IPF Research Programme 2011–2015

FULL REPORT

Unravelling Liquidity In International Commercial Real Estate Markets

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Unravelling Liquidity In International Commercial Real Estate Markets

1. EXECUTIVE SUMMARY

Liquidity is concerned with the time and costs associated with exchanging cash for specific assets, or vice versa, at prevailing market prices. Liquidity risks arise from uncertainties around when a sale will be agreed and completed, and how much will be paid or received for the asset in question. Research on the liquidity of real estate investments has increased over the last decade. However, much of this has focused on indirect real estate investment or on the US and UK direct real estate markets. Furthermore, most prior research has concentrated on measures such as volumes, turnover and holding periods. Less has been written about transaction processes and little analysis has been done on the pricing of liquidity in direct real estate markets.

This research project considered how liquidity in direct commercial real estate varies between markets and how these variations impact upon real estate prices. It investigated how transaction processes and activity vary for office markets in a range of locations. Twenty-six countries were analysed in order to provide diversity both geographically and in terms of market transparency. The first empirical section of the research focussed on variations in the market institutions and structures through which real estate transactions are executed in different countries. The second empirical section concentrated on measuring transaction activity in a sample of international markets and estimating the extent to which such activity affects market yields.

Institutional Research

- Qualitative research was used to explore aspects of liquidity such as transaction costs and processes, time to transact and brokerage models.

- An online questionnaire explored:

  - Timing and nature of the transaction process;
  - Brokerage services, fees & roles, covering both sellers and buyers;
  - Professional background of respondents.

- Real estate professionals across 26 countries were targeted and responses received from 23 targeted and three additional markets.

- The results were complemented by analysis of secondary data, including elements of the JLL Global Real Estate Transparency Index.

- Findings emerged in five specific areas:

  - **Transaction processes:** Most countries had a dominant approach to the method of transaction adopted, and typically this either fell between non-binding best bids or intermediated negotiation. There were no discernible patterns relating to transaction methods between developing and developed real estate markets, but cultural influences played a key role.

  - **Brokerage models:** The results indicated that buyers' brokers were not considered essential in many markets, in contrast to sellers. Most countries adopted a one-broker model, where the broker represented the seller only. It was unusual to find countries where the dominant brokerage models were no broker at all or one broker representing both parties.

  - **Brokerage services:** Pre-defined choices in the questionnaire proved accurate in representing their varied roles. The majority (93%) of buyers' and sellers' brokers provided all the services listed.

  - **Brokerage fees:** For brokers representing both buyers and sellers, the predominant method for calculating fees was to charge a percentage of the agreed transaction price. For some buyers' brokers, a combination of approaches or a fixed payment were adopted. There were no discernible patterns in fee structures between developing and developed real estate markets in the sample.

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- **Time & process to transact:** Time to transact ranged from 12 to 26 weeks across markets, with most transactions (62%) said to be executed within a few weeks of the typical total sale period. There were no strong differences in the time to transact between developing and developed countries. However, in certain more transparent markets (e.g. the UK and Spain), the time to transact was quicker and the overall process more fluid.

Quantitative Analysis

- The research used quantitative analysis to explore differences in transaction activity across international office markets.

- Data was sought on 44 cities situated in 26 sample countries and was obtained for the period Q1 2007 to Q2 2015 for 36 cities situated in 20 countries.

- Prime yields (i.e. yields for the highest quality office property in each market) were the dependent variable when the research investigated how transaction activity affects pricing.

- Prices may encourage trading and, at the same time, trading activity might affect prices. A two-stage modelling process was adopted, therefore, to cope with potential reverse causality:

  - In the first stage, prime yields were modelled, using variables that acted as proxies for fundamental drivers of yields, such as risk free rates, risk premiums and expected growth.
  - In the second stage, the researchers extracted the unexplained component from the first stage regression models to determine whether volumes or turnover rates could explain this part of the yield shift unexplained by changes in the 'fundamentals'.

- Turnover rates were measured in two ways:

  - By taking figures each quarter on the total floorspace of offices traded and dividing these by the total office floorspace, the proportion of stock in terms of physical area traded was derived.
  - By taking quarterly transaction volumes and dividing these by estimates of the value of the office stock in each city, this generated the proportion of stock in terms of total value traded.

- Transaction volumes were highest in the major global cities of London, New York, Tokyo and Paris.

- Turnover rates were highest in the US, Australian, UK and Chinese cities but lower in mainland European cities and the Japanese cities.

- Simple scatter graphs illustrated a negative correlation between transaction volumes and yields, but not between turnover rates and yields.

- The first stage regression models produced plausible models of yields with risk-free rates, rental growth and risk proxies all being significant determinants of prime office yields.

- Coefficients for city fixed effects in the models revealed a premium or discount in yield relative to a benchmark location (London) that was not explained by variation in market fundamentals, such as risk-free rate and expected rental growth. The values of these coefficients showed strong positive relationships with market transparency, ease of transacting and absolute transaction volumes.

- The unexplained component from the first stage regressions represented unexplained variation in yields over time. When these components of prime yields were regressed on measures of transaction volume, there were statistically significant effects. They suggested that a 100% increase in volume resulted in a decrease in yields in the following quarter of between 10 and 15 basis points, all else being equal. Such large shifts in volumes from quarter to quarter were surprisingly frequent. The effects of turnover rates on yields tended to be statistically insignificant and much less consistent.

1. EXECUTIVE SUMMARY

In summary, the research illustrated the diversity of indicators related to market liquidity and provided comparative analysis of some indicators for a range of international office markets. Methods and costs of sale were found to vary across markets, but it was quality rather than mode of transacting that set apart less transparent from more transparent markets. It also appeared that transaction volumes were a stronger indicator of liquidity than turnover rates that relate volumes to the size of the market concerned. Scale and transparency were correlated with the relative pricing of office markets, whereas transaction costs and turnover rates appeared to be unrelated. However, this did not mean that these other measures were without interest. An issue for future debate is why some indicators appeared to correlate better with market pricing than others. Certain types of investor may also find some indicators more important than others depending on their investment horizons and ability to tolerate liquidity risks.

2. INTRODUCTION

This research project was concerned with causes, sources, measurement and consequences of illiquidity. It focussed on how the liquidity of direct commercial real estate investments varies between markets and how these variations impact upon pricing. In particular, it investigated how transaction processes and activity varied across a range of office markets, since offices are often the focus of international investment activity. Twenty-six countries were selected for analysis, providing diversity both geographically and in terms of market transparency. A qualitative exercise was then undertaken to investigate transaction processes, including a questionnaire on costs and processes in different markets. Meanwhile, quantitative analysis was used to explore how transaction activity varies across office markets within these countries and whether pricing (yields) in each city could be explained by variations in liquidity indicators, as well as by fundamental drivers.

There has been substantial growth in cross-border direct real estate investment over the last two decades. This has meant that investors are increasingly exposed to the challenges and costs of sourcing, acquiring, pricing and selling assets outside their domestic real estate market. In the same period, there has been a transformation in the range and scope of real estate investment organisations and their third party service providers. In addition to fairly long-established institutional investors such as pension funds, insurance companies and listed real estate companies, other types of direct real estate investors have become prominent on the international stage. Sovereign wealth funds, specialist open-ended and closed-end real estate funds, investment banks, specialist real estate investment managers, private equity groups and endowment funds have emerged as significant market participants, with some of these organisations creating global operational platforms to execute international real estate investment strategies. Yet, despite these trends, there has been little published research on liquidity issues in direct commercial real estate. Buying and selling assets in foreign real estate markets takes time and presents significant formal and informal transaction costs for international investors. In turn, international investors are widely perceived to affect prices and the investment performance of these real estate markets.

The main drivers of cross-border real estate investment are similar to those for cross-border investment in equities and bonds – mainly diversification with the aim of improving risk-adjusted returns. However, a number of features of commercial real estate markets mean that cross-border real estate investment presents major challenges in terms of liquidity, pricing and management over and above the currency and political risks associated with international investment generally. These challenges stem from the private and disaggregated nature of real estate markets and the heterogeneity of the assets, which lead to substantial information asymmetries, high search costs, long transaction execution times, high transfer taxes, high brokerage and legal costs, and the need for a high level of management control and input, inter alia. In consequence, cross-border real estate investors are exposed to a wide range of risks. However, these costs and characteristics are not uniform between markets. Key determinants and consequences of market liquidity, such as transfer taxes, brokerage and legal fees, trading volume, transaction processes and market transparency, vary between markets and, often, over time.

The ability to enter and exit real estate markets at specific times is constrained by the time transactions take and difficulties in identifying and bringing specific properties to the market. A further issue is that of uncertainty surrounding prices, including changes to prices over the transaction period. This means that the time taken to transact has important implications for risk and return. Buyers must spend time searching for suitable assets and sellers must spend time attracting buyers. However, sourcing assets is not the only lengthy

2. INTRODUCTION

or uncertain stage, since there are further negotiations and execution processes following price agreement that are neither immediate nor without friction. Uncertainty about timing of receipt of capital value adds to the volatility of expected returns with a positive association between transaction period uncertainty and investment risk. When investing internationally, these risks may be heightened by reduced familiarity with relevant transaction processes and local performance drivers in each case.

The problem of relative illiquidity has implications for the attractiveness of real estate as an asset class as it reduces an investor's ability to switch between real estate and other types of investments. Similarly, it restricts their ability to (re)structure a real estate portfolio in response to changing forecasts of national, sectoral and local geographical performance, thus limiting the possibilities for tactical asset allocation. This can be complicated further by variations in liquidity between locations. The result is that there is a smaller pool of investors engaged in direct real estate investment and this is exacerbated in an international context where processes and costs differ across countries and territories. Furthermore, most foreign investors in direct real estate tend to be exposed to a relatively high degree of specific risk and to the stock selection abilities of fund managers.

The remainder of the report is organised as follows. The next section provides a brief discussion of the key concepts and context for the research. It also reviews previous research on liquidity in direct commercial real estate markets. The review is followed by the first empirical part of the research (Section 4), which focussed on international variations in the market institutions and structures through which commercial real estate transactions are executed. Section 5 records the research into measuring transaction activity in a sample of international markets, the analysis of the differences suggested by these measures and the estimation of the extent to which transaction activity affects market yields. Finally, conclusions are drawn in Section 6.

3. CONTEXT AND LITERATURE REVIEW

Economics has consistently struggled to pin down a definition of liquidity, which Keynes (1936: 240) labelled a "partly vague" concept. Kenneth Boulding (1955: 310) argued that it was "not very clear or easily measurable" and Makower and Marschak (1938) concluded that the term 'liquidity' was used so indiscriminately that it was not a measurable concept. More recently, Baker (1996, cited in Sarr and Lybek, 2002: 5) concluded that there "is no single unambiguous, theoretically correct or universally accepted definition of liquidity", while Goodhart (2008) contended that the term has so many facets that it needs further and closer definition prior to its use in a particular context. However, one fundamental distinction in definitions of liquidity is between trading liquidity and funding liquidity whereby the former relates to the transfer of assets and the latter relates to obtaining capital (see Brunnermeier and Pedersen, 2009). This report focuses on the transfer of assets.

Trading liquidity is itself multifaceted and finance literature considers different dimensions to this type of liquidity. These dimensions include tightness (costs), immediacy (speed), depth, breadth and resilience (response to imbalances in trading). Sarr and Lybek (2002) mapped different measures on to these dimensions, but note that such mapping is imperfect. Opportunity cost has long been recognised as another factor. Marschak (1938: 323) referred to the importance of "ease of manoeuvring into and out of various yields after the asset has been acquired" while Hicks (1974: 43) pointed out that one cost of low "plasticity" was that the asset holder "has narrowed the band of opportunities which may be open to him".

Meyer et al. (2013) drew a distinction between structural and cyclical liquidity. Structurally illiquid assets include direct real estate owing to the long ex-ante lock-in period of the investor's capital. In contrast, cyclical illiquidity is concerned with changes in the level of liquidity as market conditions change. In extremis, 'liquidity breakdowns' produce situations where there are no buyers as investors exit a sector. At the core of liquidity risk is the inability to be able to immediately transform assets to cash at current market prices at no cost and vice versa. The degree of deviation from these criteria determines the level of relative illiquidity. However, compared to other asset classes, real estate is not the only illiquid asset class, with venture capital, private equity and infrastructure being at least as illiquid as real estate, if not more so.

In the real estate literature, IPF (2004) presented a fairly comprehensive discussion of liquidity, drawing on sources from both real estate and financial economics. Several dimensions of liquidity were identified, including:

- the rate or **volume** of turnover/transactions;
- the **time** taken to transact;
- the **costs** associated with transacting (both formal costs and information costs);
- the **impact** of the decision to transact on the price of the asset and the prices of similar assets; and
- **uncertainty** as to achieved price or return at the time of the decision to transact.

Different dimensions to liquidity were also identified within IPF (2015a), which discussed the sources of market imperfections that create costs, delays and uncertainties. Furthermore, this review considered the different practical measures to proxy liquidity and the form of real estate investment that each is best applied to, e.g. listed, unlisted or direct real estate investments. In the latter case, this included some measures that are yet to be fully exploited in research on real estate markets. However, other measures remain unsuitable.

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Cheng et al. (2013b) argued that many measures of liquidity from securities markets, where there is centralised and instantaneous trading, are not appropriate for private, opaque and thinly traded assets. They stated that:

> "The notion that all assets are illiquid to different degrees and that private assets, such as real estate, are just less liquid than stocks, fails to recognize the different nature of the two markets. Private assets are not just less liquid than security assets; they are less liquid in a different way." (Cheng et al., 2013b: 675).

Some common measures that are used to gauge liquidity in direct real estate markets, including the relative liquidity of different property types, locations, countries or time periods, are transaction volumes, turnover, holding periods, transaction costs and the time taken to transact (which incorporates time-on-market). The ease of measurement and thus availability of each measure varies. However, several of these measures are interrelated. For example, say a particular market has a stock of 1,200 properties, each of which is worth £1 million, and 120 of those properties are sold each year[1]. Transaction volume would be £120 million and the proportion of assets traded – turnover – would be 10%. If each property is similar and has an equal chance of being sold, then the probability that any one asset would sell in that period is 10%. The average holding period in this scenario would then be 10 years.

In reality, though, transaction rates will vary over time and properties within a market will be heterogeneous in terms of quality, location, etc. This affects the prices at which they might trade and their attractiveness to different buyers and sellers. In turn, this creates differences between properties in how likely it is that they will transact, as well as how long it will take to sell them from when they are first marketed. This could reflect attributes that are either positive or negative. For example, a new and well located asset might have a greater number of potential buyers, yet the owners may be less willing to sell because of these features. Even where two buildings are similar, the attributes of the owners and buyers in each case may also play an influential role in the likelihood that they will transact.

Hence, it is hard to generalise about liquidity within specific real estate sectors and markets, let alone within countries or regions. However, at present, industry knowledge about variations between countries in terms of costs, processes, typical time needed to transact and how long assets are held for is extremely limited, even before considering how these variables might differ within countries. The rest of this review considers the available empirical evidence for different cities or countries on the following indicators: volumes, turnover, holding periods, transaction costs and the time taken to transact.

3.1 Transaction Volumes and Turnover

Measures of transaction volume, whether number or value of deals, are probably the simplest and most widely available proxies for liquidity in the case of commercial real estate markets. Transaction activity is frequently discussed in reports on different sectors and locations by real estate service providers. Other organisations such as Real Capital Analytics (RCA) also publish information on volumes at global, regional, national and submarket levels, as well as analysis of the sources of capital driving trading. When particular groups of investors are isolated, such as institutions, then net capital flows can be measured as the difference between acquisitions and disposals by those investors. Patterns in volumes are often discussed in the context of how particular economies or real estate markets are performing.

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[1] This illustration extends an example presented by Fisher et al. (2004).

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Volumes can be difficult to compare across real estate markets given that they differ in scale. Therefore, it is also desirable to measure turnover rates – the proportion of stock in a sector or location that was traded during a period – to capture differences in liquidity. Measurement of turnover is compromised by a lack of reliable estimates for the real estate stock in many countries. Some work has attempted to overcome this. For example, Investment Property Databank (MSCI/IPD) compiles market size estimates for those countries where they publish investment performance indices. Meanwhile, research funded by the IPF for the UK has investigated the issue of market size in some depth[2].

Results from empirical research on transaction volumes, flows or turnover in commercial real estate markets are presented in Appendix 1. The table focuses on studies that formally analysed rather than just reported these variables. The studies ranged from analysing patterns across space or over time to modelling the relationships between trading activity and other variables, such as real estate market performance. A common observation was that volumes and turnover were pro-cyclical, i.e. they were high when real estate markets were performing strongly and low when returns were weak or negative.

While a positive contemporaneous correlation between returns and transaction activity may be an empirical fact, the existence of a causal relationship is debateable. A contemporaneous relationship might reflect a market situation where prices and trading are jointly dependent on common economic variables. In contrast, lagged relationships might suggest, for instance, price pressure effects from high levels of trading or return chasing behaviour in cases where past returns appear to explain volumes. As Appendix 1 indicates, the results of work on the investment flow ↔ return relationship for direct commercial real estate were mixed and more research on this is needed. Nonetheless, the correlation between prices and transaction volumes suggested that both reflect changing market conditions in some way.

This has important implications for real estate price indices, as it suggests that a price index alone does not signal the full extent of market movements. Instead, there are changes over time in both prices and the ease with which properties can be sold. Fisher et al. (2003) set out a conceptual and an econometric model to reflect this. The former recognises that potential buyers and sellers have reservation prices that reflect the values at which they are prepared to buy and sell assets. Diversity among buyers and sellers leads to distribution of such prices and more trading takes place when the overlap between these distributions increases; in other words, when more buyers are prepared to meet the prices that sellers want for their assets. If buyer reservation prices are more sensitive to changes in the external environment than those of sellers, then the overlap will increase as economic conditions improve and reduce as they deteriorate. This would lead to rises and falls in volumes that are consistent with empirically observed patterns.

Based on this, Fisher et al. (2003) argued that price indices should be adjusted to reflect the differential ability to enter and exit the real estate market at different times. They illustrated how this might be done by modelling the probability of assets being traded through time (to infer how close buyer and seller views on prices were at different times) and then used information from this model to create a liquidity corrected or 'constant liquidity' version of a commercial real estate price index[3]. The relationship between constant liquidity and uncorrected price indices for US commercial real estate was analysed subsequently by Clayton et al. (2008) to derive a market-wide liquidity measure, while Buckles (2008) proposed a liquidity index based on a more complicated procedure.

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[2] See Key and Law (2005) and Mitchell (2014).
[3] The procedures involved are complex and are described further in Fisher et al. (2003) and Fisher et al. (2007). See Goetzmann and Peng (2006) for a different approach with similar objectives.

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This line of research has led to the periodic publication of a constant liquidity price index and an associated liquidity metric for US commercial real estate by the MIT Centre for Real Estate[4], which is released alongside a more conventional transaction-based price index. The constant liquidity index represents how prices would have changed had a constant ease of selling been maintained over the course of the cycle. It exhibits greater peaks and troughs than the conventional price index and thus arguably illustrates how fluctuations in liquidity increase risk for real estate investors, though Lin and Vandell (2007) and Cheng et al. (2013b) both argued that this approach falls short if the aim is to compare real estate against far more liquid alternatives such as mainstream equities and bonds.

Fisher et al. (2004) conducted further analysis on the probability of particular assets being offered for sale. They concluded that a range of market-wide, asset-specific and owner-related variables affect the likelihood of an asset being sold. They also made an important distinction between liquidity and transaction frequency. Volumes may be low in a sector or market not because assets are difficult to sell, but because owners prefer to hold at current market levels. For example, the low transaction frequency for UK retail warehouses identified in Collett et al. (2003) was almost certainly due to positive attributes and did not signal that these assets were less liquid. Moreover, studies that have found that smaller assets are sold more often than larger ones (e.g. IPF, 2004) do not necessarily establish differential liquidity. Rather there may be differences in motivation rather than ability to sell. During the 1990s and 2000s, it was common for UK institutional investors to sell smaller assets as portfolios were rationalised.

In an international context, similar patterns might be evident. Those locations perceived to be attractive for international real estate investors might not necessarily exhibit the highest levels of trading. However, JLL (2006; 2010; 2012; 2014) reported a broad correspondence between the level of transparency in different real estate markets and volumes in those markets. Once again, this raises an issue of causality. Is it transparency driving volumes, volumes driving transparency or are both being driven by economic and political changes in the markets concerned?

3.2 Holding Periods

Holding periods capture the length of time between an asset being purchased and later being sold. For any individual asset, an investor usually can determine this period with reference to their own preferences and objectives. Holding periods are not an obvious proxy for liquidity, but they do influence transaction activity. For example, any tendency amongst investors in a particular market or segment to hold properties for a certain length of time affects how often those properties are offered for sale. Shorter holding periods should lead to more transaction activity, while longer holding periods will mean fewer assets are sold per period, all else being equal. Of course, the level of liquidity may also influence holding periods.

Several factors might influence investor decisions on how long to hold an asset. Early studies done in the US and Canada focused on the role of taxation benefits and transaction costs (e.g. Gau and Wang, 1994). Collett et al. (2003) also noted the importance of transaction costs and how this motivates longer holding periods for real estate vis-à-vis equities and bonds. They studied how holding periods for UK commercial real estate have changed over time and were affected by market conditions. Owners might cut short an anticipated holding period in a strong market to take advantage of rising prices. Conversely, in weaker markets, they might delay disposals until conditions improve. Asset and owner characteristics may be important too, e.g. certain assets might require a longer period of ownership and more management input in order to realise value[5].

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[4] For further detail, see http://mitcre.mit.edu/research-publications/cred. URL correct as at March 2015.
[5] Furthermore, certain investment vehicles, such as closed end funds, have limited lifespans that may influence decisions to sell.

3. CONTEXT AND LITERATURE REVIEW

Recent theoretical work by Cheng et al. (2010a; 2010b) advocated the concept of an optimal holding period. They noted that, while long holding periods mitigate the impact of transaction costs and marketing period risks, they expose investors to greater price-related uncertainty. Thus, investors face a trade-off between these sources of risk, with an optimal holding period being that which minimises total ex-ante risk to the investor. Cheng et al. (2010b) illustrated an optimal holding period using assumptions about volatility, investor risk aversion, marketing time and transaction costs. All other things being equal, they argued that optimal holding periods should be shorter where volatility is greater and longer where the transaction costs are higher or marketing periods are longer.

Appendix 2 lists studies that have measured holding periods for commercial real estate in different countries. There is a great diversity in the results both across countries and property types. However, not all studies control for unsold assets. If those assets that did not sell over a period are ignored and only sold assets are used, then measurements of the average holding period will be biased downwards, making comparisons between studies much more difficult. Examples where controls were used are Collett et al. (2003) and Fisher and Young (2000). Unsurprisingly, these studies produced longer estimates of holding periods than those which focussed on sold properties alone.

3.3 Transaction Costs and Brokerage

The heterogeneity of real estate assets and the private and decentralised nature of the markets in which they are traded lead to frictions that generate higher transaction costs for investors. These include search, legal, taxation and administration costs. While the components of transaction costs are not difficult to identify, some elements, such as search costs, are difficult to quantify. Nonetheless, indirect costs connected with obtaining information and searching for assets are potentially substantial, particularly for locations that are unfamiliar. As noted previously, higher transaction costs motivate longer holding periods and so can reduce transaction activity in the real estate market. Meanwhile, unanticipated increases in transaction costs are expected to reduce asset prices.

Brokerage services are an important component of the real estate transaction cost structure, influencing both monetary and non-monetary costs, with direct implications for liquidity. However, the existing literature on brokerage for commercial real estate is limited. Most knowledge about brokerage is based on residential real estate studies. As such, the discussion below draws from the residential literature and links the key messages and principles back to a commercial real estate context. Yet, even for residential real estate, there are few international studies. Over a decade ago, Benjamin et al. (2000) noted that:

> "Internationally, real estate is bought and sold under a variety of brokerage arrangements, yet no comprehensive comparison of the differing structures has been undertaken. This represents a significant challenge for future research." (Benjamin et al., 2000: 23)

The need for and role of an intermediary in real estate transactions relates to three features of property markets: heterogeneity, information asymmetry and spatial fixity. These features are common to all real estate markets; only their extent and importance differ. Heterogeneity refers to variety in asset quality and attributes, financial conditions, and the types and preferences of buyers and sellers. Heterogeneity is a significant and pervasive characteristic that leads to gaps in the information available to different stakeholders in a

3. CONTEXT AND LITERATURE REVIEW

transaction. The two main actors, buyer and seller, do not share the same quality and quantity of information, resulting in information asymmetries that have direct implications for the bargaining power of each side. Furthermore, spatial fixity means real estate transactions are inherently local and so local market information plays a vital role. These issues limit the ability of a buyer and seller to carry out a real estate transaction on their own. Hence, common expectations for an intermediary's service include: (a) understanding the heterogeneity, (b) reconciling and negotiating the information gaps and (c) providing the local information content to the stakeholders.

The services that an intermediary may provide can be categorised into two types: matching and bargaining. The most important service is bringing together buyers and sellers. The ability to provide a more effective and efficient marketing platform (compared to 'for-sale-by-owner') is an obvious benefit for having an intermediary. Therefore, a key parameter for competition among intermediaries is the quality and quantity of the matching (i.e. listing and marketing) service. Once a match is found for a potential transaction, the need for a clear understanding of the process and information flow is the next crucial factor in a successful real estate transaction. US research suggests that intermediaries in the residential sector vary hugely with respect to the quality of negotiation and bargaining services and the extent of information asymmetry plays a crucial role at this stage[6].

The residential and commercial sectors do not differ much in terms of the basic roles of an intermediary, but they may differ on the extent and importance of information asymmetry. This is because the commercial sector generally involves (a) fewer buyers and sellers, (b) larger transaction sizes, (c) more complex financing and investment structures and (d) more globalised markets, particularly for institutional-grade assets. Another key distinction is the presence of large global firms and delivery platforms in the commercial sector, while residential real estate brokerage still remains very local in scale (Ball, 2006). The presence of global firms in the commercial sector raises issues of potential market concentration and the possibility of monopoly implications[7]. While these large entities provide economies of scale and corporate service models, lack of competition can have potential market distortion effects in terms of fee structures and standards.

In the residential literature, fee structure has been an active area for research. A key factor behind rigidity in fee structures and commission rates may be the presence of implicit entry barriers in the market, especially in the commercial sector. While there may be few explicit barriers to entry in most markets (e.g. licensee examination, cost of licenses, memberships to industry bodies), implicit requirements of private information and a need for well-established networks of local contacts can severely limit the ease of entry. Delcoure and Miller (2002) examined variations in residential brokerage fees across c. 30 international markets. In the US, they noted persistence in high levels of fees compared to other mature residential real estate markets and speculated that their "abnormal stability" was owing to a combination of variations in liability risk, regulation, use of auctions, range of services provided, imitative pricing and a degree of path dependency. They modelled brokerage fees as a function of GDP per capita, corruption levels, agency type (dual or single) and sales per broker. Broadly, with the US as a major outlier, they found that the key factor determining fee levels was relative wealth. Lower percentage fee rates were found in wealthier nations, where the authors argued that markets were more likely to be efficient, open and reliable.

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[6] For example, see the significant stream of research that has focused on the inefficient production of residential brokerage services (Yinger, 1981; Miceli, 1992; Yavas, 1992; Turnbull, 1996).
[7] See Wachter (1987) for discussion, albeit based on the residential sector.

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In the UK, brokers (investment agents) are integral to the trading of commercial real estate to such an extent that it is extremely difficult to trade assets without using them. They are crucial to the search and matching services for buyers and sellers and they provide advice and information to most investment organisations to support asset evaluation, price negotiation and transaction management. Gallimore et al. (2008) identified that separate brokers were often appointed by the buyer and the seller in a UK real estate investment transaction. Normally, a broker is appointed by the vendor to find a purchaser – the selling broker. They then market the asset to other brokers or, less frequently, direct to investors. Brokers who receive this information then select a potential investor to introduce it to (and so become 'introductory agents'). Brokers have, at any time, both vendor and buyer clients, although rarely in the same transaction)[8]. Similarly, for any particular client, a broker could be acting on both sales and acquisitions. This is in contrast to the situation in US commercial real estate where, frequently, only the seller has broker representation (see Devaney and Scofield, 2013).

Thus, in the UK, brokerage is a non-trivial cost in both the acquisition process and the sale process. A fee is paid to the introductory agent (up to 1% of the transaction price) if the investor successfully acquires a property, but it is not normally paid if a bid is unsuccessful. Sellers' broker fees are typically 0.5% of the sale price. Anecdotal evidence suggests that brokerage costs can be substantially higher in many international markets. However, some important questions are: Why do these costs vary so much across markets? What services are being offered by brokers in different cases? Do buyers and sellers tend to be represented by brokers or just sellers? How does the nature of broker remuneration vary?

In terms of the benefits of brokerage services, there is a body of literature for the residential sector that identifies potential benefits as shorter time on market, higher probability of sale and the possibility of price uplifts (see Yavas, 1994). However, benefits crucially depend on the extent of principal-agent issues. Theoretical studies by Zorn and Larsen (1986) and Yavas and Colwell (1999) modelled the contract structures of US residential brokers. This work revealed a mismatch between the interests of the principal and agent created by typical contracts and incentive structures. This does not mean that, in practice, agents act against the interests of their principals. Yet empirical research suggests that information asymmetries lead to principals being poorly served. Levitt and Syverson (2005) and Rutherford et al. (2005; 2007) examined data on residential sales and found that brokers selling their own homes behaved differently. After controlling for location, characteristics, and market conditions, these studies found that agents' houses sold for more than the houses owned by their clients. Levitt and Syverson also found that agents' houses stayed on the market almost 10 days longer on average. The conclusions of these studies are blunt. Levitt and Syverson conclude that the commission structure and information advantage of the agent led to homeowners being advised to sell too quickly and too low. Rutherford et al. (2005) concluded that the commission structure led to agents expending too little effort for their clients.

While these findings may hold for the commercial real estate sector, the transaction process is more layered, less standardised and more reliant on agents' private networks compared to the residential sector. Yet a number of moral hazard issues can be identified in commercial real estate markets. There are seemingly strong incentives for brokers to ensure that their clients bid enough to secure the asset, so that they get paid a fee and avoid costly abortive work. In a very competitive buying market, this may tempt them to bias their advice in order to get investors to overbid to be sure of success. In addition, the fee is often set at a percentage of the price and hence positively related to the price paid. While such outcome-based incentives may appear to motivate agents to act against their principals' best interests, Gallimore et al. (2008) argued

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[8] Instances of 'dual agency' – simultaneous representation of both buyer and seller by a single broker/firm – have been identified and debated in the US literature on residential brokerage.

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that there were significant counter-incentives related to reputational risks, business relationships and repeat business that mitigate potential moral hazard problems.

3.4 Time to Transact

As well as being more costly, acquiring and disposing of real estate assets takes much longer than for financial assets. Yet, little is known about the time required to transact commercial real estate assets. This is true in terms of variations between national markets and variations within those markets, either across sectors, locations or at the individual asset level. Some work to address this has emerged for the UK, but, outside the UK, empirical evidence on time to transact commercial real estate is extremely limited. The evidence that does exist is summarised in Appendix 3.

The time required to transact real estate is made up of a number of distinct stages. McNamara (1998) noted three stages; search (buyer) or marketing (seller), due diligence and settlement. IPF (2004) expanded the number of stages to six by including decision to sell at both strategic and asset level, as well as a pre-marketing stage in which particular assets are prepared for sale. Empirical work in IPF (2004) suggested that many of these stages are potentially lengthy and uncertain. This means that, compared to buying or selling securities, real estate investors not only face uncertainty around the price to be received, but also face uncertainty around the time it will take to find a buyer and execute the transaction.

There is also a complex relationship between prices, time-to-transact and market conditions. Stylized facts from research on residential markets are that properties sell more quickly in 'hot' markets, there is a discount for rapid transactions involving distressed sellers and, up to a point, there is a positive relationship between time-on-market and price. Pricing decisions by sellers have a role in this as assets that are priced too highly typically take longer to sell while assets that are underpriced tend to sell faster. Observing a trade-off between price and time, Lippman and McCall (1986: 44) defined illiquidity as "the expected time until the asset is sold when following the optimal policy". Meanwhile, Cheng et al. (2010c) proposed the concept of 'normal selling time' to represent the expected (average) time on market necessary for assets to be sold where sellers are unconstrained. This normal selling time can vary with market conditions.

Lin and Vandell (2007) explored the implications of time on market for real estate risk. They discussed a model of the transaction process, how that process affected observed prices and what the implications were for the probability of selling an asset in any period (and, thus, how long transactions might take). Key to their work was the argument that the arrival of potential buyers is stochastic, i.e. not in the control of the seller. Furthermore, reservation prices and buyer bid prices are each drawn from a distribution, which means that a seller must wait not only to attract potential buyers, but also to find a buyer whose bid is at an acceptable level. It is this delay that introduces risk.

First of all, during the course of the marketing period, a property is exposed to price risk. The price for an asset will have fluctuated while the asset was being held and it continues to fluctuate from the point at which a decision to sell is made through to the point when a price has been agreed with a prospective buyer. As the market changes, the seller may respond by reversing their decision to sell, but, if they continue to market the asset, the final price might differ from that which the seller initially anticipated, either in an upward or downward direction. This issue would exist even if the length of the marketing period was known with certainty in advance.

[9] The formulae were subsequently modified by Cheng et al. (2010a; 2013a; 2013b) to allow for the fact that real estate returns are not typically i.i.d. (independent and identically distributed) across time.

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However, Lin and Vandell (2007) identified additional risk associated with the fact that the marketing period is uncertain, which they termed marketing period risk. Although the final price and transaction date for an asset ex post can be observed, and then used to estimate the volatility of its returns, they argued that such a measurement would not capture the additional ex ante uncertainty experienced by an owner who does not know in advance when the value of that asset might be realised. Thus, the true level of risk ex ante is greater than that which is measured using ex post returns data. Under different assumptions about the distribution of marketing periods, Lin and Vandell then generated algebraic expressions that quantified how much larger ex ante risk will be relative to ex post risk[9].

Lin and Vandell (2007) identified a further element of risk that they termed liquidation bias. They discussed how observed prices for real estate assets were typically agreed following a lengthy marketing period. In contrast, observed prices for financial assets, such as exchange traded stocks and bonds, reflect what can be realised in an immediate transaction. If an investor had to rapidly sell a direct investment in real estate, then it is likely that they could only do so at a substantial discount. This is because they cannot delay for the arrival of a buyer whose offer meets or exceeds their normal reservation price. However, the risk of being in this position will vary with seller characteristics[10]. This led Cheng et al. (2013a: 512) to argue that "since normal real estate sellers do not attempt immediate sales, the price discount that would be necessary for such an immediate sale is not an appropriate measure of the asset's liquidity".

While Lin and Vandell (2007) illustrated the potential impacts from marketing period risk and liquidation bias on the return and volatility of individual assets, the first empirical estimates of marketing period risk were provided by Bond et al. (2007). They showed that the importance of marketing period risk declines as the holding period for an asset increases and when marketing periods are short. They also suggested that risk from uncertainty in the marketing period may be reduced in a portfolio context. However, this element of their analysis assumed that uncertainty in the marketing period is both independent across assets and independent from price risk, i.e. that it is purely a form of specific risk. In contrast, Lin et al. (2009) showed that, if there were systematic elements to marketing period risk, it remained important even in large portfolios[11].

Although this work extends knowledge on illiquidity and risk, it is predicated on a particular model of the transaction process: sequential bidding without recall. During the marketing period, sellers receive offers over time from a flow of buyers, whose offer prices and timing of arrival are stochastic. When offers are made, the seller evaluates the benefits of waiting for a better offer against the costs associated with waiting. The seller then decides whether or not to proceed with negotiations. If a price is agreed, the marketing period ends, but, if a deal is not reached, the search for a buyer continues. This is similar to the US model, where bids usually come in the form of a proposed purchase and sale (P and S) agreement. The seller may choose to accept any bid by signing the P and S agreement. Usually, the P and S agreement contains a due diligence clause that can last anywhere from 30 to 90 days – usually closer to 30.

However, this is only one way in which the sale process might be organised. In practice, there are a number of variations in methods of sale and procedures for the transfer of ownership. For example, in the UK, institutional-grade real estate assets are often sold using a first price sealed bid auction (FPSBA). Initially, the sale process involves pre-marketing preparation of the asset and marketing (IPF, 2004). Following marketing, interested buyers determine their bids and then simultaneously present them to the seller. Typically, the seller sells the asset to the highest bidder at that bid price. The FPSBA is distinct from the sequential search and bidding process that seems to be more common in the US market.

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[10] The impact on the expected return and risk of an asset for sellers in varying degrees of financial distress was explored further by Lin and Liu (2008).
[11] Intuitively, a systematic element to liquidity is likely given that, in market booms (crises), not only do prices rise (fall), but ease of selling typically increases (decreases).

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In the FPSBA, time-to-transact is mainly driven by variation in marketing and due diligence periods. The due diligence period is less difficult to control and is mainly determined by the buyer and their legal advisors. Highly motivated buyers can speed up the due diligence process by a less thorough examination of the asset. A possibly more common issue is extended transaction times. During the due diligence period, there can be random 'liquidity shocks' that are unpredictable and caused by changes in market conditions, changes to the asset (e.g. tenant failure), discovery of new information about the asset (e.g. problems revealed by surveys or financial records) and changes in buyer circumstances (e.g. funding availability). New information can result in re-negotiation of prices and extended transaction times. Normally, there is a gap between legal agreement to sale (usually through exchange of contracts) and transfer of legal ownership (closure or completion). Sometimes, legal agreement to sale and transfer of legal ownership occur simultaneously, but often there is a gap of, say, a week or a month (IPF, 2004; 2014). For the buyer, often the process will only begin once they are aware that the asset is for sale. This will usually be after a decision to sell by the seller has been made and pre-marketing preparations are completed. Evaluation can then begin and decisions made about whether and how much to bid. If the bid is accepted, then the due diligence and settlement periods for both buyer and seller will be the same.

3.5 Pricing of Liquidity

Having reviewed definitions and measures of liquidity, the final area to consider is the extent to which liquidity risks are priced in direct real estate investment. In principle, investors require higher returns from assets that are illiquid because they present greater risks in terms of being able to realise capital when it is required. As such, if two assets with similar cash flow characteristics differ in terms of liquidity, then the price for the less liquid asset should be lower. More formally, IPF (2015a) explained that the need for an illiquidity premium arose from the presence of market imperfections. These included participation and search costs, transaction costs, information asymmetries, imperfect competition and funding constraints. Most of these were significant issues in the case of direct real estate markets.

The existence and extent of illiquidity premiums are questions of great importance, but there is little literature that attempts to address these questions for real estate investment. This is in contrast to financial assets, where the impact of variations in liquidity on the required return for different assets has been studied widely. Hibbert et al. (2009) summarised some of the main studies for equities and bonds. They noted that most studies gauge the pricing of liquidity relative to a reference asset. For example, the liquidity and pricing of small capitalisation stocks has been measured relative to that of large capitalisation stocks on the same exchange. They also noted that clientele effects can arise where types of investors with different requirements for liquidity will price any relative absence of liquidity differently. As a result, the marginal investor for some types of asset will vary.

Cheng et al. (2013a) did not measure illiquidity premiums directly in their study of direct real estate. However, they argued that their estimates of marketing period risk, together with adjustments for the nature of real estate returns data, explained the risk premium puzzle; i.e. why portfolio allocations to real estate are so low when risk-adjusted performance appears so strong relative to equities and bonds. In other words, once measurement of risk is adjusted for uncertainties around transacting, then the performance of direct real estate is no longer anomalous in risk-return space. Meanwhile, work that estimates liquidation bias (the discount needed to achieve an immediate sale) can be seen as providing more direct quantification. Using UK real estate data, IPF (2015b) estimated liquidation bias to be in the range of between 1% and 4%, depending on property type and holding period.

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IPF (2015b) also attempted to estimate illiquidity premiums, using a regression-based approach. Real estate returns were regressed on to a variety of control variables and a variable representing liquidity levels over time. A variety of proxies for liquidity were tested, including volumes, turnover and some measures that combined trading activity and performance, such as the Amihud measure. Premiums were then estimated by multiplying the coefficient on the liquidity variable by the average value of that variable over the sample period. The results suggested an illiquidity premium for UK commercial real estate in the order of 3%. This contrasts with survey estimates of the total risk premium used by UK investors (including risks such as tenant default and obsolescence), which are typically between 2% and 4%[12]. IPF (2015b) also showed that the illiquidity premium is time varying, with much greater premiums evident during periods of market stress.

Some unresolved questions are: what premiums exist for non-UK real estate markets, how do these premiums compare across markets and can any differences be related to variations in factors such as the size or transparency of the markets in question? Furthermore, how have illiquidity premiums changed over time and with market conditions? Does the liquidity of different markets influence the types of investor that are active there, alongside other factors? If so, how does this influence the interpretation of any premiums that are measured? If a market attracts more long-term than short-term investors, do the holding periods associated with the former keep down the levels of trading, reinforcing illiquidity? It is difficult to answer most of these questions conclusively, especially given the constraints of international real estate data, but some of these questions are explored in Section 5 of the report.

3.6 Summary of Review

Liquidity is a concept with many different aspects and features. It is concerned with the speed that investors can enter and exit markets, the associated transaction costs and the extent to which transaction activity affects market prices. Hence, measures of liquidity include a diverse range of indicators such as formal and informal transaction costs, time-to-transact, turnover or volume, holding periods and bid-ask spreads. Compared to exchange traded assets, direct real estate investments display many characteristics associated with low levels of liquidity. Transaction costs are typically much higher, transaction volumes are lower and time-on-market and holding periods are substantially longer. As a result, commercial real estate investors face higher risk than is apparent from conventional performance metrics.

In addition, liquidity can vary significantly across real estate markets and over time. Despite the large volumes of cross-border real estate investment in the last decade, this is an area that has seen little research until recently. Most analysis has examined either the UK or the US and has explored transaction volumes, turnover and holding periods rather than transaction processes and costs. Meanwhile, the effects on pricing and risk of variations in the various aspects of liquidity are largely unaddressed. Therefore, this report aims to provide evidence on the diversity of processes, costs and risks that investors are exposed to when buying and selling commercial real estate in different markets. The next section discusses questionnaire based research into transaction processes and costs in office markets around the world, while Section 5 considers how such differences affect market pricing and performance.

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[12] See the Survey of Financial Advisors published by The Association of Real Estate Funds (www.aref.org.uk).

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The literature review indicates that there has been little research on transaction processes and costs in an international context. Some information is available about the different formal processes and costs, particularly in relation to legal procedures and taxes, associated with transacting commercial real estate in different countries. This is often found in the form of investor guides to different markets. However, other information on typical approaches to transacting and the role of brokers in those markets, as well as on the timescales involved, is fairly scant. With this in mind, the qualitative element of the project was mainly concerned with typical transaction procedures, costs and the role and nature of brokerage services across a range of different commercial real estate markets as of 2015. As such, the data collected primarily provides an indicative, rather than representative, snapshot of markets.

This section sets out the results of that qualitative work, which includes a substantive questionnaire exercise conducted during August and September 2015. Real estate investment professionals in a large sample of 26 countries were contacted and asked to comment on typical transaction processes and costs in the markets where they operated. Countries for which responses were received are discussed below and these span a range of transparency levels and geographical regions. In addition to the questionnaire exercise, secondary data from other sources was consulted, with the Global Real Estate Transparency Index (GRETI) produced by JLL being an important source. This is because the component questions include specific questions about the fairness and transparency of transaction processes in different countries.

4.1 Questionnaire Design and Development

The questionnaire (see Appendix 4) was designed to lead respondents through four themed sections relating to transaction processes and liquidity indicator:

1. Timing and nature of the transaction process (eight questions);

2. The seller's broker – services, fees & role (five questions);

3. The buyer's broker – services, fees & role (five questions);

4. Professional background of respondents (four questions).

The questionnaire was designed to capture information providing a broad picture of the transaction processes within markets. A variety of question structures were adopted, but closed-ended tick box responses (incorporating both single and multiple response options) were used predominantly, accounting for 18 questions. This approach ensured that the format of the questionnaire was concise and accessible to facilitate completion within five to 10 minutes. Multiple choice options were used as numerical scales were inappropriate due to both the nature of the information being sought and the inconsistencies associated with the interpretation of such measures.

Questions were developed to ensure as much detail as possible could be collected within this time frame. As an addendum to 10 of the 18 of the closed-ended questions, an option for writing additional information was provided to allow the respondent to comment further. Therefore, the unordered nominal data collected via the tick-box question options provided insight through specific, pre-defined statements, combined with any further comments offered by respondents. Open-ended style questions were minimised and applied to four questions only where seeking responses via a closed-ended question would have failed to accurately account for the diversity of responses (Questions 17 & 18) or were inappropriate due to the nature of the information being sought (Questions 1 & 22).

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4.1.1 Required and Voluntary Responses

Of the 22 questions, responses to 17 were mandatory, while five were at the discretion of the respondent. The 17 questions requiring responses consisted primarily of closed-ended tick box questions (15), with an option to comment further where appropriate. Although requiring answers to questions may have dissuaded participants, the questionnaire was developed to minimise this possibility by providing informed options for responses and utilising closed-ended questions that could be answered accurately and swiftly. By requiring responses, information capture was maximised from those completing the questionnaire in its entirety.

The five questions that were answered voluntarily included one that offered the opportunity to make any final comment on the form and function of the respondent's particular real estate market (Question 18), and four questions on their professional role. Since the latter were voluntary, the respondent could maintain their anonymity, although they could choose to answer these and provide contact details in return for a copy of the research findings.

4.1.2 Questionnaire Style and Language

The questionnaire was developed to be straightforward to navigate and allow for easy and timely completion. The use of language was considered carefully, with the questionnaire adopting understandable and definite terminology, as clarity was important considering the potential number of respondents for whom English is a second language.

The questions specifically considered 'prime high-quality investment-grade office buildings' in an attempt to ensure that respondents were thinking of similar (if not directly comparable) types of property when answering questions. Although it is impossible to account for all respondents opinions on what constitutes 'prime high-quality investment-grade offices' in their market – and there will be a varied spectrum (what is prime in the London office market is not directly comparable to prime office space in Mumbai) – these definitions were adopted to allow for consideration of a specific market sector within a particular country and how real estate assets in that sector are transacted to fulfill the objective of the study.

Similarly, the word 'typical' was employed regularly, to encourage respondents to think about what was most common in their markets. Multiple choice questions, using options such as 'always', 'often', 'sometimes', 'rarely' and 'never' (Questions 4, 5, 10 and 15), were employed so the predominant approach could be clearly indicated. The language adopted did not permit overlap or confusion between options, thus encouraging confidence in the chosen response as indicative of the 'typical' market experience.

4.1.3 Online Platform and Distribution Process

Due to the nature of the research and the need to attract international responses, the questionnaire was constructed online and disseminated for completion via email. In addition to being able to effectively draw together responses from disparate geographical areas, email provided the most direct and efficient method to collect data within a limited time frame.

The research sample was developed around real estate professionals primarily working for globally recognisable companies and their affiliates within the industry. Sampling was not random, but defined and selective: directed towards professionals with the knowledge capacity to accurately complete the questionnaire. The recipients targeted included real estate brokers or agents with knowledge of the

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transaction processes in their markets. Considering the variety of titles for professional roles adopted in the countries targeted, the questionnaire was sent to a diverse range of participants, including those active in capital markets, investment and transaction agents and managing directors. This approach accounted for variation and potential overlaps in how professional roles are defined between markets.

Contacts for the sample were compiled for each targeted country. The majority of contacts were from the dominant global real estate service providers (e.g. JLL, CBRE, Cushman & Wakefield, Knight Frank and Colliers International) rather than smaller, country-specific real estate companies, owing to their internationally recognisable presence and readily available email contact information. It proved difficult to find contacts in markets with less developed or emerging professional real estate sectors. However, in a number of these markets, global real estate service providers were present through affiliates and contacts were compiled through them. In total, contacts were collated for real estate professionals from 29 different companies across 26 countries. By targeting potential respondents in this way, the distribution process was devised to maximise completion of the questionnaire by appropriate and knowledgeable professionals, thus minimising potentially irrelevant or poorly informed responses.

The researchers and the project steering group also provided contact details for relevant professionals, accounting for c. 4% of questionnaire recipients overall. The vast majority of those approached had no contact or relationship with the researchers or project steering group prior to this study.

The questionnaire was distributed to contacts directly via personalised email, comprising an invitation to participate, including details of the aims and nature of the project, the IPF Research Programme, the academic researchers leading the project, what the questionnaire responses would be used for and information on the questionnaire itself (such as anticipated time required for its completion). Informed consent of the recipient was ensured through both the content of the invitation to participate and the introductory page of the questionnaire itself, which reiterated the focus of the research (see Appendix 4).

The invitation also encouraged the recipient to forward the email to any other appropriate contacts in the hope that the questionnaire would attract additional respondents specifically within the industry. However, this also meant that any additional participant would be an unknown entity, possibly resulting in the collection of inaccurate or misleading responses. Although a substantial response rate was desired, this could not be at the expense of accurate data collection. When assessing the respondent information (Question 22) ex post, there were no dubious inclusions as a result of this attempt to 'snowball' the sample. All efforts were made to ensure the data collected were reliable. No incentives were offered to complete the questionnaire; the implicit incentive was that the respondent was contributing towards increased real estate market knowledge, to the benefit of the industry.

The final questionnaire consisted of 11 pages, including an introductory page and a final thank you. Questions were distributed across the four sections described previously, under 4.1. The online survey was open for six weeks, from 19 August to 30 September 2015, and was directly distributed via email to over 500 real estate professionals.

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Email distribution was staggered (see Table 4.1) and dependent on response rates from each country. Potential respondents in all the targeted countries were contacted through the first email tranche, but in the second and third tranches, the emails were directly concentrated in markets where response rates were lower. Reminders were also sent on the same dates as Tranches 2 and 3. As with the initial email, these were directed to the recipient personally and contained a pared down version of the original wording. Every effort was made to ensure that those who had completed the questionnaire were not contacted with a reminder, although this was dependent on whether Question 22 had been answered and email addresses included to eliminate respondents from the reminder list.

Table 4.1: Questionnaire Distribution

Tranche No.	Date	No. of Emails	No. of Countries Contacted
1	19/08/2015	310	26
2	02/10/2015	173	23
3	21/10/2015	73	5
All tranches		**556**	**29**

4.1.4: Research Sample

The targeted sample of locations included 26 countries spread across each global region, as well as real estate markets at various stages of development and transition[13]. Sixty-one responses were received from 26 countries, reflecting responses from 23 of the targeted countries and three additional countries. These ranged from one completed questionnaire per country (Bulgaria, China, and Romania) to a maximum of six (Spain and the UK). No responses were received from real estate professionals in Colombia, Egypt and Turkey. The overall response rate was just under 11%. Table 4.2 summarises the responses received according to global region, using definitions of regions as applied by JLL for the GRETI. A breakdown of country and city specific response rates can be found in Appendix 5.

Of the 61 responses, 59 questionnaires were completed in their entirety (i.e. all 17 of the required questions were answered). In the main, the response rate was equivalent to the completion rate, with the exception of two partially-completed questionnaires, received from Russian and Panamanian respondents. They were included in the analysis as more than half of the questions had been answered and, thus, most of the questionnaire had been completed. Any surveys where less than half of Sections 1-3 (Questions 1-17) had been completed were regarded as ineligible and, thus, omitted from analysis.

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[13] In particular, the researchers referred to the JLL Global Real Estate Transparency Index and ensured that countries from each tier of the index ('high', 'transparent', 'semi', 'low' and 'opaque') were included.

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Table 4.2: Questionnaire Response Rates per Region

Region	Responses	No. of countries represented
Americas	10	4
Asia Pacific	16	7
Europe	27	10
Middle East & North Africa	4	2
Sub-Saharan Africa	4	3
All Regions	**61**	**26**

Although more contacts could be identified and accessed for developed real estate markets, this did not necessarily lead to higher response rates (see Appendix 5 for details). Overall, the response rates for each country (calculated by dividing the number of completed questionnaires by the number of professionals contacted) were highest in less developed markets, such as Nigeria and Ghana (both 100%), Panama (33.3%) and Brazil (25%) compared to the UK (10%), the USA (8%) and Australia (just under 7%). The highest response rate for a developed real estate market was Spain, at approximately 32%, while the lowest overall response rate was from China, at under 4% of professionals contacted.

4.2 JLL Global Real Estate Transparency Index

Analysis of the questionnaire was supplemented by data from JLL's GRETI survey. The GRETI is compiled by JLL biennially and measures the transparency of national real estate markets, providing a composite score of between one and five for each country included in the exercise. In 2014, the UK was the most transparent market globally, with a composite score of 1.25, while Libya was the most opaque of the 102 markets, scoring 4.63. To reach these composite scores, the 2014 GRETI evaluated 115 individual questions or data points for each market, ranking the 102 countries from highly transparent through to opaque (see JLL, 2014).

The first GRETI was released in 1999 and the index has changed and adapted over time. For example, the number of questions increased from 83 in 2012 to 115 in 2014, while the number of countries in the index rose from 97 to 102 over the same period. The GRETI survey is completed by JLL researchers and partners, with responses compiled to provide an overall perspective for each market. The surveys returned from each country are not usually reflective of a single person's response, as different sections are completed by specialists in particular areas (e.g. valuation, unlisted funds, tax, etc.). Respondents are asked to relate their responses to the primary market in their country and to institutional-grade commercial real estate across all sectors.

JLL is aware of, and rigorously verifies, potential issues relating to objectivity and bias in responses, to ensure that these appear reasonable and reflective of each market. Examples of potential adjustments following scrutiny include occasions where there have been substantial shifts in the country's transparency from the previous survey or when cultural influences and differences of opinion are apparent through optimistically overstating or pessimistically understating market conditions. Self-reporting effectively and accurately can prove challenging. The survey goes through an iterative process and responses are assessed by regional, global and, where relevant, specialist research teams. If necessary, responses can be overwritten and JLL has, on infrequent occasions, made retrospective revisions to historical survey measurements.

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The GRETI data is collected through a mixture of qualitative and quantitative methods, and classified through five weighted sub-indices, including performance measurement (25% weighting), market fundamentals (20%), governance of listed vehicles (10%), regulatory and legal (30%) and transaction process (15%). The latter sub-index was of particular interest for this study, as it includes questions on professional standards in brokerage, bidding processes, quality of pre-sale information and the cost of transactions. JLL provided the research team with access to the individual questions used to create the main composite index and the various sub-indices, with response information provided for the sub-index on transaction process only. The GRETI information set provided both a check on the qualitative data and additional information on transactions and brokerage.

The research team also obtained data for a subset of the World Bank's international *Doing Business* survey that focuses specifically on real estate transactions[14]. In this survey, data is collected in a standardized way. Doing Business researchers, with academic advisors, design a questionnaire that is distributed to more than 9,600 local experts, government officials and other professionals that routinely administer or advise on legal and regulatory requirements. The experts have several rounds of interaction with the Doing Business researchers, involving conference calls, written correspondence and visits by the researchers. The questions included on real estate transactions review the number of processes involved in transacting, the amount of time that transactions take in days and the total transaction costs as a percentage of property value (summing both buyer and seller costs).

Although the World Bank data seems to be highly relevant in the current context, the researchers have significant reservations about some of the indicators. While the composite scores for ease of real estate transactions in each country seem plausible, data for the individual variables did not appear to be plausible and were not consistent with information from real estate market sources or the researchers' own questionnaire responses.

4.3 Findings and Analysis

The principal findings from the questionnaire emerged from Sections 1 – 3 and relate to:

1) Transaction Processes;

2) Brokerage Models;

3) Brokerage Services;

4) Brokerage Fees; and

5) Time to Transact and its Component Stages.

4.3.1 Transaction Processes

Findings relating to transaction processes were drawn from responses to Question 2 of the questionnaire, as well as from data provided by JLL for questions in the 2014 GRETI on pre-sale information and the bidding process. When considering the typical method of sale used for prime, high-quality investment-grade office buildings across the 26 countries covered by the questionnaire, Figure 4.1 shows that responses were split into two core groups: best bids (51.7%) and some form of private negotiation (43.3%). Within these groups:

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[14] The *Doing Business* survey publications can be accessed at www.doingbusiness.org (as at November 2015). More details on the real estate element of the survey can be found at:
www.doingbusiness.org/methodology/registering-property

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- Best bids that are not binding until the completion of legal formalities dominated the typical method of sale, in 27 instances (45%).

- Best bids that are binding in advance of legal formalities were less common (6.7%) as a typical method of sale, but this was adopted as a common method in China, Mexico, Singapore and the Netherlands according to the respondents. In the last three cases, a mix of methods was typical. In Singapore, intermediated private negotiation was used as well, while non-binding best bids was also used as a method of sale in the Netherlands and Mexico.

- Intermediated private negotiation was stated as the most popular transaction method in 20 cases, making it the second most common method overall.

- Private negotiation was recorded as the primary method from 10% of the responses, including Ghana, Kuwait, South Africa and the UAE. However, as with best bids, a mixture of approaches was reported as typical in the latter three markets. In South Africa, intermediated private negotiation was also used while non-binding best bids was also used in the UAE and Brazil.

- Most countries had a dominant approach. For example, in the UK, South Korea and Germany, the dominant approach reported by respondents was non-binding best bids, while in Spain, France and India it was intermediated private negotiation.

- In 10 out of 26 countries, there was no dominant method of transacting sales adopted; however, in only 5% of cases did respondents select 'no typical method': Brazil, Hong Kong and Panama.

Figure 4.1: Most Commonly Adopted Method of Sale

Legend:
- Best bids, not binding
- Intermediated private negotiation
- Private negotiation
- Best bids, binding
- No typical method
- Public auction
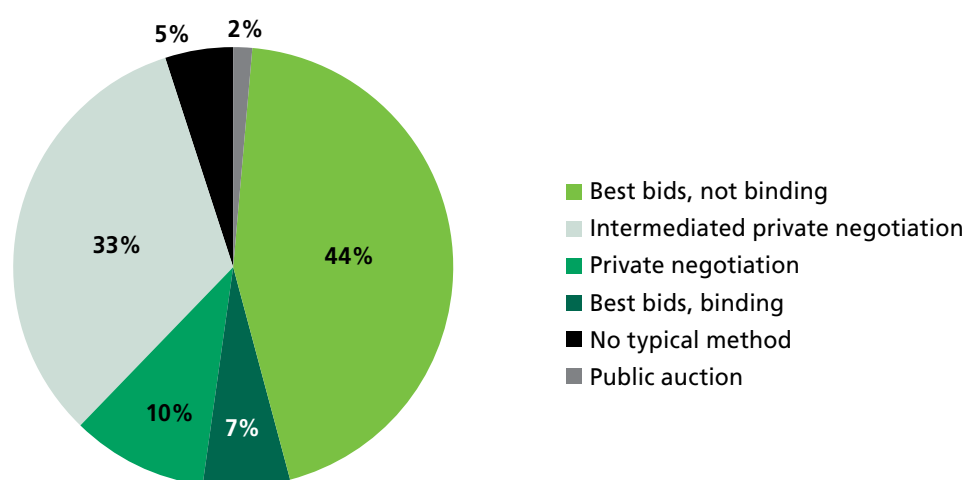
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Overall, there were no discernible patterns separating developing and developed real estate markets relating to the methods of transacting. However, the influence of cultural factors was reflected on by some respondents commenting on transaction processes in Middle Eastern markets. For example, a real estate professional in Qatar noted that they could not complete the questionnaire owing to the nature of the market and its transaction processes. Typically, properties in Qatar are marketed between principals and the transaction process is often executed without any advice or input from real estate professionals, with decisions made by Majlis councils. Meanwhile, in Kuwait, the approach of private negotiation is still primarily adopted with few sellers 'believing in having the added value of a real estate transactions advisor'. However, it was reported that perceptions are changing as the market develops and more advice is being sought from real estate service providers (although a transaction advisor does not broker deals). Thus, the roles that real estate professionals play in Middle Eastern countries differ to what would traditionally be associated with transacting real estate assets in developed markets.

The research went on to isolate scores and rankings for the transaction process sub-index from the overall GRETI rankings. The transaction process sub-index is weighted at 15% within the overall index and covers two of the 13 'topics' that JLL evaluate overall, specifically 'occupier services' and 'sales transactions'. The GRETI transparency rankings of each country studied were compiled and ranked specifically in relation to each country's score for the transaction process sub-index to facilitate an assessment of the influence of transaction processes at a more granular and independent level within the overall index. Table 4.3 records results from the 2014 GRETI, which demonstrated that certain countries with relatively strong sub-index scores, such as Panama (41) and Ghana (46), scored less well in other indicators, thereby diluting their overall rankings (to 73 and 86 respectively). In contrast, China ranked 66 for transaction processes, but 35 overall, while Russia ranked 72 for transaction processes versus 37 overall. This contrasted with little movement between rankings in the cases of transparent real estate markets.

To arrive at composite scores for the transaction process sub-index, JLL examine and rank responses relating to questions on pre-sale information, bidding and negotiation process and professional standards. For 2014, the markets scoring highest on all three questions included France, the Netherlands and the UK, while the lowest ranked markets were Russia and Nigeria. Although the overall score for transaction process is indicative of general perceptions for that market, in some instances, it can hide significant deviations in scores for individual elements, especially in developing markets.

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Table 4.3: GRETI 2014 Transaction Process Sub-Index Scores

Country	Overall GRETI Ranking	GRETI Transparency Level*	Transaction Process Sub-Index Score	Transaction Process Sub-Index Ranking
Australia	3	HT	1.4	9
Brazil	28	T	2.0	24
Bulgaria	66	LT	2.7	53
China	35	ST	3.0	66
France	5	HT	1.1	3
Germany	12	T	1.3	9
Ghana	83	O	2.6	46
Hong Kong	14	T	1.8	18
India	40	ST	2.7	53
Japan	26	T	2.3	36
Kuwait	75	LT	3.0	66
Mexico	41	ST	2.2	33
Netherlands	7	HT	1.3	6
Nigeria	86	O	3.8	87
Panama	73	LT	2.4	41
Poland	17	T	2.0	24
Romania	30	ST	1.9	23
Russia	37	ST	3.2	72
Singapore	13	T	2.1	29
South Africa	20	T	1.4	12
South Korea	43	ST	2.8	60
Spain	18	T	1.4	12
Sweden	11	T	1.5	15
United Arab Emirates (UAE: Dubai)	49	ST	2.7	53
United Kingdom (UK)	1	HT	1.3	6
United States of America (USA)	2	HT	1.3	6

*: HT = Highly transparent; T = Transparent; ST = Semi-transparent; LT = Low transparency; O = Opaque.

Although the research questionnaire responses suggested no typical method of sale was adopted across all markets, the GRETI results emphasise the importance of information, ethics and bidding processes within these transactions, with an observable difference in the way real estate transactions are executed and the quality of that execution between developed and developing markets.

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4.3.2 Brokerage Models

Findings relating to brokerage services were drawn from responses to Questions 4, 5 and 6 of the research questionnaire.

The key finding from the first two of these questions was that buyers' brokers were not considered essential across markets, in contrast to sellers' brokers. Responses indicated that it was more usual for a seller to appoint a broker than a buyer. For selling prime, high-quality, investment-grade office properties, 82% of respondents stated that sellers 'always' or 'often' appointed a broker (see Figure 4.2). The remaining responses answered 'sometimes', with no respondents choosing the 'rarely' or 'never' options. Predominantly, sellers appointed a broker 'often', with this response accounting for 59% of responses – typical in Poland, Japan, Mexico, South Korea and Sweden. For most countries (the UK, Australia, France, Germany, Hong Kong, India and the Netherlands), responses were either 'always' or 'often', but not exclusively one or the other. The respondents for the UAE all responded 'sometimes', this being the only unequivocal country response for this option.

For buyers' brokers, however, the situation was more ambiguous (see Figure 4.3). Only one respondent in the entire sample stated that buyers 'always' appointed a broker. In some countries, respondents had different perceptions about the use of brokers by buyers in that country. The most extreme example was India, where one of the three responses stated 'always' while the others stated 'sometimes' and 'rarely'. There was a general consensus between respondents in several other markets though, including the UK and Netherlands, where buyers appointed brokers 'often' and in South Korea, where they did so 'rarely'. No comments made in relation to this question gave reasons why buy-side brokers were not typically appointed.

Figure 4.2: Appointment of Brokers by Sellers

Often 59%
Always 23%
Sometimes 18%
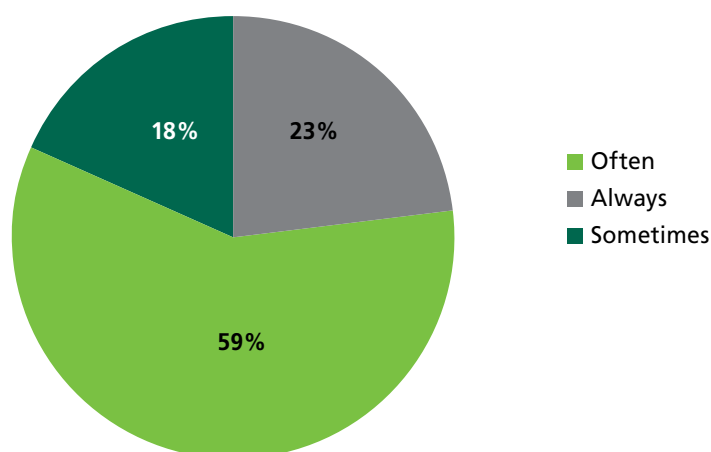
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Figure 4.3: Appoint of Brokers by Buyers
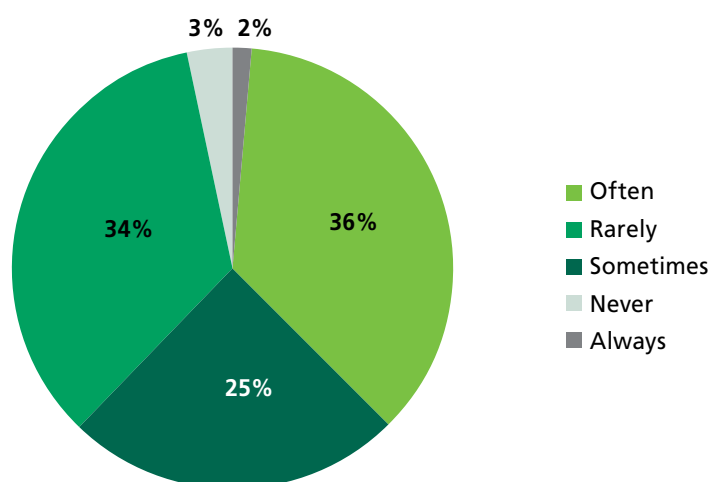
Question 6 considered the specific brokerage model adopted across countries and the breakdown of the dominant models per country is shown in Table 4.4. In the majority of countries (11 out of 26 markets), the dominant model of brokerage adopted was of one broker, representing the seller only.

Table 4.4: Distribution of Dominant Brokerage Models Across Sample

Brokerage Model	Countries
1 broker: represents seller only	Australia, Bulgaria, Mexico, Nigeria, Russia, Singapore, South Africa, South Korea, Kuwait, Sweden, USA
2 brokers: 1 buyer/1 seller	Netherlands, Poland, Romania, Spain, UK
1 broker: represents both	China, Hong Kong
No broker	UAE, Ghana
Mix of models reported by respondents	Brazil, France, Germany, India, Japan, Panama

No particular pattern in brokerage models was identified, with various models applicable across the developed and developing real estate markets worldwide. However, some observations could be discerned from the responses, such as a lack of brokers in the UAE, no doubt linked to cultural influences and traditional approaches to real estate transactions, as discussed in the previous section. Also, only China and Hong Kong adopted a model whereby one broker represented both parties. The wider lack of use of this model was unsurprising, given issues around potential conflicts of interest and that it is legally prohibited in some other jurisdictions. Across Brazil, Ghana and the UAE, four of the five respondents who stated that no brokerage model was adopted also indicated that the typical method of sale for a prime, high-quality, investment-grade office building was 'private negotiation'. In other countries, such as Spain, where 'intermediated private negotiation' was the typical method of sale, the two brokers model was applied. There did not appear to be a pattern between method of sale and adopted brokerage model in any other countries.

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4.3.3 Brokerage Services

Findings relating to brokerage services were drawn from responses to Questions 7 and 12. The former considered the services typically provided by the seller's broker, while Question 12 considered services typically provided by the buyer's broker. Respondents were asked to reflect on what services were typically provided by brokers in their market, rather than the specific services they themselves might provide to clients in their professional role. The results are displayed in Tables 4.5 and 4.6, where multiple responses were offered with respondents asked to indicate all appropriate answers.

The results indicated that, across markets, at least 54 respondents (over 88%) typically offered the seller all seven of the seller services listed, with 'conducting negotiations with buyers' the most regularly provided service (almost 97%). 'Advice on method of sale' and 'support in due diligence' were the least frequently provided of listed services, although 'least' is a relative concept.

Table 4.5: Services Typically Provided by Seller Brokers

Service	No.	%
Advice on indicative asking price	58	95.1
Advice on method of sale (tender, auction, negotiated sale)	54	88.5
Advice on marketing strategy	58	95.1
Marketing of asset, production of brochures, document centre etc.	55	90.2
Conducting negotiations with buyers	59	96.8
Support in due diligence	54	88.5
Sale agreement negotiations	56	91.8
Other services	9	14.8

Table 4.6: Services Typically Provided by Buyer Brokers

Service	No.	%
Sourcing/finding asset for buyer	53	86.9
Providing information to support asset evaluation	55	90.2
Providing a valuation of the asset	43	70.5
Advising on appropriate sources of finance	19	31.2
Advising on bidding level	47	77.1
Conducting price negotiations	51	83.6
Support in due diligence	53	86.9
Purchase agreement negotiations	49	80.3
Other services	3	4.9

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Respondents were able to describe the nature of other services, where this option was selected. Other services included broker opinions on value and appraisals (Brazil and Panama), formal valuations (Russia), building surveys (the UK) and preparing legal documentation (Japan). A respondent from Dubai reflected that there is "a real difference between the tradition Dubai 'brokerage' model, where really no advice is given, even in terms of pricing, and the model that the international practices use ... the role we play in sales/acquisition, when we play it, is fairly extensive and advanced compared to that of our peers in more mature markets".

The results in Table 4.6 indicated that, across all markets, the services provided most by the buyer's broker were 'providing information to support asset evaluation' (90%), 'sourcing/finding asset for the buyer' (87%) and 'support in due diligence' (87%). 'Advising on appropriate sources of finance' was the service provided least to the buyer overall, representing only 31% of contributors. Respondents suggested that this service was not provided at all by a buyer's broker in Australia, Brazil, India, Mexico, the Netherlands, Nigeria, Poland or Romania – a diverse mix of both developed and developing markets. 'Providing a valuation of the asset' was not typical for South Africa or the UAE, but was reported as commonplace in Brazil and France. In certain countries, there was no consistency in responses as to whether or not valuation services were offered (India, the Netherlands, Sweden, the UK and Spain).

Other services mentioned for a buyer's broker included sourcing debt (Dubai), providing financing and valuation advice as a 'bolt on' service rather than an inclusive one (Poland) and building surveys (the UK).

4.3.4 Brokerage Fees

Findings relating to brokerage fees were drawn from responses to Questions 8 - 11 and 13 - 16. Strong common patterns emerged from these questions in relation to how the brokerage fee was calculated for both the seller's and buyer's brokers in different markets (see Table 4.7).

Table 4.7: Typical Approach to Fee Calculation

Typical method	Buyers (%)	Sellers (%)
Based on time	0.0	0.0
Fixed payment	18.3	1.6
% of the price	65.0	91.8
Combination of approaches	16.7	6.6

For the calculation of fees for the seller's broker, the predominant approach applied in 92% of responses was of a brokerage fee as a percentage of the selling price. In only one market was a fixed payment used (Ghana) and only four respondents indicated that a combination of approaches was typically used (Hong Kong, Spain and the UK). However, within these three markets the majority of other respondents stated that brokerage fees for the seller's broker were typically calculated as a percentage of the sales price.

In terms of specifying what the typical fee percentage was for each market, 28 of 61 respondents referred to a scale. This range in fees indicated a sliding scale and it was noted by respondents that the percentage fee received reflected the size/value of the transaction, with incentives sometimes applied in addition to the agreed percentage fee. For comparison across markets, if a scale was indicated by respondents, the mid-point was taken and applied for analytical purposes. The fee percentage was specified 46 times across 23 markets (see Figure 4.4). No indications of fee percentages for the seller's broker were received from Bulgaria, Nigeria or Romania.

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In relation to the seller's brokerage fee, the lowest percentage indicated was in Poland, where a fee scale of 0.2% to 0.5% was included, whilst the largest overall fee percentage indicated was in Panama, at 10% (with a second respondent from Panama indicating a much lower typical fee range of 2% to 5%). However, the 10% broker's fee levied on sales price in Panama exceeded every other market by 5%. Fees of 4% to 5% were typically found at the higher end of sliding scales, in markets such as Spain, Ghana and Mexico. Spain, as with Panama, seemed inconsistent in terms of the fee ranges collated when compared to other responses from the same countries (they were typically significantly lower and therefore could skew the data).

Figure 4.4: Seller's Average Mid-point Fee per Market (%)
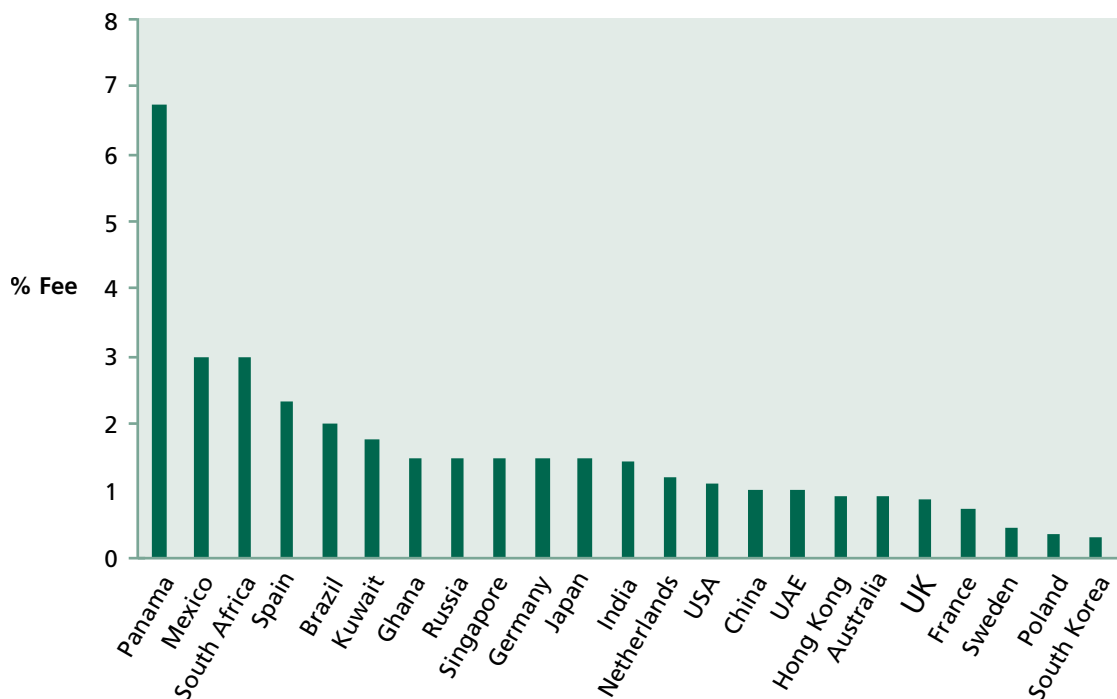
From Figure 4.4, it can be observed that several markets, including the UK, Sweden, South Korea, France, Australia and China were reported to have average fees for sellers of 1% or less. In the case of Spain and Panama, the effects of the greater scales reported can be observed, but the majority of markets averaged percentage fees for the seller's broker falling between 0.5% and 1.5%. The figures collected on seller brokerage fees were seen to be in line with the GRETI indications of sales fees in the main. However, GRETI indications for seller's costs as a percentage of price were larger for Brazil, Hong Kong, India, Sweden, Poland, the UK and the UAE than in the findings from this research.

For calculation of the buyer's brokers' fees, responses were more varied (see Figure 4.5). The predominant method was percentage of selling price, in 39 cases (65%). Fixed payment was more regularly adopted than for seller's brokers, as was a combination of approaches. In Germany, fixed payment was the typical approach to calculating the buyer's brokerage fee and it was also used in India, Poland, Australia, Spain and South Africa. Markets where responses indicated that a combination of approaches was used were Australia, Spain, Panama, Hong Kong and Brazil.

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Due to the smaller number of countries adopting a percentage fee approach, the sample size, as illustrated in Figure 4.5, was lower. Brokerage fees for the buyer were calculated as a percentage of the purchase price in 18 of 26 markets and a fee range was specified in 15 out of 18. In some instances (Poland, France, China, Mexico, Panama and India), the fee ranges specified were the same as those for the seller's brokerage fees. However, in other markets (Spain, Sweden, the UK, the USA and Ghana), the findings indicated that the buyer's fees were higher than those of the seller. This trend was reflected across a range of responses. In the UK, the difference was very small (0.1%), whereas in Ghana and the USA, the difference was more than 2%.

Figure 4.5: Buyer's Average Mid-point Fee per Market (%)
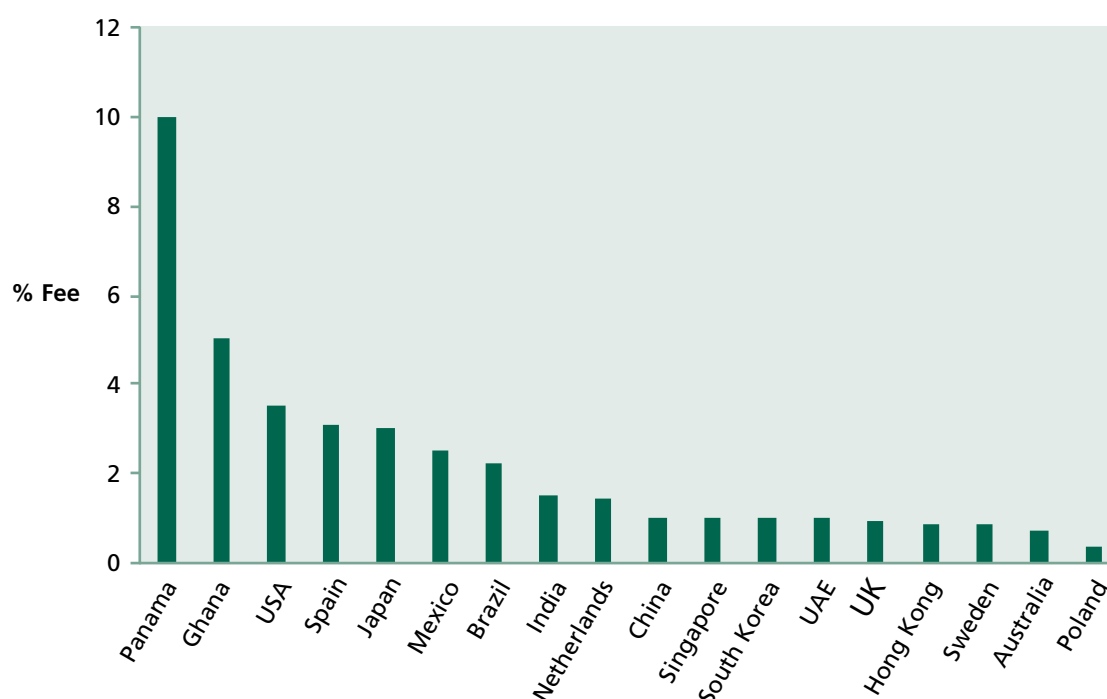
The GRETI data for the purchaser's costs includes not just the brokerage fee, but all other costs, such as transfer taxes, legal fees, registration fees and valuation costs. It was anticipated, therefore, that the GRETI percentage costs would be substantially higher than the indications collected from the questionnaire. In some markets, the gap between the research data and that of the GRETI was small (e.g. 1% to 1.5% difference in Sweden), which could be due to favourable taxation regimes or where sliding scales were applied to tax in line with transaction size/value.

Questions 10 and 15 queried whether additional fees were ever offered by the seller or buyer to incentivise the broker. Responses indicated that the seller's broker was typically incentivised either 'often' (38%), 'sometimes' (44%) or 'rarely' (18%), but no respondents chose 'always' (see Figure 4.7) or 'never' (see Figure 4.6). However, data for buyers demonstrated a wider spectrum of responses, incorporating all options except 'always'. 'Never' accounted for a quarter of all responses, as did 'sometimes', with 'rarely' (42%) reflecting for the majority of responses. 'Often' and 'sometimes' together account for a total of 33% of responses, compared to 82% in the case of seller's brokers, indicating that it was more typical for a seller's brokers to be incentivised and much less likely an occurrence for a buyer's broker.

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Figure 4.6: Additional Fees Offered as an Incentive by Sellers
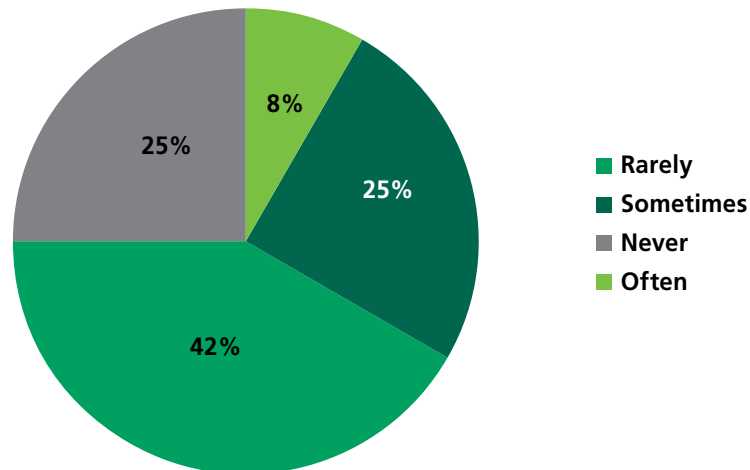
Figure 4.7: Additional Fees Offered as an Incentive by Buyers
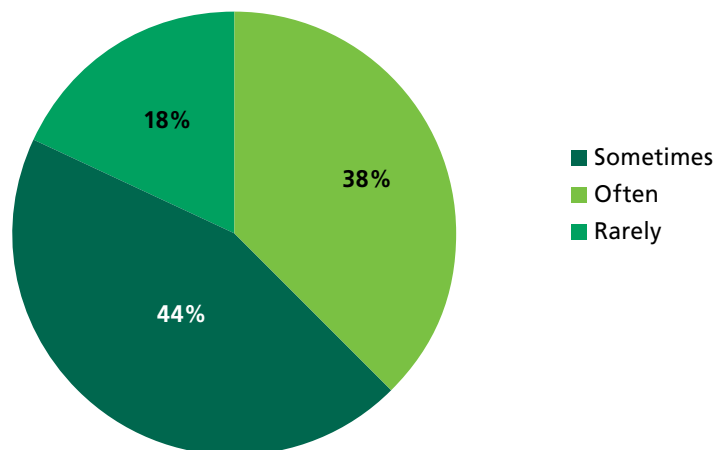
Questions 11 and 16 sought to discover if it was typical for a broker to receive a fee if a sale/purchase did not occur (see Table 4.8).

Table 4.8: Fees Received for Unsuccessful Bids

	Buyer's brokers %	Seller's brokers %
Yes	15.0	9.8
No	85.0	90.2

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Compared to the seller's brokers, the buyer's brokers appeared to be slightly more likely to receive a fee for an unsuccessful bid. Markets where it was typical for a buyer's broker to receive a fee for non-completion include Australia, South Africa, Mexico, Spain and India. On the seller's side, the markets included Brazil, the Netherlands, Romania and Spain. According to comments from Brazil, this could amount to 15% of the anticipated fee overall or, in the case of the Netherlands, an abortive fee levied against pre-marketing preparations.

4.3.5 Time to Transact and its Component Stages

Findings relating to the time taken to transact prime, high-quality investment-grade offices were drawn from responses to Questions 3 and 17, which focus on transaction times from the perspective of sellers rather than buyers.

The main finding from these questions was that total transaction times were typically three to six months (12 to 26 weeks), with almost two-thirds of respondents agreeing that 'whilst some transactions can take much longer than the typical period, a substantial majority of transactions can be executed within a few weeks of the typical total sales period. A third of the responses suggested that transactions generally took 'significantly longer to execute than the typical total sales period', with no respondents agreeing with the comment that it was common for transactions to be completed more quickly than the average sales period indicated (see Figure 4.8). Three respondents suggested that none of the options provided reflected the time to transact in their markets.

Figure 4.8: Typical Time to Sell Period
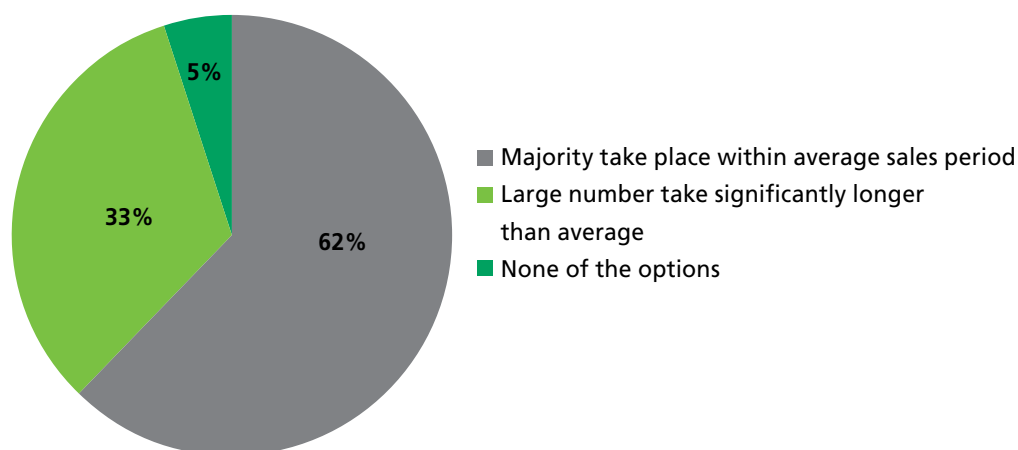
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Question 17 sought to capture the particularities within transaction processes in different markets and the data collected was noisy and varied in detail due to the open-ended nature of the question. However, the various processes could all be rationalised into the three stages presented in the question (in line with McNamara, 1998):

1) Marketing until price agreement;

2) Due diligence and preparation of legal agreements until exchange of contracts; and

3) Exchange of contracts until completion.

Table 4.9: Average Time to Transact Periods across Sample (weeks)

Country	Marketing	Due Diligence	Exchange & Completion	Total Time to Transact
Australia	7	5	7	19
Brazil	15	6	4	25
Bulgaria	8	6.5	3	17.5
China	-	-	-	-
France	12	4	8	24
Germany	7	5	4.5	16.5
Ghana	7	12	12	31
Hong Kong	9	3.5	6	23
India	10	4	3	17
Japan	5	5	3	12.5
Kuwait	-	-	-	39
Mexico	12	8	4	24
Netherlands	8	5	2.5	15.5
Nigeria	6	6	4	16
Panama	9.5	4	8	21.5
Poland	9.5	7	20	36.5
Romania	12.5	7	3	22.5
Russia	-	-	-	-
Singapore	12.5	5	11	28.5
South Africa	9.5	4	12	28
South Korea	7.5	4.5	4.5	16.5
Spain	6	5	2	13
Sweden	8	5	3	16
United Arab Emirates (UAE: Dubai)	14	9	5.5	27
United Kingdom (UK)	6	5.5	4.5	14
United States of America (USA)	9	3.5	4.5	17

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The diversity in average time to transact both across countries and between the three stages can be observed in Table 4.9. No strong patterns between developing and developed markets emerged, with any correspondence between time and maturity being distorted by anomalies, such as Nigeria and India, with short times reported relative to their levels of maturity and transparency, and France and Singapore, with long times relative to their transparency levels. No relevant information on time for transaction processes was collected on this question for Russia or China.

As with the indications received relating to fee levels, when timing was considered, a sliding scale of minimum to maximum typical time was often employed by respondents. Where necessary, mid-points were once again adopted to calculate the average time for each process within the overall transaction and average times were rounded up or down to the nearest week/mid-week in the interest of clarity when appropriate. In some countries, the total length of time to transact was stated without the breakdown of weeks or respondents varied in the amount of information that they chose to provide. As a result, the total average time for transactions did not always reflect the sum of the three component stages (e.g. Hong Kong, South Africa and the UK).

The total average time to transact across all markets recorded a mean of 22 weeks and a median of 24 weeks, with a standard deviation of five weeks. The shortest average times to transact were found in the Japanese (12.5 weeks), Spanish (13 weeks) and the UK (14 weeks) markets. Both Spain and the UK had the largest number of respondents (six) and each country recorded one response that indicated a substantially longer overall transaction period than the rest, thus increasing the average time to transact. If these two responses were disregarded, overall average times to transact fell to nine weeks for Spain and 8.5 weeks for the UK. In contrast, Kuwait had the longest time to transact period, at 39 weeks in total, followed by Poland at 36.5 weeks and Ghana at 31.

Results for Brazil (from 19 to 34 weeks) and Sweden (between 10 and 26 weeks) were spread broadly and exhibited large deviations either side of the mean. The researchers highlighted that this was due to differences between locations within these countries. In Brazil, two respondents from Sao Paulo stated that total times to transact were 19 and 21 weeks respectively, compared to Rio de Janeiro, where time to transact was 34 weeks. In Sweden, the situation was similar with two responses for Stockholm indicating average total transaction times of 10 and 11 weeks, compared to Gothenburg, where average transaction times were significantly longer, at 26 weeks.

Meanwhile, responses for South Africa illustrated wide discrepancies relating to the time spent on each stage, what each stage consisted of and the overall time to transact. There were other inconsistencies with the South Africa data and a wider sample might have indicated different processes and time to transact trends.

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Figure 4.9: Total Average Time to Transact Periods across Sample (weeks)
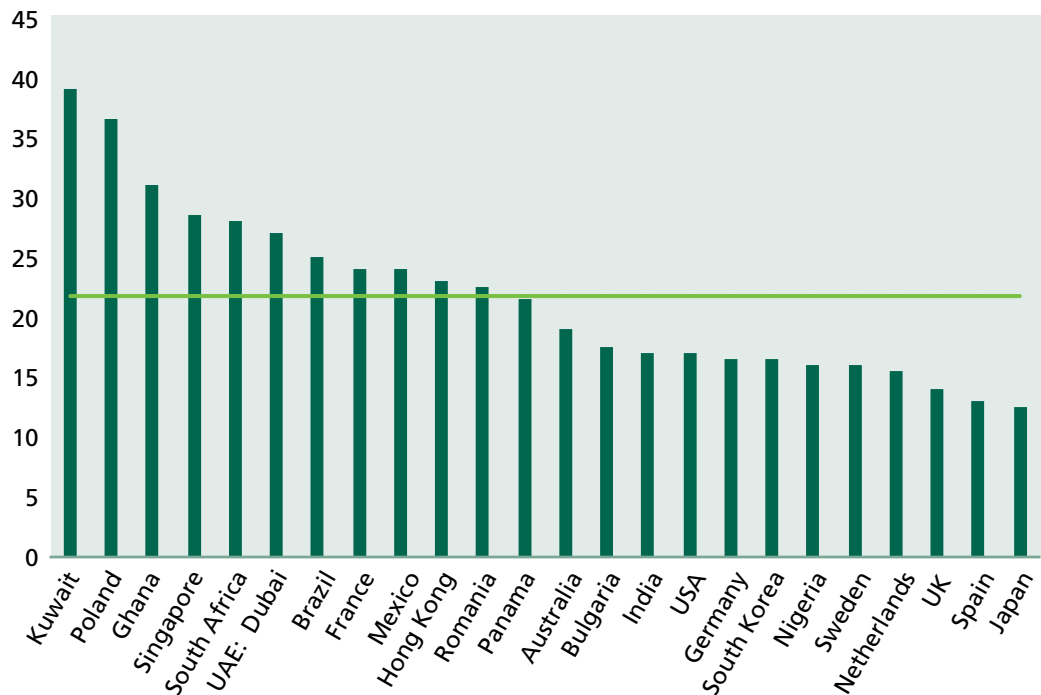
The five countries in the sample that were ranked in the top 10 most transparent real estate markets globally (JLL, 2014) – the UK (1), the USA (2), Australia (3), France (5) and the Netherlands (7) – all had relatively short times to transact. With the exception of France at 24 weeks, the times were all are below the overall mean and median figures, being between 14 and 19 weeks. Conversely, no clear pattern was discernible in time to transact in developing real estate markets, with Nigeria at 16, India 17, Brazil 25 and Ghana 31 weeks. It was noted that the speed of process in some cases was inherently dependent upon financing (Panama) and legalities (Poland), such as anti-monopoly clearance, tax rules and public registration. There was variability and unpredictability in the swiftness of the legal steps across markets, which could lead to longer transaction periods being experienced.

In the case of the UK, the reported time to transact from this survey was shorter than that based on actual evidence of transactions as reported by IPF (2014). In the latter study, the median time to transact for sellers was found to be 19 weeks. Furthermore, there was substantial variation around this average time. This difference in results echoes the findings of Scofield (2013), who noted that time estimates from interview-based research with investment principals tended to understate the actual length of time taken to buy and sell commercial real estate in the UK market.

Whilst the GRETI does not collect information on time to transact, it does examine issues related to the enforceability of contracts, which provides some information on transaction timings. One question provides the respondent with an option to indicate whether "routine transactions are often delayed" (rated 3) or "routine transactions require custom contracts and lengthy legal review" (rated 4). In the research sample, only India was rated 4 in this respect. Russia, South Korea and Bulgaria were rated 3.

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4.4 Summary of Qualitative Analysis

The qualitative element of the research was mainly concerned with typical transaction procedures, costs and the role and nature of brokerage services in different office markets, as at 2015. It complemented quantitative analysis by exploring some aspects of liquidity not necessarily amenable to quantitative measurement, offering additional insights into how buying and selling processes vary between markets. A major part of the qualitative analysis was a questionnaire exercise, supplemented by secondary data, including responses to the JLL Global Real Estate Transparency Index and the sections within that index on transaction processes.

Responses to the research questionnaire highlighted diversity in the predominant approaches to transacting, with both a non-binding best bids process and intermediated negotiation between principals being popular methods of transacting in different markets. Rather than sale method, the quality and length of the process appeared to distinguish more transparent from less transparent markets. However, in other aspects, there was a high degree of uniformity in the use of brokers by sellers and the application of percentage fee structures to remunerate brokers. Responses to the questionnaire should be considered as indicative rather than representative of the processes in each case, as the number of responses for each market was quite small and sometimes contrasted with other respondents or data sources. However, they provided a valuable insight into transaction processes, professional services and brokerage models for the acquisition and disposal of 'prime, high-quality investment-grade offices' across a range of international markets.

5. QUANTITATIVE ANALYSIS

The liquidity of real estate can vary markedly over time and between locations. Section 4 highlights some of the differences between locations with regard to typical transaction processes and costs. However, these facets of liquidity do not vary as much over time as transaction activity, such activity being driven by the numbers of buyers and sellers, and their respective reservation prices, at a given point in time. As noted in the literature review, a number of sources now provide data and reports on transaction activity, yet the effects of either temporal or cross-sectional variations in liquidity on real estate pricing are largely unaddressed by previous research. For this reason, this section explores how real estate investment yields vary across office markets and whether different proxies for liquidity help to explain such variations. For the research sample of markets, the same countries initially targeted for the questionnaire exercise were used.

Previous work for the UK published by IPF examined the relationship between liquidity indicators and total returns (IPF, 2015b). Yields rather than total returns were examined in the current study for two reasons. Firstly, using total returns would limit the variety of markets that could be studied, since real estate performance indices are typically available in only the most transparent markets. In contrast, yields are reported for a wider range of locations[15]. Secondly, it was expected that any premiums associated with illiquidity would be evident in the pricing of cash flows rather than in the cash flows themselves. Hence, the researchers argued that analysing yields was a more direct approach and permitted any pricing effects to be detected more clearly.

Other relevant determinants of yields had to be controlled for when testing how liquidity and yields were related. A large literature exists on the determinants of yields and several studies empirically test these determinants for the UK and US commercial real estate markets[16]. The standard model used in the real estate literature (see Crosby et al., 2014) is as follows:

Equation 5.1

Initial Yield = Risk Free Rate + Risk Premium - Expected Growth + Depreciation

Liquidity is not an explicit determinant of yields in this model. However, risks created by illiquidity are likely to influence the risk premium and might not be captured by the conventional proxies for this premium. In fact, research has noted a risk premium puzzle, whereby portfolio allocations to commercial real estate do not reflect its apparent risk. The typical explanation for this relates to the use of appraisal based performance data in such studies, which can exhibit smoothing, leading the volatility of returns to be understated (see Key and Marcato, 2007). In addition, the literature review noted that real estate performance measures might not reflect the uncertainties of transacting. Cheng et al. (2013a) argued that when the data was adjusted for such uncertainties, then the performance of real estate was no longer anomalous in risk-return space.

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[15] Nonetheless, as noted later, cities in some of the least transparent countries in the sample could not be included in the quantitative analysis because of data limitations.
[16] These studies include Archer and Ling (1997), Hendershott and MacGregor (2005a; 2005b), Chichernea et al. (2008), Chervachidze et al. (2009), Chervachidze and Wheaton (2013), Henneberry and Mouzakis (2014) and McAllister and Nanda (2015).

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For the purpose of the current study, data was collected on yields, transaction activity and proxy variables for risk free rates of return, risk premiums and rental growth expectations. Panel regression models were used to analyse this data and to measure the effects of each variable on yields. The standard model was estimated first, excluding any liquidity proxies, followed by an examination of whether the residuals from that model or the coefficients on city fixed effects were correlated with the researchers' liquidity variables. The approach taken depended on the liquidity measure tested and whether it exhibited reasonable variation over time (as with transaction activity) or changed only infrequently (for example, transaction costs). The researchers described the nature and sources of their data next, before presenting summary statistics, an econometric framework and the results.

5.1 Nature and Sources of Qualitative Data

Yields were modelled for a number of cities in the sample group of countries. A focus on cities stemmed from the fact that yields and other real estate variables are usually published at city level by the major real estate service providers. For each country, the research sought to identify major office locations. Time series for real estate market indicators, transaction activity and economic variables with relevance to pricing were collected. This added to the cross-sectional data on transparency and transaction processes some of which were derived from the questionnaire data.

The initial list of cities for which quantitative time-series data was sought is shown in Table 5.1, with an indication of whether each city was included in the final modelling exercise. Cities that could not be included in the quantitative modelling lacked either the relevant real estate market indicators or data on transaction activity. Some cities that were included did not have a long time series for the relevant variables. However, provided there were some quarters where pricing indicators, control variables and transaction activity measures were all available, those locations were retained in the dataset. In econometric terms, however, this meant that the dataset was an unbalanced panel.

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Table 5.1: City Time Series Data Sought/Included in Modelling

Country	City	Included	Country	City	Included
Australia	Melbourne	Yes	Panama	Panama City	No
	Sydney	Yes	Poland	Warsaw	Yes
Brazil	Sao Paulo	No	Russia	Moscow	Yes
Bulgaria	Sofia	Yes		St Petersburg	Yes
China	Beijing	Yes	Singapore	Singapore	Yes
	Shanghai	Yes	South Africa	Johannesburg	Yes
Colombia	Bogota	No	South Korea	Seoul	Yes
Egypt	Cairo	No	Spain	Madrid	Yes
France	Paris	Yes		Barcelona	Yes
	Lyon	Yes	Sweden	Stockholm	Yes
Germany	Frankfurt	Yes		Gothenburg	Yes
	Berlin	Yes	Turkey	Istanbul	Yes
	Munich	Yes	UAE	Abu Dhabi	No
Ghana	Accra	No		Dubai	Yes
Hong Kong	Hong Kong	Yes	UK	London	Yes
India	Mumbai	Yes		Manchester	Yes
	Delhi	No	United States	New York City	Yes
Japan	Tokyo	Yes		Los Angeles	Yes
	Osaka	Yes		Chicago	Yes
Mexico	Mexico City	No		Washington DC	Yes
Netherlands	Amsterdam	Yes		Boston	Yes
	Rotterdam	Yes		San Francisco	Yes

The real estate market indicators used were provided by CBRE, including the prime yield and rent for the office market in each city (where prime refers to the highest quality office property in that market), estimates of the size of the total office stock and data on vacancy and completions[17]. Most of the data was provided at a quarterly frequency from Q1 2007, or the earliest possible quarter if later than this. The city was the main unit of analysis and office submarkets were not considered. For larger cities, therefore, prime yield and rent reflected conditions in the highest value submarket – the West End in the case of London, for example.

Yields were reported in accordance with local market convention, resulting in some differences in how they were calculated across cities. Any consistent differences, such as one market reporting yields on a gross basis and another reporting them as net, should have been accounted for through the use of fixed effects in the models. Rents were also quoted in line with local market convention (meaning that they were on a per square foot basis for some cities and a per square metre basis for others, while some markets quoted rents in US dollars or Euros even where these are not the local currency). Consequently, all rental series were converted to

[17] The only exceptions to this in the data were Tokyo and Osaka where rents and stock were from CBRE, but yields were sourced from the ARES Japan Property Index and used with permission of ARES. (http://index.ares.or.jp/download-ajpi-en.php).

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a local currency per square metre basis, with currency conversion performed using exchange rates obtained from the IMF[18]. Each rental series was also converted into US dollars per square metre terms for the purpose of summary statistics.

Rents were required in order to control for trends in cash flows when modelling yields. Strictly speaking, the model presented earlier showed yields to be affected by expectations of future growth in cash flows. Usually, expectations cannot be observed directly, so previous studies used data on observed rents to create proxies for these expectations. Real rental growth was of particular interest as expected changes in inflation affect nominal growth rates and risk free rates, cancelling out any effect on yields, but expected changes in real rents are likely to influence pricing behaviour. Three specific proxies used in previous research were the rental growth rate itself, the ratio of real rent in each period to its long term average and the deviation in real rent in each period from a linear or log-linear trend[19]. These proxies were then tested, first using the national consumer price index in each case to calculate real rents for each city in the sample.

The transaction activity measures used were derived from data supplied by Real Capital Analytics (RCA). RCA tracks transactions of commercial real estate above a threshold of $10 million for all major markets around the world. For each city, RCA supplied quarterly data on the number of office transactions, the value of those transactions in local currency terms and the amount of office floorspace traded, starting from Q1 2007. For the UK and US, data from 2001 were available, but coverage of other countries only began from 2007. Floorspace was captured by RCA for the majority of transactions in their database, but not all, which should be borne in mind when considering floorspace based statistics used in this report. In general, though, the RCA database is considered to be a reliable source of information on transactions of institutional-grade real estate.

As the literature review noted, transaction activity can be hard to compare across locations if they differ in scale. The absolute value of transactions for one city in a period could be greater than that for another, but, if they differ in size, the fraction of stock being traded could be the same or lower. Turnover rates measure the percentage of stock in a market that has traded in that period and are a relative measure. They are a common measure of relative levels of liquidity for most asset classes (IPF, 2015a). However, it is hard to compute these rates in the absence of publicly available measures of the size or value of the property stock in different places.

For this research, turnover rates were measured in two different ways. Firstly, for each city in each period, the total floorspace of offices traded, as recorded by RCA, was divided by the total office floorspace as estimated by CBRE. In other words:

Equation 5.2

$$\frac{\text{Floorspace traded}_{i,\,t}}{\text{Stock}_{i,\,t}} \times 100$$

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[18] The International Monetary Fund *International Financial Statistics* dataset, accessed August 2015.
[19] See Hendershott and MacGregor (2005b), Chervachidze and Wheaton (2013) and McAllister and Nanda (2015) for examples.

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As not all transactions had an associated floorspace figure and as volumes are conventionally discussed in value and not floorspace terms, the value of transactions in each period (as recorded by RCA) was also divided by estimates of the value of the office stock produced by the authors. This was done as follows: for each quarter, prime capital value per square metre, based on CBRE rents and yields, were compared with the average price per square metre from transactions monitored by RCA. The former were too high to produce convincing estimates of stock value, while the latter varied too much from period to period. The ratio of the average and prime figures were computed in each period, therefore and the average value of this ratio used as a scaling factor for the prime capital value per square metre figures. In other words:

Equation 5.3

$$\text{Value of stock}_{i,t} = \text{Stock}_{i,t} \times \text{Prime CV psm}_{i,t} \times \overline{\text{CV Ratio}_i}$$

The turnover ratio was then computed in the following manner:

Equation 5.4

$$\frac{\text{Volume of deals}_{i,t}}{\text{Value of stock}_{i,t}} \times 100$$

The researchers did not anticipate their turnover rates to be either perfectly accurate or perfectly consistent across cities. They were estimated solely to determine whether or not they could provide different insights into liquidity – either through highlighting differences between markets that might not otherwise be apparent or by revealing different temporal patterns, given that changes in the value of assets traded over time are driven both by changes in activity and movements in real estate prices. If useful insights arose from these measurements, this could stimulate efforts to measure turnover rates more frequently and accurately.

Finally, the researchers collected economic variables of relevance to commercial real estate pricing. Their proxy for the nominal risk free rate was the yield on 10-year government bonds although not reflecting a true risk free investment in many cases, as bonds issued by some governments might be at risk of default and so incorporate a premium for country sovereign risk[20]. Nonetheless, this is a common benchmark for the relative pricing of investments in different countries.

The proxy for the risk premium was based on the volatility of the equity market in different countries in the absence of any direct quantification of the real estate risk premium and data for some countries of other proxies used in prior studies[21]. The intuition behind the measure, in addition to adopting a variable capable of measurement in all markets, was that increased volatility in prices of risky assets would raise investor risk perceptions and affect pricing behaviour. The changes in the monthly values of the relevant FTSE World share price index for each country were computed and the standard deviation of such changes calculated over a rolling window, reporting for each quarter the standard deviation in share price movements over the preceding 24 months[22].

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[20] See D'Argensio and Laurin (2009).
[21] Examples are the spread between corporate and government bond rates (Chervachidze and Wheaton, 2013) and the spread between lending and deposit rates (McAllister and Nanda, 2015).
[22] An index for Bulgaria was not available in this series, so the SOFIX index was used instead.

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Table 5.2: Variables Available for Time Series Modelling

Indicator	Description	Source
Yield	Prime office yield for city in question	CBRE
Rent psm	Level of prime office rent for city in nominal terms	CBRE
Real Rent psm	Level of prime office rent for city in real terms	Researcher calculation
Real Rent Change	Change in real prime office rent	Researchercalculation
Real Rent Ratio	Ratio of real rent level to average real rent level	Researcher calculation
Real Rent Deviation	Difference between real rent level and predicted level based on log-linear trend	Researcher calculation
Prime Capital Value psm	Estimated capital value psm based on prime rent and prime yield	CBRE
Average Capital Value psm	Average capital value psm based on samples of deals	RCA
Capital Value Ratio	Ratio of average capital value psm to prime capital value psm for period and market in question	Researcher calculation
Stock	Size of city office stock in square metres	CBRE
Stock Change	Change in stock from previous quarter	CBRE
Vacancy Rate	Percentage of vacant city floorspace	CBRE
Value of Stock	Estimate of value of stock based on floorspace figure and capital value psm estimates	Researcher calculation
Volume of Deals	Measured in local currency terms and USD terms	RCA
Floorspace Traded	To tal floorspace traded based on transactions where floorspace known	RCA
Turnover Rate 1	Volume of deals divided by estimate of value of stock	Researcher calculation
Turnover Rate 2	Floorspace traded divided by stock figure	Researcher calculation
Exchange Rate	Local currency to US dollar	IMF
Inflation	Consumer price index for each country	IMF, Eurostat
Govt. Bond Yield	Yield based on 10-year government bonds	Various
Stock Price Volatility	Standard deviation of stock price changes measured over rolling 24 month window	Based on FTSE Indices

The list of variables available for time series modelling is presented in Table 5.2, although a potential issue was the lack of many proxies for liquidity. Transaction volumes and turnover rates represent transaction activity, but the literature review stressed that liquidity requires a variety of measures to capture its different dimensions. For this reason, the coefficients for the fixed effects in the model were taken (representing a fixed element to the yield in each office market specific to that location over the period studied) and compared with other liquidity measures that vary little over time or only observed infrequently, such as the transaction cost and transaction process measures discussed in Section 4.

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5.2 Summary Statistics

The study period extended from Q1 2007 to Q1 2015. The starting point of this period marked the peak of the commercial real estate market in many countries, which was followed by a sustained downturn in both values and real estate market activity, driven by the Global Financial Crisis (GFC) in 2008-2009. Following this, most markets experienced some recovery in economic conditions, although the extent and speed of recovery varied, making it an interesting period in which to study variations in liquidity between locations and the extent to which liquidity affected real estate pricing.

The exploration of the data commenced with an examination of overall trends in transaction volumes and prime office yields throughout the period. In Figure 5.1, the total value of office transactions each quarter for the cities in the sample is shown in US dollar terms. The highest volume was recorded in Q1 2007, at $76.4 billion. Thereafter, transaction volumes fell to a low of $11.8 billion in Q1 2009. At the same time, the average prime office yield for the sample of cities rose from around 6% during 2007 to a high of 7.24% by Q1 2009[23]. Hence, the GFC was associated with large falls in volumes and substantial increases in yields, generating significant declines in values. From the middle of 2009 onwards, falling yields and rising volumes could be observed. Prime office yields fell to their pre-crisis levels by mid-2011 and reduced further after this, while transaction volumes recovered to a high of $65.4 billion by Q4 2014[24].

Figure 5.1 illustrates a strong correspondence between volumes and yields at the aggregate level, but this does not prove that one causes the other, as patterns in both could reflect other, fundamental factors. Furthermore, patterns for the sample as a whole might not represent the experiences of individual locations. Figure 5.1 also records seasonality in the data at a quarterly frequency. From 2009 onwards, spikes in transaction activity, although this was at the end of each calendar year and not unexpected, as institutional investors, in particular, may push to complete transactions within the typical calendar-year performance measurement period. Together with the high volatility in quarterly volumes for many individual cities, however, this meant that a three-quarter-centred moving average was used for each of the transaction activity measures when econometric models were used to test their relationship with yields over time[25].

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[23] In Figure 5.1, the average prime office yield is calculated without the six US cities, where yields were only available biannually. Their inclusion would distort the chart, but it does not affect the econometric modelling.

[24] Cash volumes themselves will be affected by changing values, but the patterns described here are very similar if the total amount of floorspace traded is charted in place of the total value of assets traded each quarter.

[25] In other words, if volumes changed from $30 million in the previous quarter to $200 million in the current quarter and then to $50 million in the following quarter the observation used for that quarter would be the average of the three figures, i.e. $93.33 million.

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Figure 5.1: Transaction Volumes and Yields, Q1 2007 to Q1 2015
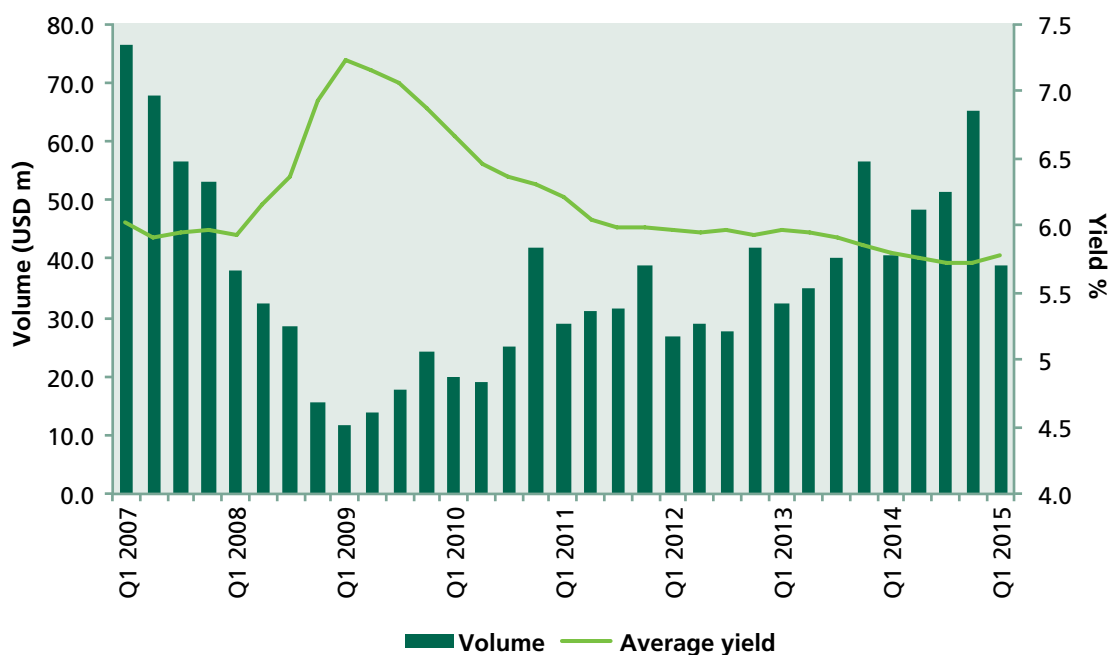
Table 5.3 shows descriptive statistics on a city-by-city basis, including average values for yields, rents and values psm, rental growth, floorspace and volumes over the period Q1 2007 to Q1 2015. An initial comparison of yields was hindered by inconsistencies in the definitions across markets. Nonetheless, some major office locations have very low prime yields, such as Hong Kong, London, Tokyo and Singapore, whilst prime yields are comparatively high in a number of emerging markets (for example, Dubai, Istanbul, Johannesburg, Sofia, Moscow, Mumbai and St Petersburg). Several cities in the latter group were also noted for having either very strong or very poor real rental growth rates – for example, Istanbul at 2.7% per quarter versus Mumbai at -2.4% per quarter.

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Table 5.3: Averages for Yields and Other Selected Indicators, Q1 2007 to Q2 2015

	Prime office yield (%)	Quarterly real rent growth (%)	Prime office rent psm USD	Prime office CV psm USD	Total office floorspace 000 m²	Volume traded in USD m
Amsterdam	5.5	-0.2	453	8,282	6,977	348
Barcelona	5.6	-1.3	340	6,195	5,356	208
Beijing	5.4	2.1	986	19,435	7,217	900
Berlin	5.1	-0.1	352	6,998	17,686	590
Boston[2]	5.1	0.0	388	7,416	9,418	1,092
Chicago[2]	5.9	0.6	346	5,936	8,525	1,071
Dubai	7.7	-2.0	994	12,871	5,769	68
Frankfurt	5.0	0.0	615	12,307	11,589	963
Gothenburg	5.1	0.9	348	6,837	3,106	145
Hong Kong	3.4	-0.3	2,462	75,906	5,971	745
Istanbul	7.8	2.7	481	6,188	2,196	60
Johannesburg[3,4]	8.0	0.2	198	2,485		81
London	4.2	-0.1	1,805	43,599	20,285	5,982
Los Angeles[2]	5.4	-0.2	359	6,624	13,538	1,299
Lyon	6.0	0.7	352	5,873	5,151	145
Madrid	5.6	-1.5	484	8,850	11,940	531
Manchester	6.0	-0.3	527	8,973	1,571	204
Melbourne	6.6	0.3	440	6,652	4,141	627
Moscow	9.4	0.4	1,149	12,652	11,681	763
Mumbai[4]	11.0	-2.4	877	8,141		113
Munich	4.7	-0.1	506	10,698	20,675	678
New York City[2]	4.8	0.1	639	13,449	35,045	4,356
Osaka[3]	5.6	0.1	794	14,075	8,532	405
Paris	4.6	-0.2	1,086	24,300	53,894	3,455
Rotterdam	5.7	0.1	279	4,911	4,014	151
San Francisco[2]	4.9	1.0	516	12,317	4,346	1,254
Seoul	6.0	0.2	390	6,590	6,166	1,292
Shanghai	5.1	-0.2	743	15,205	8,898	972
Singapore	4.5	-0.3	1,215	27,264	4,636	995
Sofia	9.1	-1.7	241	2,677	1,267	24
St Petersburg	11.8	-2.3	872	7,773	2,072	42
Stockholm	4.8	0.4	630	13,404	10,923	882
Sydney	6.0	0.2	862	14,314	4,864	1,095
Tokyo	4.3	-1.5	1,834	42,232	29,807	3,923
Warsaw	6.1	0.0	438	7,195	3,524	294
Washington DC[2]	5.2	-0.1	581	11,399	7,381	837
Overall average[1]	6.1	-0.1	714	14,550	10,655	1,016

[1] Measured as the mean of all underlying observations; does not equal the mean of figures in the table because some locations did not have a complete set of observations for all variables.

[2] Six-monthly observations for yield.

[3] Small numbers of observations for several variables in the dataset.

[4] No observations for floorspace of office stock in location.

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The average prime rent per square metre in US dollars was $714, while the average figure for prime capital value was approximately $14,500 per square metre. A number of cities had values that greatly exceeded these averages, with Hong Kong the highest, at nearly $2,500 per square metre for rent and over $75,000 per square metre for capital value. While the cities with the lowest capital values (Sofia, $2,677 psm, and Johannesburg, $2,485 psm) fell within the high yield group, locations such as St Petersburg, Istanbul, Moscow and Mumbai had similar or higher values per square metre than developed markets such as Barcelona, Los Angeles, Chicago and Lyon. High-ranking global cities, such as Amsterdam, Chicago and Los Angeles recorded below average capital values and rents. These markets also experienced high vacancy rates, at around 15% on average. The largest markets in terms of physical size were Paris, New York and Tokyo, though this was contingent on how each office market area had been defined.

Table 5.4 lists the 10 locations with the highest recorded transaction volumes, compared against a number of well-known global city rankings. The most prominent cities in the global economic hierarchy tended to have the highest levels of transaction activity in absolute terms. London, New York, Tokyo and Paris accounted for nearly 50% of office transaction volume in this sample of cities and, with the exception of Paris, featured in the top six of all the rankings presented for the Global Financial Centres Index. Seoul, Chicago and Boston also recorded high average volumes and performed strongly in these rankings.

Table 5.4: Office Transaction Volumes and Global City Rankings

	Office Transaction Volume	Global Economic Power Index	Global Cities Competitiveness Index	Global Cities Index	Global Financial Centres Index GFCI 18
1	London	Tokyo	New York	New York	London
2	New York	New York	London	London	New York
3	Tokyo	London	Singapore	Paris	Hong Kong
4	Paris	Chicago	Paris	Tokyo	Singapore
5	Los Angeles	Paris	Hong Kong	Hong Kong	Tokyo
6	Seoul	Boston	Tokyo	Los Angeles	Seoul
7	San Francisco	Hong Kong	Zurich	Chicago	Zurich
8	Sydney	Osaka	Washington	Seoul	Toronto
9	Boston	Washington	Chicago	Brussels	San Francisco
10	Chicago	Seoul	Boston	Washington	Washington

The Global Economic Power Index is produced by the Martin Prosperity Institute and the Global Cities Competitiveness Index is produced by The Economist. The Global Cities Index is produced by AT Kearney while the Global Financial Centres Index is produced by Z/Yen.

The average transaction volume for London by itself was nearly as high as for the bottom 20 cities in the sample combined. These cities included Munich, Melbourne, Madrid, Osaka, Amsterdam, Barcelona and, perhaps unexpectedly, Hong Kong. While there were issues with conflating transaction volume and liquidity without controlling for market size, a ranking in terms of volume appeared to provide a basic measure of liquidity. Essentially, markets with high volumes and strong global city rankings tended to have relatively large pools of buyers, advisors, assets and information. Consequently, the researchers concluded that it would be likely to be easier to sell in these leading global cities but whether these concentrations of principals, intermediaries, investment opportunities and information produced greater relative levels of transaction activity needed to be explored.

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5.3 Measures of Relative Transaction Activity

Figure 5.2 shows the average turnover rate for all cities in the sample across the study period. As noted in Section 5.1, the turnover rates were computed in two different ways. One set of turnover rates was calculated in terms of the physical area of floorspace transacted while the other set was based on the estimated value of offices transacted. The patterns shown by each set of rates were consistent with each other and broadly similar to the patterns in volumes shown by Figure 5.1. However, turnover rates did not rise as markedly as transaction volumes in the latter half of the sample period, suggesting that the increase in volumes during the latter years of the period was partly driven by rising prices and not simply by activity levels.

Figure 5.2: Average Turnover Rate (%), Q1 2007 to Q1 2015
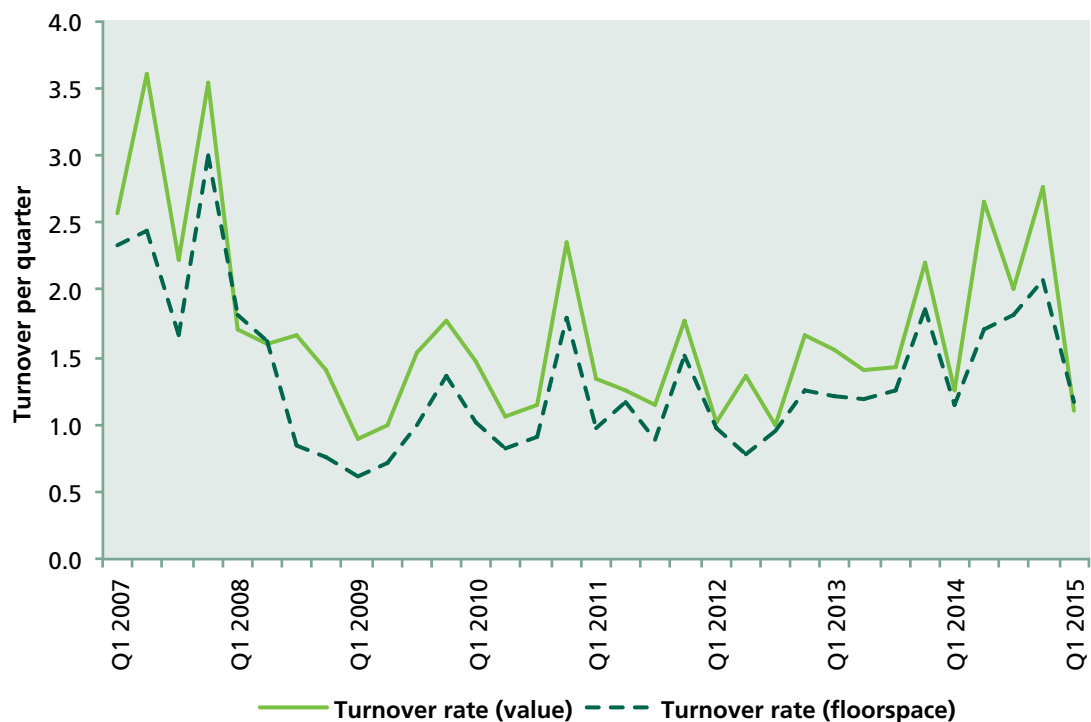
Table 5.5 comprises average turnover rates on a city-by-city basis. Although the underlying calculations were performed at a quarterly frequency, annualised numbers are presented for ease of reference. In terms of turnover rate based on value, it was estimated that the average rate was 2.2% per quarter across the sample of cities studied, equating to approximately 9.0% per annum. However, there was considerable variation around this average. For all cities, other than Hong Kong, Osaka and St Petersburg, the estimated turnover rates for value of assets transacted were higher than for physical area of space transacted, which was consistent with higher value offices experiencing higher turnover levels. Nonetheless, in most cases, differences between the measures were small, with Chicago and San Francisco being the main exceptions. The rankings of activity produced from the two sets of turnover rates were also very similar.

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Table 5.5: Cities Ranked by Turnover and Volume, Q1 2007 to Q1 2015

Average Volume Traded (USD billion p.a.)		Average Turnover, based on Stock Value (% p.a.)		Average Turnover based on Floorspace Traded (% p.a.)	
London	23.9	Chicago	32.8	Seoul	21.0
New York	17.4	San Francisco	29.2	San Francisco	19.2
Tokyo	15.7	Seoul	21.5	Chicago	18.3
Paris	13.8	Beijing	16.6	Beijing	15.2
Los Angeles	5.2	Sydney	15.9	Sydney	14.5
Seoul	5.2	Melbourne	15.7	Melbourne	13.4
San Francisco	5.0	Boston	14.5	Boston	10.6
Sydney	4.4	Los Angeles	13.8	London	9.5
Boston	4.4	Manchester	11.4	Manchester	8.9
Chicago	4.3	London	10.1	Los Angeles	8.4
Singapore	4.0	New York	9.0	Washington DC	7.4
Shanghai	3.9	Washington DC	8.9	Shanghai	7.3
Frankfurt	3.9	Shanghai	8.3	Warsaw	6.3
Beijing	3.6	Warsaw	7.4	New York	5.9
Stockholm	3.5	Frankfurt	6.8	Singapore	5.5
Washington DC	3.3	Singapore	6.4	Frankfurt	4.4
Moscow	3.1	Stockholm	6.3	Istanbul	4.2
Hong Kong	3.0	Gothenburg	5.3	Moscow	3.9
Munich	2.7	Moscow	5.1	Stockholm	3.9
Melbourne	2.5	Tokyo	4.4	Amsterdam	3.5
Berlin	2.4	Amsterdam	4.3	Hong Kong	3.4
Madrid	2.1	Barcelona	3.6	Osaka	3.2
Osaka	1.6	Berlin	3.6	Barcelona	2.8
Amsterdam	1.4	Munich	3.2	Paris	2.6
Warsaw	1.2	Rotterdam	3.2	St Petersburg	2.6
Barcelona	0.8	Paris	3.2	Madrid	2.5
Manchester	0.8	Hong Kong	3.1	Tokyo	2.4
Rotterdam	0.6	Osaka	3.1	Berlin	2.3
Gothenburg	0.6	Madrid	2.8	Munich	2.3
Lyon	0.6	Lyon	2.7	Rotterdam	2.3
Mumbai	0.5	Dubai	2.7	Lyon	2.1
Johannesburg	0.3	St Petersburg	2.0	Gothenburg	2.0
Dubai	0.3			Sofia	1.7
Istanbul	0.2			Dubai	1.5
St Petersburg	0.2				
Sofia	0.2				

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Unfortunately, data on market size for some of the emerging locations was unavailable. Good quality data is often a consequence of relatively high liquidity and those office markets where the resources and information necessary to construct good quality data sets are available are locations that tend to be relatively liquid. The cities with the lowest turnover rates in Table 5.5 were a mixed group. Cities such as Istanbul and Moscow recorded higher turnover rates than several cities in developed economies such as Barcelona, Paris, Tokyo, Munich and Hong Kong. As a result, it was difficult to discern any notable patterns in the markets with low turnover rates. However, clearer patterns emerged for the locations with the high turnover rates, which were dominated by cities in the US, Australia, the UK and, perhaps surprisingly, China.

Many markets that might be regarded as relatively liquid by investors recorded below average turnover rates. In some cases, this may have been because such cities are regarded by major investors as core markets and so are more likely to be long-term holds in portfolios. In turn, second- or third-tier cities may be regarded as 'cyclical' or 'rotational' plays. For instance, in the US, it has been found that Sun Belt cities such as Phoenix and Las Vegas have had higher turnover rates than so-called 'gateway cities', such as New York, Washington and Los Angeles (see Devaney, McAllister and Nanda, 2015). This finding reinforces the need to distinguish between liquidity and transaction activity. Markets like Hong Kong, Tokyo, Munich and New York might have low turnover rates because owners do not wish to sell rather than because they are unable to sell. Indeed, in such markets the liquidity problem is often experienced by buyers, who find it difficult to source suitable stock.

The examination of transaction activity measures concluded with a consideration of the average amount of floorspace sold against the average level of prime yield for each city (see Figure 5.3). The average turnover rate (floorspace sold as a percentage of total floorspace) was also plotted against the average level of prime yield in Figure 5.4. Floorspace sold was used to represent absolute levels of activity, since cash volumes across locations could be affected by prevailing levels of value in those locations. The comparisons at this stage did not control for differences between cities in fundamentals, such as risk or rental growth prospects. Nonetheless, they provided an indication of whether a broad correspondence between transaction activity and the pricing of cash flows existed.

Compared to Figure 5.4, Figure 5.3 shows a clearer pattern of office markets with higher absolute levels of transaction activity typically having had lower prime yields, albeit with some exceptions. In contrast, there appeared to be no correspondence between turnover rates and prime yields. This was the case, regardless of whether value-based or floorspace-based turnover rates were charted. Some markets with low turnover rates had high yields (such as St Petersburg and Dubai), while others with low turnover rates produced low yields (for example, Tokyo and Hong Kong). While the linear correlation coefficient was very small (at -0.13, compared to -0.57 between yields and average floorspace sold), cities with high turnover rates did not tend to have high levels of prime yield on average.

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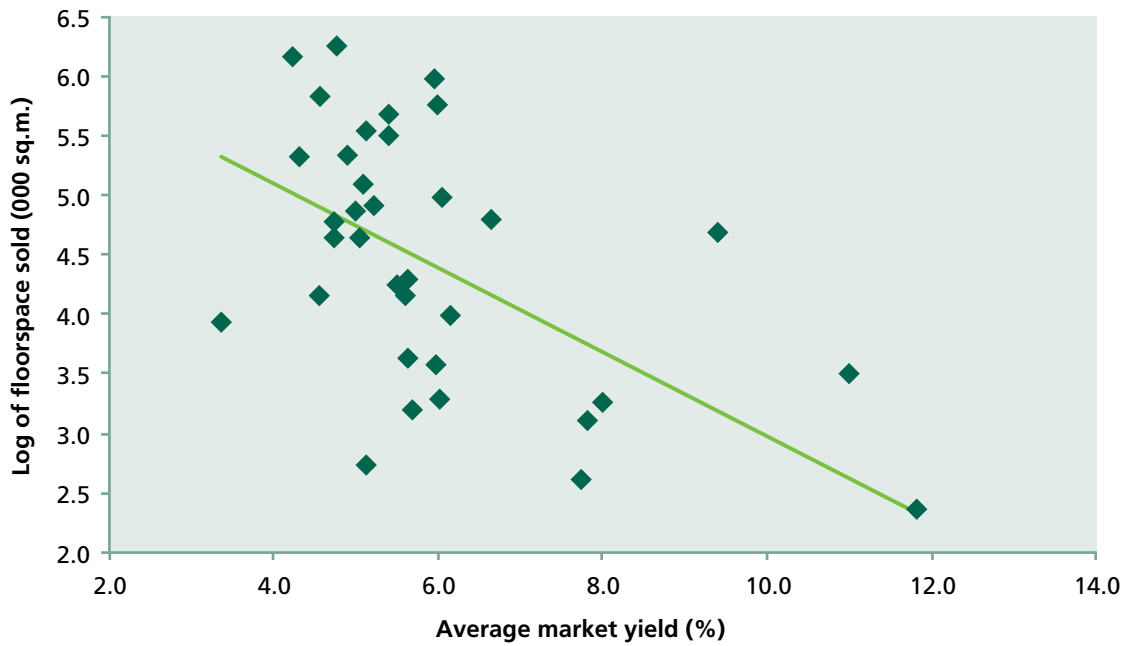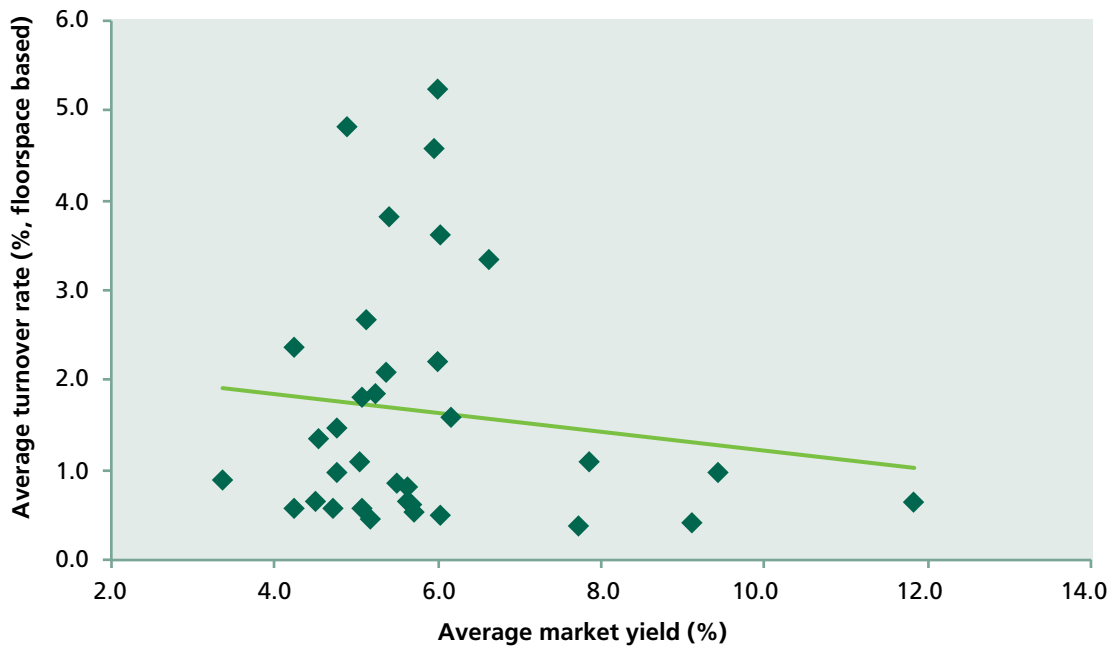
Figure 5.3: Average Yields and Average Floorspace Sold

Figure 5.4: Average Yields and Average Turnover Rates

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5.4 Econometric Modelling and Results

Following the framework set out in the model outlined at the start of Section 5 (Equation 5.1) and its empirical application in the studies cited, an initial econometric model took the following form:

Equation 5.5

$$k_{ijt} = \alpha_0 + \beta_1 RRFR_{jt} + \beta_2 \operatorname{Re} ntDev_{ijt} + \beta_3 Riskpr_{jt} + \varepsilon_{ijt}$$

where k_{ijt} is the prime office yield in city i in country j at time t. $RRFR_{jt}$ is the real risk free rate (based on long-term government bond yields) in country j at time t. $Riskpr_{jt}$ is country j's risk premium at time t as defined by the rolling 24-month standard deviation of stock price changes, discussed previously. $RentDev_{ijt}$ is the deviation of real rents in city i in country j at time t from their long-run trend rate of growth. Finally, ε_{ijt} in Equation 5.5 is a residual error, assumed to be randomly distributed and uncorrelated with the control variables.

The rent deviation variable is meant to capture expectations about cash flow growth in future periods. For example, investors may think that a positive deviation in real rents from their long run trend signals that a future downward correction is likely. As such, they may adjust prices down (and yields up) accordingly. However, it is conceivable that investors might interpret a deviation from the long-run trend as a signal of positive future conditions (see Chervachidze and Wheaton, 2013). As such, while the coefficients for the risk free rate and risk premium proxies are expected to be positive, there is no specific expectation about the relationship between yields and the rent deviation variable.

Equation 5.5 is the baseline model of yields, in line with the existing literature. However, in this simple form, it may suffer from some biases. Firstly, the real rent deviation variable is the only city-level information in the model apart from the dependent variable (yield) and, as a result, a significant amount of unobserved heterogeneity may remain in the system. An effective way of controlling for this is to specify fixed effects, such that the model becomes:

Equation 5.6

$$k_{ijt} = \alpha_0 + \beta_1 RRFR_{jt} + \beta_2 \operatorname{Re} ntDev_{ijt} + \beta_3 Riskpr_{jt} + \mu_{ij} + \varepsilon_{ijt}$$

where μ_{ij} denotes city-specific fixed effects. These capture unobserved factors that generate differences in the level of yield between cities throughout the period studied. For example, a city may have particular regulatory regimes, physical constraints, property taxes, etc., that are not included in the model, but might influence yields[26]. The coefficient on the fixed effect captures the average effect of these factors on yields over time. The models are estimated with city instead of country fixed effects because the cities in the sample may follow different economic or real estate market trajectories to other locations in their countries, for example, London and the UK or Paris and France.

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[26] Many fixed effects are often not completely fixed but can be subject to gradual change. The change tends to be slow relative to market fundamentals such as rent, bond rates, etc.

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Although Equation 5.6 could be estimated using Ordinary Least Squares techniques, it might still suffer from dynamic panel bias[27]. To address this, a Feasible Generalised Least Squares (FGLS) procedure was used that permits a panel-specific AR(1) process.

The hypothesis that, all else being equal, an increase in transaction activity reduces yields was then tested. This could be done by adding a transaction activity variable directly to Equation 5.6. However, a concern is that other variables in the model might be jointly determining yields (k_{ijt}) and the amount of activity. This will then undermine the reliability of any findings using this approach. Hence, a two-stage approach was adopted instead. In the first stage, the determinants of yields was estimated, using Equation 5.6. The residual variation from this model then provides an estimate of the unexplained variance in yields that may be caused by other factors, after controlling for market fundamentals. The unexplained variation in yields was modelled, as captured by the residual term in Equation 5.6, testing whether this was related to transaction activity as measured by either absolute activity levels (volumes and floorspace traded) or relative activity levels (turnover rates). The form of this model is:

Equation 5.7

$$\hat{\varepsilon}_{ijt} = \alpha_0 + \beta_1 liq_{ijt} + \mu_{ij} + \psi_{ijt}$$

where liq_{ij} represents the proxy for liquidity being tested.

As well as testing contemporaneous versions of the transaction activity variables, lags of these variables were also used in case further simultaneity issues existed or in case pricing reactions were delayed. In the results that followed, it was found that a one quarter lag for the transaction activity proxies was the most appropriate.

The results of the first stage regressions are presented in Table 5.6. Column (1) reports an OLS version of the model shown in Equation 5.6 while Column (2) reports the same model, but using the FGLS procedure, which was the preferred model. In both cases, city fixed effects have been used to control for unobserved sources of city-specific, time-independent variation in yield. The coefficients for these city fixed effects in the case of the preferred FGLS model are reported later in Table 5.9.

In both models, the coefficient on the real government bond yield, the proxy for real risk free rates, had the expected positive sign and was statistically significant. The same was true for the coefficient on the standard deviation of stock price changes, the proxy for the risk premium. Thus, if real bond yields increase or if stock markets become more volatile, then prime office yields tend to increase. Meanwhile, when real rents deviated above their long run trend, the negative coefficients suggested that yields fell, which was in line with previous research, but implied that investors do not anticipate mean reversion in rents. However, the coefficient on the rent variable was only statistically significant in the FGLS model.

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[27] This is an important econometric problem whereby each city follows its own error process, leading to panel-specific heteroscedasticity and auto-correlation.
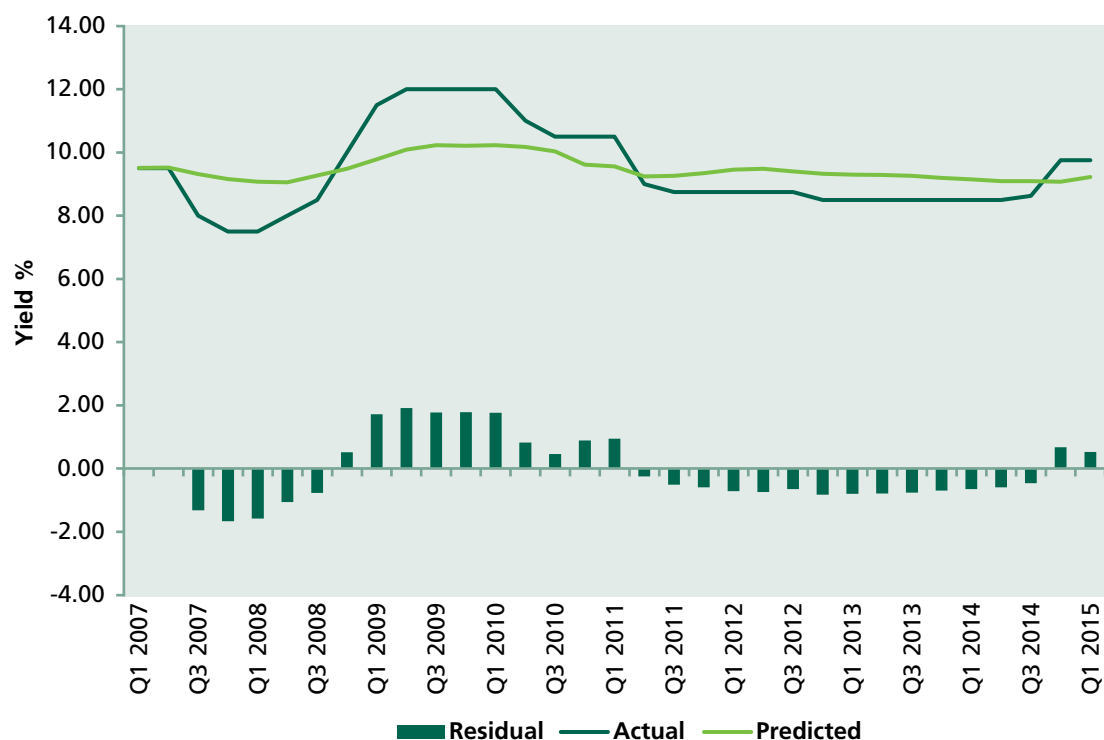
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Table 5.6: First Stage Modelling Coefficients (Full Sample of Cities)

	(1) OLS City FE	(2) GLS City FE
Real Government Bond Yield	0.062*	0.033***
	(3.38)	(4.43)
Real Rent Deviation from Trend	-0.082	-0.476**
	(-0.20)	(-2.55)
Standard Deviation of Stock Price Changes	0.243***	0.116***
	(15.40)	(12.98)
Constant	3.240***	3.701***
	(30.83)	(21.19)

Notes: ***, ** and * denote 1%, 5% and 10% significance levels, respectively.
Coefficients for fixed effects are not reported, except for the GLS model – see Table 5.10.

Next, the researchers computed and modelled the residuals from the FGLS model. To illustrate this, Figure 5.5 displays the actual yields over time for one of the cities in the sample and the yields that were predicted by the first stage model. The green columns measure the difference between the two lines, which is the residual element of yield unexplained by market fundamentals and fixed effects. By using these residuals as the dependent variable in a second regression model, the research explored whether transaction activity had a significant effect on yields.

Figure 5.5: Actual, Predicted Yields and Residuals for Selected City

5. QUANTITATIVE ANALYSIS

Table 5.7 shows the results from the second stage regression analysis. Columns (1) and (2) report the results from models that tested whether absolute levels of activity determined the unexplained element of yield, while the data contained in Columns (3) and (4) record the results from a repetition of the test, but using measures of relative transaction activity. Note that these models relate specifically to the effects of variations in activity over time rather than between cities.

The results for the measures of absolute transaction activity indicated a statistically significant relationship in both cases (volume in USD and amount of floorspace traded). Yet the effects were fairly small. The coefficients suggested that, all else being equal, a 100% increase in transaction volume produced a fall in yields of 10 to 15 basis points in the next quarter[28]. Although 100% may seem a large change in transaction activity, the dataset indicated that such movements in volumes were not unusual on a quarter-to-quarter basis. However, the largest markets, such as Paris, London and New York, displayed much less volatile changes in volume from quarter-to- quarter. The effects appeared to be stronger for transaction volume as measured in value terms compared to floorspace. Results for the turnover rate models (Table 5.6, Columns (5) and (6)) were much weaker. For the full sample of locations, it was found that there were no statistically significant effects on yields from differences in turnover rates over time. This was the case for turnover rate measured both in monetary and floorspace terms and was consistent with the weak relationship initially identified in the descriptive statistics. Hence, for the full sample and in relation to behaviour over time, absolute measures of transaction activity appeared more strongly related to pricing than relative measures.

Table 5.7: Second Stage Modelling Coefficients (Full Sample of Cities)

	(1)	(2)	(3)	(4)
Log of transaction volume in USD	-0.147***			
(MA lagged one quarter)	(-3.91)			
Log of floorspace sold		-0.103**		
(MA lagged one quarter)		(-2.46)		
Turnover rate based on value of transactions			0.001	
(MA lagged one quarter)			(0.06)	
Turnover rate based on floorspace transacted				-0.028
(MA lagged one quarter)				(-0.97)
Constant	1.348***	0.716***	0.085	0.155
	(3.98)	(2.60)	(0.78)	(1.30)

Notes: ***, ** and * denote 1%, 5% and 10% significance levels, respectively.

To test for robustness and to identify variations in relationships between different types of office markets, the first and second stage models were re-run for a range of sub-samples (see Appendix 6). In particular, highly transparent from moderately transparent, large from small, low yield from high yield and high volume from low volume markets were distinguished. Each time, the sample of cities were divided in half, based on the criteria indicated. For transparency, in the absence of city-level data, country-level transparency scores from the JLL Global Real Estate Transparency Index were used for each city, although scores for tiers of cities were used in the case of cities in China, India and Russia. It should be noted that many of the cities included in the quantitative modelling were already reasonably transparent and this was reflected in the way that these subsets were labelled.

[28] A one unit increase is like a 100% rise in volume, given that the independent variables are in logarithmic form in each case.

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Table 5.8: Second Stage Modelling Sub-sample Regression Results

	(1) Highly Transparent	(2) Moderately Transparent	(3) Low Yield	(4) High Yield	(5) Larger Markets (floorspace)	(6) Smaller Markets (floorspace)	(7) High Volume	(8) Low Volume
Panel A: Absolute measures of transaction activity								
Log of transaction volume in USD (MA lagged one quarter)	-0.175***	-0.118*	-0.180***	-0.129**	-0.216***	-0.110**	-0.180***	-0.130**
Log of floorspace sold (MA lagged one quarter)	-0.172***	-0.037	-0.102**	-0.117*	-0.116***	-0.101	-0.067	-0.130**
Panel B: Relative measures of transaction activity								
Turnover rate based on value of transactions (MA lagged one quarter)	-0.078***	0.074***	0.052***	-0.078***	0.026	-0.039	0.033*	-0.124***
Turnover rate based on floorspace transacted (MA lagged one quarter)	-0.134***	0.026	0.028	-0.140***	0.0233	-0.128***	0.021	-0.261***

Notes: ***, ** and * denote 1%, 5% and 10% significance levels, respectively.
For brevity, coefficients from first stage models are not reported.

Table 5.8 contains the results for the different sub-samples. All models showed that increases in transaction volume had negative effects on the residual component of yields. In line with the results for the full sample, the effects were stronger for volume in monetary terms compared to floorspace. As expected, given an estimated effect for the full sample of 100% change in transaction volume (by value) of a fall of 15 basis points in office yields, the results for the sub-samples ranged from decreases of 11 basis points to 22 basis points. In terms of floorspace, in some of the sub-samples (Moderately Transparent, Smaller Markets and High Volume cities) there were no statistically significant effects on yields. It is possible that the finding that volumes had stronger effects on yields in highly transparent cities compared to moderately transparent cities may reflect data quality rather than an actual effect on pricing. This is because increased levels of transaction activity provide more signals for appraisers of changes in pricing, which would be expected to lead to more responsive yield measures. As such, observed yield changes may have been due to 'information effects' and/ or 'price pressure effects'.

Sub-sample results for the measures of turnover rates were more variable. For some sub-samples (e.g. High Yield, Highly Transparent and Low Volume cities), statistically significant and negative relationships between turnover rates and yields were found. Yet statistically significant and positive relationships for other sub-samples were also found (e.g. Moderately Transparent, Low Yield and High Volume) and no significant effects for the other sub-samples. Overall, there was no consistent pattern for turnover rates compared to transaction volume measures. At a risk of over-interpreting what were mixed results, the effects when using turnover ratios tended to be stronger for floorspace measures of turnover.

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The coefficients for the city fixed effects in the GLS model are displayed in Table 5.9. As noted earlier, these captured the average effect over the period of any unobserved city-level factors on yields. It is important to note that fixed effects may not only capture differences in liquidity between markets, but liquidity is one the factors that is likely to be reflected in the fixed effects. London was used as the benchmark city against which premiums or discounts for individual locations, after controlling for market fundamentals, were measured. The two major Asian markets of Hong Kong and Tokyo were the only cities to have negative fixed effects. This meant that, after controlling for market fundamentals, the long-run average yield level was lower due to city-specific variables (albeit some city-specific factors may have been country rather than city related). Not surprisingly, the markets with the largest fixed positive effects were among the least transparent.

Table 5.9: City Fixed Effects

Market	City Fixed Effect	Market	City Fixed Effect
London	Hold-out		
Hong Kong	-0.92	Osaka	1.12
Tokyo	-0.04	San Francisco	1.15
Paris	0.18	Rotterdam	1.35
Singapore	0.30	Los Angeles	1.37
Stockholm	0.39	Warsaw	1.53
Munich	0.40	Seoul	1.63
Shanghai	0.52	Manchester	1.65
New York	0.65	Lyon	1.70
Frankfurt	0.65	Sydney	1.72
Berlin	0.70	Chicago	1.74
Gothenburg	0.80	Melbourne	2.35
Beijing	0.81	Istanbul	2.93
Madrid	1.02	Johannesburg	3.94
Barcelona	1.03	Sofia	4.38
Boston	1.04	Moscow	4.92
Washington	1.09	Mumbai	6.51
Amsterdam	1.10	St Petersburg	7.16

The research examined whether there was any correlation between the size of the fixed effects and some of the liquidity proxies, including some variables gathered during the research on institutional structures and processes, with results presented in Table 5.10. Firstly, there appeared to be only a weak relationship between direct transaction costs and the coefficients for the fixed effects. This was surprising, but was likely to reflect the lack of any significant correspondence between the level of costs and market maturity. Also, it was unclear whether different conventions for specifying yields in different markets were obscuring the effects of direct transaction costs on investor pricing behaviour. In addition, little correlation was found between time to transaction and prime office yields.

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Capturing indirect transaction costs and institutional risk, the GRETI scores for transaction process and World Bank composite scores for ease of transacting displayed strong correlations with the premiums and discounts suggested by the city fixed effects. With GRETI, a higher score indicates lower transparency and higher scores were positively correlated with the fixed effects. In other words, higher premiums than justified by market fundamentals were evident where transparency was lower. This was reinforced by the negative correlation with the World Bank index, where higher scores indicate a greater ease of transacting. Finally, in line with the descriptive statistics and previous results, the research found a negative correlation between average volumes and the premiums and discounts suggested by city fixed effects, but no such correlation between average turnover rates and the fixed effects.

Table 5.10: Correlations between City Fixed Effects and Selected Liquidity and Activity Indicators

Variable tested[29]	Correlation coefficient
Overall Costs of Investment Transactions (GRETI)	0.00
Estimated Time to Transact	0.07
GRETI Overall Score	0.55
World Bank Composite Score	-0.66
Average Transaction Volume (USD)	-0.39
Average Turnover Rate (by value)	0.02

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[29] The research also tested whether there was any correlation between proportion of overseas buyers and city fixed effects. There was no significant correlation.

6. CONCLUSIONS

6.1 Qualitative Findings

Focusing initially on transaction costs, processes and brokerage models, the research identified international variation in some structures and models, albeit usually between two approaches, and near global unanimity on others. In terms of brokerage, the UK model of representation of both seller and buyer by separate brokers was identified in only a minority of the markets sampled. In the majority of markets, the typical brokerage model was representation of the seller only by a single broker. However, the level of fees varied across markets. Respondents (mainly brokers) reported that 1% of the sale price was a typical sellers' commission, which varied within and across markets. In terms of method of sale, there was an almost binary distinction between markets that used first price sealed bid auction ('best bids') and intermediated private negotiation. Transfer taxes (almost universally payable by the buyer) generally comprised the largest element of direct transactions costs. Given significant variation in time to transact for individual assets, the main finding for this measure of liquidity was that it was unusual to see transactions completed in less than two to three months. The estimated average time to transact across all markets, at approximately five months, seemed plausible.

In contrast to the variations reported above, and despite little relationship between fee and the cost of service delivery, a striking feature of the research was the practical universality of ad valorem fee structures in the brokerage sector. While embryonic challenges to such models appear in residential markets in a few countries, ad valorem fee structures were found across nearly all commercial real estate markets in the research sample. The package of transaction services provided by brokers was also notable in its homogeneity. According to respondents, sellers' brokers almost invariably supported pricing decisions, marketing, negotiations, due diligence, etc. Meanwhile, the services provided by buyers' brokers nearly always included 'sourcing' appropriate stock, asset evaluation, negotiation of price and purchase agreements and other due diligence activities.

In terms of the variations in transaction activity, the data starkly illustrated at the aggregate level a negative association between transaction volume and yield and a positive association between transaction activity and market conditions. Leading global cities, unsurprisingly, tended to have the highest levels of absolute transaction activity. Most likely driven by network effects and economies of scale, a ranking of cities in terms of absolute transaction volume seemed to provide an intuitive measure of relative liquidity. Major global cities were inclined to have larger and concentrated pools of assets, principals, advisors and information. While cities with high relative transaction activity (turnover rates) tended to be in the US, Australia and the UK, it was difficult to discern any notable patterns in those other markets with low turnover rates. Surprisingly, many markets that might have been regarded as relatively highly liquid by investors had below-average turnover rates. In some cases, this may have been because assets in such cities are regarded as long-term holds by investors, with assets in second- or third-tier cities regarded as 'cyclical' or 'rotational' plays.

Reinforcing the need to distinguish between liquidity and transaction activity, low turnover rates may occur because investors do not wish to sell – rather than because of any inability to sell – at prevailing market prices. However, such markets are not then liquid from a buyer's perspective. Thus, in a market characterised by investors with long-term horizons and high investor demand, institutional-grade real estate assets may be liquid from a seller perspective and illiquid from a buyer perspective, leading to 'frustrated capital'. Conversely, in markets with more active funds with shorter time horizons and low investor demand, the same grade of asset may be illiquid from the seller perspective and liquid from the buyer's perspective. This suggests linked, but separate, concepts of buyer and seller liquidity, an idea also suggested in some US research.

6. CONCLUSIONS

6.2 Quantitative Findings

Quantifying the impact of a single factor on a variable such as yield that is determined by a wide range of often interlinked economic, capital market and institutional variables is fraught with data and econometric modelling challenges. Nonetheless, in terms of changes to yield over time, the models used in this research showed statistically significant effects. The results suggested that a 100% increase in transaction volume produced a fall in yields of between 10 and 15 basis points after the fundamental drivers of yields were controlled for. Such shifts in transaction volume from quarter-to-quarter were not unusual. In contrast, the results for turnover rates were weaker and inconsistent. The simple graphs and bivariate correlation coefficients also suggested stronger relationships between yields and absolute measures of transaction activity than with relative measures. When city fixed effects were analysed, the research again found a strong relationship with transaction volume variables but not with turnover rates.

A strong relationship between quality of transaction processes was also found, as captured by qualitative survey exercises, and yield.

Real estate liquidity is determined by the interplay of many factors and these factors affect the costs and risks of commercial real estate investment versus other asset classes. Different investors with varying time horizons, risk tolerances and constraints will respond to liquidity-related risks and costs differently. This research investigated a variety of liquidity dimensions, but there remain challenges in incorporating the wide range of causes and effects into an all-encompassing, yet practical and useable model. An issue for future debate is why some liquidity indicators seem to correlate better with market pricing than others. Perhaps predictably, while there have been notable improvements, data remains a fundamental problem. Data on key indicators, such as market size and performance, can be uncertain, inconsistent, partial or even unavailable, e.g. number of bidders, time to transact, etc. It is the least liquid markets where these issues are most acute. This illustrates that there is often a positive association between quality of real estate data and liquidity. This research did not explore the link between funding liquidity (availability of debt and equity capital) and market liquidity, which could be a fruitful area for further study. Driven largely by data availability, the study also focused on the office sector and there is clear scope for further research on other sectors, as well as locations, not included in this study.

There can be different emphases on different aspects of liquidity in different asset classes. Liquidity and liquidity risks seem to be fundamentally concerned with the time and costs associated with exchanging cash for assets at prevailing market prices and the extent to which transacting affects market prices. There are many causes and consequences of low liquidity. A variety of direct costs (e.g. transfer taxes, execution fees, bid-ask spreads), indirect costs (e.g. search and bargaining costs) and opportunity costs (e.g. sub-optimal portfolio holdings, increased return uncertainty) were identified by the research as relevant factors. There was also a focus on transaction methods and technologies. A range of metrics were used to try to quantify liquidity such as transaction activity, costs and time to transact. This research focused on international variations in transaction activity for commercial real estate markets and their influence on pricing, and it also sought to examine how market institutions and structures involved in real estate transactions vary internationally.

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APPENDIX 1: EMPRIRICAL RESEARCH INTO VOLUMES AND TURNOVER

Table A1: Summary of Empirical Research in Commercial Real Estate Markets

Authors	Country studied	Data used	Key Findings
IPF (2004)	UK	Various sources used incl. ONS, IPD and Property Data. Most use made of IPD data.	Turnover rates in the institutional investment market are pro-cyclical and have risen over time. Despite high volumes, Central London has relatively low turnover rates. Turnover rates in the UK are higher than in other European markets, based on only one year of data.
Fisher, Gatzlaff, Geltner and Haurin (2003; 2004)	US	NCREIF data on individual assets (held and sold) for 1982-2001 and 1985-2001.	Both studies report that turnover in the NCREIF database was strongly pro-cyclical. The 2003 paper suggests that this implies more volatile performance than prices alone indicate.
Fisher, Ling and Naranjo (2009)	US	NCREIF data on returns and capital flows for period 1983:3 to 2005:2.	The relationship between net capital flows and returns is tested within a VAR framework. Capital flows are found to affect subsequent total returns, especially for the apartment and office sectors, but returns do not affect subsequent capital flows. Results also vary by location.
Ling, Marcato and McAllister (2009)	UK	IPD monthly index data on returns and volumes analysed at quarterly frequency for 1987:1 to 2007:4.	Strong contemporaneous correlations between returns, net flows and turnover. Relationships between transaction activity and returns are then tested using VAR framework. Net capital flows do not affect subsequent returns, but turnover does. Returns have mixed effects on future flows and turnover.
Newell and Razali (2009); Newell, Adair and McGreal (2010)	Selected Asian and European markets	RCA database for 2007 and 2008.	Volumes fell less in Asia than in other world regions with the onset of the GFC. In Europe, volumes fell more in developed than developing real estate markets. In both regions, the share of cross-border activity reduced in GFC. Europe exhibits most cross-border activity.
Lizieri and Pain (2014)	100 cities across the world	Office transactions in the RCA database for 2007:4 to 2011:1.	Spatial variation in volumes is linked both to size of the city economy and position within the financial centre network.
Lieser and Groh (2014)	47 countries across the world	Cushman & Wakefield country-level data on volumes for 2000-09. Length of series varies by country.	Regressions show that institutional factors connected to the legal and regulatory environment influence real estate investment, as well as factors like size of the economy and depth of capital markets.

APPENDIX 2: EMPRIRICAL RESEARCH INTO HOLDING PERIODS

Table A2: Summary of Empirical Research in Commercial Real Estate Markets

Authors	Country studied	Data used	Key Findings
Gau and Wang (1994)	Canada	Data on 1,031 sales of apartment, retail and office assets for the period 1971-1985 in Vancouver.	Mean holding period was almost eight years for commercial real estate versus five years for apartments. Individuals hold real estate longer than partnerships. Differences in tax treatment between asset types and investors may explain this. However, holding periods were too short to be explained by tax issues alone.
Fisher and Young (2000a; 2000b)	US	Analysed 6,587 buildings (held and sold) in the NCREIF database for the period 1980-1998.	Median holding period was 11.1 years overall and was smaller for apartment blocks than for office, industrial or retail assets. Evidence that holding periods got shorter over the period studied.
Collett, Lizieri and Ward (2003)	UK	Analysed 13,405 buildings (held and sold) in the IPD UK databases for the period 1981 to 1998.	Holding periods fall from around 12 years for assets bought in early 1980s to below eight years for assets bought in mid-1990s. Hazard models indicate that larger assets and Shopping Centres are held for longer periods while stronger returns increase sale rates.
Gerald Eve (2005)	UK	Data on 5,000 office transactions in the IPD UK databases for 1983 to 2003.	Median holding period measured by year of sale using sold assets only. For latter half of the period, it ranged between 4.6 and 5.4 years. Over shorter holding periods, there is more dispersion in annualised returns.
Brown and Geurts (2005)	US	Examines data on 567 apartment block sales in San Diego over the period 1970-1990.	The mean holding period was around 4.5 years. Econometric analysis struggled to identify drivers for differences in holding periods. Larger assets appear to be held for longer while falling yields (and thus rising prices) may lead investors to sell earlier.
Hordijk and Teuben (2008)	Netherlands	Data on over 2,500 sales from the ROZ/IPD Real Estate Index over the period 1995-2004.	Average holding period was 13 years for retail and 14 years for office, but 24 years for residential investments. This is in marked contrast to US results. No patterns related to year of sale or value.
DTZ (2015)	Europe	Over 4,100 repeat sales since 2000 for markets across Europe were analysed.	Average holding period was 7.2 years for the UK versus 6.1 years in Europe, but many buildings in the dataset had yet to be re-traded. Differences between investor types were noted.

APPENDIX 3: EMPIRICAL RESEARCH INTO TIME-TO-TRANSACT

Table A3: Summary of Empirical Research in Commercial Real Estate Markets

Authors	Country studied	Data used	Key Findings
McNamara (1998)	Mainly UK	Survey of 30 market participants.	Transaction time estimates varied with asset type, larger assets taking longer. Total time-to-sell ranged from 10-22 weeks. Within that, marketing ranged from 4-9 weeks and due diligence from 4-12 weeks while settlement took one week. A comparison with other world cities (p9) suggests that London office transactions are faster.
IPF (2004)	UK	Data on 187 sales drawn from the records of three major investors for the periods 1995-96 and 2000-02.	Median time-to-sell estimated at 27 weeks. From "First record" to "Price agreement", median time was 12 weeks. Due diligence was estimated at seven weeks and settlement at three weeks. There was significant dispersion around the median times.
Johnson, Wiley and Zhonghua (2007)	US	Data on "Days on Market" for 956 sales of mainly Class B offices for markets across the US in 2006-07.	Median Days on the Market (DOM) was 190 days (27 weeks). No breakdown of transaction stages is provided. DOM may measure marketing period and not capture due diligence and settlement, or recording may be inconsistent. Econometric analysis suggests a significant negative effect of DOM on price and vice versa.
Hordijk and Teuben (2008)	Netherlands	Interviews with six brokerage firms and analysis of 512 sales spanning 1995 to 2002.	Interviews suggest that pre-marketing took 4-5 weeks while marketing took 5-12 weeks. Due diligence took 2-4 weeks while settlement took 3-5 weeks. Overall, residential investments took least time to transact. Brokers' estimates of time were consistent with the empirical data.
Scofield (2013)	UK	Interviews with market participants and data on 115 purchases from the records of four major investors for the period 2005-08.	Median time-to-buy estimated at 14 weeks. "Introduction" to "Price" took four weeks, due diligence took seven weeks and settlement took one week. Market participants tended to underestimate transaction time by 30-50% when compared against observed transaction times.
IPF (2014)	UK	Data sourced from nine major real estate investors on 303 purchases and 280 sales for the period 2004-2013.	Median time-to-buy was 15 weeks and median time-to-sell was 19 weeks. Lengths of intermediate stages also measured. Econometric analysis shows that market state influences time taken. Properties in top quartile for price paid per square foot sold faster and institutional involvement, especially on the buy side, led to faster transactions.

APPENDIX 4: ONLINE QUESTIONNAIRE

'Unravelling Liquidity in International Commercial Real Estate Markets'.

Welcome, and thank you for taking the time to respond to our questionnaire.

Liquidity is a key factor in private commercial real estate, affecting pricing and influencing investment strategies, however there is little research into how liquidity is manifested in different international markets. As part of the IPF Research Programme, our study seeks to assess this research gap and look at variations in liquidity by examining a diverse range of international markets across 25 countries. A report detailing our findings will be published later this year.

This questionnaire specifically considers the processes in your city and national market relating to the transaction and brokerage of high quality, investment grade offices. The questionnaire should take approximately 5-10 minutes for you to complete.

If you would like any further information on the study itself, or have any additional comments in relation to the questions please feel free to contact members of the research team directly on the emails below.

Prof. Pat McAllister: p.m.mcallister@henley.reading.ac.uk

Dr. Nicola Livingstone: n.livingstone@ucl.ac.uk

Many thanks again for your contribution to the work.

The following questions consider the transaction process:

Q1: Which real estate market (city) do you primarily work in?

Although you may have experience in transacting real estate within a variety of markets, when responding to the following questions please ensure your answers relate **specifically to your primary market only**.

Q2: In your primary market, what is the typical (most commonly adopted) method of sale for prime, high-quality investment grade office buildings?

☐ **Public auction:** The auctioneer opens the auction by announcing a suggested bid, then accepts increasingly higher bids from the buyers.

☐ **Informal tender or 'best bids':** Written offers will be invited to be submitted at or before a closing date. All offers are opened at the same time. Offers and acceptances are not binding until legal formalities have been completed.

☐ **Informal tender or 'best bids':** Written offers will be invited to be submitted at or before a closing date. All offers are opened at the same time. Offers and acceptances are binding upon agreement between parties, in advance of completing legal formalities.

☐ **Private negotiation between principals:** Offers are invited for the real estate asset and received at different times. Once an acceptable offer is received by the seller, it is normal that the property is taken off the market.

APPENDIX 4: ONLINE QUESTIONNAIRE

☐ **Intermediated private negotiation:** Offers are invited for the real estate asset and received at different times, with the process managed by an intermediary. Once an acceptable offer is received by the seller, it is normal that the property is taken off the market.

☐ **No typical method:** There is no typical method of sale adopted.

☐ **Other:** None of the above methods are adopted.

If none of the above methods are the most commonly used, please indicate the method of sale most adopted for prime, high-quality investment grade commercial office buildings.

Q3: Which of the following statements most closely reflects your perception about the length of time-to-sell period?

☐ Whilst some transactions can take much longer than the typical period, a substantial majority of transactions can be executed within a few weeks of the typical total sales period.

☐ A large proportion of transactions tend to take significantly longer to execute than the typical total sales period.

☐ Whilst some transactions can take much longer than the typical period, it is relatively common for transactions to be executed quickly, in advance of the estimated total sales period.

☐ Neither of the above options reflect the length of time-to-sell period in your market.

If neither option above is applicable, please comment on the length of time-to-sell period in your market.

The following questions consider brokerage instruction and fees.

Q4: For the sale of a prime, high-quality, investment grade office building in your market, do sellers normally appoint a real estate broker to act on their behalf?

☐ Always

☐ Often

☐ Sometimes

☐ Rarely

☐ Never

Q5: For the purchase of a prime, high-quality, investment grade office building in your market, do buyers normally appoint a real estate broker to act on their behalf?

☐ Always

☐ Often

☐ Sometimes

☐ Rarely

☐ Never

APPENDIX 4: ONLINE QUESTIONNAIRE

Q6: Which one of the following statements is true:

☐ Typically, one broker is involved who represents only the seller. The buyer typically does not use a broker.

☐ Typically, one broker is involved who represents both the seller and the buyer.

☐ Typically, there are two brokers involved in a real estate transaction. One represents the seller and one represents the buyer.

☐ Typically, neither party appoints a broker. Investors buy and sell directly from each other.

The following section considers brokerage instructions and fees for the seller's broker.

Q7: Please indicate the services that seller's brokers typically provide for their clients selling investment grade office buildings in your market.

Check all appropriate answers.

☐ Advice on indicative asking price.

☐ Advice on method of sale (tender, auction, negotiated sale).

☐ Advice on marketing strategy.

☐ Marketing of asset, production of brochures, document centre etc.

☐ Conducting negotiations with buyers.

☐ Support in due diligence.

☐ Sale agreement negotiations.

☐ Other services.

If other was selected, please specify what these services are:

_____

The following questions concern the basis for calculation of brokerage fees for the seller's broker, assuming the sale of a large prime, high-quality, investment grade office building in your market.

Q8: Please indicate which of the following statements is true:

☐ The fee is typically based on time (hourly rate, daily rate, rate agreed in advance) spent on the transaction by the broker.

☐ The fee for brokerage services is typically a fixed payment agreed between brokers and principals.

☐ The fee for brokerage is typically calculated as a % of the selling price.

☐ A combination of approaches is typically used.

If a combination of approaches is typically used, please outline the most common approaches to calculating broker's fees.

_____

APPENDIX 4: ONLINE QUESTIONNAIRE

Q9: What is the typical percentage fee for brokerage services for the seller's broker?

☐ Not applicable

e.g. X % of sales price

Please specify % amount: _____

Q10: Are additional fees ever offered by the seller to incentivise the broker (for example, if the price received exceeds the expected amount)?

• Always

• Often

• Sometimes

• Rarely

• Never

Q11: Is it typical for a seller's broker to receive a fee when a sale does not occur, i.e. a bid is unsuccessful?

• Yes

• No

If applicable, please describe the level of fees for unsuccessful bids: _____

The following section considers brokerage instructions and fees for the buyer's broker.

Q12: Please indicate the services that buyer's brokers typically provide for clients purchasing prime, high-quality office buildings in your market.

Check all appropriate answers.

☐ Sourcing/finding asset for buyer.

☐ Providing information to support asset evaluation.

☐ Providing a valuation of the asset.

☐ Advising on appropriate sources of finance.

☐ Advising on bidding level.

☐ Conducting price negotiations.

☐ Support in due diligence.

☐ Purchase agreement negotiations.

☐ Other services.

APPENDIX 4: ONLINE QUESTIONNAIRE

If other was selected, please specify what these services are: _____

The following questions concern the basis for calculation of brokerage fees for the buyer's broker, assuming the purchase of a large prime, high-quality, investment grade office building in your national market.

Q13: Please indicate which of the following statements is true:

- The fee is typically based on time (hourly rate, daily rate, rate agreed in advance) spent on the transaction by the broker.
- The fee for brokerage services is typically a fixed payment agreed between brokers and principals.
- The fee for brokerage is typically calculated as a % of the selling price.
- A combination of approaches is typically used.

If a combination of approaches is typically used, please outline the most common approaches to calculating broker's fees.

Q14: What is the typical percentage fee for brokerage services for the buyer's broker?

☐ Not applicable

e.g. X % of sales price

Please specify % amount: _____

Q15: Are additional fees ever offered by the buyer to incentivise the broker (for example, if the price received exceeds the expected amount)?

☐ Always

☐ Often

☐ Sometimes

☐ Rarely

☐ Never

Q16: Is it typical for a buyer's broker to receive a fee when a sale does not occur, i.e. a bid is unsuccessful?

☐ Yes

☐ No

If applicable, please describe the level of fees for unsuccessful bids: _____

_____

APPENDIX 4: ONLINE QUESTIONNAIRE

Q17: For prime, high-quality, investment grade office buildings, can you outline the main stages in the sale process and estimate how long they typically take?

For instance, in the UK commercial real estate market, we identify three main stages for sellers involving a number of events:

1) Marketing until price agreement (? weeks)

2) Due diligence and preparation of legal agreements until exchange of contracts (? weeks)

3) Exchange of contracts until completion (? weeks)

Total: _____ ? Weeks.

Could you tell us about the key stages and the typical time each stage takes for transactions in your market using the format above?

_____

_____

_____

Please use as many rows as necessary.

Q18: If you wish to make further comments, please provide details below.

The following voluntary questions complete the questionnaire and relate to your professional role.

Please do complete these final questions, all responses will remain confidential and will only be used for the purpose of this research, however your responses here are entirely voluntary.

Q19: Are you a...

☐ Broker/Agent

☐ Investor

☐ Fund Manager

Other (please specify) _____

APPENDIX 4: ONLINE QUESTIONNAIRE

Q20: For how many years have you worked in this market specifically?

☐ 0-5 years

☐ 6-10 years

☐ 11-15 years

☐ 16-20 years

☐ 21-25 years

☐ 25 + years

Q21: How many years' experience do you have overall in transacting real estate?

☐ 0-5 years

☐ 6-10 years

☐ 11-15 years

☐ 16-20 years

☐ 21-25 years

☐ 25 + years

Q22: If you would like a copy of the research upon its completion please ensure you complete the 'e-mail address' section:

E-mail address: _____

Thank you - we appreciate you taking the time to complete our survey.

For more information on the Investment Property Forum's Research Programme please visit:

http://www.ipf.org.uk/

APPENDIX 5: QUESTIONNAIRE RESPONSES

Table A5: Response Rates per Country

Country	Region	Cities	Response Rate (%)	Total No. of Responses
Australia	Asia Pacific	Adelaide, Melbourne, Sydney	6.8	4
Brazil	Americas	Rio de Janeiro, Sao Paulo	25.0	3
Bulgaria	Europe	Sofia	25.0	1
China	Asia Pacific	Beijing	3.8	1
France	Europe	Paris	4.2	2
Germany	Europe	Berlin, Frankfurt	4.3	2
Ghana	Sub-Saharan Africa	Accra	100.0	1
Hong Kong	Asia Pacific	Hong Kong	16.7	2
India	Asia Pacific	Hyderabad, Mumbai	15.0	3
Japan	Asia Pacific	Tokyo	12.5	2
Kuwait	Middle East & North Africa		100.0	1
Mexico	Americas	Mexico City	20.0	2
Netherlands	Europe	Amsterdam	14.3	3
Nigeria	Sub-Saharan Africa	Lagos	100.0	1
Panama	Americas	Panama City	33.3	2
Poland	Europe	Warsaw	8.0	2
Romania	Europe	Bucharest	16.7	1
Russia	Europe	Moscow	5.0	1
Singapore	Asia Pacific	Singapore	8.7	2
South Africa	Sub-Saharan Africa	Durban, Johannesburg	11.1	2
South Korea	Asia Pacific	Seoul	11.8	2
Spain	Europe	Barcelona, Madrid	31.6	6
Sweden	Europe	Gothenburg, Stockholm	10.0	3
United Arab Emirates (UAE)	Middle East & North Africa	Abu Dhabi, Dubai	17.6	3
United Kingdom (UK)	Europe	Edinburgh, London, Regions	10.0	6
United States of America (USA)	Americas	Chicago, New York	8.1	3
All Countries				**61**

APPENDIX 6: ECONOMETRIC MODELLING SUB-SAMPLES

Table A6: Membership of Sub-samples used in Econometric Testing

Highly Transparent 2014 country score < 1.8	Moderately Transparent 2014 country score < 1.8	Low Yield Average < 5.5%	High Yield Average > 5.5%	Larger markets by floorspace Average > 6.5m sq. m.	Smaller markets by floorspace Average < 6.5m sq. m.	High volume Average > $700m per qtr.	Low volume Average < $700m per qtr.
London	Berlin	Hong Kong	Osaka	Paris	Seoul	London	Munich
Manchester	Singapore	London	Madrid	New York City	Hong Kong	New York City	Melbourne
New York City	Hong Kong	Tokyo	Barcelona	Tokyo	Dubai	Tokyo	Berlin
Los Angeles	Warsaw	Singapore	Rotterdam	Munich	Barcelona	Paris	Madrid
Chicago	Barcelona	Paris	Chicago	London	Lyon	Los Angeles	Osaka
Washington DC	Madrid	Munich	Manchester	Berlin	Sydney	Seoul	Amsterdam
Boston	Johannesburg	Stockholm	Seoul	Los Angeles	Singapore	San Francisco	Warsaw
San Francisco	Tokyo	New York City	Lyon	Madrid	San Francisco	Sydney	Barcelona
Melbourne	Osaka	San Francisco	Sydney	Moscow	Melbourne	Boston	Manchester
Sydney	Istanbul	Frankfurt	Warsaw	Frankfurt	Rotterdam	Chicago	Rotterdam
Lyon	Beijing	Berlin	Melbourne	Stockholm	Warsaw	Singapore	Gothenburg
Paris	Shanghai	Shanghai	Dubai	Boston	Gothenburg	Shanghai	Lyon
Amsterdam	Moscow	Boston	Istanbul	Shanghai	Istanbul	Frankfurt	Mumbai
Rotterdam	St Petersburg	Gothenburg	Johannesburg	Osaka	St Petersburg	Beijing	Johannesburg
Gothenburg	Mumbai	Washington DC	Sofia	Chicago	Manchester	Stockholm	Dubai
Stockholm	Seoul	Beijing	Moscow	Washington DC	Sofia	Washington DC	Istanbul
Frankfurt	Dubai	Los Angeles	Mumbai	Beijing	Johannesburg	Moscow	St Petersburg
Munich	Sofia	Amsterdam	St Petersburg	Amsterdam	Mumbai	Hong Kong	Sofia

Note: thresholds on transparency, yield, size and volume are set to divide the sample of cities in half and should not be taken as absolute judgements about what constitutes a large or small market, a high or low yield, etc. For transparency, country score for Berlin was the same as for Frankfurt and Munich, but this was allocated to the moderately transparent group based on a qualitative judgement of relative transparency versus the other two cities.

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