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Real Estate Investment in Global Financial Centers: Risk, Return and Contagion

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Abstract

Global financial activity is heavily concentrated in a small number of world cities – international financial centers. The office markets in those cities receive significant flows of investment capital. The growing specialization of activity in IFCs and innovations in real estate investment vehicles lock developer, occupier, investment, and finance markets together, creating common patterns of movement and transmitting shocks from one office market throughout the system. International real estate investment strategies that fail to recognize this common source of volatility and risk may fail to deliver the diversification benefits sought.

Global Cities, Office Markets and Investment

This paper explores the inter-relationship between the office markets of international financial centers and the impact of that relationship on global real estate investment strategies. The starting point is the spatial clustering of global financial business in a small number of major cities, acting as coordinating centers for an interlinked international financial system. This process is linked to redevelopment of core office markets of those cities and a growing functional specialization of activity as high-order financial services have tended to drive out other users, creating an interlocking of occupation, ownership and finance: firms that occupy space are the same firms that acquire offices as an investment asset and who provide finance for the creation of new office space. This creates greater potential volatility in office markets, increasing the amplitude of upswings and downswings. Shocks in international financial markets are transmitted to occupier, investment and debt markets and can reinforce any tendency to cyclical behavior. Recent trends have reinforced this potential volatility: notably growing globalization of real estate ownership and innovation in investment vehicles which fragment ownership without necessarily diversifying away risk at market level.

This underlying is set out in Lizieri (2009) and has antecedents in Fainstein (1993), Leitner (1994), Lizieri & Finlay (1995) and in Lizieri, Baum & Scott (2000). A number of papers have also examined global or regional integration in public real estate markets: papers by Eichholtz and co-workers (e.g. Eichholtz *et al.*, 1998), Quann & Titman (1999), Ling and Naranjo (2002), Bond *et al.* (2003), for example. Results typically show the existence of a global real estate factor, some convergence, but less integration than national equity indices. Investment in REITs is, in the long run, a real estate investment, but the results of such analyses tell us little about direct investment in real estate and the extent to which performance is affected by global rather than local and national factors.

Comparative research on private markets is less common, hampered by data availability. Exceptions include Goetzmann & Wachter (1996, 2001) and Case *et al.* (1999). More general work on global property cycles includes Renaud (1997) and Herring & Wachter (1999). Another strand of literature examines international portfolio diversification

(Sirmans & Worzala, (2003)). The decade has also seen further sophistication in the modeling of office market processes in individual cities. There have been comparatively few cross-national return or rent models and those have typically rely on aggregate macro-economic demand variables to explain variation.

This paper does not attempt to conduct detailed econometric analysis of office market performance in international financial centers (IFCs). Rather, it seeks to set out a framework for understanding market linkages, based both on the development of global capital markets and on micro-level research into the functioning of office markets, backed, where feasible, with empirical evidence. The paper starts with a discussion of the development of international financial centers, then considers office market processes within those IFCs. Next, the impact of innovation in investment vehicles and in patterns of ownership on those processes and on volatility and risk is considered. Exploratory empirical findings are presented and, finally, implications for investment strategy are discussed.

International Financial Centers

Since the 1980s, researchers have attempted to map and explain the development of a global urban hierarchy and the key role of key cities in coordinating and controlling an international network of flows of capital, goods and workers: world or global cities (Friedman, 1986, Sassen, 1991). A key function of world cities is to act as a centre for financial activity. What makes a city a financial centre? Kindelberger (1974) provided an early definition of the attributes and functions of a financial centre, focusing on their role in effecting payments and transferring savings around the economy: *“the specialized functions of international payments and foreign lending or borrowing are typically best performed at one central place that is also (in most instances) the specialized center for domestic interregional payment”*. (Kindelberger, 1974, p6.).

An international financial centre (IFC) will have a greater concentration of cross-border activity than a domestic financial centre, but it is not clear where the boundary lies or whether it is the scale or the proportion of international activity that is critical (for example Tokyo in the modern era, New York historically were dominated by domestic transactions and capital). It is possible to identify IFC indicators and attributes: global ranking in financial activities, headquarters of major multinational financial firms, the presence of foreign financial services firms in the city. Research, though, generally leaves the definition open and focuses on the activities and characteristics of the leading cities of finance, judged by activity levels: a financial hierarchy to mirror the world urban hierarchy.

There is ample evidence that international financial activities are strongly concentrated in particular cities. In ranking lists, some cities dominate particular niche areas (Geneva, Zurich for wealth management, for example) but are less prominent in other lists; but a handful of key cities are highly ranked in many financial sectors. A number of “global rankings” exist. In each, the rankings vary slightly, depending on the criteria used and datasets employed. Those based on survey work may carry cultural or linguistic biases, but there is a strong common ground. In this paper, the rankings produced by Z/Yen

using their “Global Financial Competitiveness” index are used. The GFCI combines together quantitative indicators of market share, market qualities (labor market, infrastructure, available services) and market openness (transparency, regulatory and tax structure etc.) with survey data on competitiveness as a business location¹. The list contains few surprises. Paris is not ranked in the top ten (it is as low as twentieth on the fourth index) and the high ranking of both Swiss centers (reflecting their private fund management status) may be unexpected. Tokyo – in the world city literature regularly placed alongside London and New York (and sometimes Paris) as one of the dominant true global centers - is ranked tenth on the second index, reflecting concerns about its openness to foreign businesses operating there and the continuing aftermath of the bursting of the Japanese asset price and economic bubble in the 1990s. The full list of financial centers includes offshore centers (Hamilton, Bermuda, for example) whose significance greatly exceeds their size or prominence as cities, and emerging centers such as those of the United Arab Emirates.

Figure 1: The Global Financial Centre Competitiveness Index

Financial Centre	Index 2007	Financial Centre	Index 2008
1. London	806	1. London	791
2. New York	787	2. New York	774
3. Hong Kong	697	3. Singapore	771
4. Singapore	673	4. Hong Kong	700
5. Zurich	666	5. Zurich	676
6. Frankfurt	649	6. Geneva	645
7. Geneva	645	7. Tokyo	642
8. Chicago	639	8. Chicago	641
9. Sydney	636	9. Frankfurt	636
10. Tokyo	625	10. Sydney	630

Source: Z/Yen (2007, 2008)

It is worth noting that financial concentration cannot be equated with location of exchanges. Electronic platforms mean that trading can be taking place remotely; the removal of barriers to capital flows from the 1980s onwards means that beneficial ownership of equities, bonds and derivative contracts is widely dispersed. There remain significant geographical factors in trading: but a Paris derivatives trader may be dealing in Australian stock index futures on behalf of a Middle Eastern client with her middle office based in London handling the transaction and settlement process. Further, “dark pools”, private automated crossing systems and trading platforms that match buyers and sellers without publishing bid-offer prices allow institutional investors to trade large blocks of stock between each other with anonymity. In the first half of 2007 as much as 10-20% of all trades of NYSE securities may have been through such dark pools. This sense of global dislocation is reinforced by mergers, acquisitions and strategic alliances in securities and derivatives exchanges, creating global trading platforms with ownership

¹ It should be noted that the survey was commissioned by the Corporation of London and Z/Yen are London based – although most rankings place London first.

spread across IFCs. Nonetheless, while technology means that work can be anywhere, it must be *somewhere*. Location, then, will depend upon other factors associated with efficiency and profitability. For high-level financial services, the essential inputs are human capital – skilled labor – and information. This drives concentration, benefiting from the agglomeration and scale economies, labor skills and critical mass of activities that only the largest of cities offer.

It is important to distinguish between retail and wholesale financial activity and between high volume, low margin and low volume, high margin activities. Retail activity is likely to disperse since it relies on customer knowledge, tastes, preferences and local marketing. It is also cost-sensitive and, hence, may be displaced from major centers. High volume, commoditized, wholesale activities include settlement, clearing and certain forms of trading. The tasks may be relatively standardized, are less reliant on information exchange and innovation, and generate lower profits, creating pressure for these activities to decentralize to lower cost locations. By contrast, high value added, low volume business - corporate finance, fund management, raising capital, mergers and acquisitions, for example – rely both on information (from customers, rivals, parallel business and suppliers) and on close client contact. This leads to greater concentration, a concentration further fuelled by the need to access skilled labor.

Economic analyses of the competitiveness of IFCs have largely ignored real estate, beyond occasional use of indicators of total occupation cost. Real estate is seen as a derived demand that will appear in response to the needs of financial services firms. However, the real estate market in IFCs must have a direct role to play in creating and preserving financial advantage. The quantity and quality of the existing office stock and the market's ability to produce new stock appropriate for global financial firms forms part of the attributes of an IFC and cannot simply be assumed away.

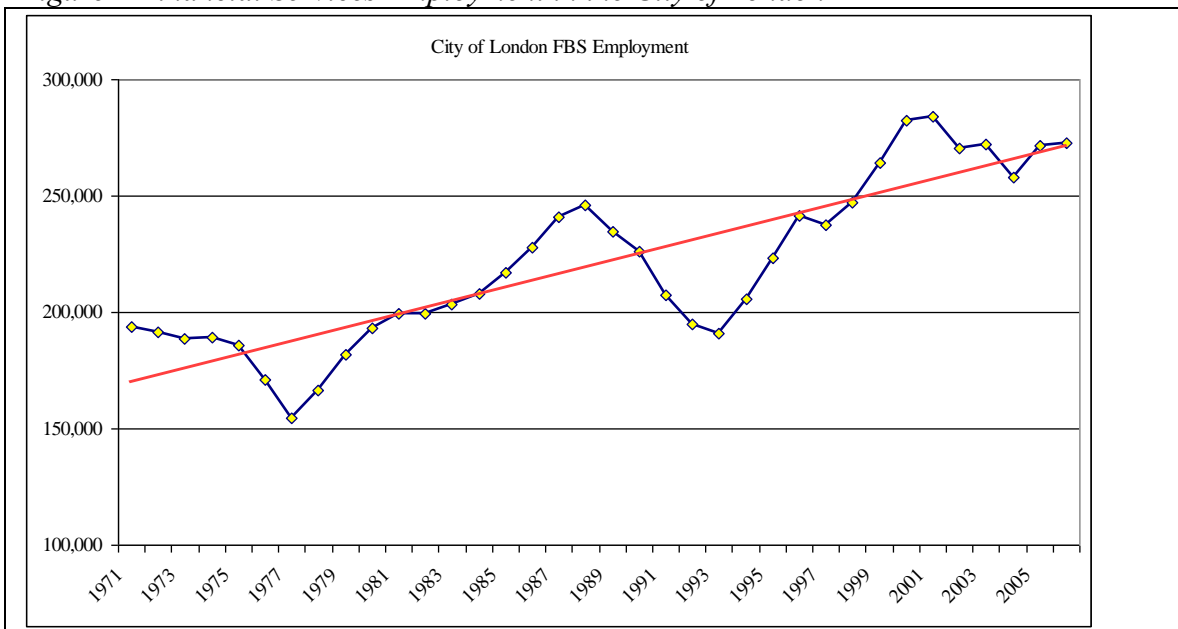
Real Estate in IFCs

Analysis of office markets has developed considerably and the connection between the occupier, investment and development markets is recognized in dynamic models of property market systems. In these models, demand for space as a factor of production translates into occupational demand; rents result from the interplay of supply and demand. Investors acquire property assets, discounting future rental income at a risk adjusted rate to produce a capital value; supply of space is driven by the relationship between the price of space in the asset market and the cost of producing that space. While this describes an equilibrium, no serious model denies adjustment processes that result from demand fluctuations and short-term inelasticity of supply². With a positive demand shock and fixed supply, real rents in the market may rise above their equilibrium level due to “excess” demand, while a negative demand shock may result in vacancies rising above their natural level, driving rents down. In the longer term, however, supply will adjust to the changes in demand.

² For example Wheaton (1987), Hendershott *et al.* (1999), Hendershott *et al.* (2002), Barras (2005), Englund *et al.* (2008).

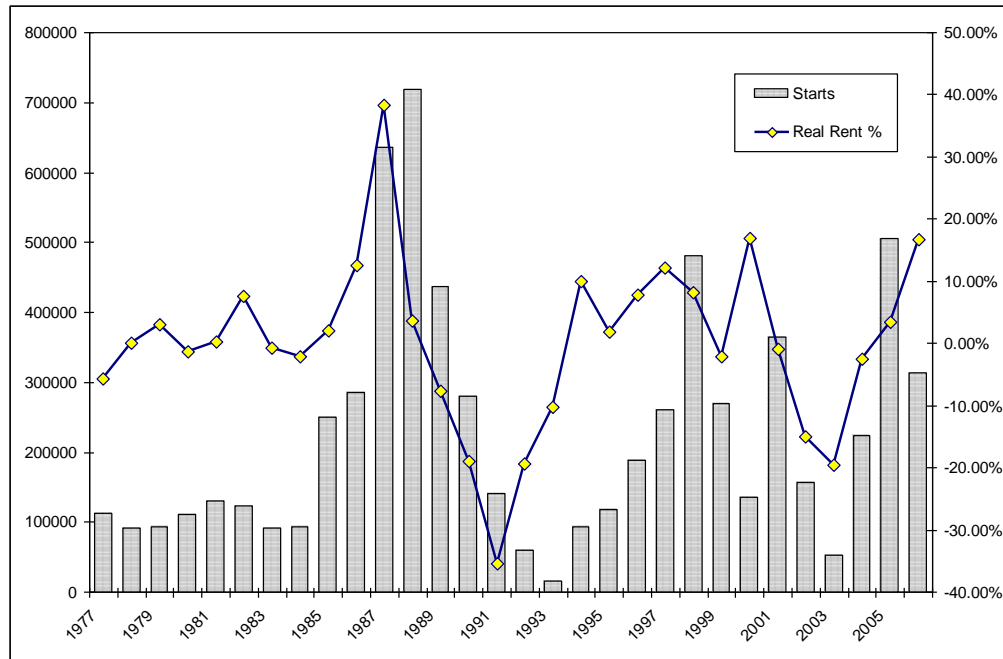
Figure 2 shows the growth in financial and business service employment in the City of London from 1971 to 2007. Trend growth is around 1% per annum, but that trend is masked by fluctuations, with periods of rapid growth followed by sharp declines. Supply should broadly match that trend growth – but must also replace stock that has reached the end of its economic life. Thus, taking a fairly standard estimate of the depreciation rate of around 2.5%, one might expect stock to increase at around 3.5% per annum to account for growth in demand and obsolescence. Over the last thirty years, the average floorspace completed in the City of London as a percentage of the existing stock is, indeed, around 3.5%. However, there is no smooth supply of space but rather periods of intense building activity surrounded by periods of inactivity (Figure 3). Moreover, construction starts lag real increases in rent. If the fluctuations in demand allied to short term inelasticity in supply might be expected to produce rental fluctuations, this pronounced building ‘cycle’ is likely to result in extreme swings in rents and capital values in office markets. The alternating pattern of high and low construction, with concomitant fluctuations in rents and prices, is observed in the office markets of world cities and financial centers in the modern era. Moreover, the boom-bust cycles appear increasingly coordinated across many major cities.

Figure 2 Financial Services Employment in the City of London



Source: Author, from Greater London Authority data.

Figure 3: Office Construction and Real Rents



Source: Author, from Corporation of London, CBRE, ONS.

While the cyclical nature of office markets is often cited as indicating irrational behavior on the part of developers and banks, a developing body of work seeks to combine real options models and game theory to explain the behavior of economic agents in the development process. These models focus on the decisions of individual actors – generally the developer – when faced with future uncertainty and volatility. Perhaps the most complete formulation of a game theoretic approach is set out in Grenadier (1996). Grenadier seeks to explain why development appears to be clustered and why developers appear to develop into recessions, despite declining occupational demand and building values. He shows that strategies adopted by developers depend on the starting conditions in the market, on the volatility of demand and on the time to construct. Development cascades – with developers rushing to develop simultaneously – occur in particular where the volatility of demand is high. The volatility increases the option value of waiting – but once the conditions favor development, all developers race to build. Developers also are prone to build “defensively” when demand signals falter, for fear of being shut out of the market if competitors do build.

Grenadier’s model is theoretical in nature but nonetheless captures many of the features observed in commercial real estate development in developed economies. In particular, it helps to identify the types of market which will be most prone to development cascades and “over-building” in response to demand signals. Since the model involves exercise of real options, volatility is a key variable – here, volatility of occupational demand over the long run trend growth. Grenadier suggests that demand volatility will be most pronounced in specialized urban markets, where fundamental demand drivers are common to a high proportion of occupiers. By contrast, diversified markets will be less prone to volatility-induced development cascades, since differences in business cycles,

product-life cycles and underlying economic fundamentals will smooth out demand shocks. He also shows where there are long lags between starts and completions, a market is prone to development cascades in falling markets, and that the more entry barriers there are, the greater the risk of overbuilding.

From this, it follows that the central office markets of IFCs are likely to be prone to development cascades, to periods of intense building amid more general low activity levels. First, there is strong specialization of activity in the core market. Office space is occupied by global financial firms and professional business service firms linked to financial activity. Demand for space and ability to pay high rents are, hence, locked into the performance of global financial markets which are both volatile and prone to shocks. Second, the complexities of building in a heavily developed market – problems of site assembly, pre-existing transport and utilities infrastructure, planning issues – are layered onto the demand for large, technologically sophisticated buildings to create long lags between project initiation and completion of development³. Finally, high land values, linked to the size of buildings and cost of construction, allied with the need to access debt and equity finance create significant entry barriers for new and smaller firms. Grenadier's model, then, points to the likelihood of pronounced development cycles in IFCs – with no need for any assumption of irrational behavior on the part of developers. More significantly, it points to the coincidence of booms and slumps *across* cities.

Ownership, Innovation and Risk

Despite the volatility inherent in IFC office markets, they have been a prime target for real estate investors. Historically, real estate investment has been largely local, domestic, focused. The large buildings and high price per square metre of Class A office space in the centers of world cities also acted as a barrier, excluding smaller investors. Nonetheless, major city office buildings took a large share of professional and institutional investors' real estate portfolios. Over the last twenty years, a series of innovations have transformed the nature of real estate investment markets and changed the patterns of ownership and exposure to real estate. The main features of this transformation have been the growth of global real estate investment; the development of new property investment vehicles that allow many more investors to gain exposure to commercial real estate as an asset; and the transformation of property debt markets through securitization. The combination of these three areas of change have potentially profound implications for IFC office markets.

While ownership of non-domestic real estate for strategic reasons is a well-established feature of international markets, global holding of real estate for investment purposes is a comparatively recent phenomenon. Advisors began directing clients towards international portfolios only from the mid-1980s, with major office markets dominating suggested portfolios. Global direct portfolios, though, only really became a standard feature of investment portfolios from the second half of the 1990s. As an example, an examination of London offices by Lizieri & Kutsch (2006). reveals a marked shift in global ownership. Until the mid-1980s, international ownership remained remarkably stable, at

between 10% and 15%. The proportion of non-UK ownership began to increase in parallel to financial deregulation across the late 1980s, reaches 25% in the second half of the 1990s and, by 2005 exceeded 45%. The late 1990s sees the appearance of “international investment” – acquisition of offices by funds with equity investment from a diverse mix of nationalities and investor types. It is difficult to obtain comparable figures for other markets but evidence of the increase in global real estate capital flows suggest that London was not unique in experiencing a globalization in ownership. Property Funds Research’s (2008) survey of Global Fund managers reports that, of the 107 funds surveyed (with over €1trillion of property assets under management), 38% had 10% or more of their assets spread across more than one continental region.

That growth in international ownership in the City of London was accompanied by a shift in the nature of ownership as “traditional” landlords – the public sector, endowments, and similar historic owners – were replaced by more financially oriented investor-owners with more intensive asset management strategies. Between 1975 and 2005, traditional ownership fell from over a third of office space to less than 10% while private equity, other financial and other forms of ownership doubled to over 41%. The shift in the nature of ownership has been accompanied by a wave of innovations in real estate investment vehicles. In particular, 1995-2005 saw the rapid growth of private real estate funds which pooled equity capital from investors, raised debt and acquired real estate assets. The vehicles ranged from relatively simple limited partnership structures to complex layered corporate structures, often based in tax havens, which allowed many investors to gain exposure to commercial real estate. At the end of 2007, INREV recorded details of 476 private funds in Europe, with a gross asset value of €336billion; NAV growing 14% per annum from 2000. Baum (2008) suggests that the value of unlisted real estate funds in Europe grew at 10% per annum between 1997 and 2007, with explosive, if more recent, growth seen in Asian and emerging markets.

Three factors are significant for an understanding of IFC office markets. First, the existence of private direct real estate vehicles breaks down entry barriers for smaller investors and for international investors who are able to build diversified global direct exposure to real estate – either through individual placements in vehicles or through fund of funds structures. Second, the growth of private equity investment vehicles effectively fragments the ownership of real estate. Third, most of the vehicles have capital structures containing substantial amounts of debt: particularly those funds with a value-added or opportunity investment style. Expected returns for geared vehicles are higher than the expected returns for the underlying real estate: but that higher return is to compensate for the enhanced volatility brought by leverage. Hence investors gain in rising markets but are more vulnerable to downward shocks, increasing the overall risk of real estate. Furthermore – as clearly demonstrated in the post 2007 downturn - liquidity of private vehicles varies considerably over the property cycle. Offsetting this exposure, investors are better able to diversify their property portfolios – both within national boundaries and globally – and can fine tune their target risk and return. The rise of private equity real estate investment vehicles was paralleled by innovation in real estate debt and the growth of real estate debt securitization. The spread of exposure links more firms to risk from the underlying real estate and debt markets. Moreover, that ownership is international in

nature - as became evident in the aftermath of the sub-prime mortgage “crisis”. Thus an initially localized residential mortgage problem had significant global contagion effects and contributed to the fall in capital values in commercial real estate markets.

Lizieri *et al.* (2000) argue that the distinction between the funding of real estate development, ownership of real estate as an investment and occupational of property has become blurred. They describe an integration of property and financial markets and argue that this integration creates systemic risk as shocks in one area of the property market are transmitted throughout the system. This can be seen most clearly in IFC office markets. The size and complexity of developments demand complex finance and funding arrangements provided by the major banks, finance houses and institutional investors. Those same financial firms are the *occupiers* of space in IFC office markets, as owners or, more generally, as tenants. Thus rents and capital values are linked to the fortunes of international financial firms and their demand for space. And it is those same firms that invest in the buildings in IFCs – directly by acquisition for their investment portfolios, indirectly through investment in funds acquiring buildings, by holding shares of the major property companies owning the buildings or by investing in the securitized debt products whose underlying cashflow and security is based on the office buildings. Those investments are significant parts of the asset base of the financial firms and act as collateral for their operational activities including property lending. Thus the occupier, supply and investment markets are locked together.

The developments described above increase that lockstep. Globalization of financial activity has led to increasing functional specialization in IFCs, with many domestic focused firms squeezed out of the occupier market by international financial service or linked professional service firms. Globalization of ownership has meant that professional investors based in one IFC typically have exposure to real estate assets in other IFCs. Innovations in real estate investment make it easier to acquire a global real estate portfolio, with capital from a range of investors pooled to acquire prime real estate assets. Greater use of debt in these vehicles, facilitated by debt securitization and capital market lending, has increased the gearing, and hence implicit volatility, of real estate. Finally, purchase of debt securities by financial firms brings further exposure to real estate risk.

This process of lockstep is important in the context of the volatility of global capital markets. In IFC office markets, demand for space is driven by the employment needs of financial firms, which in turn is driven by the behavior of international financial markets. Demand shocks are thus likely to occur in a coordinated fashion across the major global financial capitals. The integration of occupational, asset and development markets means that demand shocks (positive or negative) are reinforced. A downturn in global capital markets reduces financial firms’ demand for space putting downward pressure on rents. This affects capital values and returns, with implications for the performance of their investment portfolios. Falling rents and capital values and rising vacancy rates put pressure on borrowers, increase the risk of debt instruments and depress the value of debt securities held as an asset and used as collateral. This affects the profitability of financial firms and hence depresses their demand for space. The converse applies to positive shocks driven by booming capital markets. Larger firms based in financial centers capture

greater market share and seek to expand, placing upward pressure on rents; rising property prices enhance asset values and encourage lending and development, with the additional activity enhancing short term profitability. By implication, this suggests that the amplitude of cyclical fluctuations in international financial centers will be higher and peaks and troughs will be coincident.

Some Empirical Evidence

The foregoing suggests a number of testable propositions. First, international financial centers should attract a high or disproportionate proportion of global real estate investment. Second, with functional specialization and global financial firms' need to capture agglomeration economies, IFC office markets should exhibit higher rents than comparably sized cities. Third, IFC office markets will exhibit common patterns – for example in rental movements. In this section, some exploratory empirical findings are presented.

Testing is inevitably restricted by the availability of consistent international time series data. It is difficult to obtain robust, comparable data series – particularly series disaggregated to city or sub-market level. Even where such data series exist for individual cities, definitions employed differ considerably, even varying *within* individual data providers. Even where such data issues can be resolved, there remain difficulties. Data are published relatively infrequently (usually at best quarterly but often only available annually) and, for all but a handful of markets, time series are short. Where markets are covered by more than one agent or consultant, the separate time series may differ both in magnitude and direction (Kennedy *et al.*, 2007) – a problem compounded by change and consolidation amongst real estate service providers, where one firm's coverage may cease, creating a need to splice possibly inconsistent series. Given these problems, the analyses presented here are exploratory and preliminary in nature and are intended to point the way to further detailed research.

The Importance of IFCs in Global Real Estate Investment

RCA data for the top 1,000 commercial real estate deals by value in 2007 and in 2008 demonstrates the concentration of investment activity, despite the expanding global arena for investment. After eliminating duplication and flips, the RCA data contains 1,979 deals with a total value of \$527billion. The impact of the credit crunch is evident in the 33% fall in the value of deals in 2008 compared to 2007. By value, 49% of the deals are office acquisitions, with a total value of \$257billion and a total floorspace in excess of 437million square feet. The RCA data identifies the location of each deal. Figure 4 shows the cities with the most deals for all property and for office property. The concentration is striking: 50.2% of the major deals in 2007 and 2008 took place in just ten cities, over 40% in just five cities. Office market investment is more concentrated still: 55% of the largest office deals were in ten cities, 44% in five cities and nearly 30% of the deals took place in London or New York.

Figure 4: Commercial Real Investment by City, 2007-2008

All Property Types			Office Deals		
City	Value \$m	(% of total)	City	Value \$m	(% of total)
1. Shanghai	81,483.7	15.5%	1. New York	38,511.8	14.96%
2. New York	45,869.3	8.7%	2. London	37,783.4	14.68%
3. London	44,188.5	8.4%	3. Tokyo	15,589.9	6.06%
4. Tokyo	22,171.7	4.2%	4. Paris	13,073.5	5.08%
5. Singapore	20,654.3	3.9%	5. Singapore	8,406.7	3.27%
6. Paris	13,703.6	2.6%	6. Madrid	6,353.5	2.47%
7. Beijing	13,094.2	2.5%	7. Seoul	5,782.2	2.25%
8. Hong Kong	8,878.5	1.7%	8. Washington	5,770.3	2.24%
9. Washington	7,283.8	1.4%	9. San Francisco	5,282.6	2.05%
10. Madrid	6,896.0	1.3%	10. Beijing	5,031.3	1.95%

Source: Author, from RCA data, ©2008 Real Capital Analytics, Inc. All rights reserved

It is readily evident that many of the cities dominating global real estate investment activity are international financial centers. 64% of total deals and 72% of office deals took place in those cities ranked as international financial centers in the fourth Z/Yen global financial centers index. Excluding highly ranked offshore financial centers such as the Cayman Islands, Jersey or the Isle of Man, 37% of all property deals and 56% of office deals were located in the top twenty IFCs. Office investment activity is strongly correlated to financial market strength: there is an 0.57 correlation between office investment value and the city's score on the global financial centers index and even a statistically significant 0.39 correlation between total investment and GFCI score.

As a further indicator of the globalization of property investment, the top thousand deals (which in total represent over 80% of all the sales in the data by value) were analysed and the head office of the acquirer identified⁴. Of these large deals, 44% of all property trades (\$189billion) and 38% of office sales (\$74billion) were cross-border. Nearly a quarter of all office sales were cross-border *and* took place in a top-ranked IFC.

From these results, it is evident that, despite the trend towards global property funds and diversified property holdings, real estate investment activity – and office market activity in particular – remains strongly concentrated geographically in a relatively small number of cities – and the majority of those cities are global financial centers. The leading IFCs dominate office investment, with some \$100billion of major office sales in London, New York, Frankfurt and Tokyo alone across 2007 and 2008. This emphasizes the importance of the IFCs to real estate investment.

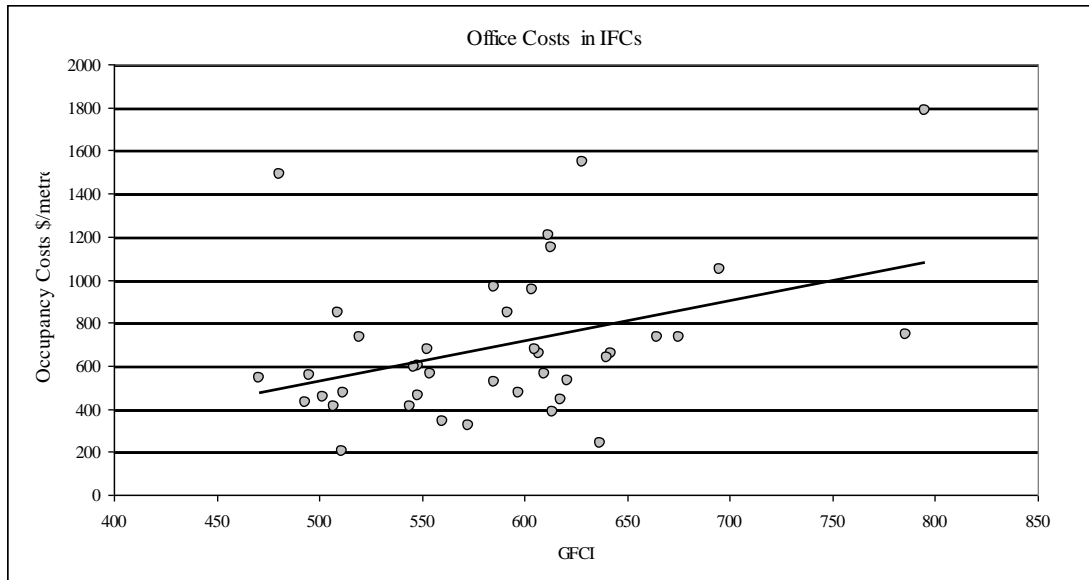
Rental Values in IFCs

Is there any evidence that IFC status affects rental levels? CBRE publish a biannual survey of office rents and total occupancy costs in a range of cities across the world. As noted above, there are issues relating to compatibility, definitions employed and

⁴ This was no easy task, with a number of private funds being impossible to locate while many others were local subsidiaries of non-domestic parent investors. The figures cited here are, thus, an underestimate.

robustness, but they do provide a benchmark with which to compare cities. The rents from the May 2007 survey are compared to the second Z/Yen Global Financial Centres Index. There are 40 cities that are ranked in the top fifty by Z/Yen which are also covered by the CBRE survey⁵. One might expect that the higher the financial centre score, the more desirable the city would be as a business location and, therefore, rents would be high due to increased demand for space. Figure 6 provides some confirmation for this: there is a 0.39 correlation between GFCI score and total occupancy costs (and a 0.35 non-parametric correlation between city rankings on GFCI and offices costs), 30 of the 50 most expensive office locations are high ranking IFCs. However, IFC ranking alone is clearly insufficient to explain variations in rent.

Figure 6 Office Occupancy Costs and International Financial Centers



From data in CBRE (2007), Z/Yen (2007)

Although many IFCs are highly functionally specialized, most perform other urban functions. Population forms a general proxy for aggregate demand – and has a 0.45 correlation with office costs using the same sample of 40 IFCs. Further, urban economics suggests that as population rises and the spatial extent of the city increases, so land rents at the centre should increase. Population density can be seen as a proxy both for urban concentration and supply constraints. Population and population density combined together explain around 24% of rental variation. US cities appear to have lower rents than those found in other nations’ cities which may reflect data collection factors (US numbers represent average prime rent, while most others are on a “best rent” basis). There may also be currency factors involved – with the rise in strength of the Euro relative to the dollar. Finally, UK cities appear to have high office costs relative to their size and financial significance⁶ – possibly as a result of planning constraints and their impact on

⁵ The majority of the Z/Yen high ranked IFCs not covered by CBRE’s report are small tax havens.

⁶ Seven of the twenty non-IFC cities in CBRE’s ranking of the fifty most expensive office locations are UK cities.

supply side response to occupier demand. These factors are combined together, along with GFCI score into a standard regression model in an attempt to explain rental levels:

Figure 7. Explaining Office Occupancy Costs
Dependent Variable: Total office occupancy per square metre

Variable	Coefficient	t-statistic (significance)
Constant	-834.50	-2.91 (0.006)
Population (millions)	+23.59	+3.22 (0.003)
Pop Density (per km ²)	+0.021	+2.141 (0.040)
US Dummy	-328.34	-3.06 (0.004)
Euro (ex UK) Dummy	+87.56	+2.85 (0.008)
UK Dummy	+501.73	+5.01 (0.000)
GFCI Score	2.030	+4.29 (0.000)
Adjusted R-squared	0.668	F-Statistic 14.124 ***
RMSE	201.76	

White heteroscedasticity consistent standard errors and covariance.

This simple model (which appears robust to functional format), explains around 67% of the variation in office rents, with all coefficients correctly signed and significant. The higher ranked the IFC, the higher the office occupancy costs, other factors equal. Thus the model suggests that London's rents should be \$376psm higher than Toronto's as a result of the UK city's first ranked GFCI score of 795 compared to the Canadian city's fifteenth ranked 610. London's costs should also be higher due to its UK location and larger population size. The model predicts a difference in total office occupancy costs of \$1,084psm – the observed difference is a little larger at \$1,222psm. The largest anomalies are Dubai and Dublin (where predicted rents are substantially lower than observed rents) and Shanghai and Beijing, where observed rents are sharply lower than the estimated costs from the model. There are local stories for these anomalies, emphasizing the importance of immediate market and economic context in explaining rental values.

Rental Relationships Over Time

The CBRE data provides a snapshot of global office occupancy costs. The theoretical model outlined above, though, suggests that there should be coincident patterns of movement in rents across international financial centers, as a result of common supply and demand factors and capital flows between the cities. This requires an analysis of changing rents over time. Using annual data provided by JLL and LaSalle Investment Management, change in prime office rental values were calculated for a sample of 32 cities for the period 1990-2007. Rental changes were calculated in domestic currency to avoid the results being influenced by the currency movement effects described in the previous sections.

For all 32 cities in the sample, the average correlation in the sample was 0.26. For the eleven cities that were ranked in the top 15 financial centers by Z/Yen, the average correlation was 0.46. This difference is statistically significant at the 0.05 level. Of the 55 possible correlations between the eleven IFC markets, even given the small sample size,

24 are significant at the 5% level and beyond, with 33 significant at 10% or beyond. New York has the highest number of significant correlation coefficients with other IFCs: of the non-US cities, the three with the highest average correlation are the “world alpha cities” of London, Paris and Tokyo. There are distinct regional factors at play, particularly in North America. The average correlation between all US cities is 0.51; between European cities 0.35. Despite this regional dimension, there does appear to be a stronger link between IFC office markets than between those found in world cities in general.

Exploratory data analysis using principal components analysis (PCA) was conducted on 28 of the 32 cities (those with no missing data). The PCA approach seeks common patterns of movement between objects; here city office markets. The first component explains as much common variation as possible; the second component, orthogonal, uncorrelated with the first, explains as much of the residual variation as possible, and so on until the final component. The factor loading of a city on a component gives some indication of the factor’s importance in explaining local rental movement. PCA will produce as many components as there are cities. If the cities behaved distinctly and individually, then each component would explain much of the variation in one city and little of the variation in others. If there are common factors driving rental movements then the early components will explain much of the variation with many cities exhibiting high loadings: while late components will explain very little variation.

The results largely confirm the Goetzmann & Wachter (1995) finding of the existence of a global office market factor. The first component extracted explained 38% of the variation in the dataset, with 20 of the 28 cities having loadings of 0.5 or higher, including nine of the eleven high ranked IFCs – the exceptions being Hong Kong and Sydney. In general, Asian cities have lower factor loadings than European and North American cities. A varimax rotation of the retained components again confirms a regional pattern, separating the US and the Asian cities more clearly. Focusing just on the eleven high ranking IFCs in the JLL data set, a further focused principal components analysis was run. The first retained factor explains 53% of return variation, with all IFCs loading at 0.62 or higher with the exception, once again, of Hong Kong (0.495) and Sydney (0.375). An hierarchical cluster analysis⁷ of the eleven cities emphasizes that, over this short time period, Hong Kong and Sydney behave differently from the other IFCs, with Singapore somewhat separate, too. The other financial centers merge quickly: there is initial regional clustering (particularly for the US cities), but most cities swiftly form a single group. Overall, then, even with a very short dataset, there is evidence of a strong common factor in rental change in major global cities, and in the office markets of International Financial Centres in particular, but also that there are regional factors at play within financial centers.

⁷ The cluster analysis used a hierarchical procedure using squared Euclidean distance metric and Ward’s method of clustering.

Component	% of Variance	Loadings on Factor 1:
1.	52.7%	
2.	13.2%	Boston 0.795
3.	10.1%	Chicago 0.850
4.	9.2%	Frankfurt 0.622
		Hong Kong 0.495
All other components 6% or less		London 0.721
		New York 0.921
		Paris 0.798
		San Francisco 0.817
		Singapore 0.676
		Sydney 0.375
		Tokyo 0.736

Figure 6. Explaining Rental Volatility in Global Cities

Risk =	0.10	+	2.26 Mean		Adjusted R ² = 0.61
	(7.25**)		(6.50**)		
Risk =	0.12	+	2.26 Mean	- 0.07 US	Adjusted R ² = 0.68
	(8.36**)		(7.83**)	(-3.70**)	
Risk =	0.10	+	2.00 Mean	- 0.07 US + 0.05 IFC	Adjusted R ² = 0.73
	(7.25**)		(6.50**)	(-3.51**) (2.00*)	
All estimates OLSQ, Newey-West heteroscedasticity corrected coefficient estimates.					
** significant at 0.01 and beyond; * significant at 0.05 level					
Data: annual rental change 1990-2007, 32 cities.					

The model also suggests that IFCs will be more volatile. The average standard deviation of rental change for the eleven leading IFCs was 21.95%; for the remaining cities, the average standard deviation was 14.86%. Using an unequal sample t-test, the difference between the two means is statistically significant at the 5% level. The higher rental volatility, consistent with the model outlined above, is compensated by a higher mean rental growth (4.8% to 2.2%), a difference which is, as with the risk measure, statistically significant. Simple regression analysis with the standard deviation as the dependent variable shows that 61% of variation in risk is associated with the average growth rate; adding a dummy variable that identifies US cities increases the level explanation to 68%; a dummy variable identifying IFCs further increases the R² to 73%, with the coefficient on the dummy statistically significant at the 5% level. Given the short time series, it is not possible to conduct robustness tests so it is important not to overstress the significance of the results, but it does provide some indication of higher rental volatility in international financial services firms.

A similar dataset from Property & Portfolio Research (PPR) covering office markets in 29 cities for 1991-2007 produced very similar results when rental change was examined. The PPR dataset also includes a yield or capitalization rate, which allows a hypothetical capital growth series to be estimated for each city. These series do not seem to be very robust, but there does seem to be evidence of common capital growth between the non-Asian IFCs, with average correlation of around 0.5. Capital growth is considerably more volatile in IFC than in non-IFC cities even if the extreme volatility of the Hong Kong market is excluded. Capital values grow strongly in most IFCs from 2003-2007, averaging 12.3%. London and the volatile Hong Kong market experienced declines in the year to Q4 2007, while others showed early indications of slower growth.

Given the lack of robustness of the private real estate data, a more productive line of enquiry might consider the co-movements of economic driver variables. Unfortunately, it is not easy to obtain comparable city level data that measures financial market activity linked to occupational demand. Co-movement of equity markets is a well known phenomenon. Examining low frequency stock market returns for 1990-2006, the correlation between eighteen leading markets was 0.50; for markets located in leading IFCs, this rose to 0.60. However, as noted above, for office demand, what is relevant is where trading activity takes place, making equity performance at best a fuzzy indicator. Examining BIS data for change in the volume of debt issuance over the period 1994-2007, the mean correlation between all markets surveyed by BIS is 0.19; this rises to 0.37 in markets which contain a leading IFC; to 0.48 if Hong Kong is excluded; and to 0.56 just considering debt issuance in the US, UK, Japan and Germany.

Finally, preliminary analysis of growth in financial and business service employment shows a correlation of 0.68 between London and New York in the period 1990-2007, despite opposite growth trends over that period, with the two series apparently cointegrated allowing for the trend. Change in FIRE employment in New York and Chicago employment shifts shows a strong annual correlation – with, at a finer, monthly, grain, New York leading by around three to six months. However, there is little evidence that Frankfurt’s financial services employment follows the London and New York trend. All three markets show a decline in financial services employment in the aftermath of the bursting of the dot.com and technology bubble in the early 2000s – although the falls in London and New York precede Frankfurt by one year, perhaps reflecting institutional inflexibility in German labor markets⁸.

These results clearly do not amount to definitive evidence in support of the idea of office market linkage advanced: but they are, at the least, supportive of the predictions of the model. It is, perhaps, too early to observe the impact of some of the changes to the commercial real estate environment – many date back only to the late 1990s so, while the effects of the boom and market adjustment phases can be observed, robust quantitative analysis is not possible. What evidence is available does, though, point to higher

⁸ The time series is too short for robust results, but New York financial service employment changes Granger cause Frankfurt changes at the 0.05 significance level over the period 1994-2006. New York changes Granger cause Chicago changes at the 0.05 significance level using monthly data 1990-2007.

volatility and to patterns of common movement, particularly at the turning points of cycles. Combined with individual observation of the linkages between real estate and finance and the feedback mechanisms as they play out in the 2007 credit crunch and the earlier 1990s downturn, it does seem that the integration of capital, financial asset and real estate markets and the evolution of the office markets of international financial centers create the possibility of systemic risk.

Conclusions and Implications

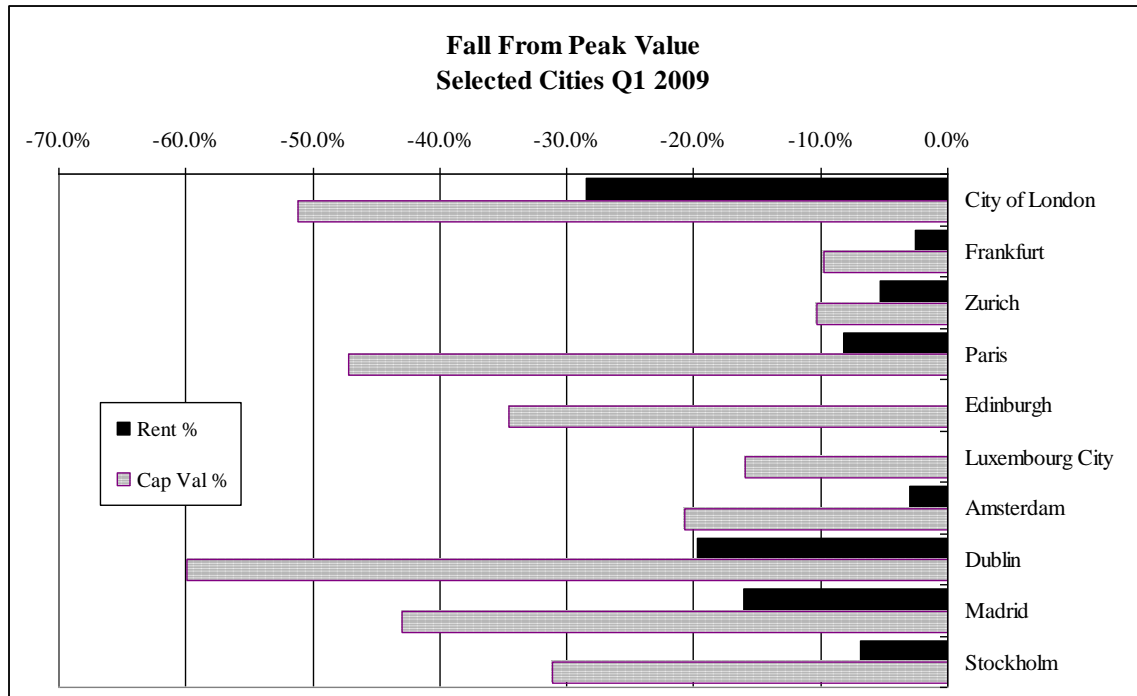
This paper has attempted to draw together research on the development of international financial centers with models of office market processes. Global capital markets have become both more closely integrated and more concentrated as technological developments have linked markets and allowed the largest, most sophisticated financial centers to capture a greater share of trading activity. While this is no new phenomenon, the growing concentration of the leading financial firms in international financial centers, surrounded by supporting professional and business services has had profound implications for the office markets in those cities, both creating a demand for large complex office developments and linking occupational demand with the ebb and flow of global financial markets as domestic-focused occupiers are increasingly squeezed out of global city centers and as these centers become ever more functionally specialized.

Innovation in the organization of commercial real estate investment and finance interacts with those broader urban trends. The development of a wide range of property investment vehicles has permitted more financial investors to gain exposure to real estate on a global basis, which both spreads exposure and fragments ownership. An overall increase in the use of debt in real estate investment funds creates additional potential volatility; that growth in debt has, in part, been enabled by developments in real estate lending, notably with the growth of debt securitization. Investment in these debt securities provides further financial market exposure to the real estate sector and, once again, this is on a global basis, as the ripples and contagion effects from the sub-prime mortgage crisis make evident. In the office markets of international financial centers, the occupational, asset and development markets have become interlocked; global financial firms occupy the office space, provide the funding and finance for the supply of that space, invest directly and indirectly in the buildings in those cities and hold debt securities whose value and risk depend on the underlying fortunes of the real estate market.

Urban economic models based on strategic behavior of developers, landlords and investors suggest that cyclical fluctuations will be more prevalent in markets where there are entry barriers, where there are long lags between the decision to develop and where demand drivers are undiversified and hence more prone to shocks. All of those factors apply in international financial centers and the interlocking of occupier, asset and development markets provides a feedback mechanism that serves to increase the amplitude of market fluctuations. Moreover, the global focus of international financial centers means that demand shocks related to economic activity are increasingly likely to be coordinated globally.

For global real estate investors, this has significant implications. A key motivation for an international investment strategy is diversification. However, diversification benefits are generally demonstrated with reference to securitized real estate assets or to national indices of real estate market performance. But direct private real estate investment happens in *cities*: and, as demonstrated above, much of that investment takes place in international financial centers that are bound together by the flows and fortunes of global financial markets. This creates an exposure to common patterns of volatility and to systemic risks of contagion in financial crises. An international real estate investment strategy with a significant component of global financial centre exposure may fail to deliver diversification at the key moment when it is required. One final figure illustrates this: Figure 7 shows rental and capital value falls from the market peak to the first quarter of 2009 for a set of European IFCs estimated from CBRE data. While the falls vary both in severity and in timing, there is little evidence of any global diversification effects. The CBRE figures show 26% average capital values falls from the peak for cities ranked in the top 30 in the GFCI index. Unranked, non-financial cities had average falls of 18%.

Figure 7: Selected European Office Market Rental and Capital Value Declines



Source: author from CBRE data.

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