

A Fundamental Comparison of International Real Estate Returns

*Joseph L. Pagliari, Jr.**
*James R. Webb***
*Todd A. Canter****
*Frederich Lieblich*****

Abstract. This study analyzes commercial real estate returns in Australia, Canada, the United Kingdom and the United States over the period 1985–95, from the perspective of a U.S. investor. Because national indices can consist of differing property mixes, this study separately analyzes the office, retail and warehouse sectors. Moreover, these analyses also convert total returns into their fundamental components: initial yield, growth in income and shifts in capitalization rates. The paths of currency-adjusted income and asset values and, therefore, capitalization rates are also presented. Generally speaking, the fundamental components of retail returns across the four countries exhibit greater divergence than the office and warehouse sectors. It is interesting that the U.S. property sectors showed the worst performance, while the Australian retail and the British office and warehouse sectors were the best performers (both before and after currency adjustments). Additionally, the currency-adjusted Australian returns were adversely effected by exchange rate movements, while the British returns were positively effected. Lastly, the correlation of the quarterly percentage change in income was generally lower and less statistically significant than the correlation patterns observed among the other components of return. This might suggest that more idiosyncratic risk can be found in the real estate space markets (as proxied by income changes) than in the real estate capital markets (as proxied by the pricing of the income—that is, capitalization rates), which appear to be more globally influenced.

Introduction

This study extends the earlier analysis of Pagliari and Webb (1992) of U.S. commercial real estate returns to returns in Australia, Canada and the United Kingdom, as well as the United States, for the period 1985–95. As in that earlier study, total returns are unbundled into their fundamental components: initial yield, income growth and shifts in capitalization rates. For analytical convenience, this study takes the perspective of a U.S.-based investor¹ who invests internationally. Therefore, the “foreign” currencies are adjusted by the then-prevailing foreign exchange rate to the equivalent U.S. dollar amount. The path of these currency-adjusted components of return are then examined over the relevant time period. Additionally, this study separately examines the office, retail and warehouse sectors in each country. Without this property-type disaggregation, spurious cross-country comparisons can result due to the varying mix of properties contained in each country’s composite index.²

*Citadel Realty, Inc., 2700 River Road, Suite 106, Des Plaines, Illinois 60018.

**Real Estate Research Center, College of Business, Cleveland State University, 1860 E. 18th Street, Cleveland, Ohio 44114.

***LaSalle Partners Limited, 200 East Randolph Drive, Chicago, Illinois 60601

****SSR Realty Advisors, One North Broadway, White Plains, New York 10601.

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The balance of the study is structured as follows: Section two reviews the relevant literature. Section three describes the underlying methodology and data used to prepare the analyses described above. Section four presents the results of these analyses. And section five presents our conclusions and discusses future research applications.

Literature Review

Much of the previous literature on international real estate returns has examined the diversification benefits of securitized real estate returns. For example, Mull and Soenen (1997), using dollar-denominated returns, found that the inclusion of U.S. real estate investment trusts (REITs) in mixed-asset, foreign portfolios did not significantly increase risk-adjusted returns over the 1985–94 time period. In contrast, Eichholtz (1996), using local-currency-based returns (which, therefore, reflect a perfectly hedged currency exposure), found significantly lower correlations between cross-country real estate returns than between stock or bond returns and, therefore, asserts that intentional diversification improves the efficiency of the real estate portfolio more so than for stocks or bonds. More recently, Eichholtz (1997) expands his analysis, by increasing the number of countries covered and by reporting dollar-denominated returns, as well as local-currency returns, and finds that the correlation between real estate securities and common stock returns varies greatly by country. Along similar lines, Asabere, Klieman and McGowan, Jr. (1991) examined the risk/return attributes of international (securitized) real estate equities over the 1980–88 time period. They found, using dollar-denominated returns, that international real estate equities offered higher returns—but at higher risk levels—than did U.S.-based REITs and that the two series were weakly, but positively, correlated. Newell and Webb (1996) also assessed the risk of international real estate investments. However, they used unsecuritized real estate returns that required a de-smoothing adjustment (see below) of the appraisal-based real estate returns in order to facilitate comparisons to stock and bond returns. They found, using dollar-denominated returns, that international investors achieved improved portfolio diversification when including real estate.

The comparisons of unsecuritized real estate to securitized stock and bond investments is clouded by appraisal smoothing (see Geltner, 1989, 1991) as well as the lack of reliable, appraisal-based (unsecuritized) real estate data in many of the developed countries (e.g., France and Germany). One approach to this dilemma is that of Quan and Titman (1997), who examined the relationship between (dollar-denominated) stock returns and changes in property values and in rents for seventeen countries for the period 1987–94. Using pooled data, they found a strong statistical relationship; however, the “four countries with the most reliable data (the United States, Australia, Canada and Hong Kong) all showed insignificant relations between stock and real estate prices.” Another approach is to examine the price discovery process between securitized and unsecuritized real estate equities. In the case of Barkham and Geltner (1995), they found that pricing information in the securitized America and British property markets leads their unsecuritized counterparts by a year or more, when examined over the 1969–92 time period. Eichholtz and Hartzell (1996) prepared a similar study that included Canadian real estate and extended the comparison to include a common stock index for each country. They found that securitized real estate was closely correlated with the stock market and predicted (or led) appraisal-based indices.

Other research has concentrated on the diversification benefits of foreign, unsecuritized real estate investment. The results have been mixed. For example, Ziobrowski and Curcio (1991) examine the potential benefits of adding U.S. real estate to the portfolios of British and Japanese investors. They suggest that exchange rate volatility offsets any potential diversification benefits to foreign investors for the 1973–87 time period. More narrowly, Hudson-Wilson and Stimpson (1996) examined the case for the inclusion of U.S. real estate in Canadian property portfolios. While they too find currency risk to be substantial, their results suggest that Canadian investors would have benefited by including U.S. real estate for the 1980–94 time period.

However, little of the previous research has focused on the fundamental factors (capitalization rates, earnings growth, etc.) of returns and how they compare across international property sectors. This is a somewhat curious development since most portfolio optimization procedures rely on the use of historical return patterns to generate the return and covariance estimates needed to optimize portfolio selection. And, as Jorion (1992) observed, these estimates are observed with error and, therefore, introduce estimation risk into the optimization process. Given the rigid nature of the optimization process, this risk can produce large errors when compared to the “true” optimal portfolio. This problem is compounded by the tension between requiring a sufficiently long-time series such that the true pattern of returns emerges and acknowledging that the underlying distribution of returns may not be stable. The fundamental factors of return can provide important insights into this situation.

Data and Methodology

This section describes both the data and the underlying methodology used to generate the results of the analyses contained in this study. First, the data consists of income-producing, commercial properties in Australia, Canada, the United Kingdom, and the United States. To increase comparability, all four data series are treated as beginning in 1985, though in some cases the underlying data series began earlier. Exhibit 1 summarizes certain important characteristics of each data series. Thereafter, each series is briefly described.

Exhibit 1
Summary Characteristics for Data Series

Country	Data Provider	Start Date	Reporting Frequency
Australia	BOMA of Australia Limited*	1985	Semiannually
Canada	Frank Russell Company	1985	Quarterly
United Kingdom	Investment Property Databank	1987	Monthly **
United States	NCREIF	1978	Quarterly

* In 1996, the name was changed to Property Counsel of Australia.

** An annual return series began in 1971, while the monthly series began in 1987. For purposes of these analyses, the annual returns for 1985 and 1986 were converted to quarterly equivalents.

Australia

The Building Owners and Managers Association (BOMA), in conjunction with the Frank Russell Company, publishes performance data (income, appreciation and total returns) for institutional-grade Australian real estate. The index is published semiannually, available from December 1984. In addition to the composite index, indices for CBD-office, retail and industrial properties are available. As of December 31, 1995, the composite index comprised 583 properties with a total market value of \$(Australian) 32.7 billion³ (or, \$(U.S.) 24.3 billion).

Canada

The Russell organization publishes performance data for institutional-grade Canadian real estate. The index is published quarterly, available from 1985. In addition to the composite index, indices for apartments, hotel, industrial, mixed-use, office, and retail properties are available. However, this study analyzes only the office, retail and warehouse sectors. As of December 31, 1995, the composite index comprised 1,118 properties with a total market value of \$(Canadian) 15.3 billion (or, \$(U.S.) 11.2 billion).

United Kingdom

The Investment Property Databank (IPD) publishes two sets of performance data for institutional-grade real estate in the United Kingdom: 1) the Long-Term Index reports annually since 1971, and 2) the Monthly Index reports monthly performance since 1987. In addition to the composite index, indices are also available for office, retail and industrial properties. As of December 31, 1995, the composite index comprised 1,924 properties with a total market value of £5.0 billion⁴ (or, \$(U.S.)7.8 billion).

United States

The NCREIF organization⁵ publishes performance data for institutional-grade real estate in the United States. The index is published quarterly, available from 1978. In addition to the composite index, indices for apartment, office, retail, R&D/office and warehouse properties are available. However, this study will examine only the composite, office, retail, and warehouse indices. As of December 31, 1995, the composite index comprised 2,318 properties with a total market value of \$(U.S.) 47.6 billion.

More detailed descriptions of these data can be found in Gordon (1991) and Newell and Webb (1994).

While the methodology for unbundling total returns into their fundamental components (initial yields, growth in income and shifts in capitalization rates) is more fully described in Pagliari and Webb (1992) and Pagliari and Webb (1995), the essence of the process can be characterized as using the reported income and appreciation returns to successively generate imputed income and property values, from which the fundamental components of return can be determined. Additionally, the data providers for the Australian and British real estate returns have methodologies for calculating income and appreciation returns that differ from one another as well as from the methodology used

to create the Canadian and American real estate returns. A summary of the ways in which the various data sets are used to create the imputed income and property values is presented in the Appendix.

As noted earlier, it is imperative to restate the foreign-currency-denominated returns into the domestic currency. Accordingly, the U.S.-dollar equivalents of the Australian dollar, the British pound and the Canadian dollar over the 1985–95 time period are presented in Exhibit 2. The data underlying Exhibit 2 show that only the British pound is converted to the U.S. dollar at more than one-for-one, while the Australian and Canadian dollars are converted at a rate of less than one U.S. dollar. Moreover the volatility of the foreign exchange rates also impacts the path of currency-adjusted income and property values.

Exhibit 2
Quarterly Exchange Rates (and Their Percentage Change)
Stated in Terms of the U.S. Dollar for the Period 1985–95

	Quarterly Exchange Rates			Percentage Change in Quarterly Exchange Rates		
	Australia	Canada	United Kingdom	Australia	Canada	United Kingdom
Avg.	0.7347	0.7857	1.6125	-0.0014	-0.0005	0.0078
Std Dev.	0.0502	0.0566	0.1662	0.0517	0.0211	0.0586

Perhaps more interesting is that the right half of Exhibit 2 also displays the summary statistics related to the percentage change in quarterly foreign exchange rates. When viewed from the perspective of their percentage change, foreign exchange rates display the classical, near-zero mean-reverting pattern associated with a “random walk.” See Black (1995) and Kritzman (1989) for discussions of central bank-induced distortions in currency returns.⁶ However, as noted subsequently, there are subperiods of persistent positive and negative exchange rate returns which, in turn, directly impact the U.S. investor owning foreign real estate.

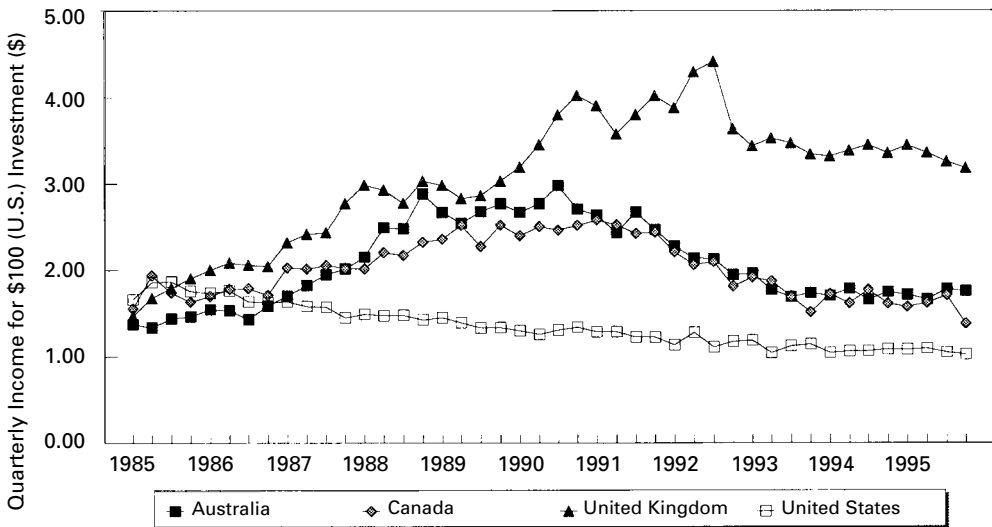
Results

We apply the methodology to the data described above for the three property types (office, retail and warehouse) for each of the four countries (Australia, Canada, the United Kingdom, and the United States).

The International Office Sector

As noted above and using the U.S. total index as a template, each of the three major property types (office, retail and warehouse) will be analyzed from an international perspective, beginning with the office sector. The analysis will take a slightly different tact from above: rather than simultaneously analyzing the fundamental components of return (income, asset values and capitalization rates) for one country, each component will be

Exhibit 3
The Office Sector Comparison of Quarterly, Currency-Adjusted Income



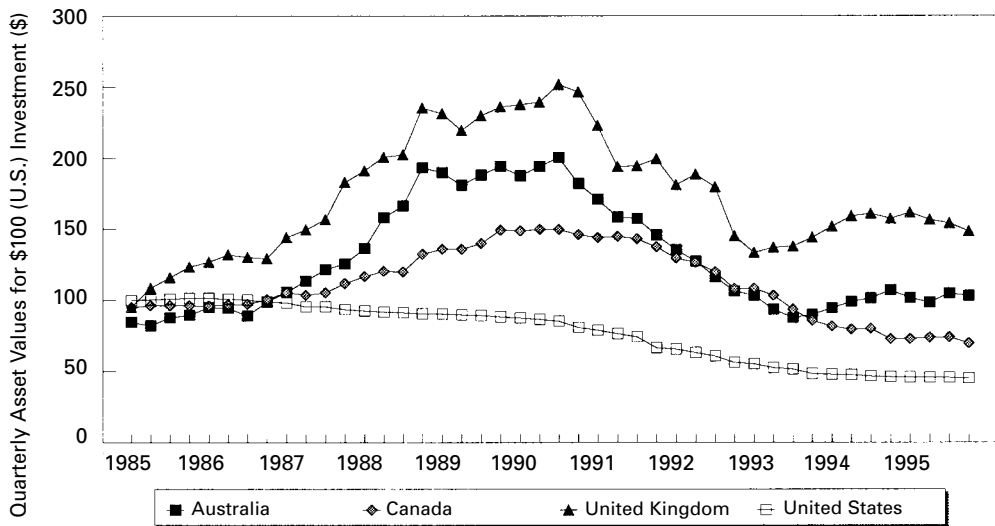
analyzed individually, but simultaneously, for all four countries. The analysis begins with Exhibit 3 displaying the quarterly, currency-adjusted net operating income generated by a \$100 (U.S.) investment in each of the four countries' office sectors.

As can be seen from Exhibit 3, U.S. office income appears to consistently decline throughout most of the analysis period. However, for Australia, Canada and the United Kingdom, income continues to rise into the early 1990s, after which there is a pronounced decline, such that the ending (1995:4) income for Australia and Canada approaches that of the U.S. (i.e., ending values of \$1.75 and \$1.32 for the Australian and Canadian series, while the corresponding U.S. value is \$1.02). The British income series remains at a level (i.e., an ending value of \$3.18) substantially higher than the other countries; however, as noted subsequently, much of this growth is attributable to favorable pound/dollar exchange-rate fluctuations. Though not readily apparent from the data presented in Exhibit 2, the peak and subsequent trough of the Australian, Canadian and the United Kingdom office income series follows the same trend observed in the U.S. series when viewed over the entire length of the 1978–95 time period.⁷ The relationship of the Canadian and U.S. data series is interesting given the geographic proximity and the interconnectedness of their economies. None of the other potential two-country combinations offer the same degree of proximity and connectedness. That said, the Australian and Canadian office time series of income levels displays a near one-to-one correspondence.

Exhibit 4 depicts the path of office property values over the 1985–95 time period. While the path of property values is smoother⁸ than observed for the path of income values (see Exhibit 6), much the same trends are observed.

As can be seen from Exhibit 4, the decline in U.S. office property values appears consistent throughout the analysis. As above, the Canadian office property values continue to rise until 1991, after which there is a pronounced decline, such that the

Exhibit 4
The Office Sector Comparison of Quarterly, Currency-Adjusted Asset Value

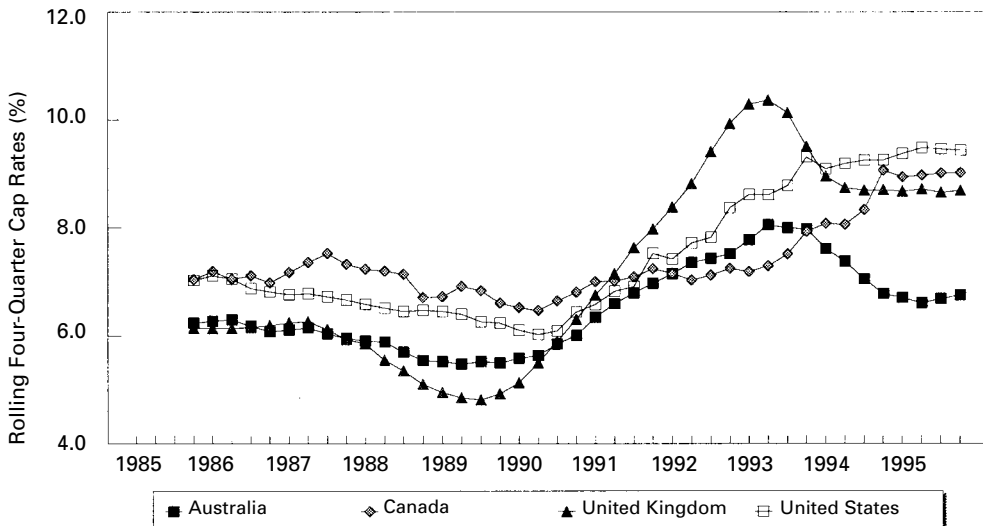


ending (1995:4) property value approaches that of the U.S. (i.e., ending value of \$69.88 for the Canadian series, while the corresponding U.S. value is \$44.97). As before and though not readily apparent from the data presented in Exhibit 4, the peak and subsequent trough of the Canadian office income series follows the same trend observed in the U.S. series when viewed over the entire length of the 1978–95 time period. For both series, the decline in asset value is astounding. With an initial investment of \$100 (U.S.), the average U.S. office property value fell by approximately 56% over the 1985–95 time period, while the Canadian series witnessed a near-identical percentage decline (i.e., 53%) from its maximum property value (of nearly \$150, reached in 1990). For the Australian and British paths of property values, the rise-and-fall pattern is equally pronounced; however, the ending values are greater than the initial (1985) investment of \$100. In the case of the Australian office market, property values plummeted to an ending value of \$103 from a peak value of \$200—a decline of approximately 48%. Meanwhile, in the case of the British office market, property values fell to an ending value of \$149 from a peak value of \$252—a decline of approximately 41%.

Exhibit 5 depicts the path of capitalization rates for office properties over the 1985–95 time period. The capitalization rates were computed using the past four quarters of trailing earnings. This computation was deemed better than alternative approaches for three reasons: (a) the use of four quarters mitigates the seasonality and volatility associated with quarterly earnings; (b) the use of trailing earnings allows the capitalization rate series to be constructed with the most recent data; and (c) trailing earnings are available and consistent to most all market participants, whereas forecasted earnings can vary by as many as the number of market participants.

While the Australian series has diverged from the other three countries in the last two years, there is a remarkable consistency in the capitalization rates for office property values for all four countries. We find it interesting that this might suggest greater

Exhibit 5
The Office Sector Comparison of Rolling Four-Quarter Capitalization Rates



integration of international capital markets and substantially less integration of local space-market conditions. That is, the pricing of properties (as proxied by their capitalization rates) is globally influenced (if not determined) while space-market conditions (as proxied by the income series) are locally influenced (if not determined). These empirical results are consistent with much of the theory surrounding the idiosyncratic behavior of real estate space markets.

Because the scale of a graph can obscure the values of the underlying data, Exhibit 6 was prepared to provide summary statistics on the components of return, as well as total return. As can be observed in this exhibit, the U.S. office sector displayed the lowest quarterly currency-adjusted total return along with the lowest standard deviation of return (see Panel A). The United Kingdom generated the highest return, but Australia had the most volatility. The returns of all four countries were positively and significantly correlated. But more fundamentally, what gives rise to these patterns of return and volatility? The balance of Exhibit 6 and Exhibit 7 are intended to illuminate these patterns.

The Canadian income series had a near-zero growth rate (with the most volatility however), while the U.S. office sector experienced nearly a 1% quarterly decrease in income and the U.K. experienced nearly a 2% quarterly increase in income (see Panel B). Similarly, the American series of office values (see Panel C) experienced a quarterly decline that was also approximately 100 basis points lower than the Canadian series (i.e., -1.78% v. -0.72%) while the Australian and British office markets experienced substantial increase in quarterly property values. Note that less than 30 basis points separate the average Canadian, British and American capitalization rates (see Panel D) over the 1985–95 time period, while the Australian office sector's average capitalization rate was considerably lower than the other three countries. The U.K. and U.S. series had higher volatilities, which is interesting since the U.S. income and asset value (office) series

Exhibit 6
Summary Statistics for the Office Sector
Quarterly Currency-Adjusted Total Returns for the Period 1985–1995

Panel A: Total Returns:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated <i>p</i> -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	1.96	7.09	Australia	100.0	53.9% <i>p</i> = .000	55.5% <i>p</i> = .000	38.0% <i>p</i> = .000
Canada	1.11	4.40	Canada	53.9% <i>p</i> = .000	100.0%	49.7% <i>p</i> = .001	42.6% <i>p</i> = .004
United Kingdom	2.96	6.93	United Kingdom	55.5% <i>p</i> = .000	49.7% <i>p</i> = .001	100.0%	26.8% <i>p</i> = .079
United States	0.01	2.23	United States	38.0% <i>p</i> = .011	42.6% <i>p</i> = .004	26.8% <i>p</i> = .079	100.0%

Panel B: Percentage Change in Quarterly Income Amounts:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated <i>p</i> -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	0.79	6.77	Australia	100.0	11.9% <i>p</i> = .446	31.1% <i>p</i> = .042	-6.9% <i>p</i> = .662
Canada	0.06	8.47	Canada	11.9% <i>p</i> = .446	100.0%	35.9% <i>p</i> = .018	3.2% <i>p</i> = .838
United Kingdom	2.01	6.38	United Kingdom	31.1% <i>p</i> = .042	35.9% <i>p</i> = .018	100.0%	6.8% <i>p</i> = .666
United States	-0.99	5.22	United States	-6.9% <i>p</i> = .662	3.2% <i>p</i> = .838	6.8% <i>p</i> = .666	100.0%

Panel C: Percentage Change in Quarterly Asset Values:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated <i>p</i> -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	0.31	0.49	Australia	100.0	54.0% <i>p</i> = .000	56.6% <i>p</i> = .000	39.4% <i>p</i> = .008
Canada	-0.72	0.19	Canada	54.0% <i>p</i> = .000	100.0%	52.0% <i>p</i> = .000	46.8% <i>p</i> = .001
United Kingdom	1.14	0.48	United Kingdom	56.6% <i>p</i> = .000	52.0% <i>p</i> = .000	100.0%	29.8% <i>p</i> = .050
United States	-1.78	0.05	United States	39.4% <i>p</i> = .008	46.8% <i>p</i> = .001	29.8% <i>p</i> = .050	100.0%

Exhibit 6 (continued)

Panel D: Rolling Four-Quarter Capitalization Rates:

Country	Risk Return Parameters		Correlation Matrix (with Associated <i>p</i> -values)				
	Arithmetic Mean (%)	Std Dev. (%)	Country	Australia	Canada	United Kingdom	United States
Australia	6.52	0.77	Australia	100.0	42.4% <i>p</i> = .006	96.2% <i>p</i> = .006	77.9% <i>p</i> = .000
Canada	7.39	0.72	Canada	42.4% <i>p</i> = .006	100.0%	57.4% <i>p</i> = .000	86.3% <i>p</i> = .000
United Kingdom	7.21	1.75	United Kingdom	96.2% <i>p</i> = .000	57.4% <i>p</i> = .000	100.0%	86.6% <i>p</i> = .000
United States	7.49	1.19	United States	77.9% <i>p</i> = .000	86.3% <i>p</i> = .000	86.6% <i>p</i> = .000	100.0%

generated the least volatility. Lastly, each of the fundamental “pricing” components (i.e., the percentage change in asset values and the level of capitalization rates) showed positive and significant⁹ correlations across countries (see Panels C and D), while the income components (see Panel B) are generally lower and less statistically significant. These empirical results may corroborate the earlier assertion regarding the pricing of properties as more globally influenced and the space-market conditions as more locally influenced.

The data displayed in Exhibits 3–6 can also be used to restate each country’s total return from office investments in terms of their underlying fundamental components of return. See Exhibit 7.

Additionally, Panels A–C also identify the currency returns¹⁰ associated with a foreign investment by a U.S.-based real estate investor, the most profound of which is found in relation to the British property market (Panel C: an average currency return of 2.46% per annum).¹¹ Conversely, the Australian property market suffered the most dramatic loss due to currency returns (Panel A: an average currency return of –1.11% per annum).¹² In a pattern to be repeated for the other two property types, the U.S. office sector (see Panel D) was the worst performing of the four countries examined here. Its poor performance can be tied directly to the persistent negative earnings growth (which averaged –4.32% per annum) and, not surprisingly, a corresponding rise in capitalization rate (the effect of which was to reduce total returns by -1.78% per annum). In this regard, Canada’s pattern of returns (see Panel B) most closely resembled that of the U.S. However, the magnitude of these problems was less dramatic for the Canadian properties. Conversely, the Australian (Panel A) and British (Panel C) office markets actually generated positive earnings growth. While all countries witnessed an increase in capitalization rates, the increase was most pronounced in the British and American office markets.

The International Retail Sector

Like the office sector analysis above, this section individually analyzes each of the

Exhibit 7
Office Index: Annualized Return Attributes from 1985:1–1995:4

	1985–88 (4 Yrs) (%)	1989–92 (4 Yrs) (%)	1993–95 (3 Yrs) (%)	1985–95 (11 Yrs) (%)
Panel A: Australia				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	6.62	5.79	7.19	6.62
Growth in Income	15.35	–3.84	–5.67	1.70
Change in Cap Rate*	<u>2.59</u>	<u>–4.38</u>	<u>2.25</u>	<u>–0.20</u>
Estimated Return	24.55	–2.43	3.77	8.11
Real Estate-related Timing/Methodology Differences	<u>0.37</u>	<u>–1.75</u>	<u>1.15</u>	<u>0.15</u>
Time-weighted Return—Domestic Currency	<u>24.92</u>	<u>–4.18</u>	<u>4.92</u>	<u>8.26</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	24.92	–4.18	4.92	8.26
Currency Returns	0.51	–4.14	1.62	–1.11
Currency Returns' Related Joint Effects	<u>–0.13</u>	<u>–0.17</u>	<u>–0.08</u>	<u>0.09</u>
Time-weighted Return—Currency-adjusted U.S.	<u>25.56</u>	<u>–8.15</u>	<u>6.62</u>	<u>7.06</u>
*Capitalization Rates:				
Going-in Rate	6.57	5.97	7.31	6.57
Going-out Rate	5.97	7.31	6.79	6.79
Panel B: Canada				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	6.52	7.12	6.96	6.52
Growth in Income	7.04	–5.23	–8.38	–1.26
Change in Cap Rate*	<u>–1.77</u>	<u>0.94</u>	<u>–4.62</u>	<u>–1.09</u>
Estimated Return	11.80	2.84	–6.34	4.18
Real Estate-related Timing/Methodology Differences	<u>0.79</u>	<u>–0.70</u>	<u>1.93</u>	<u>0.25</u>
Time-weighted Return—Domestic Currency	<u>12.59</u>	<u>2.14</u>	<u>–4.11</u>	<u>4.43</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	12.59	2.14	–4.11	4.43
Currency Returns	2.49	–1.55	–2.95	–0.30
Currency Returns' Related Joint Effects	<u>–0.31</u>	<u>0.03</u>	<u>–0.12</u>	<u>0.01</u>
Time-weighted Return—Currency-adjusted U.S.	<u>15.40</u>	<u>0.55</u>	<u>–6.95</u>	<u>4.12</u>
*Capitalization Rates:				
Going-in Rate	6.52	7.01	6.72	6.52
Going-out Rate	7.01	6.72	7.89	7.89

Exhibit 7 (continued)

	1985-88 (4 Yrs) (%)	1989-92 (4 Yrs) (%)	1993-95 (3 Yrs) (%)	1085-95 (11 Yrs) (%)
Panel C: United Kingdom				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	6.20	5.40	10.04	6.20
Growth in Income	6.58	8.26	-4.81	4.29
Change in Cap Rate*	<u>4.23</u>	<u>-15.40</u>	<u>4.81</u>	<u>-2.17</u>
Estimated Return	17.01	-1.74	10.04	8.32
Real Estate-related Timing/Methodology Differences	<u>1.26</u>	<u>-0.88</u>	<u>0.17</u>	<u>0.36</u>
Time-weighted Return—Domestic Currency	<u>18.27</u>	<u>-2.62</u>	<u>10.20</u>	<u>8.68</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	18.27	-2.62	10.20	8.68
Currency Returns	11.39	-2.46	1.97	2.46
Currency Returns' Related Joint Effects	<u>-2.08</u>	<u>-0.06</u>	<u>-0.20</u>	<u>-0.21</u>
Time-weighted Return—Currency-adjusted U.S.	<u>31.74</u>	<u>-5.01</u>	<u>12.37</u>	<u>11.36</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	6.08	5.15	10.01	6.08
Going-out Rate	5.15	10.01	8.56	8.56
Panel D: United States				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	6.64	6.41	8.46	6.64
Growth in Income	-3.73	-4.71	-4.57	-4.32
Change in Cap Rate*	<u>1.38</u>	<u>-6.12</u>	<u>-2.39</u>	<u>-1.78</u>
Estimated Return	4.29	-4.43	1.51	0.54
Timing/Methodology Differences	<u>-0.01</u>	<u>-0.78</u>	<u>-0.21</u>	<u>-0.62</u>
Time-weighted Return	<u>4.27</u>	<u>-5.21</u>	<u>1.29</u>	<u>0.07</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	6.71	6.30	8.38	6.71
Going-out Rate	6.30	8.38	9.09	9.09

fundamental components of return (income, asset values and capitalization rates) simultaneously for all four countries. The analysis begins with Exhibit 8 displaying the quarterly, currency-adjusted income generated by a \$100 (U.S.) investment in each of the four countries' retail sectors.

As can be seen from Exhibit 8, retail income in Australia, the U.K. and the U.S.

Exhibit 8
The Retail Sector Comparison of Quarterly, Currency-Adjusted Income

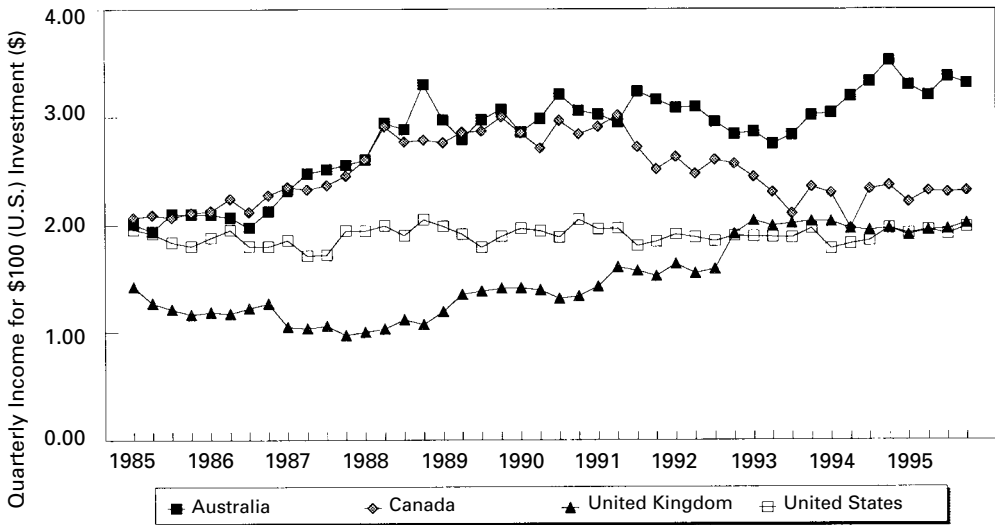
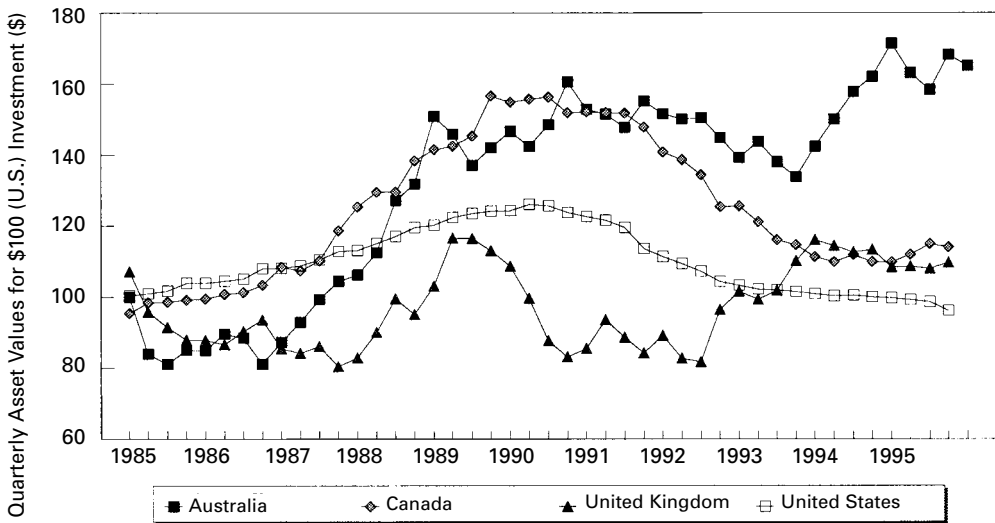


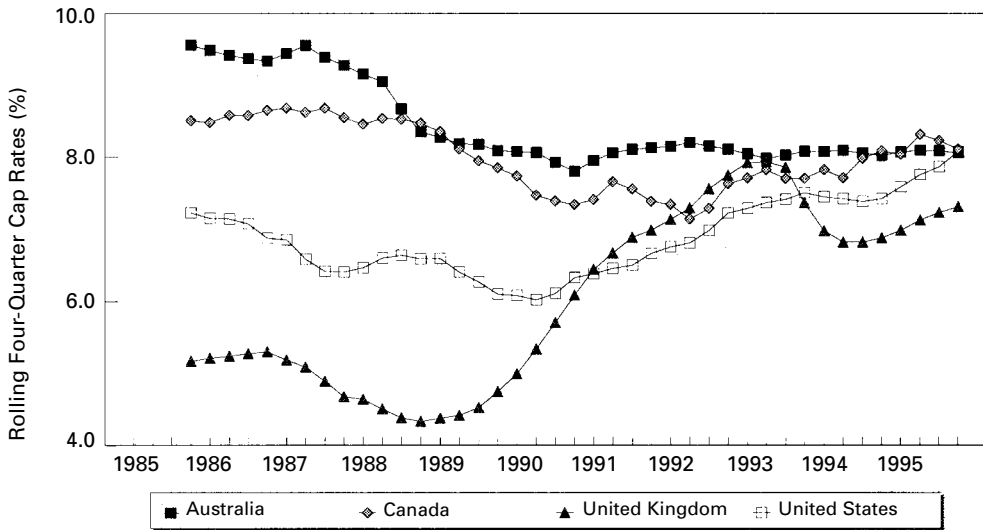
Exhibit 9
The Retail Sector Comparison of Quarterly, Currency-Adjusted Asset Value



appears fairly consistent—as compared to the office sector—throughout the analysis period. For Canada, on the other hand, income continues to rise until 1991, after which, there is a fairly pronounced decline. Ending (1995:4) income values for Canada and the United Kingdom approach that of the U.S. (i.e., ending value of approximately \$2.00). Exhibit 9 depicts the path of retail property values over the 1985–95 time period.

As can be seen from Exhibit 9, U.S. retail property values continued to rise until 1991,

Exhibit 10
The Retail Sector Comparison of Rolling Four-Quarter Capitalization Rates



after which, they fell below their initial 1985 levels. Canadian retail property values also continue to rise until 1991, after which there is a pronounced decline—such that the ending (1995:4) property values approach those of the U.S. (i.e., ending value of \$113.96 for the Canadian series, while the corresponding U.S. value is \$96.16).¹³ However, the decline in ending values was about \$45–\$50 less than that observed for the office sector. Unlike the office sector, there was much greater synchronicity between the rise and fall of Canadian and U.S. retail property values. It is interesting, too, that the Australian retail sector experienced a substantial decline in the mid- to late-1980s only to emerge as the highest ending asset value of all four countries. While the British retail sector experienced a similar initial decline, it underperformed all other countries in all but the last couple years.

Exhibit 10 depicts the path of capitalization rates for retail properties over the 1985–95 time period. As noted earlier, the capitalization rates were computed using the past four quarters of trailing earnings.

As can be seen from Exhibit 10, the general pattern of capitalization rates is widely divergent through 1991. We find it interesting that this gap narrowed considerably as the time period progressed, such that ending capitalization rates were nearly identical for all four countries. Like the office sector (but perhaps not to the same degree), the retail capitalization rates suggest increasingly greater integration of international capital markets and substantially less integration of local space-market conditions.

Exhibit 11 provides summary statistics on the components of return, as well as total returns.

As with the office sector returns, the retail sector returns are positively and significantly correlated across all four countries. Here too in the retail sector, the U.S. shows the lowest return and risk over the 1985–95 time period (see Panel A). The U.S., not surprisingly,

Exhibit 11
Summary Statistics for the Retail Sector
Quarterly Currency-Adjusted Total Returns for the Period 1985–1995

Panel A: Total Returns:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	3.51	5.92	Australia	100.0	48.6% $p = .001$	40.1% $p = .007$	29.8% $p = .049$
Canada	2.38	3.31	Canada	48.6% $p = .001$	100.0%	43.3% $p = .003$	59.0% $p = .000$
United Kingdom	3.19	6.50	United Kingdom	40.1% $p = .007$	43.3% $p = .003$	100.0%	26.4% $p = .083$
United States	1.66	1.52	United States	29.8% $p = .049$	59.0% $p = .000$	26.4% $p = .083$	100.0%

Panel B: Percentage Change in Quarterly Income Amounts:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	1.32	5.60	Australia	100.0	23.2% $p = .135$	-40.6% $p = .007$	5.3% $p = .734$
Canada	0.46	6.31	Canada	23.2% $p = .135$	100.0%	5.3% $p = .738$	23.6% $p = .128$
United Kingdom	1.01	6.49	United Kingdom	40.6% $p = .007$	5.3% $p = .738$	100.0%	-12.8% $p = .415$
United States	0.14	4.77	United States	5.3% $p = .734$	23.6% $p = .128$	-12.8% $p = .415$	100.0%

Panel C: Percentage Change in Quarterly Asset Values:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	0.96	6.48	Australia	100.0	37.5% $p = .012$	-7.9% $p = .610$	24.5% $p = .109$
Canada	0.35	3.19	Canada	37.5% $p = .012$	100.0%	-31.3% $p = .039$	58.3% $p = .000$
United Kingdom	0.41	6.46	United Kingdom	-7.9% $p = .610$	-31.3% $p = .039$	100.0%	0.8% $p = .958$
United States	-0.08	1.51	United States	24.5% $p = .109$	58.3% $p = .000$	0.8% $p = .958$	100.0%

Exhibit 11 (continued)

Panel D: Rolling Four-Quarter Capitalization Rates:

Country	Risk Return Parameters		Correlation Matrix (with Associated p -values)				
	Arithmetic Mean (%)	Std Dev. (%)	Country	Australia	Canada	United Kingdom	United States
Australia	8.44	0.59	Australia	100.0	79.4% $p = .000$	-57.4% $p = .000$	-9.0% $p = .576$
Canada	8.00	0.47	Canada	79.4% $p = .000$	100.0%	-61.1% $p = .000$	12.3% $p = .445$
United Kingdom	6.05	1.22	United Kingdom	-57.4% $p = .000$	61.1% $p = .000$	100.0%	63.0% $p = .000$
United States	6.88	0.53	United States	-9.0% $p = .576$	12.3% $p = .445$	63.0% $p = .000$	100.0%

also had the lowest quarterly earnings growth (0.14%), while the Australian retail market showed the highest (1.32%) (see Panel B). The percentage change in quarterly United Kingdom retail earnings is lowly to negatively correlated with the other countries. However, two of these three correlations cannot significantly reject the null hypothesis ($H_0: \rho=0$). The correlation coefficients among the remaining three countries are generally positive but statistically insignificant, which effectively implies that the four space markets act independently of one another. As with earnings, the Australian retail asset values (see Panel C) showed the highest quarterly growth (0.96%) and the U.S., the lowest (-0.08%). As for capitalization rates (see Panel D), Australia had the highest average (which helps explain why it had the highest total return) and Britain had the lowest (6.05%), while the correlation coefficients for two of the three U.S. capitalization rate series could not reject the null hypothesis. Note that the significant spread in average capitalization rates over the 1985-95 time period reflects more their initial disparity than it does their converging ending values. While the Australian, Canadian and American series reflected about the same volatility (see Panel D), the British capitalization rate series was substantially more volatile.

The data displayed in Exhibits 8-11 can also be used to restate each country's total return from retail investments in terms of their underlying fundamental components of return. See Exhibit 12.

As can be seen from Exhibit 12, the Australian retail sector (Panel A) consistently outperformed its counterparts in terms of total returns. This was true in each of the smaller time periods (with one exception, the 1993-95 period vis-à-vis the United Kingdom), as well as the overall eleven-year time period—even though U.S. investors in Australian real estate suffered adverse foreign currency fluctuations. The differences in returns for the Australian retail sector can be traced to the highest initial yield (i.e., 9.68%), the second highest income growth rate (4.13%—only the U.K. performed better) and the most favorable shift in capitalization rates. The reasons for the poor U.S. performance are abundant (see Panel D): the second lowest initial yield, the lowest income growth and an adverse shift in capitalization rates. Meanwhile, the British retail

Exhibit 12
Retail Index: Annualized Return Attributes from 1985:1–1995:4

	1985–88 (4 Yrs) (%)	1989–92 (4 Yrs) (%)	1993–95 (3 Yrs) (%)	1985–95 (11 Yrs) (%)
Panel A: Australia				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	9.68	8.27	8.02	9.68
Growth in Income	8.06	3.32	3.55	4.13
Change in Cap Rate*	<u>2.13</u>	<u>1.64</u>	<u>0.58</u>	<u>1.03</u>
Estimated Return	19.87	13.23	12.15	14.84
Real Estate-related Timing/Methodology Differences	<u>1.28</u>	<u>-1.97</u>	<u>-1.14</u>	<u>0.49</u>
Time-weighted Return—Domestic Currency	<u><u>21.15</u></u>	<u><u>11.26</u></u>	<u><u>11.00</u></u>	<u><u>15.33</u></u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	21.15	11.26	11.00	15.33
Currency Returns	0.51	-4.14	1.62	-1.11
Currency Returns' Related Joint Effects	<u>-0.11</u>	<u>0.47</u>	<u>-0.18</u>	<u>0.17</u>
Time-weighted Return—Currency-adjusted U.S.	<u><u>21.77</u></u>	<u><u>6.65</u></u>	<u><u>12.80</u></u>	<u><u>14.05</u></u>
*Capitalization Rates:				
Going-in Rate	9.55	8.75	8.16	9.55
Going-out Rate	8.75	8.16	8.01	8.01
Panel B: Canada				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	8.66	7.99	7.63	8.66
Growth in Income	4.17	-0.32	1.32	0.93
Change in Cap Rate*	<u>1.61</u>	<u>-0.36</u>	<u>0.25</u>	<u>0.35</u>
Estimated Return	14.44	7.31	9.20	9.94
Real Estate-related Timing/Methodology Differences	<u>0.81</u>	<u>-1.57</u>	<u>-1.91</u>	<u>0.02</u>
Time-weighted Return—Domestic Currency	<u><u>15.24</u></u>	<u><u>5.75</u></u>	<u><u>7.29</u></u>	<u><u>9.96</u></u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	15.24	5.75	7.29	9.96
Currency Returns	2.49	-1.55	-2.95	-0.30
Currency Returns' Related Joint Effects	<u>-0.38</u>	<u>0.09</u>	<u>0.22</u>	<u>0.03</u>
Time-weighted Return—Currency-adjusted U.S.	<u><u>18.12</u></u>	<u><u>4.11</u></u>	<u><u>4.12</u></u>	<u><u>9.63</u></u>
*Capitalization Rates:				
Going-in Rate	8.62	8.05	8.18	8.62
Going-out Rate	8.05	8.18	8.12	8.12

Exhibit 12 (continued)

	1985-88 (4 Yrs) (%)	1989-92 (4 Yrs) (%)	1993-95 (3 Yrs) (%)	1985-95 (11 Yrs) (%)
Panel C: United Kingdom				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	5.40	4.72	7.96	5.40
Growth in Income	5.56	10.44	1.66	6.39
Change in Cap Rate*	<u>4.28</u>	<u>-13.66</u>	<u>2.62</u>	<u>-2.22</u>
Estimated Return	15.24	1.50	12.24	9.57
Real Estate-related Timing/Methodology Differences	<u>0.48</u>	<u>0.29</u>	<u>-0.44</u>	<u>0.24</u>
Time-weighted Return—Domestic Currency	<u>15.72</u>	<u>1.78</u>	<u>11.80</u>	<u>9.81</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	15.72	1.78	11.80	9.81
Currency Returns	11.39	-2.46	1.97	2.46
Currency Returns' Related Joint Effects	<u>-1.79</u>	<u>0.04</u>	<u>-0.23</u>	<u>-0.24</u>
Time-weighted Return—Currency-adjusted U.S.	<u>28.90</u>	<u>-0.72</u>	<u>13.99</u>	<u>12.51</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	5.34	4.52	7.95	5.34
Going-out Rate	4.52	7.95	7.33	7.33
Panel D: United States				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	7.83	6.64	7.24	7.83
Growth in Income	1.14	-1.90	1.39	0.09
Change in Cap Rate*	<u>2.90</u>	<u>-1.30</u>	<u>-3.69</u>	<u>-0.30</u>
Estimated Return	11.87	3.45	4.93	7.62
Timing/Methodology Differences	<u>0.21</u>	<u>-0.40</u>	<u>-0.02</u>	<u>-0.86</u>
Time-weighted Return	<u>12.09</u>	<u>3.05</u>	<u>4.91</u>	<u>6.77</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	7.82	6.85	7.27	7.82
Going-out Rate	6.85	7.27	8.23	8.23

sector (Panel C) suffered the most adverse shift in capitalization rates and the lowest initial yield, but enjoyed the highest earnings growth rate and the highest return due to currency fluctuations. Lastly, Canada (Panel B) was “middle of the pack” in all categories.

Exhibit 13
The Warehouse Sector Comparison of Quarterly, Currency-Adjusted Income

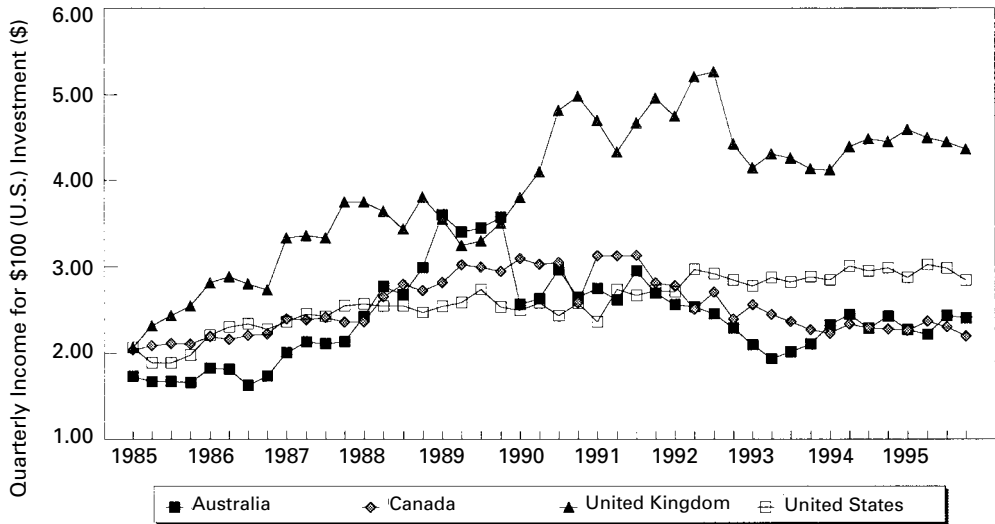
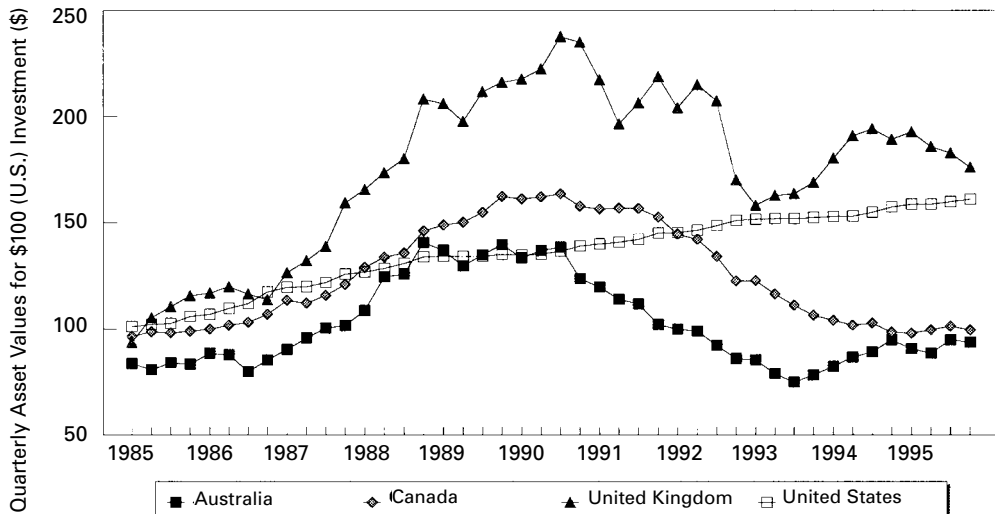


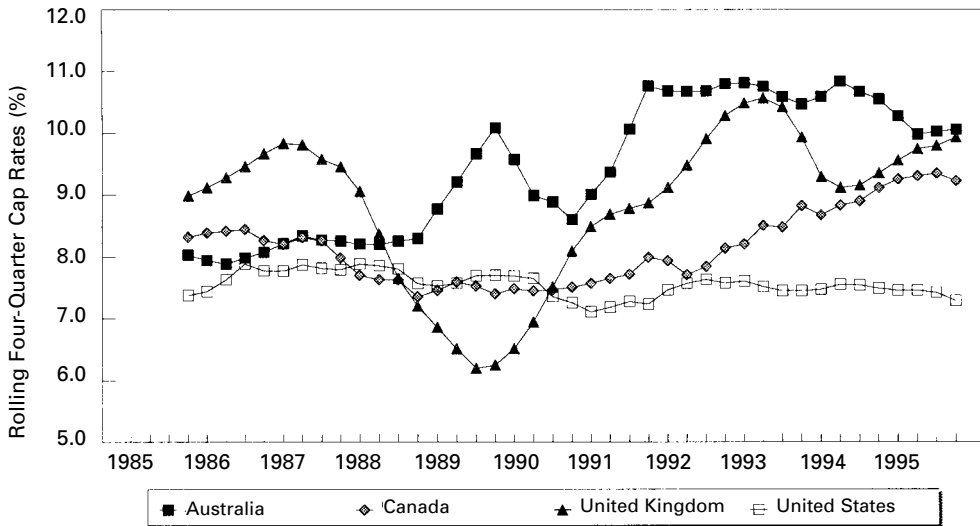
Exhibit 14
The Warehouse Sector Comparison of Quarterly, Currency-Adjusted Asset Value



The International Warehouse Sector

This section also individually analyzes each of the fundamental components of return (income, asset values and capitalization rates) simultaneously for all four countries. The analysis begins with Exhibit 13 displaying the quarterly, currency-adjusted income generated by a \$100 (U.S.) investment in each of the four countries' warehouse sector.

Exhibit 15
The Warehouse Sector Comparison of Rolling Four-Quarter Capitalization Rates



As can be seen from Exhibit 13, the warehouse income shows a fairly steady climb throughout the analysis period, unlike the office and retail sectors (see Exhibits 3 and 8). For Australia and Canada, income shows the familiar pattern of rising until 1991 after which there is a decline. As noted earlier, the British series benefits from favorable exchange rate fluctuations as well as positive earnings growth denominated in the local currency, which results in a much higher ending value (i.e., \$4.36 for Britain, while the Australian, Canadian and American ending values were \$2.41, \$2.20 and \$2.85, respectively).

Exhibit 14 depicts the path of warehouse property values over the 1985–95 time period. Again, the path of property values is generally smoother than observed for the path of income values (see Exhibit 13). However, the trends are quite interesting.

As can be seen from Exhibit 14, the U.S. warehouse property values continue to rise consistently throughout the analysis (as was also generally true for their path of earnings—see Exhibit 13). This is also the first observation of steadily increasing property values for any of the three U.S. property types examined here. As with the office and retail sectors, the Australian, Canadian and British warehouse property values continue to rise until 1991, after which there is a pronounced decline, such that ending (1995:4) Australian and Canadian property values fall dramatically below that of the U.S. (i.e., ending values of \$93.71 and \$99.38 for the Australian and Canadian series, with the corresponding U.S. value of \$160.98) while the ending British value (\$176.07) remains slightly above the U.S. value.

Exhibit 15 depicts the path of capitalization rates for industrial properties over the 1985–95 time period. Here too, the trends are different from earlier observations for the office and retail sectors.

As can be seen from Exhibit 15, there is a remarkable constancy in the capitalization rate series for the U.S. warehouse sector. In addition, there is a remarkable consistency in

Exhibit 16
Summary Statistics for the Warehouse Sector
Quarterly Currency-Adjusted Total Returns for the Period 1985–1995

Panel A: Total Returns:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	2.43	6.32	Australia	100.0	54.4% $p = .000$	45.7% $p = .002$	44.1% $p = .003$
Canada	2.11	3.57	Canada	54.4% $p = .000$	100.0%	54.1% $p = .000$	65.6% $p = .000$
United Kingdom	3.82	6.54	United Kingdom	45.7% $p = .002$	54.1% $p = .000$	100.0%	30.3% $p = .045$
United States	1.51	1.63	United States	44.1% $p = .003$	65.6% $p = .000$	30.3% $p = .045$	100.0%

Panel B: Percentage Change in Quarterly Income Amounts:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	1.19	9.09	Australia	100.0	19.9% $p = .201$	18.3% $p = .240$	-2.8% $p = .861$
Canada	0.36	6.32	Canada	19.9% $p = .201$	100.0%	-6.1% $p = .698$	-21.4% $p = .168$
United Kingdom	2.01	7.31	United Kingdom	18.3% $p = .240$	-6.1% $p = .698$	100.0%	3.5% $p = .826$
United States	0.87	5.00	United States	-2.8% $p = .861$	-21.4% $p = .168$	3.5% $p = .826$	100.0%

Panel C: Percentage Change in Quarterly Asset Values:

Country	Risk Return Parameters		Country	Correlation Matrix (with Associated p -values)			
	Arithmetic Mean (%)	Std Dev. (%)		Australia	Canada	United Kingdom	United States
Australia	0.04	6.20	Australia	100.0	55.5% $p = .000$	46.6% $p = .001$	10.5% $p = .496$
Canada	0.05	3.50	Canada	55.5% $p = .000$	100.0%	55.2% $p = .000$	29.2% $p = .054$
United Kingdom	1.50	6.44	United Kingdom	46.6% $p = .001$	55.2% $p = .000$	100.0%	18.0% $p = .243$
United States	1.09	1.03	United States	10.5% $p = .496$	29.2% $p = .054$	18.0% $p = .243$	100.0%

Exhibit 16 (continued)

Panel D: Rolling Four-Quarter Capitalization Rates:

Country	Risk Return Parameters		Correlation Matrix (with Associated <i>p</i> -values)				
	Arithmetic Mean (%)	Std Dev. (%)	Country	Australia	Canada	United Kingdom	United States
Australia	9.45	1.08	Australia	100.0	33.4% <i>p</i> = .033	26.4% <i>p</i> = .095	-39.7% <i>p</i> = .010
Canada	8.15	0.60	Canada	33.4% <i>p</i> = .033	100.0%	68.2% <i>p</i> = .000	-12.9% <i>p</i> = .423
United Kingdom	8.86	1.22	United Kingdom	26.4% <i>p</i> = .095	68.2% <i>p</i> = .000	100.0%	-5.1% <i>p</i> = .752
United States	7.56	0.20	United States	39.7% <i>p</i> = .010	-12.9% <i>p</i> = .423	-5.1% <i>p</i> = .752	100.0%

the capitalization rates for Canadian and U.S. warehouse property values through 1992; however there is a considerable divergence thereafter with the Canadian market displaying higher values (e.g., the ending capitalization rate disparity stood at nearly 200 basis points: 9.22% v. 7.29%). Meanwhile, the Australian and British warehouse sectors displayed astounding volatility (with ranges of 294 and 437 basis points, respectively). Exhibit 16 provides summary statistics on the components of return as well as total returns.

The United Kingdom generated the highest return and volatility—and the U.S. the lowest—of the four countries examined here. This pattern was also observed in the office sector (see Exhibit 6). As with both the office and retail sectors, the concurrent cross-country returns are positively and significantly correlated (see Panel A). A ranking of the percentage change in quarterly income amounts (see Panel B) finds the countries in the same relative positioning as total returns, except that Canada and the U.S. have changed places. As before, the correlation of these changes is not as statistically significant as the correlation of total returns, asset values and/or capitalization rates. It is interesting that the percentage change in asset values (see Panel C) reveals that the Australian and Canadian warehouse sectors displayed near-zero growth, while the United Kingdom and the United States warehouse sectors displayed growth in excess of 1% per quarter. As noted in Exhibit 18, the U.S. capitalization rate series for the warehouse sector has displayed remarkably little variation (0.20%—see Panel D). However the U.S. capitalization rate averaged almost 200 basis points less than that realized in the Australian market (i.e., 7.56% v. 9.45%).

The data displayed in Exhibits 13 through 16 can also be used to restate each country's total return from warehouse investments in terms of their underlying fundamental components of return. See Exhibit 17.

As can be seen from Panels A–D of Exhibit 17, there is remarkable consistency in the rise-and-fall pattern of total returns for the warehouse sector of all four countries. With the exception of the U.S. warehouse sector, the initial yields cluster around 8.50%. Also, the United Kingdom clearly shows the highest growth in warehouse income. In addition,

Exhibit 17
Warehouse Index: Annualized Return Attributes from 1985:1–1995:4

	1985–88 (4 Yrs) (%)	1989–92 (4 Yrs) (%)	1993–95 (3 Yrs) (%)	1985–95 (11 Yrs) (%)
Panel A: Australia				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	8.34	10.75	9.51	8.34
Growth in Income	9.54	–7.27	3.32	2.52
Change in Cap Rate*	–0.79	–4.83	1.10	–1.22
Estimated Return	<u>17.09</u>	<u>–1.36</u>	<u>13.93</u>	<u>9.64</u>
Real Estate-related Timing/Methodology Differences	0.70	3.09	–2.25	0.83
Time-weighted Return—Domestic Currency	<u>17.79</u>	<u>1.74</u>	<u>11.68</u>	<u>10.47</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	17.79	1.74	11.68	10.47
Currency Returns	0.51	–4.14	1.62	–1.11
Currency Returns' Related Joint Effects	–0.09	0.07	–0.19	0.12
Time-weighted Return—Currency-adjusted U.S.	<u>18.39</u>	<u>–2.48</u>	<u>13.49</u>	<u>9.24</u>
*Capitalization Rates:				
Going-in Rate	8.25	8.51	10.66	8.25
Going-out Rate	8.51	10.66	10.28	10.28
Panel B: Canada				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	8.54	7.71	8.18	8.54
Growth in Income	3.95	–2.66	–2.24	0.57
Change in Cap Rate*	3.17	–1.06	–3.76	–0.22
Estimated Return	15.66	3.99	2.18	8.90
Real Estate-related Timing/Methodology Differences	0.88	–0.16	2.01	–0.13
Time-weighted Return—Domestic Currency	<u>16.54</u>	<u>3.83</u>	<u>4.19</u>	<u>8.77</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	16.54	3.83	4.19	8.77
Currency Returns	2.49	–1.55	–2.95	–0.30
Currency Returns' Related Joint Effects	–0.41	0.06	0.12	0.03
Time-weighted Return—Currency-adjusted U.S.	<u>19.45</u>	<u>2.22</u>	<u>1.11</u>	<u>8.44</u>
*Capitalization Rates:				
Going-in Rate	8.51	7.45	7.82	8.51
Going-out Rate	7.45	7.82	8.84	8.84

Exhibit 17 (continued)

	1985-88 (4 Yrs) (%)	1989-92 (4 Yrs) (%)	1993-95 (3 Yrs) (%)	1985-95 (11 Yrs) (%)
Panel C: United Kingdom				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	8.70	7.28	10.36	8.70
Growth in Income	3.52	8.85	-0.30	4.07
Change in Cap Rate*	<u>3.68</u>	<u>-8.26</u>	<u>1.54</u>	<u>-0.88</u>
Estimated Return	15.90	7.87	11.60	11.89
Real Estate-related Timing/Methodology Differences	<u>2.68</u>	<u>-2.36</u>	<u>-0.12</u>	<u>0.61</u>
Time-weighted Return—Domestic Currency	<u>18.26</u>	<u>5.51</u>	<u>11.48</u>	<u>12.50</u>
<i>Currency-Adjusted Real Estate Return (U.S. Investor):</i>				
Real Estate Return in Domestic Currency	18.26	5.51	11.48	12.50
Currency Returns	11.39	-2.46	1.97	2.46
Currency Returns' Related Joint Effects	<u>-2.08</u>	<u>0.14</u>	<u>-0.23</u>	<u>-0.31</u>
Time-weighted Return—Currency-adjusted U.S.	<u>31.72</u>	<u>2.92</u>	<u>13.67</u>	<u>15.27</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	8.53	7.32	10.41	8.53
Going-out Rate	7.32	10.41	9.91	9.91
Panel D: United States				
<i>Real Estate Return in Domestic Currency:</i>				
Initial Yield	7.47	7.24	8.46	7.47
Growth in Income	1.22	-2.52	1.52	-0.08
Change in Cap Rate*	<u>1.18</u>	<u>-2.38</u>	<u>-4.20</u>	<u>-1.13</u>
Estimated Return	9.87	2.34	5.78	6.27
Timing/Methodology Differences	<u>0.79</u>	<u>-0.41</u>	<u>0.18</u>	<u>-0.13</u>
Time-weighted Return	<u>10.66</u>	<u>1.92</u>	<u>5.96</u>	<u>6.14</u>
<i>*Capitalization Rates:</i>				
Going-in Rate	7.47	7.07	7.90	7.47
Going-out Rate	7.07	7.90	9.11	9.11

the United Kingdom experienced the second lowest (Canada had the lowest) adverse effect from rising capitalization rates over the entire eleven-year period. Consequently, it should come as no surprise that the U.K. experienced the highest returns.

Conclusions and Recommendations

This study has analyzed the fundamental components of return (i.e., initial yield, growth in income and shifts in capitalization rates) for the office, retail and warehouse sectors in Australia, Canada, the United Kingdom, and the United States. These returns have been currency-adjusted so as to state them in terms of U.S. investors making their initial investment at the beginning of 1985. It is important to examine the property sectors individually because differing property mix for the total indices for these countries may obscure the extent to which the cross-country, currency-adjusted returns are similar or dissimilar.

The results of this comparison can be summarized as follows:

- **Currency Returns:** Though in theory currency returns should average zero percent, dramatic swings in currency returns are observed in several subperiods. The British pound/U.S. dollar exchange rate has been particularly volatile; in the early period, this has substantially enhanced total returns from British real estate from the perspective of an U.S. investor and, in the next period, has substantially detracted from such investments. However, on balance, currency returns have well served the U.S. investor with holdings in the United Kingdom. Conversely, currency returns have adversely effected such holdings in Australia.
 - **Space Market v. Capital Market:** In general, the space markets display more divergence between countries than do the capital markets. As a measure of space-market dynamics, the path of income over the eleven-year horizon is examined herein. As a measure of the capital markets, the path of capitalization rates is used. Compare the correlation matrices found in Panel B to those found in C and/or D of Exhibits 6, 11 and 16. It seems appropriate to view the space markets (as proxied by earnings changes) as comprising more idiosyncratic risk as local customs, regulations and business practices may cause the space markets (for the same property type) to behave differently from one country to the next. Conversely, it seems appropriate to view the capital markets as comprising less idiosyncratic risk as the price of capital (as proxied by capitalization rates) is more fluid and is increasingly set in international markets. As such, the path of property values reflects the interaction of these two (space and capital) markets.
 - **Office Sector:** In a pattern to be repeated for the other two property types, the U.S. office sector was the worst performing of the four countries examined here. Its poor performance can be tied directly to the persistent negative earnings growth and, not surprisingly, a corresponding rise in capitalization rates. In this regard, Canada's pattern of returns most closely resembled the U.S. However, the magnitude of these problems was less dramatic for the Canadian properties. Conversely, the Australian and British office markets actually generated positive earnings growth. While all countries witnessed an increase in capitalization rates, the increase was most pronounced in the British and American office markets.
 - **Retail Sector:** The Australian retail sector consistently outperformed its counterparts in terms of total returns; this was true in all but one of the smaller time periods as well as the overall, eleven-year time period—even though U.S. investors in Australian real estate suffered adverse foreign currency fluctuations.
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The differences in returns for the Australian retail sector can be traced to the highest initial yield, the second highest earnings growth rate (only the U.K. performed better) and the most favorable shift in capitalization rates. The reasons for the poor U.S. performance are abundant: the second lowest initial yield, the lowest earnings growth and an adverse shift in capitalization rates. Meanwhile, the British retail sector suffered the most adverse shift in capitalization rates and the lowest initial yield but enjoyed the highest earnings growth rate and the highest return due to currency fluctuations. Canada was “middle of the pack” in all categories.

- **Warehouse Sector:** The United Kingdom generated the highest return and volatility—and the U.S. the lowest—of the four countries examined here. This pattern was also observed in the office sector. As with both the office and retail sectors, the concurrent cross-country returns were positively and significantly correlated. A ranking of the percentage change in quarterly income amounts finds the countries in the same relative positioning as total returns, except that Canada and the U.S. have changed places. As before, the correlation of these changes is not as statistically significant as the correlation of total returns, asset values and/or capitalization rates. It is interesting that the percentage change in asset values reveals that the Australian and Canadian warehouse sectors displayed near-zero growth, while the United Kingdom and the United States warehouse sectors displayed growth in excess of 1% per quarter. As noted in Exhibit 15, the U.S. capitalization rate series for the warehouse sector has displayed remarkably little variation. However the U.S. capitalization rate averaged almost 200 basis points less than that realized in the Australian market.

It should also be emphasized that these results are time-period specific and future return patterns may materially diverge from those presented herein. Lastly, authors hope this study stimulates future research into areas such as (1) efficient real estate portfolio diversification in an international context, and (2) a more extensive empirical examination as to the degree to which the time series of international real estate returns are co-integrated.

Appendix

As noted earlier, it is necessary to successively restate the data provider's methodology for computing income and appreciation returns in terms of the imputed income and property values. The following overview of each country's methodology (and subsequent restatement in terms of income and market values) uses a standardized notation, though, in practice, each country has a slightly different version.

Canada and U.S. Return Series

In order to depict this process, the Russell-NCREIF methodology for computing income and appreciation returns in Canada and the U.S. is shown below:

$$R_{inc} = \frac{NOI_t}{MV_{t-1} + .5(CI_t - PS_t) - .33NOI_t}, \text{ and} \quad (1)$$

$$R_{App} \frac{MV_t - MV_{t-1} + PS_t - CI_t}{MV_{t-1} + .5(CI_t - PS_t) - .33NOI_t}, \quad (2)$$

where:

- R_{Inc} = income return;
- R_{App} = appreciation return;
- NOI_t = net operating income in quarter t ;
- CI_t = capital improvements in quarter t ;
- PS_t = partial sales in quarter t ; and
- MV_t = market value in quarter t .

In order to simplify the analytical process and to avoid the problem that the data providers do not normally provide separate, detailed information on capital improvements and partial sales, these components are assumed to equal zero.¹⁴ Given the foregoing, the income and property values can be derived as follows:

$$NOI_t = \frac{MV_{t-1} * R_{Inc}}{1 + .33R_{Inc}}, \text{ and} \quad (3)$$

$$MV_t = MV_{t-1} \left[1 + \frac{R_{App}}{1 + .33R_{Inc}} \right]. \quad (4)$$

Assuming any arbitrary initial investment for MV_0 , subsequent income and property values can be computed by successively substituting the reported income and appreciation returns. As shown below, a similar "reverse engineering" process can be performed for the Australian and British data series.

Australian Return Series

The BOMA of Australia methodology for computing income and appreciation returns, as shown below, is nearly identical to the NCREIF methodology:

$$R_{Inc} \frac{NOI_t}{MV_{t-1} + .5(CI_t - PS_t) - .5NOI_t}, \text{ and} \quad (5)$$

$$R_{App} \frac{MV_t - MV_{t-1} + PS_t - CI_t}{MV_{t-1} + .5(CI_t - PS_t) - .5NOI_t}, \quad (6)$$

As before, in order to simplify the analytical process and to avoid data disclosure problems, capital improvements and partial sales are assumed to equal zero. Given the foregoing, the income and property values can be derived as follows:

$$NOI_t = \frac{MV_{t-1} * R_{Inc}}{1 + .5R_{Inc}}, \text{ and} \quad (7)$$

$$MV_t = MV_{t-1} \left[1 + \frac{R_{App}}{1 + .5R_{Inc}} \right]. \quad (8)$$

Again, by assuming any arbitrary initial investment for MV_0 , subsequent income and property values can be computed by successively substituting the reported income and appreciation returns.

However, the Australian return series is only available on a semiannual basis. Therefore, in order to assure comparability across foreign indices it was necessary to convert the semiannual returns to quarterly returns via the following approach:

$$\sqrt[4]{(1 + \Sigma)} - 1 = r. \quad (9)$$

where:

Σ = semiannual return, and
 r = quarterly return.

It should also be noted that this multiplicative approach, while theoretically correct, produces a small bias in the arithmetic combination of income and appreciation returns into total returns.

United Kingdom Return Series

The IPD methodology for computing income and appreciation returns, as shown below, is similar to the methodologies employed in the other countries noted above:

$$R_{Inc} = \frac{NOI_t}{MV_{t-1} + .5CI_t}, \text{ and} \quad (10)$$

$$R_{App} = \frac{MV_t - MV_{t-1} - CI_t}{MV_{t-1} + .5CI_t}. \quad (11)$$

As before, in order to simplify the analytical process and to avoid data disclosure problems, capital improvements and partial sales are assumed to equal zero. Given the foregoing, the income and property values can be derived as follows:

$$NOI_t = MV_{t-1} * R_{Inc}, \text{ and} \quad (12)$$

$$MV_t = MV_{t-1} [1 + R_{App}]. \quad (13)$$

Again, by assuming any arbitrary initial investment for MV_0 , subsequent income and property values can be computed by successively substituting the reported income and appreciation returns.

However, the British return series is only available on an annual basis for 1985 and 1986. Therefore, in order to assure comparability across foreign indices it was necessary to convert the annual returns (R) to quarterly returns (r) via the following approach:

$$\sqrt[4]{(1 + R)} - 1 = r, \quad (14)$$

where:

R = annual return, and
 r = quarterly return.

As noted above, this multiplicative approach, while theoretically correct, produces a small bias in the arithmetic combination of income and appreciation returns into total returns.

Currency Returns and Currency-Adjusted Returns

The following section overviews the conversion from the domestic real estate returns into the U.S. currency-denominated returns, as identified in Exhibits 7, 12 and 17. (For a more complete description, see Bodie, Kane and Marcus, 1992, for example.) The currency returns can be computed quarterly in the following manner:

$$\epsilon_{i,t} = \frac{e_{i,t-1}}{e_{i,t}} - 1, \tag{15}$$

where:

- $\epsilon_{i,t}$ = the return on the i th currency in the period t , and
- $e_{i,t}$ = the spot exchange rate from the U.S. currency into the i th foreign currency at period t .

Moreover, these quarterly currency returns can be “strung together” in order to provide the annual currency return over any T periods as follows:

$$E_{i,T} + T/4 \sqrt[T]{\prod_{t=1}^T (1 + \epsilon_{i,t})} - 1, \tag{16}$$

where:

- $E_{i,T}$ = the annual return on the i th currency over T periods.

The annual return of the U.S. investor who diversifies internationally (in any of the i th foreign economies) can be expressed as:

$$R_{U.S.,t} = [1 + R_{i,t}] [1 + E_{i,t}] - 1. \tag{17}$$

Accordingly, the components of the U.S. investor’s total return can also be expressed as:

Real Estate Return in Domestic Currency	$R_{i,t}$
Currency Return	$E_{i,t}$
Currency Returns’ Related Joint Effects	$R_{i,t} * E_{i,t}$
Time-weighted Return - Currency-adjusted U.S.	<u><u>$R_{U.S.,t}$</u></u>

as shown in Panels A–C of Exhibits 7, 12 and 17.

Notes

¹ The choice of the “domestic” currency is largely irrelevant. It is important, however, to recognize that any international investor must periodically and/or eventually repatriate the foreign dollars to the domestic currency. Otherwise, the growth of foreign net worth can be dramatically overstated: as an extreme case, consider the inflation-ridden economies of certain South American countries.

² For instance, consider the example where property mixes differ from one country to the next and these mixes change independently over time. Such an arrangement would mask what might otherwise represent a perfect correlation of the time series of currency-adjusted property-type returns.

³ These semiannual returns are converted to quarterly equivalents, as described in the Appendix.

⁴ The annual returns for 1985 and 1986 are converted to quarterly equivalents, as more fully described in the Appendix.

⁵ The NCREIF Index began as the Russell-NCREIF Index.

⁶ However, in the absence of central bank distortions, Kritzman (1989) for example, suggests that "(a)s currencies are not productive assets, we should expect, a priori, that their returns will average 0% over the long run."

⁷ This analysis is available from the authors.

⁸ The authors do not necessarily suggest that this smoother path of property values (as opposed to income values) is the result of appraisal smoothing (see Geltner, 1989, 1991; Lai and Wang, 1996).

⁹ The p -values indicate the confidence level at which the null hypothesis can be rejected in favor of the alternative hypothesis: $H_0: \rho = 0$ v. $H_a: \rho \neq 0$. In the case of the office sector, the concurrent cross-country correlations are all significant at the 10% confidence level or better.

¹⁰ A description of the calculation of currency returns is contained in the Appendix.

¹¹ In addition to the currency return itself, the impact of the currency returns on total currency-adjusted returns is also attributable to the cross-product of currency and real estate returns, denoted as Currency Returns' Related Joint Effects. See the Appendix.

¹² Note that the average earnings growths reported in Exhibits 9 and 10 are not directly comparable, due to: (a) the former is restated in terms of the U.S. currency while the latter is in the domestic currency, and (b) the former is based on the arithmetic mean while the latter is based on the geometric mean.

¹³ As compared to an identical investment in the respective office sectors, the Canadian and U.S. retail sectors were ravaged less (by about \$45 to \$50 (U.S.) per initial \$100 investment).

¹⁴ For the ramifications of this assumption, see Pagliari and Webb (1992).

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