



**Discussion Paper
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**Does it Pay to Diversify Real Estate Assets? - A
Literary Perspective**

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Does it Pay to Diversify Real Estate Assets? - A Literary Perspective

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ABSTRACT

This paper examines the literature to date on the benefits of diversifying property assets internationally. Currently, there is no consensus on how much benefit can be derived from diversifying property portfolios globally. This is contrary to other financial assets where there seems to be common ground supporting holding international assets. In the real estate literature, there are two contrasting opinions as to the level of integration global property markets have and the advantages there are from holding international property assets. Specifically, this paper shows there are mixed outcomes irrespective of whether direct or indirect property assets are being examined, and this often depends on what type of statistical procedures are being applied. This study also provides some insights into more recent developments in the literature that might explain some of the diverse opinions that have been formed, these primarily being the inter-temporal instability of correlation coefficients and the impact that structural breaks can have upon statistical analyses.

1. INTRODUCTION

There has been much discussion in the literature over the past decade or so on the benefits arising from international diversification of real estate holdings. There are essentially two very clear and opposing views to emerge from this research. The first is that there are significant benefits to be had from holding real estate assets spread across a number of countries. However, the second school of thought questions the risk reduction benefits from diverse international holdings of real estate assets. This school argues that the advantages may not be large, or at least not significantly more than what can be obtained from other financial instruments. A previous review article on diversification in real estate by Seiler, Webb and Meyer (1999) did consider the issue of geographic diversification, but discussion was constrained to continental United States. However, with the ever-increasing globalization of financial markets, domestic geographic diversification is now not the only issue of interest to large investors. Investors need also be aware of the diversification issues and benefits to holding property assets offshore. This article seeks to summarize the debate and, in the process, highlight avenues of research that both academics and practitioners might consider pursuing.

The issue of the gains from international diversification in real estate hinges on the question of how susceptible returns are to a collapse in one segment of a diversified portfolio, and the answer to this is intricately associated with the degree of segmentation/integration between assets. The more markets are integrated, the less benefits from diversification will materialize as these same markets are affected by the same economic and financial stimuli. Consequently, a property fund manager will not

only be concerned with how closely correlated property assets are with other financial instruments, such as equity or debt, but also how inter-connected domestic property markets are with the rest of the world. If the domestic real estate market is globally integrated, the incentive to diversify internationally will diminish.

Conventional wisdom suggests that real estate is an asset class with specific risk/return characteristics - having low co-movement with other asset classes, such as stock and bonds. So, from a domestic viewpoint, it has traditionally been accepted that adding real estate to a portfolio of stocks and bonds should improve the risk/return profile, and this was the consensus reached by Seiler, Webb and Myer (1999). Unfortunately, although much has been written on the benefits to be gained from international diversification with assets of other financial instruments, the issue of the benefits to be derived from diversifying real estate holdings across several countries has only come under serious consideration in academic literature over the past decade or so.

The diametrically opposed views that have emerged in the literature can be attributed to a number of factors, two of these being whether one is examining direct (physical) or indirect (securitised) property investment. To a layperson real estate investment is conventionally conceived of as holding a physical (i.e. 'bricks and mortar') asset and, in fact, direct investment currently remains the largest form of real estate investment in any country. For a portfolio manager seeking international diversification benefits from direct real estate holdings there are a number of substantial problems to be overcome. For example, the large lot size (fund outlay) of such property investments, the

lack of a central market, low liquidity, high transaction costs, maintenance expenditure, the need of local market knowledge and management requirements, etc.

These numerous drawbacks from direct property investments can be overcome, to a large extent, through the purchase of units in property companies, thereby making an indirect (securitised) real estate investment. In a sense, securitised property can be characterized as baskets of assets in which investors may participate in a particular portfolio of professionally managed, income-producing properties. In terms of absolute value the US has the largest securitised property market (known as Real Estate Investment Trusts or REITS), although, proportionately, the US securitised sector is smaller than some of the securitised property markets of Asia or Europe. For example, Steinert and Crowe (2001) have indicated that about 55% of all institutional grade real estate recorded in the Australian Property Council's database is listed, compared with similar listings for the US of 18%, the UK 17% and Japan 10%.

From a portfolio management perspective securitised property overcomes many of the difficulties associated with direct property investment. The shares (units) in real estate investment companies (or trusts where these exist) are liquid in the sense that there exists an active secondary market. Size of holding is not an issue since units may be bought or sold to adjust portfolio weights in the fine tuning of a portfolio. The underlying asset is managed by property professionals with local market expertise, and transaction costs are very low relative to those on the physical market. Of course there are issues such as the tax treatment and the level of permitted leverage that can differ

across countries. In Australia, for example, the property trust is treated as a separate entity for income tax purposes allowing it to claim deductions on depreciation and interest payments. Unit holders can then reduce their assessable income by these deductions. In the US 95% of the income from the trust must be distributed. In the UK property companies are treated like any other company and are taxed at source. There are also substantial international differences on the extent to which property companies can involve themselves in property development.

With these broad issues in mind the following represents a summary of the research on international real estate diversification over the last decade - with the main finding being that the jury is still out on the degree to which international property diversification is beneficial. The remainder of the paper is structured to acknowledge the different outcomes that are achieved depending on whether direct or indirect property prices are examined. Sections 2 and 3 review the literature supporting diversification in securitised and direct property, respectively; while sections 4 and 5 consider research suggesting caution on the benefits from diversification in securitised and in direct property. Following this section 6 examines some issues that have arisen in recent studies that have examined the integration of international property markets, while section 7 provides some conclusions.

2. SUPPORTING DIVERSIFICATION – SECURITISED PROPERTY

The potential for international diversification in securitised real estate only really became established relatively recently. Eichholtz and Koedijk (1996) point out that the combined market value of all listed real estate companies in the world was under \$20 billion in the mid-80s – generally considered to be too small to construct a well diversified international portfolio and be treated seriously by institutional investors. By the mid-90s the combined market value had risen to about \$240 billion and to \$350 billion towards the end of the 90s, making it possible to construct portfolios that were fine tuned to exposure by region and type of real estate.

Despite the recent growth of securitisation, it is possible to find research conducted before this date. One of the first studies on the international diversification of real estate assets was by Ibbotson and Fall (1979). Their work stirred notions of ascertaining diversification benefits from real estate holdings, although their study was very preliminary as they estimated the total value of assets, including real estate, in the United States. Their work was followed by Hartzell, Hekman and Miles (1986) who examined the diversification benefits of holding different categories of real estate (retail, commercial and the like) while Hartzell, Shulman and Wurtzebach (1989) analysed the effects of diverse geographic holdings (on a within US regional basis) of real estate on risk reduction. The underlying methodology for these, and most other papers on real estate diversification at the time, was to study the correlation structures for asset returns, using this as the basis for initial asset selection for possible portfolio inclusion.

This early work prompted researchers to study the potential benefits of international diversification of real estate holdings. In a study on the role of indirect property holdings in a mixed asset portfolio over the 1980-88 period, Asabere, Kleiman and McGowan (1991), using a Markowitz mean-variance framework, demonstrated there were benefits to diversification. These researchers found low positive correlations between US REITs and international real estate equities, suggesting that the addition of international real estate should improve portfolio performance. They found that when returns were exchange adjusted for the US dollar, international real estate equities (Capital International Perspectives Real Estate Index) offered higher returns – with greater volatility (risk) - compared with US REITs.

This work was further supported by the research of Hudson-Wilson and Simpson (1996). These analysts examined the inclusion of US securitised real estate in Canadian property portfolios over the period 1980-94. While they found the currency risk to be substantial their results indicated that Canadian investors would have benefited by the inclusion of US real estate in their portfolios (contrasting with the earlier research of Ziobrowski and Curcio (1991) below – although over a different time period, with a different form of real estate and for different countries).

Most of the studies on international diversification in real estate have examined potential benefits from the point of view of a US investor. In contrast to this Addae-Dapaah and Kion (1996) took the viewpoint of a Singaporean investor holding property stocks in seven countries between 1977 and 1992. Conventional mean-variance analysis

was used to construct optimum portfolios and these researchers found the potential gain from international diversification to be substantial. Interestingly, these authors found no significant differences between exchange adjusted and unadjusted performance – suggesting currency risk was not a factor. In a word of caution, however, these researchers warned that *temporal instability* of correlation coefficients may be cause for concern.

In an interesting comparison of the international diversification benefits of real estate compared with stocks and bonds, Eichholtz (1996) found significantly lower cross-country correlations for real estate returns than for either common stock or bond returns, thereby asserting that international diversification improves the efficiency of the real estate portfolio more so than for equity or bonds. Eichholtz suggested that a possible reason for the lower correlations for real estate may be that real estate is more influenced by local factors than is the case for either stocks or bonds. The study included monthly data over the period January 1985 to August 1994 and included a host of countries, such as France, the Netherlands, Sweden, the UK, Hong Kong, Japan, Singapore, Canada and the US. Compared with a single-country holding of real estate securities, Eichholtz found that an internationally diversified portfolio had higher expected returns at lower risk. A potential difficulty with the research, however, is that it was undertaken in local-currency based returns, therefore automatically assuming a perfectly hedged currency exposure.

In a later study, Eichholtz (1997) expanded the number of countries to nineteen and undertook analyses on both a local currency and exchange adjusted basis (reflecting hedged and unhedged situations) using monthly data from 1987 to the end of 1996. The main purpose of the study was to examine the correlation structure between real estate securities and common stock. He found that the correlation varied greatly between countries. European countries had relatively low correlations between returns on real estate and stocks (in the order of 0.12 to about 0.4), whereas the US, the UK and Canada had fairly high correlations (in the order of 0.56 to 0.8). In the Far East they ranged from 0.56 for New Zealand to 0.96 for Hong Kong. Eichholtz (1997) suggested market maturity as a possible reason – the stock markets of the Far East being relatively less mature. Another suggested reason was the relatively greater importance of property companies in the stock markets of the Far East. Finally, it was also proposed that since investor-developers have much less importance in index construction for Europe and North America, this might be a contributing factor.

Another study supporting these findings was conducted by Gordon, Canter and Webb (1998) and used conventional mean-variance analysis to construct global mixed asset portfolios that contained both US financial assets along with US and international real estate securities as well as some international common stocks. The study considered fourteen countries between 1984 and 1997 with all returns expressed in US dollars (which assumes a US investor perspective and assumes that currency risk is left unhedged). The study concluded that there were international diversification benefits in holding securitised real estate in a portfolio.

A paper written by Eichholtz, Huisman, Koedijk and Schuin (1998) covering very much the same period also provided further insight on international property diversification. They used a multi-factor model to examine the extent to which real estate returns are driven by continental factors. These researchers found that in almost all European countries real estate returns depended positively and significantly on real estate returns of other European Countries, but not on countries in the Asia-Pacific or North American regions. This led the authors to conclude that a continental factor clearly exists in Europe i.e. in order to obtain optimal diversification opportunities European real estate investors should look outside their own continent. Surprisingly, these researchers did not find a continental factor for the Asia-Pacific region – implying that Asia-Pacific investors can find diversification opportunities both within and outside their region. In addition, their research suggested that European and North American investors would find real estate diversification opportunities in the Asia-Pacific region.

In a detailed study covering the 1980s Liu and Mei (1998) analysed the possible integration of real estate markets (and stock markets) across six countries – the US, UK, France, Japan, South Africa and Australia. These authors used a conventional mean-variance analysis together with a multifactor latent variable model. The researchers found there were diversification benefits, but these benefits were primarily driven by unanticipated returns that, in turn, were partially driven by changes in exchange rate risk. They found that, from a US investor's viewpoint, investing in international real estate securities provided additional diversification benefits over and above that associated with holding international stocks. A very much wider study by Ling and Naranjo (2002)

across 28 countries and including over 600 companies found that real estate securities may provide international diversification benefits. This study spanned the period 1984 through 1999 and calculated both Treynor and Jensen performance indices in the analysis. While the study detected little evidence of abnormal, risk-adjusted returns at the country level, the researchers did find evidence of a strong world wide-factor in international real estate returns.

Among other things, the question of international diversification in real estate needs to address issues of market size (are the markets large enough to absorb substantial amounts of capital?) and liquidity (can assets be sold quickly when there is a need to do so – e.g. when markets are heading down?). Eichholtz, Op't and Vestbirk (1999) considered these questions for publicly traded real estate across six countries for the previous decade. These countries were the US, UK, France, Japan, Hong Kong and Australia. In terms of market size the broad finding was that the 'global' securitised property market was relatively small compared with the value of the direct real estate market, although this varied across countries. The 'global' average was estimated at less than 3% in securitised property. However the upshot of the degree of variation in securitisation across countries is that indirect real estate investment on a serious scale is not an option in all countries. The implication is that institutional investors with very specific asset allocation strategies and with large investment capital available are forced to use both direct and indirect property markets for diversification. This has clear connotations for the other issue viz. that of liquidity. Considering trading volume as a suitable proxy for liquidity, Eichholtz et. al. (1999) found that securitised property

markets maintained a high degree of liquidity in both bull and bear runs. This contrasted sharply with the direct property market where, in the Far East during the Asian Crisis, liquidity all but dried up.

3. SUPPORTING DIVERSIFICATION - DIRECT PROPERTY

Comparisons based on direct (unsecuritised) property is clouded by appraisal smoothing (cf. Geltner (1989, 1991)), and 'de-smoothing' procedures have been developed to deal with this issue (cf. Geltner(1992), Barkham and Geltner (1995,1996) and Chau, MacGregor and Schwann (1999)). The basic concern is that the true risk inherent in real estate investment is understated by the volatility of appraisal based total return indices. This results from two facts: (i) valuers take into account past appraised values as well as recent comparable transactions when estimating current values; and (ii) valuations of individual properties in the indices happen infrequently and at different times throughout the year. This causes a smoothing effect on direct real estate return series and results in strong autocorrelation within the series. There do exist de-smoothing procedures which attempt to 'put the volatility back into the data'. However, there is a degree of subjectivity involved in the selection of the smoothing coefficient – so there is no entirely satisfactory answer to the problem¹.

In a study of real estate risk assessment across five countries for direct property series – US, Canada, UK, Australia and New Zealand - Newell and Webb (1996) found that estimates of risk based on direct property series needed to be adjusted upward by

between 34% and 47% to account for appraisal smoothing (based on an adjustment procedure developed by Goodman, 1962). In addition these authors found that, after adjusting for currency risk (dollar denomination), real estate risk estimates increased significantly for international investors. Nevertheless, these authors found that there were still higher international diversification benefits to be had in real estate compared with stocks.

The issue of risk in real estate is considered to be broader than risk in other asset classes. For example, Geurts and Jaffe (1996) argued that conventional assessment of real estate risk with respect to direct property within a mean-variance framework failed to fully consider the true risk to international investors. In particular Geurts and Jaffe (1996) argued that political risk was an important factor to be considered prior to acquisition of direct property – political risk being specifically the ‘probability of economic losses due to government actions that could hamper, curtail or preclude investment projects’. This includes the possibility of ‘unfair administration laws, the lack of law enforcement, corruption levels, nationalization and expropriation threats’.

Pagliari, Webb, Canter and Lieblich (1997) argued that, since national direct property indices have different property mixes it is more appropriate to disaggregate these indices into different sectors (office, retail, warehouse etc) before assessing diversification benefits. These researchers took the standpoint of a US investor (i.e. US dollars) diversifying in real estate across the US, the UK, Canada and Australia over the period 1985 to 1995, with an equal weighting in each country. The analysis examined the

correlation structure along with the risk/return parameters. These researchers found that exchange rate fluctuations generally favoured the US investor with UK holdings but adversely affected the US investor with Australian holdings. While international diversification benefits differed across sectors, they were generally held to be favourable to the US investor.

A further study by McAllister (1999) conducted a survey and analysed trends in direct property investment by British investing institutions in the 1980s and 1990s. It was found that direct property was more segregated internationally than other asset classes, and this was largely attributable to high information costs and the high cost of executing a global diversification strategy. An implication of lower integration levels is the potential existence of international diversification benefits. McAllister also suggested that the primary barriers to international integration were declining in importance with continuing economic integration. Chua (1999) also considered the benefits of including international real estate in an already internationally diversified mixed asset portfolio. After correcting for appraisal smoothing and adjusting for the higher transaction costs of direct property compared with other asset classes, Chua pursued a conventional mean-variance analysis to construct optimum portfolios from the perspective of a US investor. This analysis covered the first quarter 1978 to the fourth quarter of 1997, and it was found that real estate does have a viable role to play in global mixed asset investment portfolios. The optimal allocations to real estate varied from 4% to 21% - depending on the risk tolerance of the investor.

4. NOT SUPPORTING DIVERSIFICATION – SECURITISED PROPERTY

The non-viability of international diversification in securitised real estate also has its supporters. For example, Mull and Soenen (1997) using mean-variance analysis found that, in exchange adjusted terms (US dollars) the inclusion of US REITs in mixed assets, foreign portfolios did not significantly increase risk-adjusted returns between 1985 and 1994. This is in contrast with the results from Asabere et.al (1991) over a similar time length, but different time period.

Further evidence by Stevenson (2000) also casts doubt on the benefits to holding international real estate portfolios. Stevenson examined the potential benefits of international property diversification on both a hedged and unhedged basis. He used securitised real estate data from 1978 to 1997 across ten countries. Data was obtained from Datastream International (with the exception of the US data series, which was the NAREIT index). In contrast to the findings of Eichholtz (1996), Stevenson could not find evidence to support the view that international diversification in real estate stocks provided enhanced benefits in a mixed asset portfolio.

5. NOT SUPPORTING DIVERSIFICATION – DIRECT PROPERTY

Ziobrowski and Curcio (1991) studied the potential benefits of adding US real estate to the portfolios of British and Japanese investors over the period 1973-87 (with further non-overlapping sub-periods considered). Conventional mean-variance efficient

frontiers were generated for a variety of different asset combinations and cross-country combinations, with the assets under consideration including government and corporate bonds, common stocks and three types of real estate. These researchers found that while there may be international diversification benefits for real estate assets in non-exchange adjusted terms, exchange rate volatility over the study period offset any potential diversification benefits to foreign investors. This study was supported by further work from Curcio and Ziobrowski (1991) who undertook an extended analysis of the benefits of international diversification across the same three countries – the US, the UK and Japan – over the same period.

Ziobrowski and Boyd (1991) extended the analysis to consider the impact of leverage (denominated in US dollars as a means of hedging exchange rate risk)² on the benefits to British and Japanese investors diversifying into US real estate. These researchers found that while a high degree of leverage provided a vehicle to eliminate foreign exchange risk, it induced higher levels of ordinary financial risk, thereby removing the possibility for US real estate to improve the efficiency of a foreign investor's portfolio.

In yet a further extension using the same data Ziobrowski and Ziobrowski (1993) investigated "...the hypothesis that currency options can be used to enhance the return characteristics of US real estate to foreign investors sufficiently to make the assets attractive in a mean-variance portfolio framework". These researchers found that the use of currency options provided a means of hedging the exchange rate risk of foreign

investment in US real estate³. Importantly they also found that the risk reduction was insufficient to make US real estate consistently attractive to foreign investors in a mean-variance portfolio framework.

Continuing their previous work, Ziobrowski and Ziobrowski (1995) further increased the number of assets under consideration as well as the time period. They hypothesized that in periods of volatile exchange rates multiple acquisitions in the same country do not significantly improve the efficiency of a mean-variance portfolio. In undertaking their study various mixes of assets were considered in the construction of optimum mean-variance portfolios. In terms of diversification of real estate across countries the important finding was that common stock (not real estate or bonds) may be the most desirable type of foreign asset to hold from the perspective of effective foreign diversification. This was not only because it provided the highest rates of return available, but also because exchange rate fluctuations appeared to have less influence on the correlation structure of common stocks compared with other types of assets.

Ziobrowski, McAlum and Ziobrowski (1996) considered the benefits of international diversification of real estate assets (by a foreign investor into the US) on an after-tax basis over the period 1973 to 1991 (using both smoothed and unsmoothed returns). Fifteen overlapping five-year holding periods were used and after tax income was re-invested annually. At the end of each five year period all assets were sold, capital gains taxes paid and the funds were repatriated at the prevailing exchange rate without being subjected to further taxation in the investor's home country. As with so many

previous studies by Alan Ziobrowski (in conjunction with other researchers) the finding was not in favour of diversification by foreign investors into US real estate. On an after tax basis Ziobrowski et al. (1996) found that for British investors holding US real estate, real estate provided no diversification benefits that were not more easily found from common stock. The scenario was even more dismal for Japanese investors - they found that because of higher marginal tax rates in the US, after-tax US assets perform even worse than before-tax US assets and that US real estate never enters the optimum portfolio. These researchers found that *“Foreign investors in US real estate may be legitimately buying US real estate for many logical reasons, but rational diversification for the sole purpose of improving portfolio performance does not appear to be one of them”*.

Even hedging exchange risk by currency swaps appears to be an insufficient means of producing diversification gains for foreign investors to hold US real estate within the context of mean-variance portfolio performance, as indicated in a recent study by Ziobrowski, Ziobrowski and Rosenberg (1997)⁴. The period of study covered 1973 to 1991 and did not consider the effects of transaction costs, taxes and short selling. Asset holding sub-periods of five years were the same as those constructed for the study on after-tax diversification benefits discussed earlier, and a standard Markowitz mean-variance analysis was used to construct the optimum portfolios. These researchers found that while the use of currency swaps completely eliminated currency risk, there was no evidence that foreign investors obtain any diversification gains that can be attributed specifically to US real estate.

In a move away from the use of mean-variance techniques Myer, Chaudry and Webb (1997) used both aggregated and disaggregated (retail, office, industrial) direct property series for the US, UK and Canada over the period 1987 to 1992 to consider the possibility that these real estate markets were integrated. The researchers used a Johansen cointegration analysis and found there was at least one cointegrating equation at the 10% level once the series were exchange adjusted for US dollars. The presence of cointegration indicates that in the long-run there is a binding force that links these markets together. While this does not suggest that there are no diversification benefits, the finding would certainly indicate the possibility of reduced diversification benefits in the long-run.

In a study using regression analysis on the relationship between commercial real estate prices and stock market returns Quan and Titman (1997) studied data sets across seventeen countries for varying periods between 1978 through to 1994. To enlarge the data set the series were pooled and dummy variables used for cross-country control in the regressions. In general, these researchers found a significant positive relationship between real estate values (changes) and stock prices (returns), with the results mainly attributable to countries in the Asia/Pacific region, although there was also a positive relationship for selected European countries (but insignificant relationships were found for the US, Australia, Canada and Hong Kong). One implication of this analysis is that since there is a significant relationship between real estate price changes and stock market returns there may be limited diversification benefits in holding both real estate and common stock in the same portfolio.

Quan and Titman (1999) extended their earlier work by controlling for economic fundamentals (proxied by inflation rates, interest rates and changes in GDP) in their regressions (all expressed in US dollars), the objective being to find underlying reasons for the relationship between real estate values and stock returns. Their results suggested that a large part of the positive correlation between real estate and stock prices can be attributed to economic fundamentals – in particular changes in GDP. That is, the commonality of movements in both real estate and equity prices can be partially explained by GDP growth. This served to reinforce the implication of their earlier work in 1997 viz. that there may be few international diversification benefits from holding both real estate and common stock in the same portfolio.

A study by Goetzman and Wachter (1996) on the real estate crash in the early 90s found that there were no safe havens for property investors – i.e. diversification did not help. These authors had conjectured that risk exposure was due to a global GDP effect, but had insufficient data to test the claim. Following up this research Case, Goetzman and Rouwenhorst (2000), using appraisal based property data over 22 countries for the period 1987 through to 1997, presented strong evidence to support the notion of globalisation of property markets. The researchers originally conjectured that property markets should be fairly independent of each other due to the market being location-specific. However, their research actually showed that price changes in real estate markets around the world are surprisingly correlated. After further analysis, they suggest one reason why property markets are inter-linked is because of a common exposure to world economic conditions. Specifically, they found that an equally weighted index of international GDP changes

significantly explained changes to real estate prices in different countries. In essence Case et. al. (2000) extended Quan and Titman's (1999) finding of local GDP effects on real estate to one of global GDP effects on real estate.

6. SOME RECENT ISSUES – THE CASE OF CORRELATION STABILITY AND STRUCTURAL BREAKS

It is important to know whether degrees of integration across assets and across countries vary according to different economic climates (different regimes). That is, does the existence of a structural break (a regime shift) affect the benefits from diversifying internationally? Here the temporal instability of the correlation structure is an important issue. We should note that most, if not all the studies using modern portfolio theory to address the issue of portfolio diversification in real estate fail to address the problem (or only give lip service) to the temporal instability of correlation structures as a means of initial selection of portfolio assets. In addition, none of the studies address the issue of how structural breaks might impact on their analysis, despite the fact that many of the studies actually include periods of structural breaks associated with either the 1987 stock market crash, the 1989 property market correction, the 1990/91 recession, the 1994 property market correction, or the 1997 Asian crisis. All of these were periods that may well have impacted on the diversification benefits available to investors in international real estate (or other) assets.

In the last few years the problem of correlation stability and the impact of structural breaks has become more pronounced in the academic literature. For example, a recent study by Forbes and Rigobon (2002) has shown that conventional cross-correlation coefficients of several markets can be biased upwards during a period of increased volatility in just one market. Correlation and its relevance to the diversification issue is clear - since correlation coefficients are temporally unstable, a well-diversified portfolio initially selected through correlation analysis in one period may not hold in subsequent periods, possibly leading to far less diversification benefits than originally anticipated.

Determining the optimum international allocation of real estate assets using Markowitz models requires estimates of the covariance structure of real estate returns. In the real estate investment literature this is done by using realized covariance data. However, as Eichholtz (1996) points out this is only justified on the presumption that the international covariance structure is temporally stable. If the structure is not stable the allocation of real estate assets across countries will be sub-optimal. Eichholtz (1996) studied the temporal stability of the covariance of international securitised property returns for nine countries over the period 1973 to 1995 using securitised data from Datastream International. The analysis was undertaken in local currency and nominal terms – implying an investor who is perfectly hedged against currency risk but not hedged against inflation risk. He divided his time series into four equal sub-periods of sixty-one months and used a Jennrich (1970) Chi-square test⁵ to show that the time series covariance structure was significantly unstable, regardless of the time periods used. Therefore, despite his general enthusiastic support for international diversification, as

discussed earlier, Eichholtz's work was one of the first to cast some doubt on the usefulness of conventional asset allocation models in international diversification of securitised real estate.

Further evidence on the instability of correlation coefficients is provided by D'Arcy and Lee (1998). After conducting a study on real estate portfolio strategies for Europe using direct property data covering the period from 1990 to 1996, they came up with some interesting results. First, in contrast to Eichholtz et.al.'s (1998) study these authors could not find evidence of a continental factor for Europe suggesting, in part, that Europe over the short term would be unlikely to achieve a high level of integration amongst their economies, "*... let alone their property markets, necessary to render portfolio strategies based upon an allocation by country obsolete*". While also finding that country factors dominate other levels of consideration (e.g by region and property type) in portfolio construction, their most important finding was that there existed considerable temporal instability in the composition of the optimal portfolio "*... making the potential gains to investors from diversification difficult to obtain in practice*" (p.122). In an earlier analysis of European economic integration and the implications for commercial real estate, Worzala and Bernasek (1996) also could not reach firm conclusions regarding diversification issues. In a study largely based around descriptive statistics these authors found some degree of convergence in real estate markets, but they suggested continued convergence would likely be slow and barriers to efficient investment flows likely to remain a reality for an extended period due largely to both cultural differences and differences in market fundamentals. While there may be short-

term diversification benefits across countries in the EU it was a moot point whether these would continue over the long run, with these authors suggesting further research was needed on this question.

Lu and Mei (1999) studied the return distributions (US dollars) of property shares in emerging markets from 1973 to 1998. The data was primarily from market indices in these countries as well as the S&P500 and the US NAREIT index. These authors did find that, for the full study period, the correlations between the NAREIT and the various property indices were lower than the correlation between the NAREIT and the S&P500 – thereby implying some diversification benefits. However, this was not their main finding. The researchers were concerned that there was asymmetry in the correlations between better times and worse times so that “...*when you need diversification, you don't have it, and you get it when you don't need it*” (see Patel and Sarkar, 1998). Lu and Mei (1999) found that the correlations between the NAREIT and the property indices were higher in the worse performing quarters (such as during the Asian Crisis) than in the better performing quarters. This casts considerable doubt on the benefits of diversification since correlations were higher during times of market volatility (when, ideally, the opposite is desired).

In a study on the integration between capital markets and real estate security markets around the world Gordon and Canter (1999) also drew some results that are pertinent to the question of diversification benefits. The study covered the period between 1984 and 1997, dealing with fourteen countries. The question of market

integration (real estate/stock) was generally dealt with through the use of full period correlations and sub-period samples, along with rolling correlations (36 month and 60 month). The purpose was to ascertain the overall correlations as well as how these correlations were behaving over time. The findings were quite diverse – with some markets appearing to become more integrated, while others more segregated. For example, Australia, Hong Kong, Singapore, Spain, the UK, Malaysia, France and Japan were found to be either integrated or becoming more integrated⁶. On the other hand Canada, Sweden, the Netherlands, the US and Germany were either segmented or becoming more segmented. The implication here for international diversification in a mixed asset portfolio is that increasing integration implies decreasing potential for diversification benefits. The other important finding in this piece of research, in terms of diversification issues, is that the correlation structures were unstable over time - implying that asset selection based on correlation becomes more problematic.

In a very recent study on global mixed asset portfolios Conover, Friday and Sirmans (2002) considered the question of whether foreign securitised real estate, when added to a portfolio containing US Stocks and US real estate, produced any further diversification benefits. Their study contained monthly data from January 1986 to June 1995 (with the authors particularly pointing out that this spanned the 1987 crash), with the US and foreign stock data obtained from Morgan Stanley, the foreign real estate data from S&P Global Vantage and the US real estate data from NAREIT. The data was analysed in both US dollar terms and local currency. For the full sample period the correlation of monthly returns between US stocks and foreign stocks (equally weighted

US dollars) was 0.69. Within the framework of the twelve month rolling correlations this ranged from a high of about 0.78 at the time of the 1987 crash to a low of about -0.12 during 1993 (a period when US stock returns were substantially below foreign stock returns). Their research supported other findings on the asymmetry of stock correlations (high at times of high volatility – i.e. no diversification when you need it). The correlation between US stock and foreign real estate for the full period was 0.59. Within the twelve month rolling correlations this ranged from a high of about 0.70 at the time of the 1987 crash to a low of about -0.10 during 1993. However, it was on the basis of these marginally lower correlations between US stock and foreign real estate that Conover et.al. (2002) added foreign real estate to the portfolio of US stocks and US real estate to demonstrate that there were still some diversification benefits in holding foreign real estate.

To elaborate further, a graphical demonstration of how unstable unconditional correlation coefficients are may be beneficial. For this purpose, weekly real estate price returns were extracted from DataStream International for two Asian states, these being Hong Kong and Singapore – both of which were affected by the 1997 financial crisis. Figures 1 and 2 plot the change in correlation structure for a rolling correlation between the weekly real estate price returns series for both a one-year window and a three-year window. This was achieved by measuring the association between groups of 52 paired observations (in the case of a one year roll of weekly data) and 156 paired observations (for a three year roll). While these correlations will be highly dependent on each other they can give a graphical assessment of whether correlation relationships are changing

over time. Any notion of temporal instability in correlations can be examined by looking at the changes in the correlation structure as the sample is rolled through the series. Monte Carlo tests, using the series of correlations obtained, were then used to assess whether changes occurred just via natural variation or whether a shift in the relationship may have occurred.

While figure 1, with only a twelve month window, may be more readily influenced by abnormal events within the time frame, this is less likely to be the case for figure 2, which follows a three-year window. The dark heavy lines are 95% confidence intervals for the difference in correlations⁷. The full sample correlation is 0.70 while the rolling values for the one-year window range from 0.21 to 0.86 and for the three-year window from 0.44 to 0.79⁸. From the figures it is evident that the relationship between the series appears to shift around significantly as it crosses the 95% confidence limits on more than half a dozen occasions irrespective of the window size. The figures also show how these correlations shoot up during the financial crisis, supporting the previous research and highlighting the problems associated with using cross-correlations as a tool for determining the level of integration between markets and designing long-run asset allocations for international assets.

As a means of overcoming the problems associated with the instability of correlation coefficients, some researchers have opted to use cointegration analysis and focus on long-term diversification benefits for property portfolios. One such example is a study conducted by Tarbet (1998), who applied multivariate cointegration analysis to

consider long-run diversification benefits of holding diversified regional property holdings within the UK. She found that the potential risk reduction benefits of property diversification by region and sector within the UK were more limited than previously thought. However, Tarbert's work was only based on regional data and did not consider international property investments.

Although there is still only limited research in this area, a study by Wilson and Zurbruegg (2002) did examine international real estate markets using cointegration analysis. They analysed the possible integration of Australian property markets in three of the world's leading economies viz. the US, Japan and the UK using cointegration techniques that incorporated the potential for structural breaks. These structural breaks could also be associated with periods of changes to the correlation structures between the markets. Their results did highlight that these property markets do trend together over the long term, implying reduced diversification benefits in the long run.

CONCLUSION

The seemingly diametrically opposed outcomes from much of the research that has been discussed in this survey can be partly explained due to a couple of factors. The first, and most obvious, is whether direct or indirect property is being analyzed. This can have a major impact upon the results obtained, although even here there are opposing schools of thought. Secondly, there is no doubt that financial markets around the world are becoming more integrated. For this reason there would be a tendency for earlier research to show more evidence for the segmentation of world property markets than for

integration. This would also have implications for the benefits that can be received from international diversification.

Moreover, recent literature indicates that one must be extremely careful when developing optimal portfolios based on correlations, due to the fact that market correlations change over time. This makes the job of designing optimal portfolios not only more difficult, but also problematic. The problem is that of obtaining diversification when you need it most, viz. during periods of crisis and high volatility, and these may also be times when the markets of interest actually become more correlated. This is not a problem specific to real estate markets, but it is an extra burden for the property portfolio manager to consider.

Finally, from this review of the literature it would seem there is more supportive evidence that holding a portfolio of international real estate can aid in diversifying risk than there is non-supportive evidence. However, whether such diversification is greater than what can be achieved through other financial instruments is still debatable, and requires far more research.

Figure 1

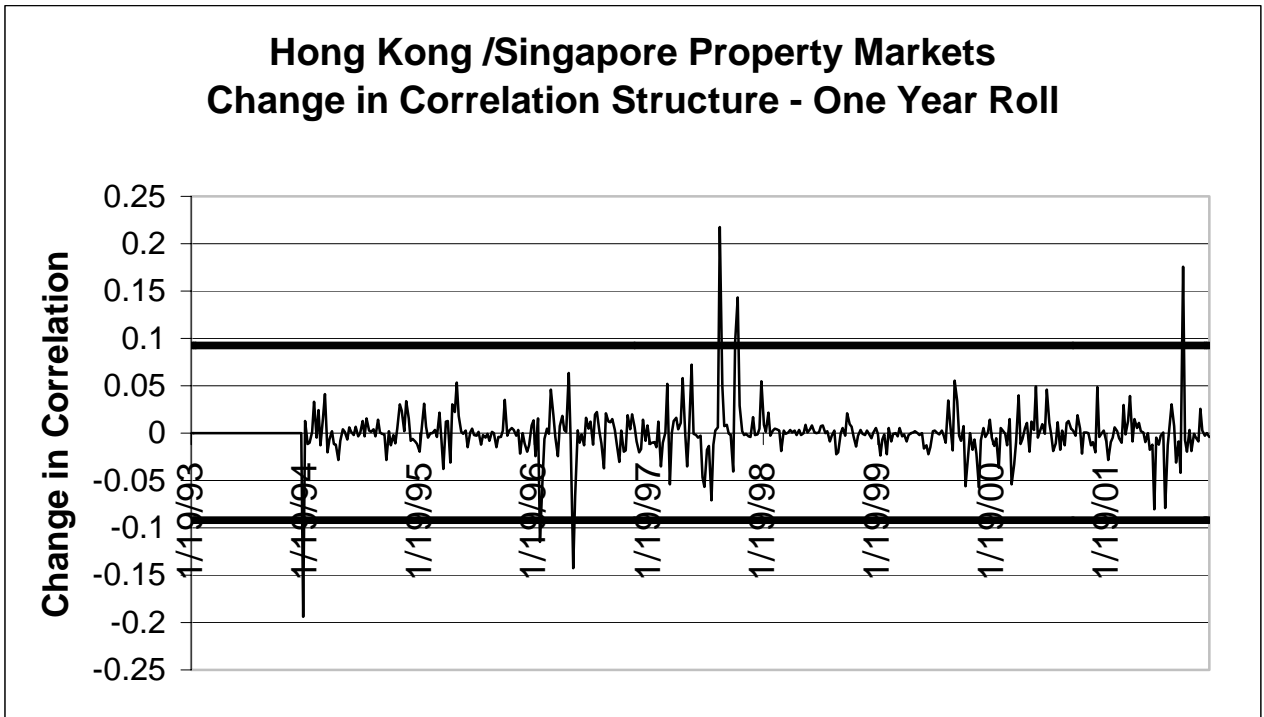
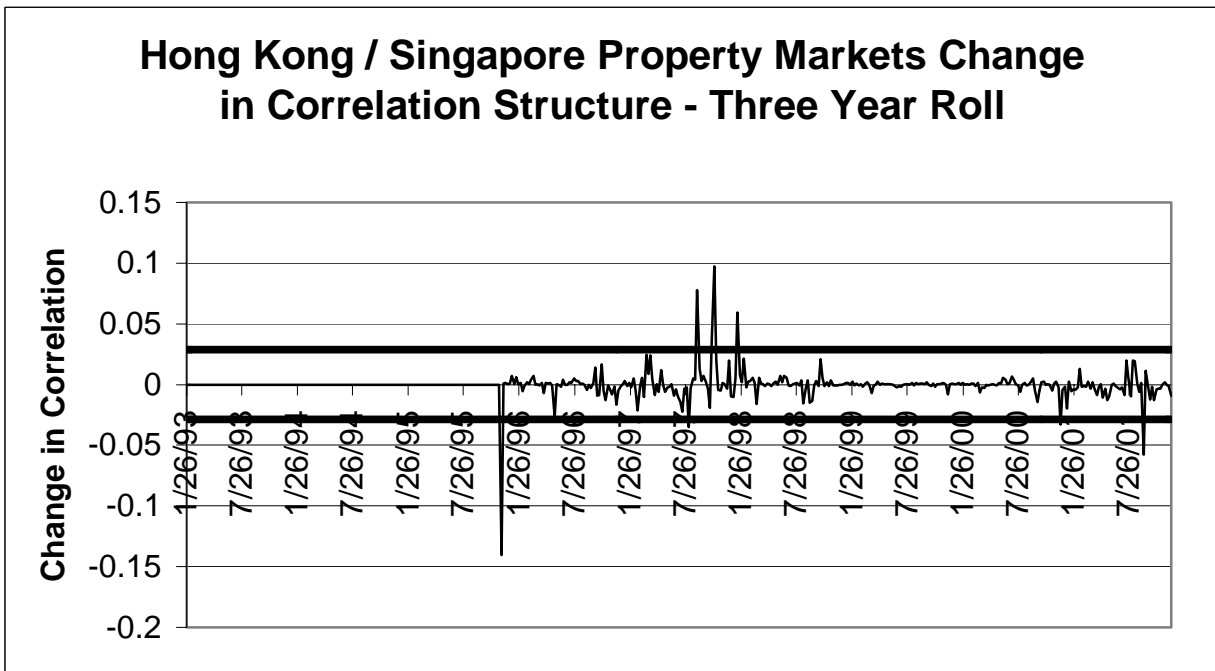


Figure 2



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ENDNOTES

¹ Further discussion of issues on de-smoothing and suggested solutions can be found in: Chaplin (1997) and Brown and Matysiak(2000).

² This is a common means of hedging exchange rate risk. A foreign asset is purchased with a high degree of leverage in borrowings from an institution in the foreign country. Thus the asset on the books has an almost identical offsetting liability. Consequently major fluctuations in the exchange rate have only a minor impact on the owner's equity in the investment, which is minimal. See Ziobrowski and Boyd (1991) for further discussion.

³ For example, a British investor in US real estate could guarantee the value of his or her US dollar returns in British pounds sterling by purchasing a sterling call option. The option would ensure that the value of the dollar would not fall below the strike price during the asset holding period, while allowing the British investor to benefit from any favourable exchange rate movements (cf. Ziobrowski and Ziobrowski (1993) p.29).

⁴ In a 'plain vanilla currency swap' (also known as a generic swap, a parallel loan and a back-to-back loan) the two parties physically exchange equivalent amounts of the two different currencies so that each has the quantity of foreign currency they desire. In essence they begin by loaning each other an identical sum of cash, although each in a different currency. Next they make periodic interest payments to each other during the life of the contract. These payments must be made in the currency borrowed and reflect the level of interest rates in the home country of this currency. Finally the two parties complete the swap by re-exchanging the principal of cash originally borrowed. (cf. Ziobrowski, Ziobrowski and Rosenberg (1997) p.224).

⁵ The Jennrich (1970) test was developed to investigate the equality of two correlation or covariance matrices.

⁶ Generally, correlations exceeding 0.6 and upwards suggested increasing integration while correlations of 0.5 and downwards suggested increasing segmentation.

⁷ This was obtained by simulation and accounting for the variability in the data and the dependence in the rolling correlations, assuming a normal distribution.

⁸ To account for variability we select the overall correlation, mean and variance between the two series and simulate 10,000 sets of observations of the same length with the equivalent correlation structure. For each of the 10,000 series we then undertake rolling correlations.