica* 53(6): 1315–1336. http://dx.doi.org/10.2307/1913210

Lizieri, C. 2011. *Who owns the city? An analysis of office ownership and global investment in the City of London*. Development Securities PLC, London.

Lizieri, C.; Kutsch, N. 2006. *Who owns the city 2006? Office ownership in the City of London*. Development Securities PLC, London.

McNamara, P. 1998. Exploring liquidity: recent survey findings, in *The 7th Investment Property Databank Conference*, 27–28 November 1998, Brighton, UK.

Maravall, A.; del Rio, A. 2007. Temporal aggregation, systematic sampling, and the Hodrick-Prescott filter, *Computational Statistics & Data Analysis* 52(2): 975–998. http://dx.doi.org/10.1016/j.csda.2007.08.001

Mitchell, P. 2014. *The size and structure of the UK property market 2013: a decade of change*. London: Investment Property Forum.

Niskanen, J.; Falkenbach, H. 2012. Liquidity of European real estate equities: REITs and REOCs, *International Journal of Strategic Property Management* 16(2): 173–187. http://dx.doi.org/10.3846/1648715X.2011.587906

ODPM. 2004. *Monitoring the 2002 Code of practice for commercial leases: interim report*. University of Reading, Reading and Office of the Deputy Prime Minister, London.

Ravn, M. O.; Uhlig, H. 2002. On adjusting the Hodrick-Prescott Filter for the frequency of observations, *Review of Economics and Statistics* 84(2): 371–380. http://dx.doi.org/10.1162/003465302317411604

Scofield, D. 2013. Time to completion liquidity in UK commercial real estate investment: 2000–2008, *Journal of European Real Estate Research* 6(1): 34–47. http://dx.doi.org/10.1108/17539261311313004

Wheaton, W. 1999. Real estate "cycles": some fundamentals, *Real Estate Economics* 27(2): 209–230. http://dx.doi.org/10.1111/1540–6229.00772

APPENDIX A. Quarterly analysis, 2001–2013

A parallel HP quarterly analysis was also undertaken based on the much shorter period 2001 until the second quarter of 2013 derived from data drawn from IPD (2013). Quarterly figures are inevitably more susceptible to large real estate purchases than annual data. The most extreme example in the time series is the industrial purchases in 2001 Q3 that are equivalent to 70% of all purchases for the year. Quarterly figures are also affected by seasonal influences. In terms of numbers quarter three is the most popular for purchasing and quarter four for sales. The quarterly factor impacts on the identification of real estate cycles. There are only a small number of occurrences where there is clear run of quarters that rise or fall consecutively. These are:

- In 2007 purchases fall quarter on quarter for the full year, resulting a decrease of more than 80%;
- In 2001 sales consistently rise through the four quarter to give an increase of 25%;
- From the first quarter of 2008 sales fall in each of five quarters resulting in a drop of almost 60%.

However, these rises or falls last only a maximum of five quarters and are limited in number. There is a lack of cyclicity evident in these quarterly figures over this twelve year period except for the dominance of the global financial crisis. It led to a fall in capital values by 30% and contributed to a re-appraisal of real estate investment values (Jones *et al.* 2015), creating arguably a unique upheaval in domestic investment.

The HP quarterly trend/cycle analysis uses a λ value of 25 rather than the 6.25 for the annual time series presented in the main element of the paper. Both the HP trends in real value of purchases and sales are distorted by the magnitude of the credit crunch, reflecting the limitations of focusing on a short period with a severe event at its centre. There is a dramatic downward HP trend in the real value of purchases from 2005/06 in all three sectors until 2009 when the trend stabilises. The HP trend in sales is the opposite with an accelerating upward trend especially after 2011, particularly for offices with the leakage to international investors noted in the paper.

In terms of liquidity, measured by sales as a percentage of capital value, the quarterly HP analysis identifies an even more accelerating upward trend from the beginning of 2008. With regard to the trend in purchases as a percentage of capital value the HP analysis gives a more moderate picture because the fall in the real value of purchases is associated with a fall in capital values. The deviations from the HP sales trends for the different sectors show some variation between sectors, but the general pattern is similar. From the middle of the last decade deviations from the trends get larger as in the annual data.

This quarterly analysis largely confirms the results of the annual data for the decade up to 2010. However, the short time period of the analysis has its limitations as a result of the scale impact of the global financial crisis. One consequence is that it is difficult to identify trends. The HP trends based on purchases in particular look more like a jagged cycle while the sales trends exhibit a sudden rise after 2011. Both phenomena can be attributed to the credit crunch. The analysis does demonstrate the sudden rise in leakages after 2010, beyond the period of the main study.