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ABSTRACT

The correlations among international real estate markets are surprisingly high, given the degree to which they are segmented. While industrial, office and retail properties exist all around the world, they are not economic substitutes because of locational specificity. In addition, the broad securitization of real estate property companies has, until recently, lagged that of other types of companies. Never-the-less, international property returns move together in dramatic fashion. In this paper, we use eleven years of global property returns to explore the factors influencing this co-movement. We attribute a substantial amount of the correlation across world property markets to the effects of changes in GNP, suggesting that real estate is a bet on fundamental economic variables which are correlated across countries. A decomposition shows that a local production factor is more important in some countries than in others.

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I. Introduction

The real estate business is distinguished from almost all others by the fact that its "product" is not portable. For the most part, property owners compete locally for business. While inter-urban competition for industrial, office or retail space exists, customer choice depends upon a number of economic factors beyond the price and quality of the space. Thus, one would expect the correlation of changes in property values across markets to diminish with the distance between them. There are no short-term arbitrage forces preventing prices in one local market from suddenly getting hot while prices in another local market are dropping -- buildings from one market cannot be moved to the other. For the same reasons, one might also expect international property markets to exhibit low correlations due to the difficulties of re-locating businesses across national boundaries. Studies measuring the diversification benefits of real estate and other asset classes suggest real estate compares favorably in this dimension (e.g. Eicholtz, 1996, Eicholtz and Hartzell, 1996, Eicholtz et. Al, 1998, Liu and Mei, 1998, Liu, Hartzell and Hoeseli, 1997). After looking at recent published empirical evidence, it is clear that international real estate investment is useful for portfolio diversification.

This logic makes the evidence about co-movement in international property returns all the more striking. Goetzmann and Wachter (1996) [GW] document that the real estate crash in the early 1990's was felt by nearly every country in the world. Despite their separation by political boundaries and great distances, the world's office markets plunged into a slump together. While economists looked for local reasons for local decreases in property values, the reality is that there were no safe havens for property investors in the years 1991 and 1992. Diversification did not help. The conjecture in GW was that this slump was due to exposures to global GDP. Unfortunately, insufficient time-series data prevented any formal test of the conjecture. Work by Quan and Titman (1998), using the same data sources as GW and longer time series document that real estate is significantly correlated to stock returns and to changes in GDP. In his in-depth analysis of the international real estate slump of the 1990's, Renaud (1997) considers the degree to which unique events in the late 1980's may have led to the correlated change in real estate prices and the global economy. He also discusses the co-cyclycality of global economies and real estate. Together, these recent studies suggest that a mix of global and local economic factors influence the world's real estate markets.

In this paper, we use 11 years of commercial property data to examine the relationship between GNP changes property returns. We explore the relationship in considerably more depth than GW and take a different approach to GDP effects than Quan and Titman. Our goal is to separate global from local economic effects on the covariance of real estate returns. In particular, we test to see whether the correlations across global real estate markets are due to common exposures to changes in world GDP. In addition, we estimate the incremental value of local economic fluctuations in explaining real estate performance. We find strong evidence to show that removing the effects of both country-specific GDP and global GDP from returns significantly decreases global real estate market correlations. Of the two, global GDP has the greatest effect.

The implications of our results are twofold. First, world real estate markets are largely correlated through common GDP effects. Thus, we find that even markets that are segmented by definition can exhibit significant correlations if they are exposed to a common source of risk. Second, we show that an investment in a global real estate portfolio is essentially a bet on broad trends in global production.

II. Data

International property return data is difficult to obtain. Some authors have collected returns from publically traded property companies in a number of countries for successful analysis. This is useful but not always representative of the markets in all countries, and depends upon the existence of public markets in property companies. Our data source is a recently dissolved global consortium of real estate firms that collectively shared yield and effective rent data sampled and assembled on an annual basis. Until recently, these firms were affiliated through International Commercial Property Associates (ICPA), with a successor agreement with ONCOR International. Over the past decade, their estimates of yields and effective rents were formed by firms operating in each market according to commonly agreed upon standards. These estimates were published as ICPA's "International Property Bulletin" and ONCOR's "World Real Estate Review," and "European Property Bulletin." Both ICPA and ONCOR have ceased publishing these data, but London-based Hillier Parker has continued to organize European firms to share data for European markets. In addition, the data for Asian real estate markets is also collected by several affiliates of Hillier Parker and published by its Hong Kong affiliate, Brooke Hillier Parker, in "Asian Property Market Survey." Throughout the time ICPA existed, new markets entered -- particularly emerging markets in Asia. The existence of these markets in the database is undoubtably conditioned upon investor interest, and thus potentially biased by positive performance. Thus, some of the markets included in our database may have been "backfilled" and the paucity of data about other markets, particularly the lack of industrial and retail information about Japan, for example, may result from recent lack of interest in international investing there.

Since we do not have income and capital appreciation returns reported as such in the database, we estimate them using yields and cap-rates. Specifically, total returns (income and appreciation) for prime industrial, office, and retail real estate in 22 cities around the world is the sum of the estimated yield and the change in capitalized estimated effective rents:

$T_{i,t} = Y_{i,t-1} + \frac{[R_t/Y_t]}{[R_{t-1}/Y_{t-1}]} - 1$ where $T_{i,t}$ equals estimated total return for city i at time t; $Y_{i,t}$ equals the estimated yields (going-in cap rates); and $R_{i,t}$ equals estimated effective rents. This implicitly assumes that the perpetuity formula is a reasonable approximation to value. Rents and yields were estimated for consistently-defined standard properties in the prime commercial districts of each city by commercial real estate firms in each country.

While these sources present data for a large number of cities, the analysis must be restricted to those markets for which estimated rents and yields are available for every year during the period 1987-1997. Table 1 shows the 22 markets from 21 countries included in the analysis under this criterion. Two German markets, Dusseldorf and Frankfurt, are included, because the required data were available for both cities.

While the effective rent data are given in nominal terms and generally denominated in local currency, from the perspective of a U.S. investor it is more relevant to consider returns expressed in U.S. dollars. Therefore the nominal foreign-currency returns were converted to real U.S. dollar terms by using the exchange rate in effect at the end of each year and then deflating by the U.S. inflation rate.

Table 1 shows the geometric means, arithmetic means, and standard deviations of the total return series computed for each type of real estate, and for the stock market total return series. The average total returns are in some cases spectacularly high: for example, the geometric means for the 11-year period exceed 20 percent for industrial space and office space in Hong Kong, Portugal, Singapore, and Thailand and for retail space in Portugal and Thailand. At the same time, these investments were extremely volatile, with standard deviations exceeding 40 percent in several cases. The volatility for the U.S. is only slightly higher than obtained from other appraisal-based indices.

As a check on whether the yield-based return series' for the U.S. correspond to appraisal-based returns in the U.S. we measured the correlation to the NCREIF index . The U.S. Industrial property index had a correlation of .84 to the NCREIF index and the U.S. Office property index had a correlation of .56. Neither had a significant correlation to the NAREIT index of equity real estate investment trusts. Thus, we are using series' that more closely resemble and indeed track the appraisal-based indices commonly used in the U.S. to measure commercial real estate performance.

Figure 1 shows the trend in real estate returns over the period 1987 through 1997 for each country and property type. The crash of the early 1991 through 1993 shows up clearly as a majority of markets and property types experiences negative real returns during the period. There were almost no safe havens during this period. Only Hong Kong, Singapore, Malaysia and Portugal had strong positive returns in the three-year slump. The year 1997 closely resembles the early 90's, when most real returns were negative. The comovement between markets also shows up in the correlations. We do not report the entire 60 by 60 correlation matrix, however, on average, the correlations within property types across countries ranged between 0.33 and 0.44.

Figure 2 shows the dollar-denominated changes in GDP for each country, deflated by the U.S. CPI over the same time period. The eleven-year period contains two booms and two busts in the global economy. The relationship to the real estate cycles is unmistakable -- property returns clearly fluctuate with GDP changes. In the next section we more formally test the effects of GDP on real estate market trends and correlations.

III. Methodology

In this section we test the hypothesis that international real estate markets are correlated through GDP. To do this, we first remove the effects of a country's own GDP on its property return series through univariate linear regression of the return series on contemporaneous GDP changes. Then for each property type, we compare the correlation matrices of the raw returns and of the regression residuals. Finally, we perform a paired t-test of the off-diagonal elements in the return and residual correlation matrixes to determine whether the difference in the means is significant. Rejecting the null hypothesis of equality of returns and residual correlations would provide strong support for the hypothesis that the co-movement of global real estate markets is driven by common exposure to factors affecting production. We then perform the same test after removing the effects of an equal-weighted index of GDP changes. This second test allows us to examine whether exposure the global economy explains correlations. In the second test, we expect the average correlation to decrease, since we are simply extracting a common factor. This is not necessarily the true when we extract each country's own GDP effect, however. If local GDP effects are important and uncorrelated across countries, then removing them could increase correlations of the residuals. If the local the GDP factor reflected both important local economic effects and global economic effects, then correlations could either increase or decrease.

III.1 T-test results

Table II reports the results of the paired t-test for each property-type in the sample. The correlation of dollar-denominated returns is relatively high for each property-type, although highest for office properties. It is tempting to attribute this high correlation to the fact that customers for class A office space in major countries around the world have increasingly become the same 100 multi-national firms, however we no empirical evidence to support this conjecture. The table shows that purging the returns of the effects of own-country GDP changes results in a significant drop in average correlation across country. The largest proportional drop was in the Industrial property sector -- the sector most closely tied with production -- which dropped to a third of it value. Notice that purging the returns of the equal-weighted GDP factor results in an even larger and strongly significant decrease in average correlation across countries. In fact, the average correlation in the Industrial property sector drops to 0.087.

Another way to evaluate the effects of removing local GDP and global GDP is to examine the change in summed variance. Removing the global factor decreases variance by 58 to 72 percent. Removing only the local factor results in 20 to 30 percent variance reduction.

III.2 Global vs. Local Effects

The analysis thus far shows that the effect on covariance of removing an equal-weighted global GDP factor is, on average, important. Cross-sectional differences may be relevant, however. For example, the recent performance of Asian real estate markets suggests that local GDP factors may overwhelm global trends. In order to compare the relative effects of global vs. local GDP effect, we use econometric methods to separate the two. In Table III we report the R^2 from regressions in which we separate the GDP factor into local and common components. To do this, we first regress each GDP series on the equal-weighted global GDP factor and save the residuals. Next, we use these residuals in a regression, together with the equal-weighted global GDP factor as variables to explain each real estate market. I.e. in stage 1, we estimate the local GDP factor λ_{it} with the regression: $G_{it} = \alpha + \beta G_{wt} + \lambda_{it}$, where G_{it} is the change in GDP for country i at time t and G_{wt} is the equal-weighted global GDP factor realization at time t. In stage 2, we use λ_{it} and G_{wt} as regressors to explain the total return series for a real estate market: $T_{it} = \alpha + \beta_1 G_{wt} + \beta_2 \lambda_{it} + \varepsilon_{it}$ and save the R^2 from this regression as R_A^2. Finally, we use only G_{wt} as an explanatory variable: $T_{it} = \alpha + \beta G_{wt} + \varepsilon_{it}$ and save the R^2 from this regression as R_B^2.

In order to determine the importance of the local GDP component to the global GDP component, we take the difference in R^2 and divide by the R^2 from the regression on the global factor alone. That is: $(R_A^2 - R_B^2)/R_B^2$. It is important to note that the number of time-series observations in each regression is only eleven. Thus, we would expect relatively high R^2 from a regression with two explanatory variables. We have not used adjusted-R^2, although this would be appropriate if we were explicitly testing an hypothesis with this ratio. With these caveats in mind, we use the ratio only for the purposes of indicating the tendency in each market for the local factor to predominate over the global factor. In fact for most markets, the global factor is most important -- the incremental variance explained by the local residual variable is less that the amount of variance explained by the global factor. There are a few markets that differ from this norm, however. We find that Australia, Canada, Hong Kong, Thailand, U.K. and to some extent, the U.S., Malaysia and Spain are countries where local GDP effects dominate global influences. We might expect this for the U.S. and the U.K.

since the GDP factor is equal-weighted and these two countries' GDP's would obviously have a larger than equal weight were we using gross GDP weights, or market capitalization weights. This is not true for some of the other countries, however. The table suggests that, while fundamental economic factors explain much of the performance of local real estate markets, the effects of local economic deviations from global trends are more important for some countries, the U.S. included.

III.3 Time-series regressions

Although we have only eleven years of data, it is useful to further consider how the global GDP factor is related to the fluctuations of property returns. In Table III we regress equal-weighted portfolios of property-types on the equal-weighted GDP factor, and include the one-year lagged values of GDP changes and the lagged property-type return itself, in order to control for autocorrelation in the regression error. Note that in each case, the contemporaneous GDP change is significantly related to returns, and the lagged value is not. In this regard, our time-series results are broadly consistent with Quan and Titman (1998). This is potentially important, because one criticism of all appraisal-related real estate data is that it captures "asking rents" not "effective rents." Asking rents are typically sticky and thus are a stale measure of real estate markets. The lack of a lagged relationship between GDP and real estate returns suggests that contemporaneous economic conditions are reflected in our data. This does not mean our return series' are unpredictable random walks. In two of the three regressions, office and retail, the lagged value of the return series is also significant, indicating strong persistence.

III.4 U.S. Time-Series Regression

Although long-term international data is unavailable, we have time-series data for the U.S. commercial property market that extends from 1960. We use Ibbotson Associates Business Real Estate total annual return series from 1960 through 1994, and the NCREIF index for years 1995 through 1997. This is the dependent variable in a regression that includes four years of lagged values and contemporaneous and four lagged values of U.S. GDP growth. The results of this regression are reported in Table 4. Contemporaneous GDP growth has a coefficient of .65 and is strongly significant. The inclusion of four lags for each series appears to eliminate the autocorrelation of the errors in the regression -- the Durbin-Watson statistic is 2. This regression indicates that in at least one market where we do have long-term data, the relation between GDP growth and real estate returns is a strong one.

IV. Diversification

The co-movement of real estate markets through exposure to global GDP changes is potentially meaningful to investors because it suggests that despite the obvious importance of local economic conditions to the determinants of property values, diversification has its limits. One way to explore these limits is to consider how the volatility of a real estate portfolio decreases as more markets are added to the portfolio. Figure 3 shows the average percentage reduction in volatility achieved by adding additional countries in sequence, by property type. Country stock markets are provided for a comparison. The greatest percentage reduction in risk through international diversification is achieved by the industrial property type and the least percentage of reduction in risk through international diversification is achieved by office markets. Both office markets and retail markets appear to offer slightly lower relative benefits to international diversification than do equity markets. In general, however the figure suggests that the international diversification benefits to real estate are similar in magnitude to those of the equity markets. This is somewhat surprising in light of the fundamentally location-specific nature of real estate as an investment.

Figure 4 shows the result of removing the global GDP factor from each series. In effect, the figure shows the results of a portfolio continuously hedged against GDP risk. Notice that the risk of the industrial portfolio drops considerably, and is well below the equity portfolio limit. The lower bound is at 13.7 % of the variance of a portfolio with a single country industrial real estate portfolio investment.

V. Conclusions

Our analysis of the relationship between changes in GDP and international property returns suggests that the cross-border correlations of real estate are due in part to common exposure to fluctuations in the global economy, as measured by an equal-weighted index of international GDP changes. Country-specific GDP changes help explain more of the variation in real estate returns. Indeed, in some countries local factors explain considerably more, in percentage terms, than do global factors. Our study suggests that, while real estate is fundamentally local, demand for space apparently responds to contemporaneous changes in the global economy. Our analysis of international diversification suggests that portfolio volatility is reduced by cross-border property investment, but that only one asset class, Industrial properties, actually yields greater diversification benefits than international equity market diversification.

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Table I: Summary Statistics of Real U.S. Dollar-Denominated Returns

Summary statistics for the ICPA data by country and property type over the period 1987 through 1997. Returns are estimated fromyields and effective rents as discussed in the text, and converted to U.S. dollars and deflated by the U.S. inflation rate.

	Industrial Properties				Office Properties				Retail Properties			
Country or city	Geometric Return	Arithmetic Return	Standard Deviation	Serial Correlation	Geometric Return	Arithmetic Return	Standard Deviation	Serial Correlation	Geometric Return	Arithmetic Return	Standard Deviation	Serial Correlation
Australia	12.10	14.46	24.73	0.07	4.39	7.56	28.63	0.39	1.67	5.77	31.18	0.57
Belgium	7.51	9.93	23.82	-0.20	8.34	9.61	17.11	0.33	11.55	14.13	25.05	-0.50
Canada	NA	NA	NA	NA	2.96	4.32	16.51	0.07	NA	NA	NA	NA
Denmark	5.18	6.73	20.60	-0.16	4.50	5.14	12.07	-0.25	3.69	4.76	16.78	0.39
Finland	9.08	13.30	30.53	0.52	4.54	9.47	32.98	0.47	10.24	14.95	33.19	0.25
France	5.29	7.03	20.76	-0.09	3.47	5.57	22.19	0.40	8.88	11.01	22.70	0.16
G-Dusseldorf	6.58	8.46	21.26	0.05	7.25	8.50	17.06	0.18	9.56	11.42	23.10	-0.20
G-Frankfurt	2.96	5.13	20.40	0.43	7.61	9.43	21.29	0.76	7.37	10.39	27.48	0.41
HongKong	20.86	23.14	25.26	0.32	16.45	22.79	41.34	0.26	12.65	13.53	14.33	0.05
Ireland	18.01	20.20	24.14	0.05	11.78	13.25	19.29	0.04	11.56	12.56	15.61	0.70
Italy	11.18	13.16	21.85	0.24	1.00	5.16	32.53	0.46	1.57	7.06	34.20	-0.54
Japan	NA	NA	NA	NA	-17.35	-12.21	31.33	0.25	NA	NA	NA	NA
Malaysia	-0.33	5.41	39.94	-0.55	4.19	9.53	34.25	-0.28	NA	NA	NA	NA
Netherlands	10.25	11.61	19.19	-0.04	10.08	11.46	18.75	0.20	7.77	9.07	17.48	-0.54
Portugal	28.99	34.88	45.52	0.43	17.80	21.09	30.04	0.67	27.22	31.89	42.18	0.13
Singapore	26.90	31.06	33.62	-0.51	15.73	18.66	27.68	0.13	12.61	15.75	30.00	0.66
Spain	14.46	21.11	44.60	0.76	3.81	10.28	40.23	0.51	4.05	11.54	46.12	0.59
Sweden	5.88	9.71	27.27	0.24	2.71	8.81	35.85	0.22	9.31	15.10	36.27	0.29
Switzerland	-5.18	-3.25	22.72	-0.07	-10.42	-2.20	47.43	0.46	-8.54	-7.35	15.84	-0.42
Thailand	9.75	16.80	40.50	-0.17	5.29	12.68	45.94	0.26	27.20	35.31	51.70	0.36
UK	13.14	15.82	26.92	0.35	4.12	7.94	29.88	0.30	4.24	7.17	24.99	0.18
USA	7.18	8.68	18.97	0.49	4.68	4.95	8.05	-0.16	NA	NA	NA	NA

Table II: Test of the Equality of Means

This table reports the results of testing the hypothesis that the average off-diagonal element in the correlation matrix of property-type returns across countries in the sample is equal to the average off-diagonal element in the correlation matrix of residuals that result from the return series being regressed on its own change in GDP. All returns and residuals and GDP changes are real U.S. dollar denominated. Please note, t-statistics have not been corrected for doubled off-diagonal values in the correlation matrices.

	Industrial	Office	Retail
Average Correlation of Returns	0.334	0.439	0.363
Average Correlation of Own GDP Residuals	0.129	0.265	0.162
t-stat of Paired t-test of difference	*11.157*	*11.335*	*10.616*
Average Correlation of World GDP Residuals	0.087	0.270	0.121
t-stat of Paired t-test of difference	*13.452*	*10.807*	*15.787*
Variance Reduction: Own GDP	0.284	0.309	0.199
Variance Reduction: EW GDP Factor	0.719	0.602	0.584

Table III: Global vs. Local GDP Effects

R^2 from (1) regressions of returns on the equal-weighted global GDP factor and the orthogonal local GDP factor for each market and (2) regressions of returns on the equal-weighted global GDP factor alone. The orthogonal local GDP factor is constructed by regressing each country's change in GDP on the equal-weighted global GDP factor, which is constructed as an equal-weighted portfolio of each country's change in GDP. The ratio is the difference in R^2 between the two regressions, scaled by the R^2 of the regression on the global GDP factor alone. Ratios for countries where the incremental R^2 due to local GDP changes exceeds R^2 due to the global GDP factor are in bold. R^2 are unadjusted.

Country or city	**Industrial Properties**			**Office Properties**			**Retail Properties**		
	R^2 local + global	R^2 global	Ratio ΔR^2/global R^2	R^2 local + global	R^2 global	Ratio ΔR^2/global R^2	R^2 local + global	R^2 global	Ratio ΔR^2/global R^2
Australia	0.604	0.069	**7.719**	0.962	0.009	**2.446**	0.873	0.289	**2.016**
Belgium	0.787	0.748	0.053	0.737	0.691	0.067	0.611	0.588	0.038
Canada	NA	NA	NA	0.628	0.012	**52.395**	NA	NA	NA
Denmark	0.464	0.397	0.169	0.799	0.735	0.086	0.444	0.318	0.397
Finland	0.451	0.386	0.170	0.841	0.352	**1.387**	0.543	0.446	0.217
France	0.445	0.443	0.005	0.507	0.482	0.051	0.374	0.302	0.238
G-Dusseldorf	0.478	0.425	0.125	0.314	0.300	0.050	0.449	0.166	**1.700**
G-Frankfurt	0.523	0.516	0.014	0.482	0.424	0.136	0.390	0.389	0.003
Hong Kong	0.409	0.003	**158.169**	0.451	0.057	**6.847**	0.170	0.001	**244.065**
Ireland	0.859	0.855	0.004	0.359	0.308	0.167	0.584	0.533	0.096
Italy	0.457	0.255	0.789	0.425	0.275	0.545	0.287	0.258	0.114
Japan	NA	NA	NA	0.462	0.447	0.032	NA	NA	NA
Malaysia	0.310	0.310	0.000	0.251	0.111	**1.254**	NA	NA	NA
Netherlands	0.833	0.830	0.003	0.684	0.678	0.009	0.514	0.512	0.005
Portugal	0.106	0.102	0.040	0.354	0.334	0.059	0.464	0.438	0.059
Singapore	0.308	0.331	0.147	0.776	0.759	0.023	0.123	0.108	0.134
Spain	0.450	0.167	**1.689**	0.516	0.358	0.440	0.196	0.181	0.082
Sweden	0.619	0.357	0.735	0.580	0.437	0.326	0.619	0.572	0.081
Switzerland	0.328	0.324	0.013	0.238	0.188	0.267	0.499	0.484	0.031
Thailand	0.517	0.169	**2.051**	0.216	0.072	**1.987**	0.769	0.030	**24.557**
UK	0.541	0.249	**1.169**	0.589	0.168	**2.501**	0.285	0.218	0.380
USA	0.326	0.009	**34.263**	0.170	0.102	0.673	NA	NA	NA

Table IV: Time-Series Regression of Property-Type Portfolios on A GDP Factor

Results from regressions of equal-weighted property-type portfolios on an equal-weighted GDP factor over the period 1987 through 1997.

	Industrial		Office		Retail	
	coef	t-stat	coef	t-stat	coef	t-stat
Intercept	0.010	0.227	0.005	0.123	-0.013	-0.329
Equal-Weighted GDP	1.321	3.560	0.808	1.876	1.160	3.224
Equal-Weighted GD[-1]	-0.369	-0.588	-.861	-1.344	-0.343	-0.647
Property Portfolio [-1]	0.480	0.350	0.709	2.325	0.587	2.307
Durbin-Watson	1.86		1.78		1.48	
R-Square	0.76		.754		.778	

Table V: U.S. Business Real Estate total Return and Changes in U.S. GDP

U.S. Business Real Estate is taken from Ibbotson Associates EnCorr database and measures the total return to a portfolio of commercial real estate over the period 1960 through 1994. For 1995 through 1997, the NCREIF total return index is used.

Period: 1960 - 1997	Coefficient	T-Statistic
Intercept	-0.044	-1.450
GNP	0.533	2.178
GNP t-1	-0.399	-1.436
GNP t-2	0.779	2.742
GNP t-3	-0.217	-0.691
GNP t-4	0.407	1.350
Business Real Estate t-1	1.068	5.208
Business Real Estate t-2	-0.716	-2.483
Business Real Estate t-3	0.331	1.164
Business Real Estate t-4	-0.224	-1.161
Durbin-Watson	2.03	
R-squared	0.785	

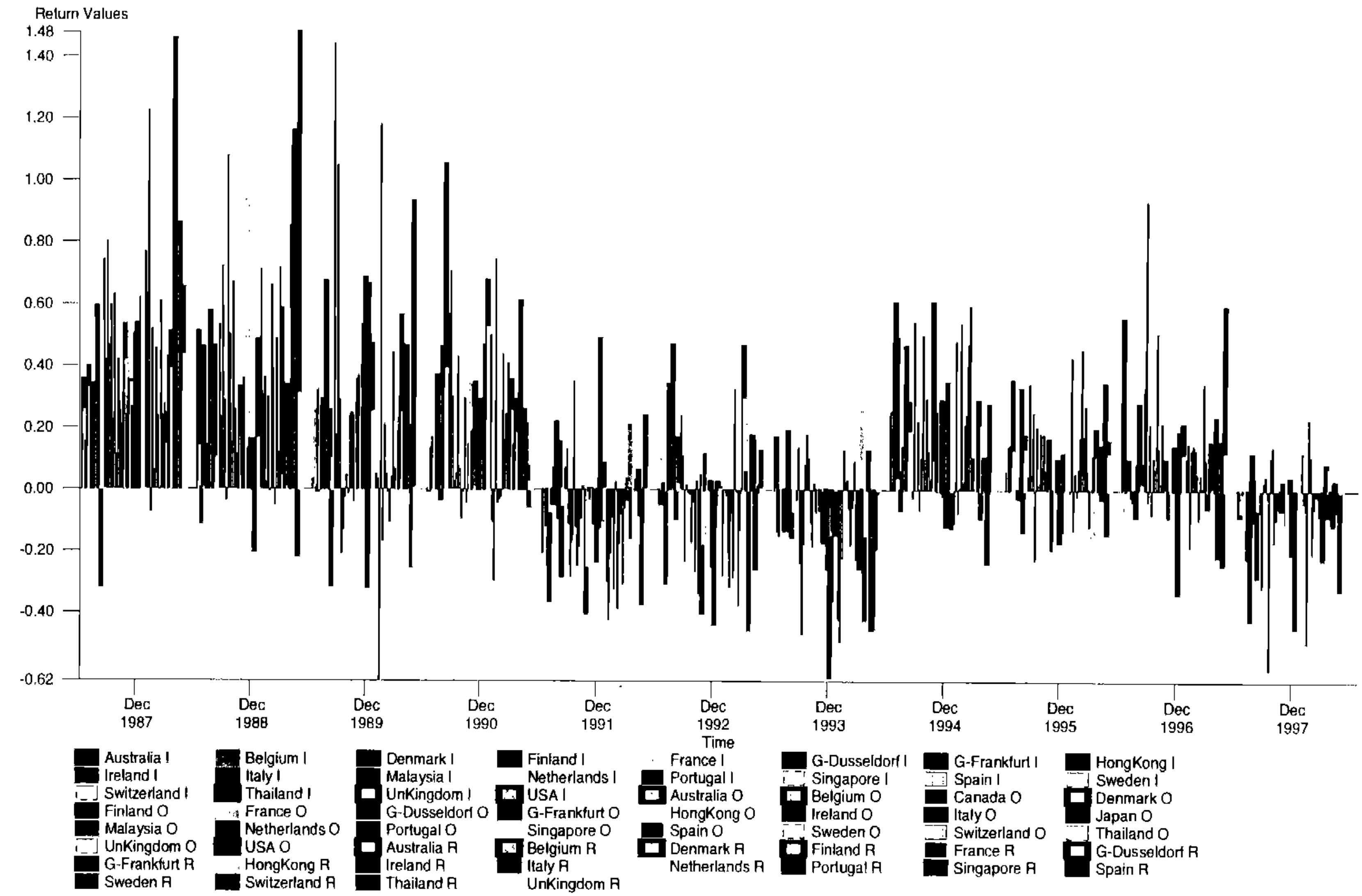

Figure 1: Annual Returns For all Markets and Property Types: 1987 - 1997

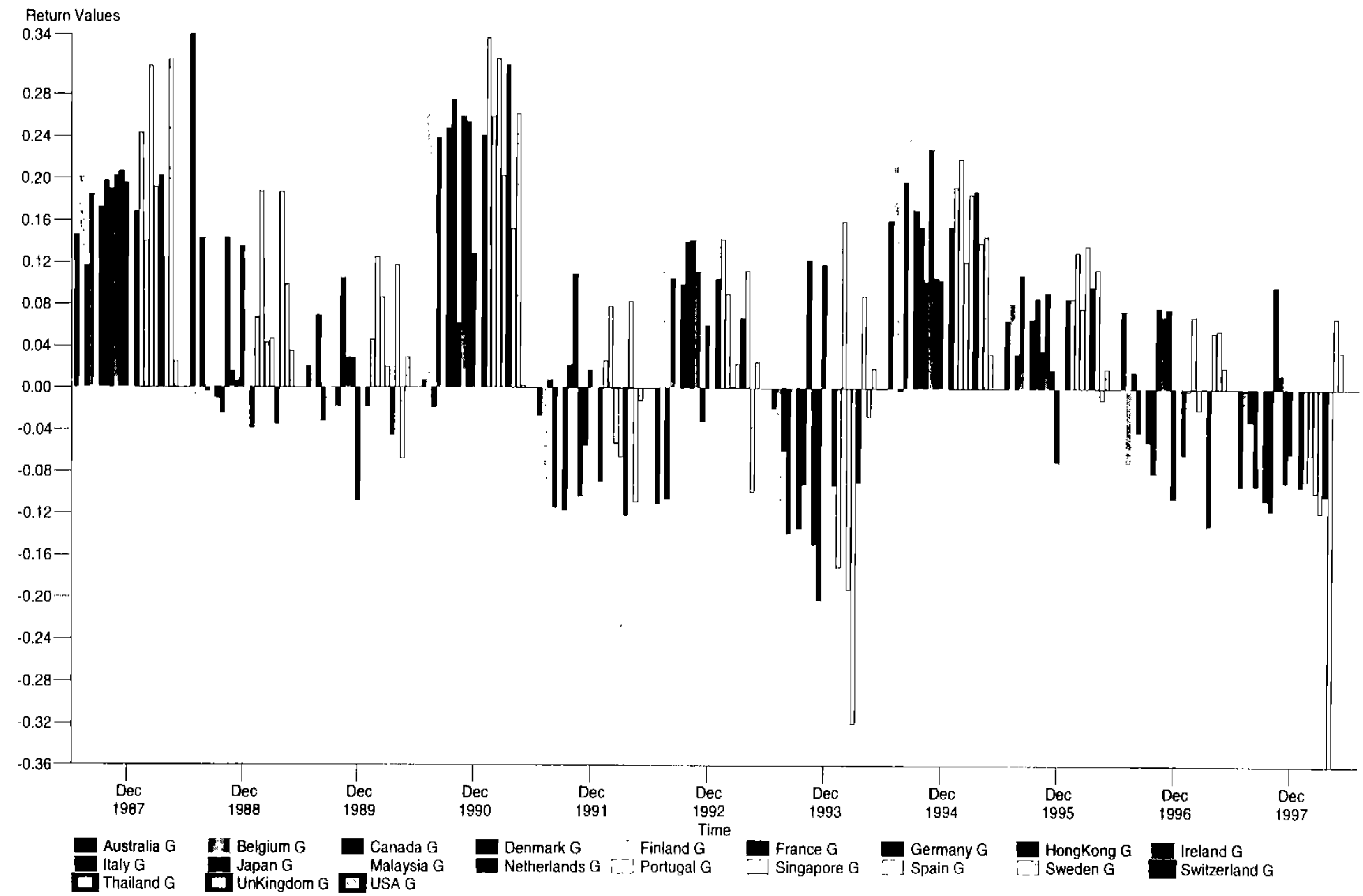

Figure 2: Dollar-Denominated changes in GDP deflated by the U.S. CPI, 1987 - 1997

Benefits of Global Diversification in Real Estate by Property-Type

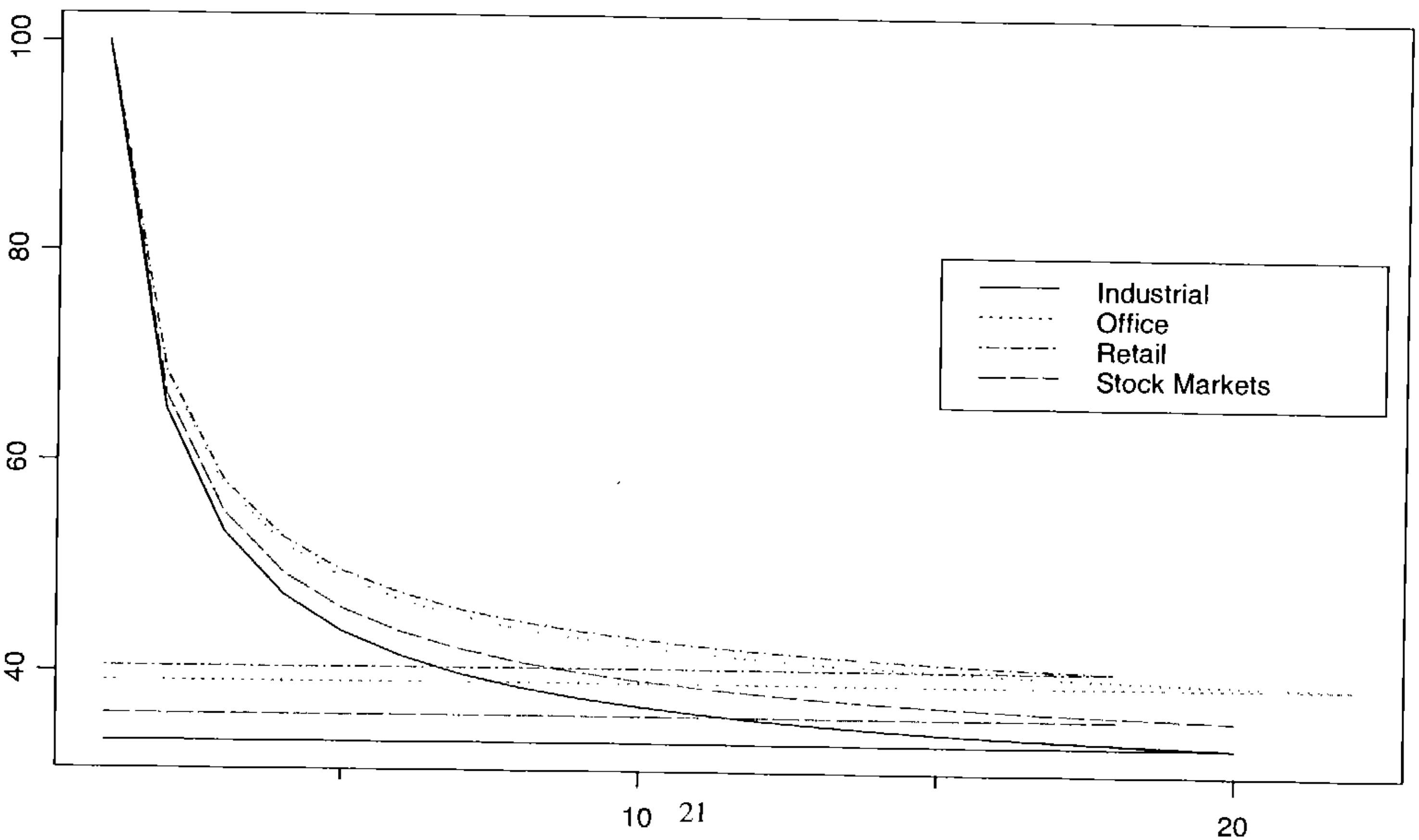

Figure 3

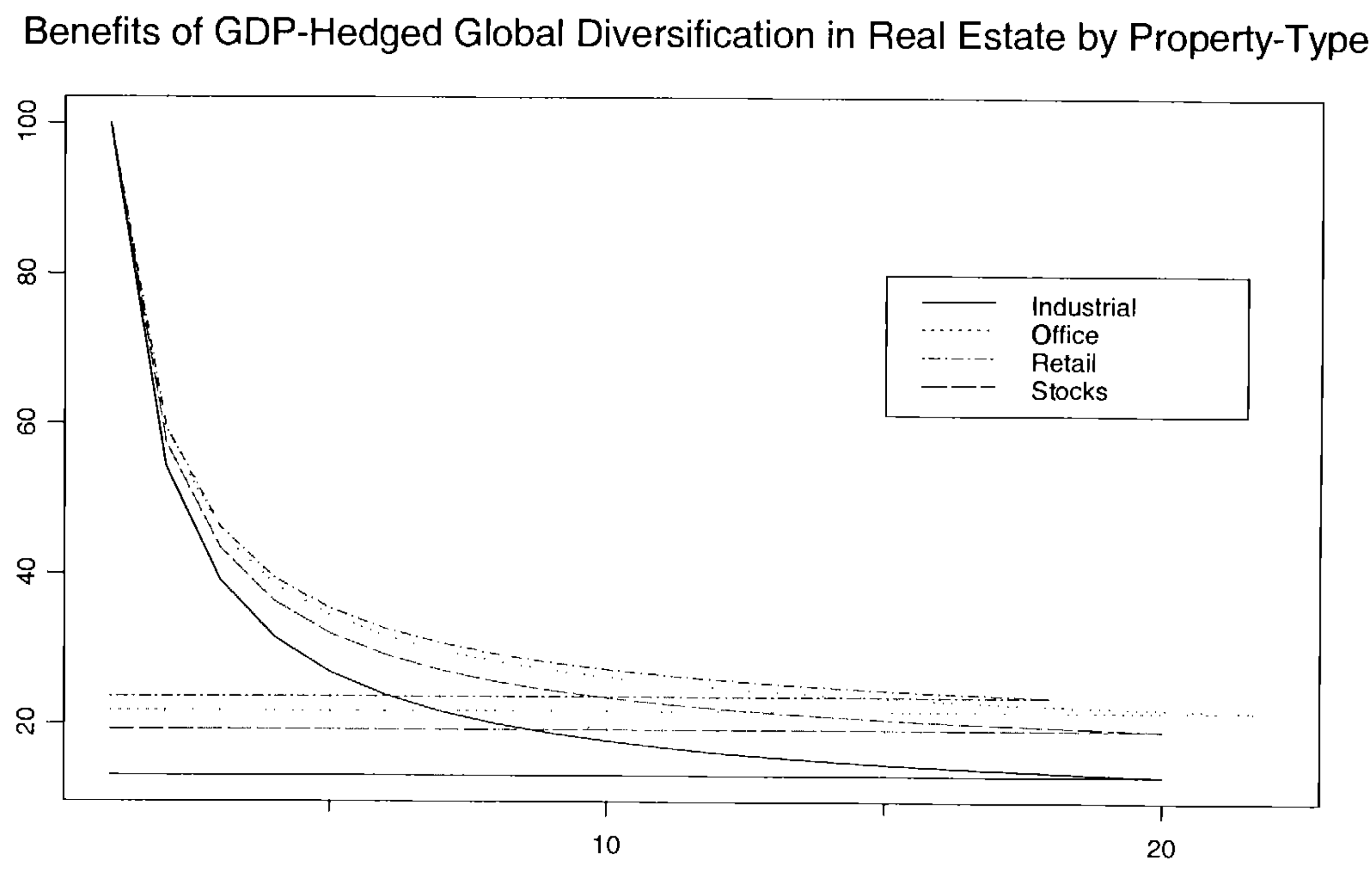
Benefits of GDP-Hedged Global Diversification in Real Estate by Property-Type
100
80
60
40
20
10
20
Industrial
Office
Retail
Stocks

Figure 4