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Liquidity and the Drivers of Search, Due Diligence and Transaction Times for UK Commercial Real Estate Investments

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Abstract

Trading commercial real estate involves a process of exchange that is costly and which occurs over an extended and uncertain period of time. This has consequences for the performance and risk of real estate investments. Most research on transaction times has occurred for residential rather than commercial real estate. We study the time taken to transact commercial real estate assets in the UK using a sample of 578 transactions over the period 2004 to 2013. We measure average time to transact from a buyer and seller perspective, distinguishing the search and due diligence phases of the process, and we conduct econometric analysis to explain variation in due diligence times between assets. The median time for purchase of real estate from introduction to completion was 104 days and the median time for sale from marketing to completion was 135 days. There is considerable variation around these times and results suggest that some of this variation is related to market state, type and quality of asset, and type of participants involved in the transaction. Our findings shed light on the drivers of liquidity at an individual asset level and can inform models that quantify the impact of uncertain time on market on real estate investment risk.

Keywords

Time on market; Liquidity; Transaction process; Hazard models; Real estate risk

1. Introduction

Arguably, the most important characteristic of liquidity is the time it takes to complete an investment or convert an asset into money (Lippman & McCall, 1986). Buying and selling commercial real estate involves a process of exchange that occurs over an extended period and incurs risks and costs of a character and order that are different from many other investment assets. These stem from the private and dispersed nature of real estate markets and the fact that real estate assets are heterogeneous, with varying physical, spatial and legal characteristics. Buyers must spend time searching for suitable assets and sellers spend time attracting buyers. The nature of risk in this period is investigated by Lin &

Vandell (2007). Their models estimate the extent to which ex-post data on real estate returns understates the ex-ante risk taken by real estate investors because it does not account for uncertainty about the marketing period itself. However, search and marketing are not the only lengthy or uncertain stages of transacting, with price agreement – the moment a bid is accepted by a seller – being only the start of further negotiations and processes that are neither immediate nor without friction.

The length and variability of transaction times has implications for investment strategies that can be applied to commercial real estate and renders some measures that are used in determining the liquidity of other assets less relevant. Measures used for financial assets concern not just trading volumes, but also costs of trading in terms of bid-ask spread and the sensitivity of prices and returns to trading. However, it can be difficult to assess these in the private real estate market. Even turnover is difficult to measure in the absence of robust information on market size while time on market is not consistently measured for commercial real estate assets. In contrast, studies addressing liquidity for other major investment assets can often assume transaction transparency and immediacy, coupled with low to modest transaction costs. Nonetheless, the time taken to transact, and how this varies between assets, is of major relevance to real estate market participants.

Previous research (Crosby & McAllister, 2004 and Scofield, 2013) highlights significant variability in the time to transact commercial real estate assets; both through time and across cases, as well as between different stages of the process. Lin & Vandell (2007) provide a description of the real estate sale process in which a defining feature is the sequential but random arrival of offers that characterises the outcome of search by both buyers (for assets) and sellers (for counterparties). The uncertainty surrounding both price and the length of the transaction period in this process affects both the risk and returns from real estate investment.¹ There is currently little information on whether variation across cases and stages is simply random or whether other features of the asset or process (such as the approach adopted for sale and the use and structure of brokerage) can explain this.

This study explores relationships between time to transact, asset characteristics, market state and other features of the transaction process using a sample of nearly 600 UK commercial real estate transactions that took place over the period 2004-2013. To date, information on the time it takes to transact commercial real estate has not been collected

systematically in many markets. This may, in part, explain why the majority of academic research on transaction times has occurred for residential rather than commercial real estate assets. This study is based on primary data collected by the authors and it aims to extend knowledge on what causes variations in transaction times and so drives liquidity at an individual asset level.

The remainder of the study is structured as follows. First, a review of relevant work on time to transact is presented. The review begins with theoretical insights from studies on time on market for residential real estate before discussing studies on time to transact in commercial real estate markets. After this, the data collected for this study are discussed. The dataset contains variables such as dates for transaction events, price, property type, location and counterparties. Tabular analyses of transaction times are then presented and these analyses are followed by econometric modelling that concentrates on variability in the due diligence phase of the transaction.

The key findings are that transaction times vary markedly with market conditions, the type and quality of the asset being traded and the nature of the participants involved in the transaction. We find that average transaction times were shortest during the growth phase of the UK commercial real estate cycle and lengthened as market conditions deteriorated and prices fell after Q2 2007. However, they lengthened even further in the aftermath of market collapse, once the trough in prices had been reached. This suggests that both the direction and speed of market movement influence the number and length of commercial real estate transactions. More complex real estate investments such as Shopping Centres and portfolios of properties took longer to transact while the involvement of institutional investors leads to deals being concluded more rapidly.

2. Literature review

2.1. Theoretical background

In the residential literature, most studies of transaction times concentrate on the concept of time on market. This focuses on time from a seller perspective and can be defined as the period from first listing to deposit, though some use the phrase to define the entire sale process (see Benefield & Hardin, 2013). Sirmans, MacDonald & Macpherson (2010)

provide a meta-analysis of some of the most important studies of time on market. Our work considers both the search/marketing phase and the due diligence phase of the transaction process. In a commercial real estate context, both of these phases exhibit considerable uncertainty and variability in their length.

Search models show how the time it takes to sell a property is affected by the number of buyers relative to the number of sellers (e.g. see Novy-Marx, 2009). More buyers mean more viewings and a greater chance of a successful match, but more sellers means more competition and dilution of buyers across available assets. A successful match depends on the potential buyer being willing to match or exceed the reservation price of the seller. Fisher, Gatzlaff, Geltner & Haurin (2004) suggest that, across all buyers, there is a distribution of potential bids while, across all sellers, there is a distribution of reservation prices. The extent of the overlap between these distributions will determine the amount of market activity. This overlap should be greater in strong markets if buyer prices rise more rapidly with changing market conditions, and Clayton, MacKinnon & Peng (2008) discuss why this might be expected. Thus, holding constant the number of sellers, assets should sell more rapidly owing to more buyers and a greater probability of making a match.

However, sellers could adjust their reservation prices upwards as a boom progresses and more sellers may enter the market, altering the balance between buyers and sellers once more. Therefore, the relationship between market conditions and transaction times could be complex. Yet residential studies report average transaction times that are shorter during strong markets (Pryce & Gibb, 2006; Carrillo, 2013). Hence, we expect that the strength or otherwise of the market is likely to have an important effect on transaction times, with faster times in stronger market conditions. We also expect that the element of time most likely to be affected is the search phase. We anticipate that average due diligence times would remain the same unless, in strong markets, buyers reduce the amount of due diligence that they carry out.

The residential literature also draws attention to the relationship between pricing strategies and time to transact. For example, if a seller sets too high a reservation price relative to the asset's true value, then the asset is likely to stay on the market longer. Conversely, if the seller sets too low a reservation price, then an asset is likely to trade more quickly. Highly motivated sellers may set lower reservation prices to ensure that they get access to capital quickly, e.g. distressed sellers. Hence, potentially, prices and transaction times are

endogenous, with implications for econometric modelling. Studies that consider the characteristics and motivations of sellers with reference to the sale of single family homes include Anglin (2006) and Glower, Haurin & Hendershott (1998). It should be noted that the mix of market participants can change over time and in connection with market state.

Buyer and seller circumstances are likely to matter in commercial real estate markets as well, but the nature of the participants and their circumstances differs considerably from the residential arena. Firm level processes and organisational dynamics are more likely to affect transaction times. For example, internal 'buying centres' are expected to be similar within the same type of investors. These investment firms will cast individuals in similar investment roles and transactions will occur within similar organisational structures, with similar authorities, status and rewards, utilizing similar subsystems of communication (Webster & Wind, 1972, as cited in Gallimore, McAllister & Hughes, 2006). When similar investor types transact, similar internal organization and related processes might encourage more efficient transactions between these groups.

Furthermore, private real estate markets provide sellers with an informational advantage relative to buyers. Research and due diligence by buyers attempts to eliminate this, but this incurs costs. These costs rise when buyers lack market familiarity. In particular, non-domestic investors may suffer from informational disadvantages as compared to their domestic counterparts. However, investors and others may use brokers to mitigate information differences and acquire assets faster, though this does increase the cost of the transaction. The role and use of brokers or agents varies across markets (Devaney & Scofield, 2013), but, in principle, they should facilitate search and may also offer advice to facilitate the due diligence process, making transactions more efficient. For example, Baryla & Zumpano (1995) find for residential property that brokers increase buyer search intensity, reducing actual search time.²

Finally, early research considered the impact of housing quality on selling time (Cubbin, 1974) and the literature has since considered this and related issues such as the effects of atypical characteristics on transaction times (Haurin, 1988; Haurin, Haurin, Nadauld & Sanders, 2010). More complex or unusual assets take longer to sell since fewer buyers lead to longer marketing periods while complexity increases the necessary due diligence relating to ownership, use or other attributes of the asset. What makes for a complex or

unusual commercial real estate investment is likely to differ from the case of a residential property, but we expect the general insight to remain valid.

2.2. Empirical research on commercial real estate

Early treatment of the relationship between transaction time and price for commercial real estate investments comes from Trippi (1977). His work posits that sellers of real estate face two conflicting objectives: maximising price whilst minimising transaction time. This creates “ceteris paribus, a clearly defined trade-off between expected time to sell and the capitalization rate ($r = \text{income/price}$)” (1977: 838). Trippi models these assumptions using a Cobb-Douglas production function in which price and time form a single dependent component, while factors relating to the economic environment, the age of the structure, the number of rental units and quality rankings based on location and appearance form a second set of variables. The work finds that higher capitalisation rates are associated with shortened expected time to sale.

McNamara (1998) explored the acquisition and sale process for UK commercial real estate through a survey of investment principals and agents directly involved in transacting commercial real estate on behalf of institutional investors. He noted three key points in the transaction process – heads of terms/price agreement, exchange and completion – and used these to define three stages in that process: either search (buyer) or marketing (seller), due diligence and settlement. He then reported indicative times for these stages. A seller was judged to need 4-6 weeks to find a buyer for high street retail units versus 6-8 weeks for offices and 7-9 weeks for shopping centres. Due diligence ranged from 4-6 weeks for high street retail through to 12 weeks for shopping centres. On the buy side, similar patterns were reported, though with longer times to allow for search and selection of appropriate assets.

McNamara notes a further difference between commercial and residential real estate investment: the role of income and associated opportunity costs of capital. He compared real estate liquidity to that of equities and developed a model of the opportunity costs incurred during time on market. This work demonstrates that buyers and sellers of real estate incur differential opportunity costs concomitant with time to transact. Time on market illiquidity is “a two tailed problem” affecting buyers and sellers differentially (1998: 17). Yet the study found little evidence that investors in commercial real estate – whether buying or selling – were adjusting prices to reflect opportunity costs.

Johnson, Wiley & Zhonghua (2007) examine 956 office sales from across 39 US markets using data from CoStar. The average time on market for their sample is reported to be 260 days (over eight months). They find that lower grade properties with higher square footage take longer to transact and that longer marketing times correlate with price discounts. The authors posit that the lack of similar studies on commercial real estate in the literature is because these assets continue to produce income for their owners during the sale process, mitigating any capital loss associated with time on market. However, the consequence to an investor of a delay in transacting is that it narrows the band of subsequent investment opportunities (Hicks, 1974, as cited in Lippman & McCall, 1986: 54) and will affect their ability to use capital efficiently and so meet operational requirements.³ This important observation coincides with McNamara's insights regarding opportunity costs.

Crosby & McAllister (2004) provide further evidence for UK commercial real estate. They focused on the sell side of the transaction and measured average times per stage of the sale process using data on 187 transactions collected from the records of three major real estate investors for the periods 1995-1996 and 2000-2002. The authors adapted McNamara's stages of the sale process, expanding these to six: decision to sell sector, decision to sell asset, pre-marketing, marketing, due diligence and exchange to completion. Their paper marked the first attempt to analyse data collected directly from transaction principals.

Crosby & McAllister highlight the importance of stages prior to marketing, as it is here that specific assets are selected and prepared for sale, but the length of these stages is very difficult to quantify. Working from the first record of sale, which sometimes predated formal marketing, the mean transaction time was found to be more than nine months and the median time to be more than six months in length. The authors noted considerable variability in the time to transact and that this not only affected the marketing stage, but also the due diligence stages of the transaction. They found that "few generalisations can be made concerning the causes of longer and shorter transaction times", but to disaggregate and analyse further "the sample size needs to increase and the number of funds and range of ownership also needs to increase" (2004: 36-37).

Bond, Hwang, Lin & Vandell (2007) note how uncertainty and variability in time to transact is an important element of the ex-ante risk of real estate investment. They model this risk using the framework set out in Lin & Vandell (2007) and the empirical data of

Crosby & McAllister (2004). They argue that uncertainty around the time needed to sell assets prompts risk mitigation strategies such as longer holding periods and a minimum number of assets held in a portfolio. In addition to uncertainty about the time it takes to liquidate real estate, there is a comparable risk to investors of being unable to place capital when required to meet redemption and consumption demands in other areas of the investment portfolio. Moreover, holding period and market state at the time of sale are also important (see also Lin & Vandell, 2007; Lin, Liu & Vandell, 2009).

Hordijk & Teuben (2008) provide evidence on transaction times for the Netherlands, also focusing on sellers. They conducted interviews with brokerage firms and gathered evidence on 512 real estate transactions occurring between 1995 and 2002. They did not conduct any econometric analysis despite their relatively large sample. Instead, they tabled average times by sector, year of sale and value of the sale concerned. They also discuss the opportunity costs arising from delays in real estate transacting.

Finally, Scofield (2013) tests for changes in median transaction times by analysing buy side data sourced from transaction principals alongside sell side data collected by Crosby & McAllister (2004). The buy side data relates to 115 purchases between 2005 and 2008. Scofield concentrates on the due diligence stages of the transaction, so that comparative analysis of changes in time to transact can be made between the periods represented in these studies. He shows that time to transact varies with overall market activity: greater transaction volume and steadily rising returns are found to be significantly associated with shorter times from the point of price agreement to deal completion. However, results were based on a comparatively small number of transactions and the present study significantly increases the evidence base, allowing a deeper analysis to be conducted.

3. Data

To facilitate new analysis of transaction times for commercial real estate, primary data collection took place during late 2013. Different investment organisations were asked if they could supply dates for key stages in the transaction process for deals where they acted either as buyer or seller. Key dates were defined by the authors based on prior research by McNamara (1998), Crosby & McAllister (2004) and Scofield (2013). For purchases, these were the date on which the asset was first introduced, the date on which price was agreed,

the date that solicitors were instructed, the date when contracts were exchanged and the date of completion. For sales, the same dates were sought except that introduction date was replaced by the date on which the asset was first marketed.

The dates requested relate to easily identifiable landmarks in the transaction process. Yet it is likely that the time between the first and the last date will understate the total time involved in transacting given that buyers must search for suitable assets while sellers must spend time selecting and preparing assets for sale before placing them on the market. However, timings for these activities are much harder to quantify. For example, in the case of institutional investors, there is often a rolling programme of introductions whereby they receive information from brokers about different opportunities on a regular basis. Thus, defining a date when search began that can be related to each specific purchase may be impossible. In contrast, data contributors could identify a specific date of introduction fairly easily.

Data from Real Capital Analytics/Property Data (RCA/PD) was used first to identify the most frequent buyers and sellers of UK investment grade real estate over the last decade and this provided a sampling frame from which enquiries were made. This list was supplemented with names of other organisations in which the authors had contacts. Twenty-four organisations were approached, of which seven provided data for this study. Those responding with data included insurance companies, fund management houses and real estate investment trusts. Furthermore, similar information on purchases collected by Scofield (2013) was reused in this exercise. Two additional organisations are represented in the data collected by Scofield, raising the number of contributing firms to nine.

To assist with data collection, a template was supplied by the authors to each firm which showed a list of variables desired for this study. The templates were prepopulated with a list of deals involving those firms (either as buyers or sellers) and this was achieved with reference to data supplied by RCA/PD – itself based on information in the public domain. Firms were then asked to provide data relating primarily to the dates noted above, but also about other asset and transaction features if not already captured by RCA/PD, such as the capitalisation rate or counterparties involved.⁴ Although it facilitated responses, a potential issue with prepopulating the templates in this way is that it placed the focus on successful deals, but time lost in aborted transactions may be of interest as well. Contributors could

report additional transactions, if they wished, and did so in some instances, but only two aborted transactions in total were captured.

Table 1 shows the size of the dataset assembled for this study. It comprises 303 purchases and 280 sales spanning the period 2004 to 2013. Five transactions were duplicates in the sense that they were bought and sold between data contributors and reported by both parties. Allowing for these instances, 578 transactions are captured representing £15.7 billion of expenditure. 542 of these transactions were sales of individual properties while 36 transactions related to portfolios. The three main sectors of the UK commercial real estate market are all represented in the dataset. There were 237 retail, 194 office and 124 industrial transactions, as well as 23 deals involving other property types. The sample size for each sector broadly reflects the size and structure of the UK commercial real estate investment market (see IPF, 2014).

INSERT TABLE 1 HERE

Table 2 presents information on how complete the different fields are within the dataset. Sector, location and price are all 100% complete, as are type of buyer for the purchases and type of seller for the sales. Information on the counterparties was also relatively complete and this facilitated the construction of variables that described the type of organisation and nationality of the counterparty in each case. This step was guided by the classification scheme used by RCA/PD to determine the nature and sources of capital for real estate transactions. Capitalisation rate and floorspace are both fairly complete, but the situation with dates is more variable. Nonetheless, two or more dates were reported for each of the 578 transactions and this meant that the time in days for at least part, if not all of the transaction process could be measured in each case.

INSERT TABLE 2 HERE

From Table 2, it can be seen that completion date is reported in all cases. The date when solicitors were instructed is the next most populated, followed by date of exchange. Other dates are then less well populated. However, in cases where both date of price agreement

and the date when solicitors were instructed were available, the difference between them was very small, with a median distance of only one day. Nor was it uncommon for the instruction of solicitors to happen on the same day as price agreement. For this reason, a new date variable was created once data collection had been completed and this equalled the date of price agreement, if available, or the solicitor instruction date in other cases. This allowed the analysis to focus on two key phases in particular: time from either introduction or marketing of the asset to price/solicitor and time from price/solicitor to completion. This helped to utilise the available data more effectively.

4. Results

We now report the length of different stages in the transaction process as measured from our sample. After reviewing all purchases and all sales, the dataset is disaggregated to explore how transaction times vary with factors such as market state, property type, price and counterparty. Table 3 provides summary statistics for transaction times both in terms of total time measured for purchases and sales and the length of the two major stages in each case relating to the periods before and after price agreement. It reports the number of transactions on which average times are based, two measures of average time (mean and median) and the standard deviation in transaction time as a measure of spread around the mean. The table also reports skewness and kurtosis, which indicate that the distributions of times are strongly peaked and positively skewed. As such, a normal distribution is easily rejected in all cases. This matches the findings of Bond et al. (2007: 453) in relation to the data that they used.

INSERT TABLE 3 HERE

For purchases, the stage from introduction to price agreement/instruction of solicitors has a median length of 35 days, or just over one month, and was not usually longer than three months. The period from price agreement/instruction of solicitors to completion was then longer, with a median length of 56 days. Within this time, the due diligence period up to exchange of contracts was more lengthy than the period required for settlement. Exchange to completion typically took a week and there were a few instances (45 cases) where these

two events occurred on the same day. Total time from introduction to completion of a purchase, where this could be measured, suggests a typical timespan of over 100 days or around three and half months.

For sales, the stage from initial marketing to price agreement/instruction of solicitors has a median length of 42 days, or about one and half months, but could be as long as six months or more. The period from price agreement/instruction of solicitors through to completion was then longer, with a median length of 64 days, though there is considerable variation around this figure. Once again, within this time, the due diligence period up to exchange of contracts was normally longer than the time needed for settlement. Finally, the total time from initial marketing to completion of a purchase, where this could be measured, exhibited a median figure of 135 days, or around four and half months.

Patterns in the sales data are broadly consistent with those in the purchases data. The first stage is longer for sales, which is unsurprising given that this includes time spent on the market before introduction to the successful buyer. What is surprising is that the median is only one week longer, though there is a larger difference when total time is compared. There are also substantial variations around the average times. Graphs that show the distributions of transaction time, including times for each stage, are provided in the appendix. These distributions are all similar in shape: positively skewed with a tail of instances in which lengthy delays occurred. There are no significant correlations (either positive or negative) between the times taken for different stages. For instance, a long marketing period is not necessarily followed by a long due diligence phase.

As noted earlier, a key influence on variations in transaction times is likely to be market state, as this should influence the numbers of buyers and sellers. The number of potential buyers or sellers is not easy to quantify and is often proxied by transaction volumes or other information on market conditions. One assumption would be that, in deteriorating markets, there are fewer buyers relative to sellers and so prices fall and fewer transactions take place. Hence, market state was defined with reference to turning points in price and capital value indices. The IPD UK quarterly capital growth index peaked in Q2 2007 and then fell before reaching a trough in Q2 2009. Similarly, the RCA/PD UK Commercial Property Price Index peaked in Q2 2007 and bottomed out in Q2 2009. With reference to these series, four market phases were defined: Boom (up to June 2007), Downturn (from July 2007 to June 2009), Recovery (from July 2009 to June 2011) and Recent (July 2011

onwards). Transactions were then grouped into one of those four periods based on their date of completion.⁵

Table 4 shows the median times for key transaction stages according to the market state in which the transaction completed. For this and subsequent tables, only the price/solicitor to completion stage is shown for sales because a lack of data for the marketing stage prevents disaggregation. In the final row of the table, results from a non-parametric test of whether median times for different periods are significantly different from each other are reported. In this test, the null hypothesis is that no difference exists between the median times for each group of transactions.⁶

INSERT TABLE 4 HERE

The figures indicate that average transaction times lengthened as the downturn began and then continued to lengthen during the recovery. This seems to be driven by the phase prior to price agreement and the differences in median times relating to this phase are found to be highly statistically significant. It may be surprising that there is not a starker transition between boom and downturn. However, some deals that completed during the downturn had already reached price agreement in the boom phase. In these cases, the initial phase of the transaction was rapid, contributing to a shorter than expected overall transaction time. Furthermore, the dataset largely ignores withdrawn or aborted transactions. According to proprietary RCA/PD data, the proportion of aborted deals rose over the course of 2008 and peaked during 2009. Thus, liquidity will have reduced more in the downturn than these figures on transaction times indicate since time lost in aborted transactions has not been captured in the measurements above.

Other possible sources of variation relate to property type. Table 5 shows results for the main sectors of the UK commercial real estate market and for assets in sectors outside the UK investment mainstream. Furthermore, given wide variation within the retail sector in the nature and scale of assets, figures were computed for segments such as retail parks, shopping centres and supermarkets. Standard shops and individual retail warehouses are the types of retail property that progress most rapidly from introduction to price agreement while shopping centres take the longest, though, surprisingly, the differences are not found to be statistically significant in this instance. In contrast, differences in median time for

introduction to completion are significant with the total time being longest for shopping centres, while individual retail warehouses take least time to transact. Similar relativities between types of retail were reported in McNamara (1998).

INSERT TABLE 5 HERE

Price might also influence transaction times, but the relationship between time and price is complex, since time spent on the market could affect the eventual price that is accepted by a seller. Furthermore, a confounding factor arises from the fact that the transactions are spread over a number of years. Therefore, some properties may appear to be more valuable than others simply because they were sold in a stronger market. To address this second point, the price for each asset was adjusted for capital growth between the quarter in which they traded and Q4 2012, which was used as a base point. The indices used for this adjustment were the RCA/PD UK Commercial Property Price Indices.⁷

In Table 6, purchases and sales are segmented into price bands, using the adjusted prices and thresholds of £5 million, £10 million, £20 million and £50 million. For this analysis, portfolio deals were removed as these typically concluded at prices of £20 million or higher and might distort the results. There appears to be some relationship between price and time to transact, with longer times for higher priced assets, though this difference is only significant when examining the initial phase of the transaction. Table 6 also presents results from an exercise to distinguish assets of different quality. Samples of purchases and sales were each split into quartile groups, based on their achieved price per square foot (in Q4 2012 terms) relative to other properties in the same sector. The test focuses only on properties in the retail, office and industrial sectors and the results suggest that lower quality properties within each sector are associated with longer times to transact.

INSERT TABLE 6 HERE

Finally, for purchases, Table 7 records median times to transact, based on the nature of the counterparty (seller) that the purchasers were dealing with. Two distinctions are noted: a difference between UK and non-UK sellers and a difference between institutional

investors, such as insurance companies, fund management houses and pension funds, and other types of sellers, such as private property companies, private investors and non-investing organisations, such as owner-occupiers or government bodies. Meanwhile, an unknown group in each case captures deals where the identity or nationality of the seller concerned had not been recorded. The results suggest that domestic organisations and investment institutions are quicker to transact with than other types of sellers, with the differences for institutions versus other sellers being significant across all transaction stages. A similar analysis of the sales data (not reported) supports these suggestions.

INSERT TABLE 7 HERE

5. Econometric analysis

Multivariate modelling was conducted to see which factors explain transaction times after controlling for the influence of other variables. The quantity and depth of available data is an important consideration for such modelling. Most of the data relates to the time from price agreement/instruction of solicitors to completion of the transaction and not the time from either marketing or introduction date to completion. The stage from price agreement onwards differs from the classic concept of time on market and measures the efficiency of the processes required to conclude a sale (Benefield & Hardin, 2013). The analysis so far suggests that this stage is as lengthy and variable as earlier stages of the transaction process and so drivers of variations in the time taken here are of considerable interest as they still impact on the liquidity of the assets concerned.⁸

Where time is a dependent variable, there can often be violations of the assumptions under which Ordinary Least Squares techniques are effective. The alternative techniques for modelling time can be classified into parametric, semi-parametric and non-parametric techniques. The residential literature has often used parametric models to explore the determinants of time on market. Such models can be very effective, but they make assumptions about the underlying behaviour of the time variable in question. Uncritical use of parametric models is criticised by Pryce & Gibb (2006), who highlight that time on market data can violate the assumptions of the most commonly used models. Bearing this in mind, analysis was conducted here to understand the best approach to modelling the data available.

Non-parametric modelling was used first to explore the nature of the time data for each transaction stage, including the price to completion stage that is modelled below. This analysis started with the estimation of survivor and hazard functions. Beginning from a probability of 1 at time $t=0$, a survivor function plots how likely it is that properties ‘survive’ beyond time t , where ‘survival’ means that the asset remains on the market or the deal remains uncompleted. For the price to completion stage, date of price agreement represents $t=0$ in the analysis and each observation ‘fails’ at a time greater than zero, when the sale is formally completed. The hazard function then plots the probability of completion occurring within a given time interval, conditional on survival up to that point.

Our dataset contains observations of times from both a seller and a buyer perspective. These observations should be compatible for the period from price/solicitor date to completion as this stage is shared by both in a way that earlier stages in the transaction process are not. Thus, observations of price to completion times were pooled prior to analysis and the hazard function estimated on the combined data for this stage.⁹ This hazard function is displayed in Figure 1. The shape echoes the distribution of the raw data shown in appendix 1, with the probability that completion is achieved rising at first and then falling as time passes. As such, survival models that rely on the hazard function being constant over time (exponential model) or consistently rising or falling (Weibull model) can be ruled out.

INSERT FIGURE 1 HERE

Therefore, regression modelling took place using a semi-parametric technique: the Cox proportional hazards model. Further tests of whether data from the purchases and sales were compatible rejected the hypothesis of an identical hazard function between these samples, though without changing the conclusions in regard to shape. Thus, stratified Cox models were estimated that enable the baseline hazard function for the two groups of observations to differ. The models also allow for possible correlations in measured price to completion times between deals reported by the same firm. Such correlations might arise from differences in transaction processes between organisations having an influence on times or from measurement errors common to a particular firm, e.g. if one contributor

defined the price agreement date somewhat differently to another when completing the survey.

Independent variables were then chosen to try to explain variations in the time from price to completion. To test the influence of market conditions, we measure the average rate of price growth between the price/solicitor date and completion date for each transaction using the RCA/PD Commercial Property Price Indices.¹⁰ The continuous variable that this generates captures market performance over the period when due diligence occurred, with a spline used to allow for different relationships in rising versus falling markets. In effect, the spline splits the market performance indicator into two variables: the first records the average price growth in cases where this is positive and reports a zero otherwise while the second reports average price growth where negative and zero otherwise. This proved more effective in explaining variations in transaction times than using dummy variables for different market states.

In contrast, price worked poorly, whether as a continuous variable or via dummies based on the price bands defined earlier. An issue noted already is that price can be endogenous, i.e. it affects transaction time and also may be affected by how long an asset has been on the market. For example, price may be reduced if a vendor considers that their asset has been on the market for too long. In the case of the stage from price agreement, though, the presence of endogeneity is less certain. In principle, price has been determined by this point and so should be exogenous, but renegotiations can occur in some instances where due diligence reveals unforeseen problems or where new events have occurred, e.g. tenant insolvency (Crosby & McAllister, 2004). It is not known whether there are any instances of renegotiation in the data provided whereby the price supplied was not that which was originally agreed, but this possibility, together with its poor performance during tests led to the omission of a price variable from the final models.

However, price per square foot was utilised as a variable based on the quartile groups defined earlier, which were used to form dummy variables that act as proxies for asset quality. Other dummy variables identify whether an observation is a portfolio transaction and whether there are unusual legal features with the asset being traded. In the UK, these include non-freehold tenure and/or a partial interest in the property, whereas such features may be more common in other real estate investment markets. Further dummy variables were used for property type (with standard retail being the base group), buyer and seller

nationalities (UK or non-UK/unknown) and type of buyer and seller (financial institution or other/unknown).

Results from five models are presented in Table 8. The first two models present output from standard Cox proportional hazards model for price to completion times using sale observations and purchase observations, respectively. Given the findings for the hazard functions reported earlier, the third model is then a stratified Cox proportional hazards model that uses both seller and buyer observations for price to completion times. The fourth and fifth models are also stratified models based on the combined sample, but which isolate and examine observations for the retail and the office sector, respectively. For these two models, additional dummies that specified detailed asset type or location were substituted for the sector indicators.

INSERT TABLE 8 HERE

As is common for survival models, output is presented in terms of hazard ratios rather than coefficients. Essentially, there is a baseline level of hazard for each time interval, and independent variables may increase or decrease that level of hazard. An increased level of hazard means an increased likelihood of completion in each interval, which should translate into a faster time. Thus, hazard ratios report the shift in hazard relative to the baseline. A ratio below 1 means reduced likelihood of completion while a ratio above 1 means increased likelihood. So if the reported hazard ratio is 1.1, completion is 10% more likely within each interval for a unit increase in the variable in question. The table also reports the number of observations that were modelled given the availability of the independent variables.

Table 8 contains several interesting findings. First, all models indicate that market state has a very important influence on the length of the stage from price to completion. The results also suggest that this impact differs between up and down markets. In an up market, stronger price growth raises the likelihood of reaching completion more quickly. In a down market, though, it is stronger falls in prices that are associated with faster completions. This point might be difficult to understand at first sight, but, drawing on the literature review, a strong downward market movement can alter the mix of buyers and sellers, with some sellers compelled to sell and sell quickly, e.g. unit trusts to meet

redemptions (Crosby, Lizieri & McAllister, 2010). Thus, in markets that are moving rapidly up or down, buyers and sellers move more quickly to completion once they agree to transact.

Other hazard ratios suggest that portfolio transactions are less likely to reach completion quickly, which matches our hypothesis about the impact of transaction complexity on due diligence times. Similarly, investments that do not provide 100% freehold ownership to the buyer are less likely to reach completion quickly. Transactions of all property types relative to the base group of standard retail are less likely to complete quickly, with the exception of standalone retail warehouses, which are separately identified in the retail sector model. This makes sense as offices, shopping centres and retail parks are all more likely to be multi-tenanted, increasing the amount of tenant-related due diligence that is required. However, assets adjudged to be in the top quartile for price paid per square foot have a higher probability of completing more rapidly, although this variable is only significant in models 1 and 5. Finally, the buyer and seller type variables suggest that institutional investor involvement, especially on the buy side, leads to the due diligence phase being concluded more quickly than in the case of other types of counterparty.

6. Conclusion

Liquidity is a key consideration for investors in real estate, with high liquidity enabling them to convert either cash into assets or assets into cash quickly in order to capitalize on investment opportunities. Our study provides up-to-date measurements of the time taken to acquire or sell UK commercial real estate based on an extensive primary data collection exercise. We measure the time taken for different stages of the transaction process and explore the relationships between time to transact, asset characteristics, market state and the nature of the investors involved. Our findings extend knowledge on what causes variations in commercial real estate transaction times and thus what drives liquidity at the individual asset level, especially with respect to the due diligence phase of transactions.

For the sample of purchases, the median time taken from introduction of an asset through to completion of a deal was 104 days or between three and four months. On the sell side, the median time from initial marketing to completion was 135 days or four to five months. Considerable variation exists around these averages and they omit the time that buyers

spend searching for suitable assets and sellers spend in selecting and preparing assets for sale. However, for what we can measure, we find evidence of asset, market and clientele factors having a significant influence on the time taken to transact. For instance, sales involving institutional buyers and acquisitions involving institutional sellers were more likely to transact faster. Further research into the internal organisation of actors in this investor group may facilitate a better understanding of how the organisation of investment can create efficiencies that manifest in shorter transaction times.

Another finding is that market state has a strong influence on time to transact. Drawing on theory, we expect that transaction times will be driven by the relative number of buyers and sellers, with market state likely to both affect and reflect this balance. In particular, weaker markets are likely to contain fewer potential buyers, which should lead to longer transaction times. However, our tabular and econometric analyses indicate that speed of market movement may also be a factor. Those deals that progressed to completion in a falling market from mid-2007 took less time on average than subsequent transactions that completed around and following the trough in real estate prices in mid-2009. Yet, the relationship to liquidity is complex as the mix and motivations of sellers in such markets become important, as does the frequency of aborted transactions, which are not reflected in the data we have available.

In line with expectations, we also found that more complex real estate investments took longer to transact. Shopping centres took longer to transact than other types of property, while standard retail units and standalone retail warehouses transacted more quickly. In the same vein, portfolio deals were less likely to complete rapidly compared to deals for individual assets. This may, in part, reflect the increased due diligence necessary when investors acquire multiple properties in one transaction. Our analysis of due diligence times suggests that the quality of the asset is also important, with this serving to increase the probability of reaching completion more rapidly. However, price itself was not found to be a significant determinant of time to transact when tested alongside other factors and so was omitted from our final models.

Although our study goes further than previous commercial real estate studies in terms of isolating asset, market and investor factors that influence time to transact, there are some areas that require more investigation. For example, the relationship between asking price, achieved price and transaction time is one such area and better data on marketing times, in

particular, would facilitate such exploration. The influence of financing and brokerage on the speed of different transaction stages are other examples. In the case of brokers, we assume that their role in a transaction should affect the time taken significantly. Yet the nature of brokerage varies between markets and, in some markets, the use of brokers or agents may be ubiquitous, making the detection of any impacts difficult. However, in all of these cases, the key challenge is that there is often no systematic tracking of transaction times for commercial real estate assets. Thus, improvements in the collection of this type of data are essential in order for research and analysis to progress further.

Notes

- 1 This is explored further by Cheng, Lin & Liu (2010, 2013), Lin & Liu (2008) and Lin, Liu & Vandell (2009).
- 2 It is possible that the decision to use a broker is another aspect that is endogenous. Depending on market practice, a seller may only instruct a broker if they suspect that buyers may be difficult to find while a buyer may only instruct their own representative if search or negotiations become difficult. We thank an anonymous reviewer for highlighting this to us.
- 3 These requirements could include the placing or withdrawal of capital on behalf of new or departing unitholders, as in the case of open-ended funds, or reinvestment to help meet future liabilities, as in the case of pension funds.
- 4 The template also asked contributors about the method of sale used and how deals were financed, but these were not reported often enough for these variables to be included in this study.
- 5 An alternative might be to define market conditions with reference to transaction volumes. Data provided by RCA/PD indicate that the amount of trading peaked around Q2 2007, but the trough in activity was slightly earlier than the trough in prices, being Q1 2009 in terms of number of deals and Q4 2008 by value traded.
- 6 The absence of a significant difference does not necessarily mean that a particular factor is unimportant. The result may be driven by small samples or by the presence of confounding factors, an issue that is tackled in the multivariate modelling.
- 7 Properties were matched to the most appropriate index in this family. The UK Retail index was used for retail properties while the Central London Office and UK ex-London Office were used for offices in those locations. For industrial and other property types, the aggregate UK Commercial series was used. Note that analyses using unadjusted prices produced similar results.
- 8 Using purchases, several models of the stage from introduction to price agreement / instruction of solicitors were tested, but these did not yield convincing results owing to the much smaller samples available.
- 9 This and subsequent modelling excludes assets from outside the retail, office and industrial sectors as well as one transaction with a time greater than one and a half years from price agreement to completion.

- 10 Once again, properties were matched to the most appropriate index in this family. As a robustness check, we also tested the IPD UK Quarterly Property Index (an appraisal based index) as the measure of market performance, matching each asset to the appropriate sector index. The regression results obtained were substantively similar to those presented in Table 8.

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Appendix: Distribution of times for different transaction stages

INSERT FIGURES A1 TO A6 HERE

Figure 1: Estimate of hazard function for period from price agreement to completion

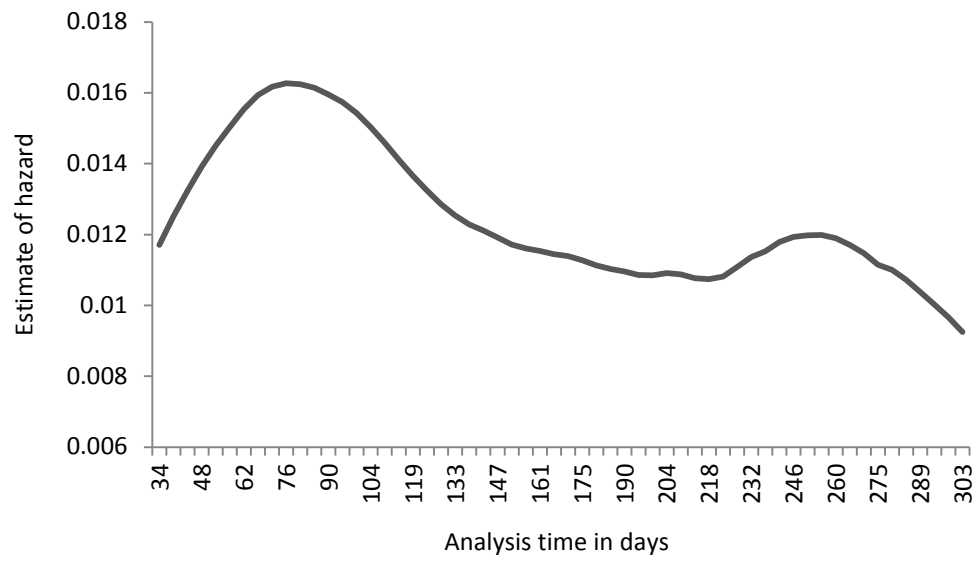


Figure A1: Purchases – Distribution of time in days from introduction to price/solicitor date

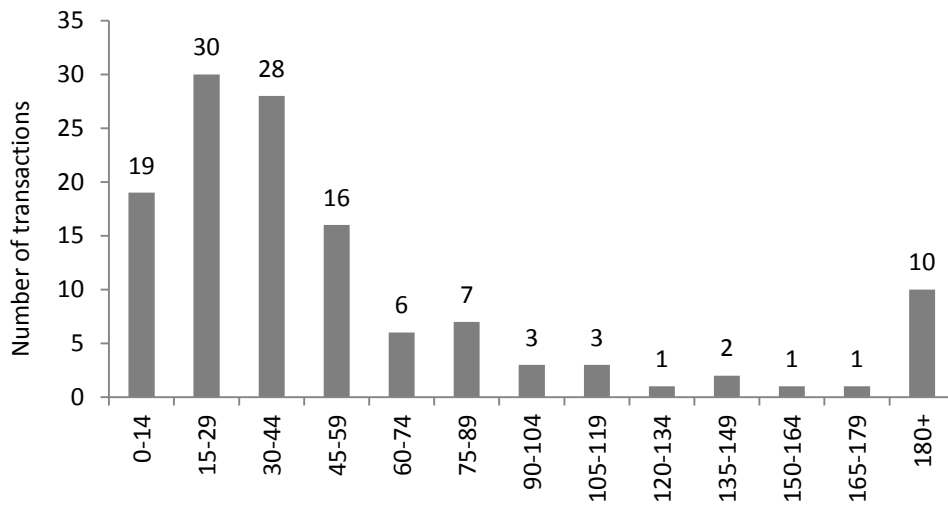


Figure A2: Purchases – Distribution of time in days from price/solicitor date to completion

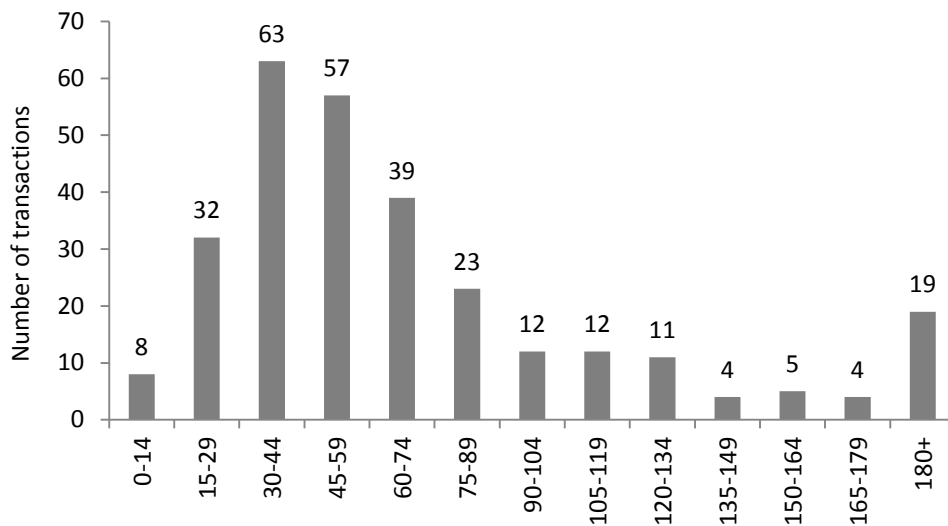


Figure A3: Purchases – Distribution of time in days from introduction to completion

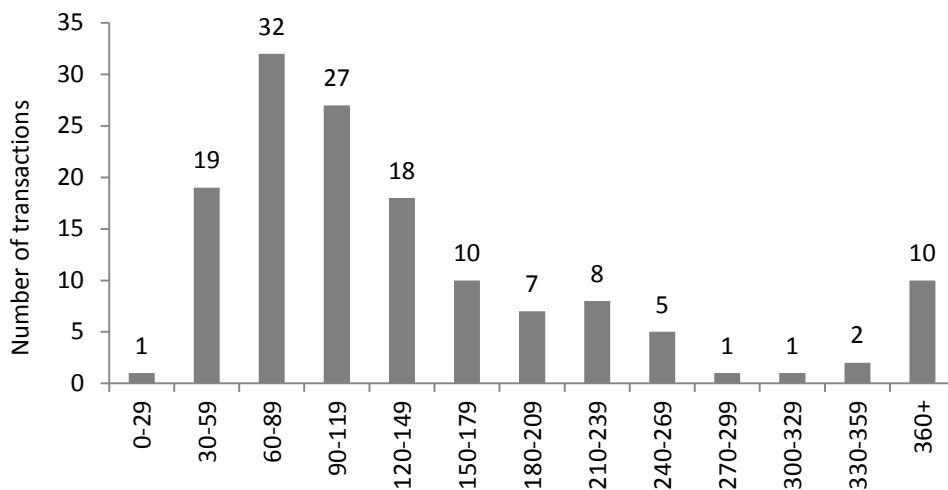


Figure A4: Sales – Distribution of time in days from marketing to price/solicitor date

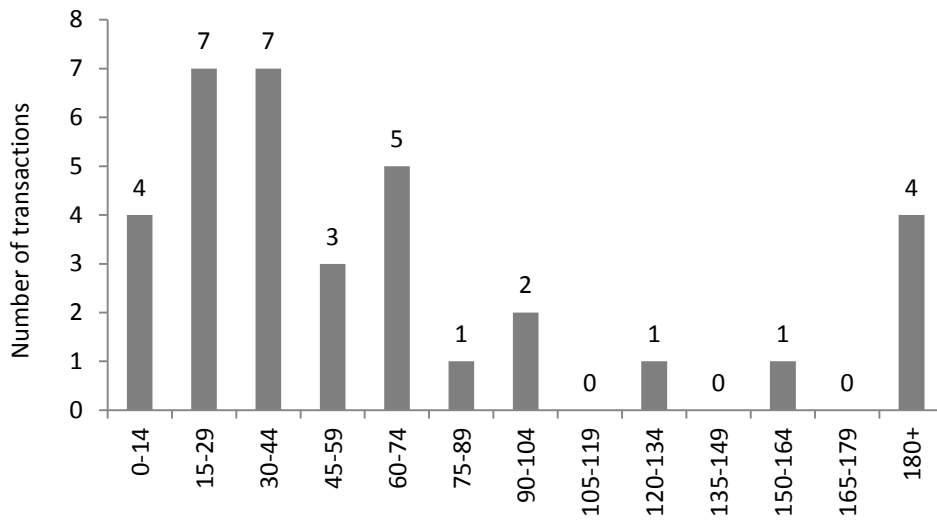


Figure A5: Sales – Distribution of time in days from price/solicitor date to completion

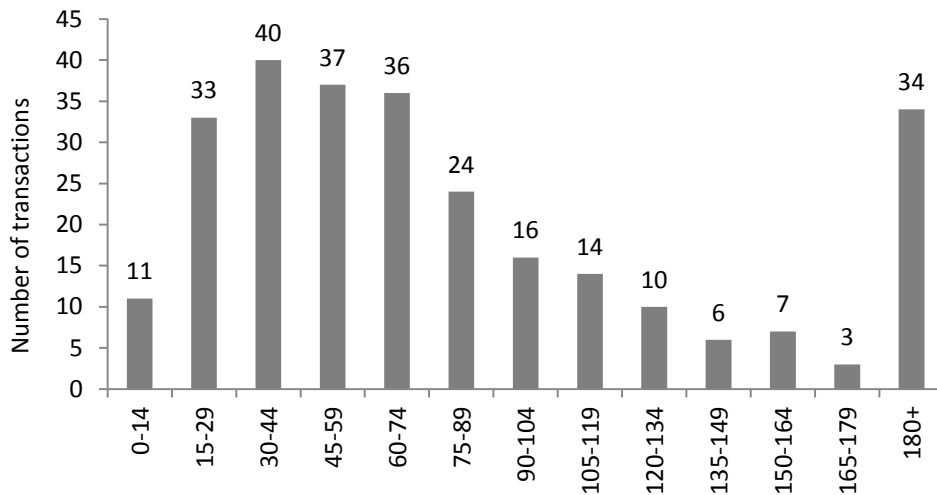


Figure A6: Sales – Distribution of time in days from marketing to completion

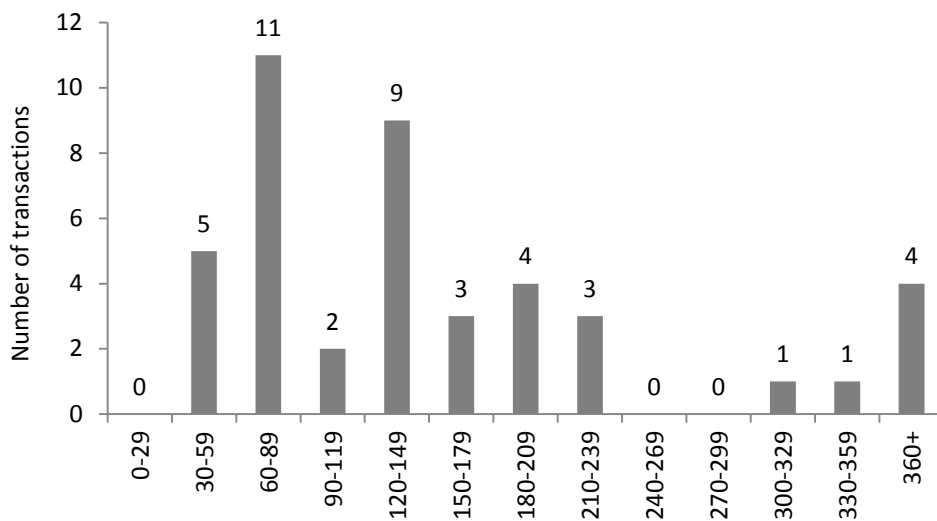


Table 1: Number and value of transactions in the sample over time

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Purchases	1	21	48	49	16	20	38	42	53	15	303
Sales		13	30	26	26	40	29	42	42	32	280
Adjustment								-1	-3	-1	-5
All transactions	1	34	78	75	42	60	67	83	92	46	578
Amount in £m	18	679	1,515	2,671	1,175	1,552	1,560	2,062	2,830	1,663	15,724

Table 2: Completeness of different variables in the dataset

	Purchases			Sales		
	Observed	Absent	% complete	Observed	Absent	% complete
Introduction date	141	162	47%	n/a	n/a	n/a
Marketing date	n/a	n/a	n/a	43	237	15%
Price agreement date	114	189	38%	66	214	24%
Date solicitor instructed	272	31	90%	245	35	88%
Date of exchange	225	78	74%	207	73	74%
Completion date	303	0	100%	280	0	100%
Sector	303	0	100%	280	0	100%
Region	303	0	100%	280	0	100%
Price	303	0	100%	280	0	100%
Capitalisation rate	222	81	73%	228	52	81%
Floorspace sq. ft.	249	54	82%	252	28	90%
Buyer nationality	303	0	100%	245	35	88%
Buyer type	303	0	100%	245	35	88%
Buyer broker	206	97	68%	197	83	70%
Seller nationality	254	49	84%	280	0	100%
Seller type	254	49	84%	280	0	100%
Seller broker	183	120	60%	226	54	81%

Table 3: Summary statistics – time in days for different transaction stages

	Obs.	Median	Mean	St. dev	Skew	Kurtosis	JB stat
Purchases							
Introduction to price/solicitor	127	35	63	83	3.01	12.6	678.4
Price/solicitor to completion	289	56	74	63	2.60	11.7	1240.5
Introduction to completion	141	104	144	107	1.79	5.75	119.8
Sales							
Marketing to price/solicitor	35	42	75	87	2.28	7.85	64.6
Price/solicitor to completion	271	64	92	88	2.59	12.1	1237.6
Marketing to completion	43	135	165	131	1.76	5.60	34.4

Measurements of means, medians, etc. are based on different sized samples. Thus, results for introduction to price/solicitor and for price/solicitor to completion will not sum to time from introduction to completion. Similarly, results for marketing to price/solicitor and for price/solicitor to completion will not sum to time from marketing to completion.

Table 4: Median times in days for key transaction stages by market state

	Purchases			Sales
	Introduction to Price/Sol	Price/Sol to Completion	Introduction to Completion	Price/Sol to Completion
Boom to June 2007	29	55	88	63
Downturn to June 2009	32	60	117	61
Recovery to June 2011	67	50	145	50
July 2011 to mid-2013	51	59	122	81
P-value: medians are equal	0.001	0.261	0.028	0.048

Measurements of medians are based on different sized samples. Results for introduction to price/solicitor and for price/solicitor to completion will not sum to time from introduction to completion.

Table 5: Median times in days for key transaction stages by type of property

	Purchases			Sales
	Introduction to Price/Sol	Price/Sol to Completion	Introduction to Completion	Price/Sol to Completion
Retail	39	52	95	58
Office	32	53	102	73
Industrial	36	69	122	62
Other	31	79	143	-
P-value: medians are equal	0.612	0.005	0.190	0.202
Standard Retail	28	46	96	48
Retail Park	43	55	95	57
Retail Warehouse	25	33	56	56
Shopping Centre	160	58	222	101
Supermarket	69	60	128	-
P-value: medians are equal	0.152	0.034	0.021	0.010

Measurements of medians are based on different sized samples. Results for introduction to price/solicitor and for price/solicitor to completion will not sum to time from introduction to completion.

Table 6: Median times in days for key transaction stages by price band and for quartile groups based on price per square foot

	Purchases			Sales
	Introduction to Price/Sol	Price/Sol to Completion	Introduction to Completion	Price/Sol to Completion
Less than £5m	23	55	80	64
£5m to £10m	32	51	107	60
£10m to £20m	41	53	104	59
£20m to £50m	39	56	122	64
£50m and above	61	63	114	61
P-value: medians are equal	0.024	0.314	0.930	0.984
Highest price psf	38	49	96	56
Second quartile	30	56	94	67
Third quartile	34	57	90	67
Lowest price psf	69	57	156	76
P-value: medians are equal	0.165	0.399	0.006	0.013

Measurements of medians are based on different sized samples. Results for introduction to price/solicitor and for price/solicitor to completion will not sum to time from introduction to completion. Analysis using price bands excludes portfolio deals. Quartiles for price per square foot are derived using prices in Q4 2012 terms as explained in main text.

Table 7: Purchases - Median times in days for transaction stages by type of seller

	Introduction to Price/Sol	Price/Sol to Completion	Introduction to Completion
UK	39	55	104
Non-UK	63	56	132
Unknown	26	65	102
P-value: medians are equal	0.068	0.571	0.579
Institution	33	49	92
Other type	53	58	137
Unknown	26	65	102
P-value: medians are equal	0.001	0.063	0.028

Measurements of medians are based on different sized samples. Results for introduction to price/solicitor and for price/solicitor to completion will not sum to time from introduction to completion.

Table 8: Cox Proportional Hazard Models – Time from Price/Solicitor Date to Completion Date

	(1) Sales	(2) Purchases	(3) All data	(4) All retail	(5) All office
Average price growth where < 0	0.953 ***	0.919 ***	0.948 ***	0.912 ***	0.976
Average price growth where > 0	1.074 ***	1.072 ***	1.066 ***	1.087 ***	1.037 ***
Portfolio deal	0.770 **	0.795	0.809 **	0.673 *	0.657 **
Sector					
Other retail	0.801 *	0.888 *	0.852 **		
Office	0.660 ***	0.906	0.790 ***		
Industrial	0.733	0.601 *	0.668 ***		
Top quartile price psf	1.537 **	1.006	1.290	1.247	1.786 ***
Not 100% freehold	0.681 *	0.672 ***	0.632 ***	0.670 ***	0.359 ***
UK buyer	1.271		1.340	0.933	2.156 ***
UK seller		0.972	0.997	1.175	0.770
Institutional buyer	1.181 ***		1.203 ***	1.061	1.836 ***
Institutional seller		1.274 ***	1.028	1.297 **	0.595 *
Retail type					
Retail park				0.844	
Retail warehouse				1.466 ***	
Shopping centre				0.687	
Supermarket				0.757 ***	
Rest UK location					0.940
No of observations	237	230	467	196	173
χ^2	361.48	6.24	191.92	388.94	1636.4
Probability > χ^2	0.0000	0.2835	0.0000	0.0000	0.0000
Harrell's C	0.611	0.608	0.596	0.648	0.636

Notes: The table reports hazard ratios, which are derived by taking the exponential of the estimated coefficients. ***, ** and * denote 1%, 5% and 10% significance levels, respectively. The dependent variable equals the time in days from price/solicitor date to completion date. The omitted category for the sector dummies is standard retail and this is also the omitted category for the retail type dummies. The models adjust for possible correlation between observations from a given fund.