GUGGENHEIM

GLOBAL COMMERCIAL REAL ESTATE APPRECIATION RETURNS FORECAST

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Last Updated January 2011

January 2011

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Data Sources and Date of Forecast:

Economy.com:	December 2010
IHS Global Insight:	December 2010
World Bank (historical data):	June 2010
IPD:	June 2010

I. Introduction

This report presents the Guggenheim Real Estate LLC ("GRE") global forecast, along with our forecast methodology and information on our data sources. The 50 countries whose relative real estate prospects are considered here is larger than the set of countries that we would invest in at the present time (an investment in Venezuela is not currently attractive, for example). However, we choose to follow this larger number because global conditions are fluid. In addition, there are countries that should be added as better data becomes available.[1]

In a companion paper, we use long run, stable characteristics of the 50 countries to categorize the countries by economic drivers, rather than just by geographic region. As is discussed in more detail in the companion paper, diversification across these categories lowers the overall risk of our portfolio.[2]

The global forecast is for a five year time horizon (2011-2015) as that is the expected duration of investments in the GRE International Fund. The models used in this report combine variables that are similar to those included in a) our domestic three year forecast, and b) our domestic out year model (for years four through ten). The long run variables add some stability to the global forecast that may make it valid beyond the five year time horizon. We are able to produce forecasts for five categories of real estate: all property, residential[3], office, retail and industrial, which correspond to the IPD designations of property types.

As in the United States, this forecast combines the best available information from a wide range of sources to produce a forecast that is purely objective. Subjective factors play a role in the investment process, but they only enter into our analysis after the information in this report is processed. Just as with our domestic forecast, the methods and forecast will evolve and hopefully improve through time.

As shown in the body of this report, international statistics are both less available and more error prone than in the United States. This is expected with multiple nations choosing to record information differently and potentially with varying levels of rigor. Whenever the data is weaker, the information which can be extracted comes with larger confidence intervals. The good news internationally is that the pricing differences across the various sectors (countries, to property types, to capital markets) are larger, offering attractive investment opportunities even when the confidence intervals are larger. The lack of reliable data also allows for more value to be added

[1] Eventually, data permitting, we would like to track all countries as we track all metropolitan statistical areas ("MSAs") in the United States. Still, our focus is not likely to move beyond about 50 countries as data beyond that point is unlikely to be reliable in the near future. However, looking even to a lesser extent at smaller nations improves insight into the more likely investment targets.

[2] See "Economic Diversification in International Commercial Real Estate," by David K. Guilkey, PhD, Mike E. Miles, PhD, and Jennifer Cianelli Cooper. This companion paper also outlines the investment hypothesis behind the GRE International Fund Series.

[3] We use the designation "residential" to coincide with the categories provided by IPD, however, we believe that this category is representative of the multifamily sector.

by qualitative work. This effort is obviously required to identify the best execution alternatives in selected countries and property types. As with the domestic models, we expect constant feedback to ensure that the results of the local market research are reflected in refinements to the top-down model.

In collaboration with CB Richard Ellis ("CBRE"), we are experimenting with using their extensive information on market rents from a very large number of cities around the world. Our preliminary work indicates that the very large sample sizes available from CBRE allow one to consider the use of a greater number of theoretically important variables than is possible with the IPD[4] data as well as move to city specific forecasts. While this work is "cutting edge", it is also totally experimental as this time. Currently the CBRE work informs this set of models. Someday, we hope to have a full set of models based on CBRE data.

In the next section, we present inputs to the forecast. Information on capital, income and total returns is obtained from IPD. We use three demand side data sources in our forecast: Economy.com, IHS Global Insight ("Global Insight"), and the World Bank. Economy.com and Global Insight provide forecasts for the major demand side inputs: gross domestic product ("GDP"), employment, and population growth and we present statistics for each country by data source. However, neither vendor provides complete information for all 50 countries. For the countries where both providers have statistics, we present a comparison of the forecasts. The World Bank does not provide forecast data, but it does provide historical data on a large number of countries for variables that are not available from other sources. At the present time, we do not have supply side variables that are comparable across markets. However, we know from our work in the United States that supply side growth is correlated with population density and so part of Section II.H presents information on spatial data including density and other variables for each country. This dataset and the accompanying paper were developed through an individual researcher and most of this data is proprietary to GRE. Section III presents the forecast model and the regression results. These regression results are used to calculate the forecast rankings displayed in Section IV and we conclude in Section V. Additional information is presented in two appendices.

II. Inputs to the Forecast

A. IPD

Our models are used to produce five year forecasts for risk adjusted total return rankings for 50 countries (including the United States). Yearly historical total return statistics are available for 23 individual countries in the IPD data set including the United States where IPD has its own return series that is distinct from the NCREIF series.[5] The IPD series for the United States

[4] Investment Property Databank ("IPD") is a global real estate information business that provides research services related to the commercial real estate market. IPD is headquartered in London.

[5] In addition to the statistics available for 23 individual countries, IPD also provides statistics for a grouping of countries in Central and Eastern Europe (Hungary, Czech Republic, Bulgaria, Romania, and Slovakia) and we present these statistics in the table. However, we cannot use this grouping in the forecasting model because we need to match up return statistics with demand and supply data on individual countries.

starts in 1999 and is about half the size (both in terms of number of properties and value) of NCREIF. We choose to use the IPD series rather than augmenting the IPD series with NCREIF so that we have a more uniform set of statistics across countries. However, the correlation between the two series (IPD and NCREIF) for total returns across all properties is almost perfect (.99).

Tables 1 to 5 present the list of countries by property type along with the number of years of data available for each country, the minimum and maximum property count, and the mean, standard deviation, maximum and minimum total return. The statistics are presented for all property types, residential, office, retail, and industrial, respectively. Note that IPD provides additional property types or sub types. However, we use the four main types and the types combined in this work. It is important to note that the length of the time series for the set of countries varies from a low 4 years of data (Korea) to 29 years of data (United Kingdom) and so care must be taken in comparing returns across countries. The tables in the appendix give more information on returns through time for all countries.

Table 1: Total Return Statistics for All Property Types

Country	Sample Size	Min Property Count	Max Property Count	Mean	STD Dev	Min	Max
Australia	25	217	1116	10.40	9.39	-9.2	29.7
Austria	6	735	933	5.17	1.36	3.7	6.7
Belgium	5	226	418	6.44	2.69	3.4	9.6
CE Europe	5	164	441	8.10	10.49	-6.5	17.8
Canada	25	1692	2565	9.24	7.34	-6.4	18.7
Denmark	10	911	2192	9.67	4.93	3	18.1
Finland	12	1020	3004	7.98	2.92	3.8	13.1
France	12	2567	7873	10.18	6.98	-1.4	21.9
Germany	14	760	4521	3.45	1.59	0.6	5.6
Ireland	26	160	377	11.31	16.45	-34.5	38.6
Italy	7	368	1762	6.89	3.77	0.8	10.8
Japan	7	340	2174	5.93	7.30	-6.2	13.5
Korea	4	75	147	12.90	10.47	4	26.7
Netherlands	15	4854	6971	10.21	4.38	-0.2	16.1
New Zealand	16	271	380	10.88	6.04	-4.1	22.4
Norway	10	289	583	9.99	6.81	-4.6	18.3
Poland	5	58	205	9.20	9.60	-4.6	19
Portugal	10	210	810	9.51	4.54	0	13.8
South Africa	15	1596	2607	16.09	7.56	5	29.8
Spain	9	264	840	7.77	8.85	-9.4	16.9
Sweden	13	959	2980	9.22	7.72	-3.3	21.9
Switzerland	8	2257	4244	5.75	0.63	5.2	7.1
United Kingdom	29	10986	16377	9.53	10.43	-22.1	29.5
United States	11	765	3205	7.61	10.72	-17.1	19.2

Table 2: Total Return Statistics for Residential

Country	Sample Size	Min Property Count	Max Property Count	Mean	STD Dev	Min	Max
Austria	6	185	240	5.40	1.61	2.6	7
Canada	25	120	199	11.32	5.77	1.7	22.3
Denmark	10	178	491	11.40	12.63	-6.8	38.1
Finland	12	253	1062	8.86	3.42	5.1	16.3
France	12	1066	1826	8.50	5.97	0.1	20.5
Germany	13	176	2306	4.56	1.54	1.3	6.4
Japan	7	67	1166	3.81	5.19	-5	7.7
Netherlands	15	2416	3080	10.42	5.29	-2.2	18.5
Norway	1	8	27	3.80		3.8	3.8
Sweden	13	196	914	12.13	5.54	-3.7	18.2
Switzerland	8	1716	2842	5.34	0.44	4.6	6
United Kingdom	29	49	911	15.70	10.22	-8	34.5
United States	11	119	514	7.51	10.82	-16.5	23.3

Table 3: Total Return Statistics for Office

Country	Sample Size	Min Property Count	Max Property Count	Mean	STD Dev	Min	Max
Australia	25	127	411	9.09	11.17	-13.9	31.1
Austria	6	203	246	4.33	1.08	2.7	5.6
Belgium	5	174	285	5.24	2.31	2.3	7.7
CE Europe	5	84	125	7.72	9.02	-5	16.2
Canada	25	524	626	8.81	8.96	-10.9	24.4
Denmark	10	432	808	8.64	4.08	3.5	15.6
Finland	12	291	850	7.28	2.96	2.7	12.1
France	12	1034	3922	10.37	7.77	-2.5	21.8
Germany	14	303	1533	3.05	2.15	-0.7	5.8
Ireland	26	82	149	10.98	17.07	-31.1	43.1
Italy	7	218	419	6.71	3.43	1.5	10.8
Japan	7	238	640	6.61	8.58	-8.2	15.5
Korea	4	70	100	13.00	10.00	5	25.7
Netherlands	15	646	1159	9.06	4.78	-0.2	15.5
New Zealand	20	50	114	6.67	9.89	-9.5	26.2
Norway	10	180	363	9.05	7.75	-7.5	18.7
Poland	5	23	45	9.10	7.24	-1.8	16.4
Portugal	10	100	287	6.79	2.35	2.5	10.6
South Africa	15	494	936	13.39	7.99	1.4	30.5
Spain	9	77	193	6.42	8.25	-8.1	16.7
Sweden	13	447	1139	8.50	8.83	-3.4	24.2
Switzerland	8	226	728	5.50	0.93	4.3	7.4
United Kingdom	29	3070	4981	8.67	11.83	-22.4	31.1
United States	11	227	596	7.21	12.04	-19.5	19.1

Table 4: Total Return Statistics for Retail

Country	Sample Size	Min Property Count	Max Property Count	Mean	STD Dev	Min	Max
Australia	25	42	320	12.98	6.18	0.1	25.3
Austria	6	293	332	6.68	2.07	3.2	9
Belgium	5	16	30	10.84	5.50	3.9	16.4
CE Europe	5	32	103	11.04	11.70	-5.2	20.9
Canada	25	273	427	10.63	5.78	-0.1	21.5
Denmark	10	229	744	9.52	2.58	7	14.5
Finland	12	287	664	8.96	4.03	2.6	15.8
France	12	163	1813	15.12	8.52	-1.1	26.4
Germany	14	89	472	4.59	1.25	2.6	7
Ireland	26	40	149	12.28	16.76	-40.2	34.4
Italy	7	57	721	7.33	4.81	0	11.3
Japan	7	32	199	5.67	6.97	-4.3	12.3
Korea	2	2	38	7.10	0.85	6.5	7.7
Netherlands	15	1170	2336	10.37	3.26	2.4	14.9
New Zealand	16	14	74	13.03	5.98	-2.9	24.2
Norway	10	38	104	11.92	5.71	-0.4	17.9
Poland	3	11	44	4.80	8.96	-2.5	14.8
Portugal	10	56	211	10.90	6.63	-2.9	17.4
South Africa	15	385	722	17.89	7.56	8.8	32.5
Spain	9	81	303	9.47	9.87	-7.4	20
Sweden	13	105	284	10.09	6.50	-2.6	18.5
Switzerland	8	134	405	7.10	1.47	5.6	9.7
United Kingdom	29	4028	8075	10.29	9.87	-22.6	24.8
United States	11	83	460	9.05	10.37	-12.6	20.3

Table 5: Total Return Statistics for Industrial

Country	Sample Size	Min Property Count	Max Property Count	Mean	STD Dev	Min	Max
Australia	25	47	338	11.37	8.28	-7.3	25.1
Austria	5	7	25	3.68	1.42	2.4	6.1
Belgium	5	19	32	8.02	5.69	0.4	13.6
CE Europe	5	47	192	6.26	12.83	-9.7	20.4
Canada	25	534	1043	10.37	6.88	-4.4	19.7
Denmark	10	12	67	7.81	4.34	2.2	16.5
Finland	12	128	265	8.81	2.93	4.5	13.7
France	12	117	993	9.89	7.24	-3.8	20.8
Germany	13	10	193	4.99	3.02	-2.9	7.7
Ireland	26	33	86	12.44	14.49	-24.6	42.1
Italy	7	29	515	7.06	4.07	0.2	11.6
Japan	4	0	98	9.30	10.37	-1.6	21.8
Netherlands	15	113	220	10.11	4.23	-0.3	17.1
New Zealand	16	44	192	13.38	4.66	6.5	24.6
Norway	7	7	56	13.34	8.62	0.5	23
Poland	4	24	107	5.40	12.47	-9	19.3
Portugal	8	22	117	7.65	2.60	3.8	11.4
South Africa	15	467	897	16.72	10.40	2.1	35.3
Spain	9	18	63	8.37	10.60	-12.1	21.4
Sweden	13	43	311	9.45	7.66	-1.9	25.4
Switzerland	8	38	73	8.10	3.27	4.7	15
United Kingdom	29	1950	3513	10.76	11.10	-21.2	39.3
United States	11	304	1552	7.27	10.19	-17.9	15.3

Note that the length of the series is not always indicative of the number of properties. For example, Ireland has a relatively long time series but few properties throughout (the series starts with 160 properties, but only has 377 properties after 26 years). It should also be noted that the number of properties in the database varies substantially by country and that the number of properties is not necessarily indicative of the importance of the country to the global economy (see the large number of properties in the Netherlands, for example). This fact contributes to our decision to equal weight across countries in our regression analysis so that countries like the Netherlands and South Africa, for example, with relatively large numbers of properties do not get more weight than potentially more important countries, such as Germany, that have relatively fewer numbers of properties. However, we did compare the equal weighted analysis to a GDP weighted analysis and got similar results.

Further information on the relationship between historical returns in the United States and other countries is shown in Appendix A where in each graph we present the return series for the United States and then data for four other countries. Note that the graphs for income returns (Figures 7-12 in the Appendix) show major differences across countries. This is the reason we choose to model total returns rather than just capital returns as is done in the United States. When we model total returns in the United States, the high variability in capital returns relative to income returns causes the capital return data to dominate in an analysis of total returns.

The graphs show that there is substantial variability in returns across countries and in fact, as shown in Table 6, total return correlations for some countries are either negative or less than 0.5. Note that Table 6 only presents results for the 15 counties where IPD has at least 10 observations, later we show that this variability is also present for GDP growth correlations which we have for all 50 countries. This is obviously important in portfolio construction as explained in the companion paper.

Table 6: Total Return Correlations for Countries with Ten or More Years of Observations

Country	Aus	Can	Den	Fin	Fr	Ger	Ire	Neth	NZ	Nor	Port	SA	Swe	UK	US
Australia	1.00														
Canada	0.77	1.00													
Denmark	0.76	0.86	1.00												
Finland	0.54	0.70	0.62	1.00											
France	0.91	0.82	0.84	0.57	1.00										
Germany	-0.18	-0.24	-0.25	0.38	-0.06	1.00									
Ireland	0.43	0.59	0.79	0.77	0.70	0.12	1.00								
Netherlands	0.61	0.63	0.69	0.84	0.72	0.44	0.89	1.00							
New Zealand	0.82	0.60	0.58	0.33	0.71	-0.33	0.33	0.32	1.00						
Norway	0.88	0.84	0.79	0.79	0.92	-0.07	0.86	0.73	0.59	1.00					
Portugal	0.84	0.72	0.63	0.60	0.77	0.21	0.78	0.82	0.60	0.67	1.00				
South Africa	0.69	0.58	0.63	0.09	0.69	-0.59	0.18	0.09	0.85	0.66	0.33	1.00			
Sweden	0.58	0.68	0.67	0.84	0.74	0.23	0.82	0.85	0.27	0.82	0.48	0.26	1.00		
United Kingdom	0.68	0.47	0.63	0.24	0.54	-0.28	0.60	0.49	0.15	0.66	0.52	0.24	0.49	1.00	
United States	0.93	0.93	0.75	0.67	0.89	-0.09	0.88	0.79	0.77	0.78	0.84	0.66	0.66	0.61	1.00

B. Economy.com

Economy.com provides forecasts for 45 countries. However, we have identified five additional countries (Costa Rica, Egypt, Saudi Arabia, the United Arab Emirates, and Vietnam) that we feel are important to track. The following table provides the Economy.com average annual forecast for GDP per capita, growth in GDP, employment, population, and consumer price index ("CPI") for the five year period from 2011 to 2015.

Note that GDP is defined in terms of the United States dollar and so we get the expected result that countries rich in natural resources (Russia and Venezuela, for example) and outsource countries (China and India, for example) have very large dollar denominated GDP growth. This is one of the major motivations for a United States investor to allocate a portion of their portfolio offshore.

Part D of this section presents a comparison of the forecasts for Economy.com and Global Insight and we provide historical information on GDP and employment growth based on consolidated information from the two vendors in that section as well.

Note that some of the countries that are forecast to have very high employment growth over the next five years during this period of global economic recovery also tend to have highly volatile numbers. For example, Argentina and Turkey are forecast to do quite well in terms of employment growth going forward but they have had very volatile employment growth over the past 15 years. Argentina has also had a very high inflation rate in the past.

Table 7: Forecast for Key Variables 2011-2015

Country	GDP Per Capita (Thousands of US $)	GDP Growth	Employment Growth	Population Growth	Change in CPI
Argentina	11.25	9.64	3.82	0.99	8.62
Australia	70.47	7.88	2.00	1.12	2.72
Austria	46.79	3.66	0.35	0.02	2.01
Belgium	42.43	2.04	0.87	0.06	1.53
Brazil	11.45	5.94	1.49	1.09	4.74
Canada	51.27	4.48	1.40	0.78	1.99
Chile	14.54	7.29	2.46	0.80	3.25
China	7.18	17.63	1.29	0.67	2.73
Colombia	4.17	0.12	1.83	1.12	3.35
Costa Rica					
Czech Republic	26.36	9.73	0.08	-0.14	2.87
Denmark	70.88	6.95	0.83	0.22	1.84
Egypt					
Finland	43.02	2.15	-0.24	0.04	1.18
France	38.67	3.18	0.97	0.47	1.87
Germany	39.66	2.63	0.13	-0.08	1.61
Greece	25.69	1.12	0.50	0.06	1.15
Hong Kong	35.87	7.44	1.76	0.42	2.70
Hungary	18.68	8.51	0.48	-0.26	4.31
India	1.96	15.39	2.00	1.31	6.13
Indonesia	4.21	14.40	3.32	1.03	5.78
Ireland	49.35	5.04	2.59	1.06	1.78
Israel	37.27	8.82	2.33	1.56	2.00
Italy	33.66	1.83	0.99	-0.14	1.85
Japan	40.85	-1.57	0.13	-0.33	0.53
Malaysia	10.91	10.21	2.29	1.68	2.88
Mexico	11.01	8.71	1.10	1.08	3.44
Netherlands	45.08	2.63	0.70	0.36	1.67
New Zealand	41.75	5.96	1.77	0.88	2.72
Norway	119.41	10.77	1.02	0.30	2.42
Peru	4.37	3.13	1.60	1.12	2.01
Philippines	2.42	10.42	2.56	1.87	4.58
Poland	15.80	7.73	0.00	-0.08	2.79
Portugal	20.53	2.83	1.16	0.17	2.58
Russia	19.16	18.05	1.58	-0.49	7.43
Saudi Arabia					
Singapore	40.80	6.83	0.78	0.75	2.33
South Africa	8.88	7.52	3.21	-0.34	6.01
South Korea	32.92	13.10	1.37	0.20	2.81
Spain	35.86	4.97	1.42	-0.03	1.54
Sweden	53.76	5.39	0.27	0.18	2.32
Switzerland	83.86	4.23	0.91	0.21	1.76
Taiwan	21.72	5.50	1.20	0.16	1.78
Thailand	5.57	9.18	1.95	0.54	3.73
Turkey	12.00	9.54	3.03	1.18	6.14
United Arab Emirates					
United Kingdom	43.42	6.16	0.69	0.29	1.98
United States	53.41	5.03	1.87	0.97	2.34
Venezuela	12.82	20.49	3.02	1.47	26.18
Vietnam					

C. IHS Global Insight

Global Insight provides at least some information on 203 countries. However, like Economy.com, forecasts for the key variables are spotty. An interesting feature of the Global Insight information is risk ratings on six different dimensions (security, tax, legal, economic, political and operational) as well as an overall risk measure. The scale is one to five with five being the highest risk. Global Insight has 11 years of historical data on the risk measures through 2010. What is included in each risk category is obvious except for operational risk, which includes corruption, quality of the transportation system, and the quality of the telecommunications system. It is interesting to note that there is a high degree of correlation between Global Insight's measure of GDP per capita and the risk measures. If you correlate GDP per capita in the 50 countries with each of the risk measures you get correlations ranging from -0.80 for the all risk category to -0.65 for the economic risk category. With these correlations, it appears that there is a limited amount of independent information in these measures. However, GDP per capita and risk have huge variability across countries and some countries with high forecast GDP growth have very low GDP per capita. The best example is India which still has very high birth rates relative some of the more developed countries and even a competitor like China with its one child policy.

Table 8 shows Global Insight's average annual forecast for key economic variables for the five year period from 2011 to 2015[6], while Tables 9 and 10 show the values for the risk variables for 2010 and change in these variables over the past five years. While we use the risk level in our forecast, the change in risk level gives us an indication of what the trend has been in risk over the last five years. For example, we see from the tables that risk has increased substantially for Spain over the past five years while it has dropped substantially for Indonesia. It is also interesting to note that the overall risk numbers for the United States and the United Kingdom are higher than one might expect due to relatively high security risk related to a high terrorism threat. However, we see that the security risk numbers for both countries have improved over the last five years.

[6] Note that there is missing data in the forecast from Global Insight that is presented in Table 8. We are currently working with Global Insight to complete this data.

Table 8: Forecast for Key Variables 2011-2015

Country	GDP Per Capita (Thousands of US $)	GDP Growth	Employment Growth	Population Growth	Change in CPI
Argentina	10.72	8.19		0.94	10.42
Australia	66.27	5.71	0.74	0.96	2.89
Austria	49.14	4.85	0.94	0.18	1.93
Belgium	48.46	4.98	0.24	0.18	1.92
Brazil	13.01	11.67	1.71	1.11	4.14
Canada	50.78	3.42	1.57	0.84	2.01
Chile	15.09	9.76		0.92	3.17
China	6.81	18.61		0.55	3.51
Colombia	6.90	8.63	0.95	1.15	4.33
Costa Rica	9.08	8.01		1.34	6.30
Czech Republic	23.60	9.09	1.55	-0.08	2.46
Denmark	62.86	5.15	0.07	0.14	1.82
Egypt	3.47	9.52	2.16	1.64	6.61
Finland	51.35	6.52	0.57	0.24	1.85
France	45.56	5.72	0.90	0.40	1.85
Germany	44.45	4.58	0.44	-0.13	1.42
Greece	28.75	4.23	0.37	0.11	1.82
Hong Kong	35.80	7.14	1.44	0.87	2.57
Hungary	15.45	8.04	0.37	-0.31	3.40
India	1.90	15.77	2.35	1.33	6.10
Indonesia	3.77	10.82	1.91	1.00	5.43
Ireland	48.00	5.32	2.04	1.23	1.91
Israel	35.48	7.67	1.61	1.43	2.70
Italy	37.61	4.39	0.54	0.00	1.90
Japan	47.75	3.89	0.14	-0.16	0.17
Malaysia	10.63	10.50	2.07	1.50	2.86
Mexico	10.62	5.73		0.99	3.65
Netherlands	49.73	5.43	0.24	0.15	2.07
New Zealand	34.88	3.89	0.82	0.80	2.74
Norway	98.33	6.65	0.55	0.61	1.91
Peru	6.26	7.88	2.71	1.27	1.98
Philippines	2.55	10.56	2.32	1.70	4.55
Poland	16.16	10.88	0.37	-0.16	3.12
Portugal	22.56	4.55	0.20	0.17	1.88
Russia	14.26	10.94	0.36	-0.55	5.95
Saudi Arabia	21.22	10.11		2.09	4.08
Singapore	61.66	8.94	1.07	0.96	2.15
South Africa	8.74	6.98	1.55	0.40	4.88
South Korea	28.42	10.72	1.05	0.20	2.96
Spain	33.26	4.50	0.89	0.42	1.88
Sweden	56.96	6.97	1.00	0.42	1.78
Switzerland	77.02	3.73	1.18	0.35	1.11
Taiwan		9.32	1.96		2.01
Thailand	6.16	8.92	0.57	0.51	3.22
Turkey	11.20	9.29	2.85	1.13	5.33
United Arab Emirates	60.51	9.65		2.19	4.28
United Kingdom	45.82	8.55	1.07	0.41	2.29
United States	50.38	4.48	1.36	0.90	1.97
Venezuela	8.93	11.30	0.81	1.52	15.95
Vietnam	1.28	9.75	1.33	1.22	7.34

Table 9: Risk Variables in 2010 and Change over the Last Five Years

Country	Overall Risk 2010	Change in Overall Risk	Security Risk 2010	Change in Security Risk	Tax Risk 2010	Change in Tax Risk	Legal Risk 2010	Change in Legal Risk
Argentina	3.36	0.31	2.75	0.25	2.75	0.25	3.25	0.00
Australia	1.60	0.09	2.00	-0.50	1.75	0.25	1.00	0.00
Austria	1.51	-0.11	1.25	0.00	1.50	0.00	1.25	0.25
Belgium	1.93	0.34	2.00	0.00	1.75	0.00	1.25	0.00
Brazil	2.66	-0.06	3.00	0.00	3.00	0.00	2.50	0.00
Canada	1.40	0.08	1.00	0.00	1.00	0.00	1.00	0.00
Chile	1.74	0.06	2.00	0.00	1.50	0.00	1.50	0.00
China	2.87	0.03	2.50	0.00	3.00	0.00	3.25	0.00
Colombia	2.96	-0.30	3.75	0.00	2.50	0.00	2.75	-0.25
Costa Rica	2.34	0.23	2.00	0.00	2.25	0.25	2.50	0.50
Czech Republic	1.94	-0.13	2.00	0.00	2.00	0.00	2.00	0.00
Denmark	1.51	0.08	1.75	0.50	1.75	0.00	1.00	0.00
Egypt	2.82	-0.06	2.75	0.25	2.50	-0.25	3.00	-0.50
Finland	1.46	0.10	1.00	0.00	1.50	0.00	1.00	0.00
France	1.76	0.10	2.25	-0.25	1.50	0.00	1.50	0.50
Germany	1.59	0.00	1.75	0.00	1.50	0.00	1.25	0.00
Greece	2.67	0.94	3.00	0.50	1.75	0.00	1.75	0.00
Hong Kong	1.75	0.07	1.50	0.00	1.50	0.00	1.50	0.00
Hungary	2.24	0.27	2.25	0.25	2.00	0.25	2.00	0.00
India	2.73	-0.03	3.50	0.25	2.50	0.00	2.50	-0.25
Indonesia	2.76	-0.54	2.75	-1.00	2.50	-0.50	3.25	-0.25
Ireland	1.98	0.63	1.50	0.50	1.25	0.25	1.00	0.00
Israel	2.24	-0.14	3.50	0.00	1.50	0.00	1.00	0.00
Italy	2.20	0.39	2.25	0.00	2.00	0.00	1.75	0.00
Japan	1.76	-0.10	1.75	0.25	2.00	0.25	1.50	0.00
Malaysia	2.39	0.37	2.25	-0.25	2.00	0.50	2.50	0.50
Mexico	2.88	0.51	3.75	0.75	2.25	0.25	2.50	0.00
Netherlands	1.41	-0.03	1.50	-0.25	1.50	0.00	1.00	0.00
New Zealand	1.52	-0.03	1.25	0.00	1.75	-0.25	1.00	0.00
Norway	1.52	0.00	1.50	0.50	1.75	-0.25	1.00	0.00
Peru	2.89	-0.19	3.50	0.00	2.50	0.00	2.50	0.00
Philippines	2.72	-0.11	3.75	0.25	2.75	-0.25	2.25	-0.25
Poland	1.99	-0.13	2.25	0.00	2.00	0.00	1.75	0.00
Portugal	2.06	0.33	1.25	0.00	2.00	0.00	1.50	-0.25
Russia	3.01	0.03	4.00	0.25	2.50	-0.25	2.75	-0.25
Saudi Arabia	2.50	-0.12	3.25	0.00	2.00	0.00	2.50	-0.50
Singapore	1.32	0.00	1.50	0.00	1.00	0.00	1.00	0.00
South Africa	2.37	0.15	3.25	0.00	1.50	0.00	2.00	0.00
South Korea	2.09	-0.01	2.75	0.50	1.75	-0.25	1.50	0.00
Spain	2.31	0.71	2.75	0.25	1.50	0.00	1.50	0.00
Sweden	1.33	-0.22	1.00	0.00	1.50	-0.50	1.00	0.00
Switzerland	1.45	0.13	1.25	0.25	1.25	0.25	1.00	0.00
Taiwan	2.18	0.00	2.00	-0.25	2.50	0.00	1.75	0.25
Thailand	2.97	0.51	3.50	0.75	2.50	0.00	2.50	0.25
Turkey	2.74	0.19	3.50	0.00	2.25	-0.25	2.00	0.00
United Arab Emirates	2.12	0.43	2.25	0.25	1.00	0.00	2.50	0.00
United Kingdom	1.80	0.25	2.50	-0.50	1.75	0.50	1.00	0.00
United States	1.57	-0.03	2.50	-0.50	1.00	0.00	1.00	0.00
Venezuela	3.86	0.33	3.75	0.25	3.25	0.75	3.75	0.00
Vietnam	2.95	-0.11	2.00	0.25	2.75	-0.25	3.25	0.00

Table 10: Risk Variables in 2010 and Change over the Last Five Years

Country	Economic Risk 2010	Change in Economic Risk	Political Risk 2010	Change in Political Risk	Operational Risk 2010	Change in Operational Risk
Argentina	3.75	0.50	3.50	0.25	3.50	0.50
Australia	1.50	0.25	1.75	0.25	1.50	0.00
Austria	1.50	-0.25	1.75	-0.25	1.50	0.00
Belgium	1.75	0.25	2.50	1.00	1.75	0.00
Brazil	2.50	-0.25	2.50	0.00	2.75	0.00
Canada	1.75	0.25	1.50	0.00	1.50	0.00
Chile	1.75	0.00	1.50	-0.25	2.50	1.00
China	2.75	0.25	2.75	0.00	3.00	-0.25
Colombia	2.50	-0.50	3.25	-0.25	3.25	-0.75
Costa Rica	2.75	0.25	2.00	0.25	2.25	0.00
Czech Republic	2.00	0.00	1.75	-0.50	2.00	0.00
Denmark	1.50	0.00	1.50	0.00	1.50	0.25
Egypt	2.75	0.00	3.00	0.25	2.75	-0.25
Finland	1.75	0.25	1.50	0.25	1.50	-0.25
France	1.75	0.00	1.75	0.25	2.00	0.25
Germany	1.50	-0.25	1.75	0.25	1.75	0.00
Greece	3.25	1.50	2.75	1.50	2.75	1.00
Hong Kong	2.00	0.25	2.00	0.00	1.25	0.00
Hungary	2.75	0.50	2.00	0.25	2.00	0.00
India	2.75	0.25	2.50	-0.25	3.00	-0.25
Indonesia	2.75	-0.50	2.50	-0.50	3.00	-0.75
Ireland	3.00	1.50	1.75	0.25	1.75	0.00
Israel	2.00	-0.50	2.75	0.00	2.00	-0.25
Italy	2.75	1.00	2.00	0.50	2.00	0.00
Japan	1.75	-0.75	1.75	0.25	1.75	0.00
Malaysia	2.25	0.00	2.75	1.00	2.25	0.00
Mexico	3.00	1.00	2.75	0.50	3.25	0.25
Netherlands	1.50	0.00	1.50	0.00	1.25	0.00
New Zealand	2.00	0.25	1.25	-0.25	1.25	0.00
Norway	1.75	0.50	1.25	-0.50	1.75	0.00
Peru	2.50	-0.50	3.25	-0.25	3.25	0.00
Philippines	2.50	-0.25	2.75	0.25	2.50	-0.75
Poland	2.00	-0.25	2.00	-0.25	2.00	0.00
Portugal	2.75	0.75	1.75	0.50	2.25	0.25
Russia	3.00	0.25	2.75	0.00	3.50	0.00
Saudi Arabia	2.25	0.25	2.75	-0.25	2.25	-0.25
Singapore	1.50	0.00	1.50	0.00	1.00	0.00
South Africa	2.50	0.25	2.50	0.25	2.25	0.25
South Korea	1.75	0.00	2.50	0.00	2.25	-0.25
Spain	3.00	1.50	2.25	1.00	2.00	0.25
Sweden	1.50	0.00	1.25	-0.50	1.50	0.00
Switzerland	1.75	0.25	1.50	0.00	1.50	0.00
Taiwan	2.00	0.00	2.50	0.00	2.00	0.00
Thailand	2.75	0.50	3.50	1.00	2.75	0.00
Turkey	2.75	0.25	3.00	0.50	2.75	0.25
United Arab Emirates	2.25	1.00	2.00	0.50	2.50	0.50
United Kingdom	2.00	0.50	1.75	0.50	1.50	0.25
United States	1.75	0.25	1.50	0.00	1.50	0.00
Venezuela	4.00	0.50	4.00	0.25	4.25	0.25
Vietnam	3.00	-0.25	3.00	0.00	3.25	-0.25

D. Economy.com versus IHS Global Insight Comparison

It is interesting to compare the five year employment growth and GDP growth forecasts from Economy.com and Global Insight. While we include 50 countries in our group of major countries, we only have 40 common employment growth forecasts and 45 common GDP growth forecasts. For these common countries, the correlation in the employment growth forecasts is 0.59 while the correlation in the GDP growth forecasts in 0.74. This presents an interesting contrast to our MSA level forecast for the United States where the employment growth forecast correlation is typically in the 0.7 to 0.8 range while the correlation in personal income is typically in the 0.2 to 0.4 range.

Table 11 displays Economy.com and Global Insight's versions of historical growth in employment over the past five years as well as their five year forecasts and a column showing the difference in the two forecasts. It is comforting that there is a reasonable correspondence in the historical numbers with differences of more than 1% for only five countries (Colombia, Peru, the Philippines, South Africa, and Turkey) – the correlation is 0.89. This disparity in the historical numbers sometimes carries over to major differences in the forecast. However, some countries with almost identical histories have very different forecasts (see Indonesia and Venezuela, for example).

Table 12 displays the same type of information for GDP growth. We again see a great deal of conformity in the historical numbers – the correlation is 0.96. However, there are six countries that have greater than 1% differences in historical GDP growth rates (Colombia, Hungary, Malaysia, Peru, Singapore, and Thailand). Even though the forecasts are starting from the same historical base in many cases, there are major differences in the forecasts for some countries. In fact, there are five countries where the differences between the GDP growth forecasts are more than 5% (Brazil, Colombia, Japan, Russia, and Venezuela).

Table 11: Employment Growth Forecast Comparison

Country	Economy.com 2006-2010	Global Insight 2006-2010	Economy.com Forecast	Global Insight Forecast	Difference in Forecasts
Argentina	2.47		3.82		
Australia	2.37	1.89	2.00	0.74	1.26
Austria	0.80	1.16	0.35	0.94	-0.59
Belgium	1.10	0.15	0.87	0.24	0.63
Brazil	2.38	2.42	1.49	1.71	-0.22
Canada	1.16	1.18	1.40	1.57	-0.17
Chile	3.31		2.46		
China	0.90		1.29		
Colombia	0.72	2.09	1.83	0.95	0.88
Costa Rica					
Czech Republic	0.14	0.55	0.08	1.55	-1.46
Denmark	-0.33	-0.28	0.83	0.07	0.75
Egypt		3.12		2.16	
Finland	0.27	0.10	-0.24	0.57	-0.82
France	0.34	0.31	0.97	0.90	0.07
Germany	0.74	0.80	0.13	0.44	-0.30
Greece	0.06	0.11	0.50	0.37	0.13
Hong Kong	1.12	1.00	1.76	1.44	0.32
Hungary	-0.83	-0.51	0.48	0.37	0.11
India	2.02	2.46	2.00	2.35	-0.35
Indonesia	2.76	2.55	3.32	1.91	1.41
Ireland	-1.14	-0.52	2.59	2.04	0.55
Israel	2.89	2.96	2.33	1.61	0.71
Italy	0.74	0.27	0.99	0.54	0.45
Japan	-0.38	-0.44	0.13	0.14	-0.01
Malaysia	1.97	2.17	2.29	2.07	0.22
Mexico	1.70		1.10		
Netherlands	1.13	0.28	0.70	0.24	0.45
New Zealand	1.05	0.77	1.77	0.82	0.95
Norway	1.78	1.87	1.02	0.55	0.47
Peru	1.59	2.88	1.60	2.71	-1.11
Philippines	2.48	3.58	2.56	2.32	0.24
Poland	1.61	1.51	0.00	0.37	-0.37
Portugal	-0.07	-0.54	1.16	0.20	0.96
Russia	0.47	0.63	1.58	0.36	1.21
Saudi Arabia					
Singapore	4.62	3.63	0.78	1.07	-0.29
South Africa	1.27	2.28	3.21	1.55	1.66
South Korea	0.89	0.84	1.37	1.05	0.32
Spain	-0.50	-0.48	1.42	0.89	0.53
Sweden	0.83	0.83	0.27	1.00	-0.73
Switzerland	1.48	1.59	0.91	1.18	-0.27
Taiwan	0.91	1.09	1.20	1.96	-0.76
Thailand	1.71	1.57	1.95	0.57	1.38
Turkey	0.92	2.54	3.03	2.85	0.18
United Arab Emirates					
United Kingdom	0.17	0.18	0.69	1.07	-0.39
United States	-0.35	-0.35	1.87	1.36	0.51
Venezuela	2.74	2.77	3.02	0.81	2.21
Vietnam		2.21		1.33	

Table 12: GDP Growth Forecast Comparison

Country	Economy.com 2006-2010	Global Insight 2006-2010	Economy.com Forecast	Global Insight Forecast	Difference in Forecasts
Argentina	15.15	15.22	9.64	8.19	1.46
Australia	11.43	11.83	7.88	5.71	2.17
Austria	4.62	4.83	3.66	4.85	-1.20
Belgium	4.02	4.67	2.04	4.98	-2.93
Brazil	19.08	18.65	5.94	11.67	-5.73
Canada	6.92	7.21	4.48	3.42	1.06
Chile	11.88	11.85	7.29	9.76	-2.47
China	21.09	21.16	17.63	18.61	-0.99
Colombia	7.09	14.77	0.12	8.63	-8.50
Costa Rica		12.34		8.01	
Czech Republic	10.26	10.23	9.73	9.09	0.64
Denmark	4.30	4.25	6.95	5.15	1.80
Egypt		18.18		9.52	
Finland	3.92	4.62	2.15	6.52	-4.37
France	3.61	4.20	3.18	5.72	-2.54
Germany	3.40	3.89	2.63	4.58	-1.95
Greece	4.94	5.58	1.12	4.23	-3.11
Hong Kong	4.59	5.14	7.44	7.14	0.30
Hungary	5.30	4.11	8.51	8.04	0.47
India	14.69	14.36	15.39	15.77	-0.38
Indonesia	19.54	19.90	14.40	10.82	3.58
Ireland	0.83	1.22	5.04	5.32	-0.28
Israel	10.51	10.42	8.82	7.67	1.15
Italy	2.78	3.27	1.83	4.39	-2.56
Japan	3.95	4.08	-1.57	3.89	-5.46
Malaysia	10.52	12.17	10.21	10.50	-0.28
Mexico	4.49	4.78	8.71	5.73	2.98
Netherlands	4.16	4.11	2.63	5.43	-2.80
New Zealand	6.17	5.56	5.96	3.89	2.06
Norway	7.59	7.25	10.77	6.65	4.12
Peru	10.04	14.01	3.13	7.88	-4.75
Philippines	13.87	13.96	10.42	10.56	-0.15
Poland	10.56	10.69	7.73	10.88	-3.15
Portugal	3.33	3.96	2.83	4.55	-1.72
Russia	17.09	16.49	18.05	10.94	7.11
Saudi Arabia		9.16		10.11	
Singapore	8.37	13.03	6.83	8.94	-2.11
South Africa	8.17	8.33	7.52	6.98	0.54
South Korea	4.42	4.62	13.10	10.72	2.38
Spain	4.49	4.92	4.97	4.50	0.47
Sweden	4.14	5.05	5.39	6.97	-1.57
Switzerland	8.22	7.33	4.23	3.73	0.50
Taiwan	3.34	3.18	5.50	9.32	-3.82
Thailand	11.29	13.09	9.18	8.92	0.27
Turkey	9.74	9.62	9.54	9.29	0.25
United Arab Emirates		12.80		9.65	
United Kingdom	0.73	0.55	6.16	8.55	-2.39
United States	2.96	3.03	5.03	4.48	0.55
Venezuela	11.35	10.90	20.49	11.30	9.18
Vietnam		13.09		9.75	

E. GDP Growth Correlations

As stated above, our forecast uses an average of the Economy.com and Global Insight forecast when both are available and the non-missing forecast when only one is available. As a result we have GDP growth statistics for all 50 countries along with historical growth. Since the IPD data only has historical return data for a subset of the countries, it is interesting to repeat the correlation matrix presented in Table 6 for total returns using GDP growth since GDP growth is available for all 50 countries. The correlations in Table 13 were calculated by first computing year over year GDP growth for each country. We then correlated these single year GDP growth numbers over 20 years (1991-2010). We see that some countries are very highly correlated (France and Belgium, for example). However, we see low and even negative correlations in many cases – see the United States where there are only three correlations of 0.5 or better and three negative correlations. This is obviously a strong argument for global diversification by the United States real estate investor. Looking across the entire matrix, one also sees the benefit of diversifying the non-United States exposure across countries. Our approach to global economic diversification is explained in the previously cited companion paper.

Table 13: GDP Growth Correlations for all Countries 1991-2010

Country	Arg	Austr	Aust	Bel	Bra	Can	Chil	Chin	Col	CR	CzR	Den	Egp	Fin	Fr
Argentina	1.00														
Australia	0.17	1.00													
Austria	0.21	0.55	1.00												
Belgium	0.17	0.54	0.99	1.00											
Brazil	0.33	0.47	0.33	0.35	1.00										
Canada	0.32	0.77	0.37	0.37	0.46	1.00									
Chile	0.51	0.45	0.46	0.46	0.73	0.51	1.00								
China	0.28	0.19	0.32	0.29	0.53	0.27	0.40	1.00							
Colombia	0.31	0.34	0.34	0.36	0.68	0.13	0.57	0.19	1.00						
Costa Rica	0.55	0.09	0.24	0.18	0.07	0.12	0.43	0.18	0.15	1.00					
Czech Republic	-0.12	0.44	0.72	0.74	0.56	0.26	0.32	0.46	0.44	-0.13	1.00				
Denmark	0.17	0.64	0.97	0.98	0.39	0.46	0.49	0.26	0.36	0.15	0.76	1.00			
Egypt	0.03	0.05	-0.05	-0.03	0.52	0.02	0.19	0.51	0.36	-0.09	0.47	0.00	1.00		
Finland	0.01	0.60	0.83	0.86	0.45	0.47	0.33	0.17	0.38	-0.04	0.78	0.90	0.12	1.00	
France	0.15	0.56	0.99	0.99	0.31	0.39	0.39	0.28	0.30	0.12	0.75	0.98	-0.03	0.87	1.00
Germany	0.32	0.42	0.93	0.90	0.20	0.25	0.47	0.21	0.29	0.45	0.47	0.86	-0.30	0.65	0.88
Greece	0.21	0.46	0.95	0.95	0.18	0.28	0.37	0.18	0.29	0.18	0.59	0.92	-0.23	0.76	0.95
Hong Kong	0.49	0.00	-0.02	-0.06	0.31	-0.05	0.56	0.18	0.54	0.57	-0.09	-0.06	0.05	-0.26	-0.13
Hungary	-0.06	0.59	0.76	0.76	0.15	0.46	0.21	0.18	0.26	0.06	0.66	0.78	-0.13	0.70	0.79
India	0.16	0.81	0.36	0.39	0.68	0.74	0.47	0.30	0.45	0.01	0.52	0.48	0.44	0.62	0.39
Indonesia	-0.01	0.51	0.12	0.10	0.09	0.43	0.19	0.19	0.08	0.13	0.06	0.13	-0.01	0.02	0.07
Ireland	-0.07	0.39	0.77	0.80	0.15	0.39	0.26	0.11	0.16	-0.04	0.67	0.82	-0.10	0.81	0.82
Israel	0.53	0.25	0.41	0.40	0.63	0.29	0.59	0.39	0.41	0.44	0.30	0.42	0.22	0.40	0.34
Italy	0.16	0.58	0.93	0.93	0.24	0.41	0.37	0.17	0.24	0.09	0.63	0.95	-0.17	0.84	0.96
Japan	0.36	0.21	0.27	0.26	0.09	0.11	0.30	0.08	0.17	0.46	-0.06	0.18	-0.10	0.01	0.17
Malaysia	0.30	0.55	0.39	0.36	0.44	0.52	0.59	0.42	0.40	0.37	0.33	0.40	0.11	0.22	0.32
Mexico	0.27	-0.09	-0.36	-0.42	-0.20	0.14	-0.01	-0.08	0.01	0.40	-0.35	-0.41	-0.11	-0.51	-0.42
Netherlands	0.15	0.50	0.98	0.98	0.28	0.37	0.36	0.28	0.30	0.16	0.75	0.97	-0.06	0.88	0.99
New Zealand	0.04	0.90	0.57	0.59	0.47	0.61	0.43	0.19	0.40	-0.02	0.53	0.65	-0.02	0.62	0.58
Norway	0.13	0.71	0.72	0.72	0.53	0.76	0.56	0.40	0.32	0.14	0.67	0.80	0.12	0.75	0.73
Peru	0.41	0.40	0.51	0.50	0.55	0.30	0.67	0.03	0.66	0.41	0.25	0.53	-0.08	0.47	0.45
Philippines	0.22	0.63	0.43	0.40	0.46	0.45	0.55	0.37	0.51	0.38	0.42	0.46	0.34	0.34	0.37
Poland	0.40	0.29	0.64	0.62	0.53	0.34	0.59	0.37	0.46	0.48	0.44	0.63	-0.07	0.59	0.58
Portugal	0.20	0.38	0.94	0.93	0.14	0.24	0.41	0.18	0.21	0.30	0.56	0.91	-0.19	0.74	0.92
Russia	0.26	0.16	-0.02	-0.05	0.26	0.20	0.17	0.02	0.34	0.16	-0.15	-0.07	-0.40	-0.05	-0.08
Saudi Arabia	0.39	0.60	0.26	0.23	0.42	0.83	0.51	0.33	0.20	0.28	0.18	0.33	0.04	0.25	0.24
Singapore	0.43	0.47	0.39	0.37	0.61	0.40	0.75	0.32	0.67	0.48	0.28	0.38	0.11	0.24	0.30
South Africa	0.45	0.70	0.52	0.55	0.36	0.66	0.57	0.16	0.14	0.11	0.19	0.56	-0.15	0.41	0.53
South Korea	0.03	0.53	0.23	0.22	0.21	0.51	0.45	0.05	0.20	0.23	0.08	0.26	-0.16	0.15	0.16
Spain	0.12	0.53	0.89	0.89	0.15	0.48	0.30	0.18	0.12	0.05	0.57	0.91	-0.19	0.82	0.93
Sweden	0.14	0.76	0.78	0.78	0.36	0.65	0.47	0.10	0.17	0.17	0.52	0.86	-0.11	0.81	0.80
Switzerland	0.11	0.61	0.89	0.88	0.44	0.36	0.39	0.26	0.34	0.20	0.72	0.88	0.05	0.82	0.87
Taiwan	0.38	0.34	0.21	0.18	0.27	0.35	0.67	0.15	0.30	0.56	0.00	0.21	0.03	-0.04	0.11
Thailand	0.27	0.64	0.55	0.51	0.40	0.44	0.57	0.32	0.42	0.40	0.34	0.52	-0.02	0.31	0.46
Turkey	0.19	0.52	0.51	0.51	0.50	0.65	0.54	0.66	0.08	0.16	0.44	0.51	0.14	0.42	0.51
United Arab Emirates	0.24	0.54	0.33	0.32	0.51	0.85	0.48	0.42	0.23	0.09	0.39	0.40	0.25	0.42	0.33
United Kingdom	0.08	0.58	0.55	0.57	0.23	0.61	0.44	-0.05	0.23	0.15	0.39	0.66	-0.13	0.69	0.59
United States	0.17	0.16	0.10	0.12	0.19	0.44	0.36	-0.04	0.26	0.13	0.23	0.19	0.15	0.21	0.11
Venezuela	0.38	-0.21	0.20	0.23	0.26	0.08	0.29	0.42	0.38	0.07	0.18	0.17	0.32	0.22	0.20
Vietnam	0.39	0.06	0.42	0.39	0.42	-0.08	0.47	0.45	0.59	0.36	0.42	0.34	0.19	0.13	0.32

Table 13: GDP Growth Correlations for all Countries 1991-2010 (Continued)

Country	Ger	Gre	HK	Hn	Ind	Indn	Ire	Isl	Ity	Jpn	Mal	Mex	Net	NZ	Nor
Argentina															
Australia															
Austria															
Belgium															
Brazil															
Canada															
Chile															
China															
Colombia															
Costa Rica															
Czech Republic															
Denmark															
Egypt															
Finland															
France															
Germany	1.00														
Greece	0.92	1.00													
Hong Kong	0.16	0.04	1.00												
Hungary	0.64	0.74	-0.08	1.00											
India	0.14	0.19	-0.07	0.41	1.00										
Indonesia	0.12	0.07	0.18	0.11	0.29	1.00									
Ireland	0.65	0.82	-0.14	0.77	0.31	-0.02	1.00								
Israel	0.45	0.34	0.43	0.04	0.29	0.16	0.18	1.00							
Italy	0.86	0.95	-0.10	0.77	0.33	0.06	0.82	0.35	1.00						
Japan	0.40	0.22	0.29	0.00	0.00	0.49	-0.10	0.40	0.06	1.00					
Malaysia	0.40	0.33	0.55	0.36	0.37	0.75	0.21	0.59	0.31	0.50	1.00				
Mexico	-0.25	-0.34	0.47	-0.01	-0.14	0.17	-0.28	-0.19	-0.43	0.14	0.25	1.00			
Netherlands	0.89	0.95	-0.09	0.80	0.35	0.08	0.86	0.39	0.94	0.18	0.34	-0.37	1.00		
New Zealand	0.46	0.53	0.06	0.66	0.73	0.45	0.51	0.18	0.57	0.23	0.52	-0.14	0.55	1.00	
Norway	0.58	0.63	0.02	0.69	0.63	0.39	0.68	0.53	0.74	0.11	0.66	-0.16	0.74	0.63	1.00
Peru	0.59	0.50	0.46	0.27	0.31	0.13	0.24	0.68	0.51	0.24	0.49	-0.17	0.46	0.30	0.55
Philippines	0.37	0.33	0.44	0.28	0.53	0.75	0.21	0.50	0.35	0.37	0.83	0.04	0.37	0.52	0.65
Poland	0.71	0.60	0.34	0.42	0.27	-0.02	0.49	0.77	0.61	0.16	0.46	-0.14	0.64	0.30	0.67
Portugal	0.93	0.95	0.05	0.69	0.15	0.00	0.81	0.41	0.93	0.21	0.31	-0.37	0.94	0.42	0.64
Russia	0.14	0.03	0.36	0.06	0.03	0.18	-0.13	0.17	-0.06	0.26	0.27	0.37	-0.05	0.25	0.01
Saudi Arabia	0.22	0.19	0.22	0.32	0.48	0.50	0.20	0.48	0.29	0.25	0.71	0.31	0.25	0.40	0.76
Singapore	0.46	0.35	0.76	0.26	0.37	0.51	0.19	0.65	0.28	0.49	0.86	0.23	0.31	0.49	0.51
South Africa	0.49	0.50	0.01	0.40	0.53	0.25	0.35	0.20	0.51	0.38	0.34	-0.14	0.46	0.68	0.46
South Korea	0.28	0.19	0.32	0.19	0.34	0.83	0.22	0.28	0.18	0.49	0.76	0.17	0.18	0.58	0.49
Spain	0.80	0.89	-0.25	0.76	0.32	0.05	0.82	0.26	0.96	0.00	0.24	-0.42	0.92	0.47	0.75
Sweden	0.70	0.74	-0.09	0.65	0.56	0.20	0.72	0.45	0.88	0.08	0.42	-0.35	0.78	0.64	0.84
Switzerland	0.79	0.75	-0.16	0.65	0.49	0.16	0.54	0.44	0.79	0.32	0.34	-0.44	0.85	0.59	0.68
Taiwan	0.31	0.18	0.69	0.08	0.15	0.50	0.08	0.48	0.12	0.59	0.76	0.35	0.12	0.30	0.40
Thailand	0.59	0.46	0.43	0.35	0.38	0.77	0.21	0.45	0.43	0.57	0.85	0.07	0.45	0.61	0.58
Turkey	0.41	0.43	0.02	0.50	0.45	0.12	0.45	0.29	0.45	0.16	0.39	-0.06	0.48	0.50	0.62
United Arab Emirates	0.18	0.23	0.06	0.36	0.58	0.49	0.38	0.46	0.32	0.14	0.66	0.18	0.35	0.39	0.82
United Kingdom	0.47	0.59	0.03	0.69	0.52	-0.04	0.79	0.20	0.68	-0.17	0.23	-0.05	0.60	0.56	0.65
United States	0.03	0.13	0.30	0.27	0.27	0.01	0.50	0.15	0.12	-0.07	0.29	0.45	0.17	0.19	0.37
Venezuela	0.16	0.22	0.14	-0.01	0.00	-0.11	0.19	0.44	0.15	0.08	0.15	-0.10	0.24	-0.25	0.24
Vietnam	0.47	0.44	0.71	0.18	-0.07	0.22	0.19	0.54	0.25	0.46	0.60	0.14	0.37	0.20	0.26

Table 13: GDP Growth Correlations for all Countries 1991-2010 (Continued)

Country	Per	Phil	Pol	Port	Rus	SA	Sing	SAf	SK	Sp	Sw	Swit	Tai	Thai	Tur
Argentina															
Australia															
Austria															
Belgium															
Brazil															
Canada															
Chile															
China															
Colombia															
Costa Rica															
Czech Republic															
Denmark															
Egypt															
Finland															
France															
Germany															
Greece															
Hong Kong															
Hungary															
India															
Indonesia															
Ireland															
Israel															
Italy															
Japan															
Malaysia															
Mexico															
Netherlands															
New Zealand															
Norway															
Peru	1.00														
Philippines	0.52	1.00													
Poland	0.73	0.38	1.00												
Portugal	0.51	0.33	0.66	1.00											
Russia	0.29	0.02	0.33	-0.14	1.00										
Saudi Arabia	0.44	0.56	0.47	0.18	0.25	1.00									
Singapore	0.66	0.74	0.55	0.32	0.45	0.51	1.00								
South Africa	0.29	0.25	0.17	0.43	0.09	0.41	0.34	1.00							
South Korea	0.29	0.70	0.23	0.18	0.28	0.53	0.66	0.37	1.00						
Spain	0.44	0.28	0.56	0.89	-0.13	0.33	0.16	0.49	0.15	1.00					
Sweden	0.57	0.48	0.59	0.77	-0.06	0.51	0.37	0.57	0.37	0.86	1.00				
Switzerland	0.54	0.42	0.59	0.74	0.03	0.27	0.32	0.47	0.19	0.74	0.73	1.00			
Taiwan	0.43	0.65	0.32	0.26	0.08	0.58	0.75	0.35	0.71	0.05	0.30	0.09	1.00		
Thailand	0.53	0.85	0.43	0.42	0.33	0.51	0.81	0.43	0.79	0.35	0.49	0.54	0.64	1.00	
Turkey	0.13	0.24	0.40	0.41	0.12	0.52	0.36	0.58	0.22	0.48	0.52	0.41	0.31	0.32	1.00
United Arab Emirates	0.32	0.58	0.42	0.21	0.13	0.89	0.49	0.34	0.52	0.39	0.52	0.29	0.44	0.47	0.58
United Kingdom	0.39	0.26	0.47	0.61	-0.02	0.37	0.31	0.45	0.26	0.67	0.78	0.38	0.24	0.18	0.46
United States	0.07	0.23	0.24	0.15	0.03	0.41	0.35	0.10	0.33	0.12	0.24	-0.13	0.44	0.07	0.24
Venezuela	0.29	0.15	0.41	0.22	-0.01	0.20	0.22	-0.08	-0.13	0.23	0.00	0.04	0.06	-0.02	0.16
Vietnam	0.42	0.49	0.50	0.38	0.31	0.19	0.70	0.05	0.25	0.09	0.06	0.28	0.51	0.55	0.21

Table 13: GDP Growth Correlations for all Countries 1991-2010 (Continued)

Country	UAE	UK	US	Ven	Viet
Argentina					
Australia					
Austria					
Belgium					
Brazil					
Canada					
Chile					
China					
Colombia					
Costa Rica					
Czech Republic					
Denmark					
Egypt					
Finland					
France					
Germany					
Greece					
Hong Kong					
Hungary					
India					
Indonesia					
Ireland					
Israel					
Italy					
Japan					
Malaysia					
Mexico					
Netherlands					
New Zealand					
Norway					
Peru					
Philippines					
Poland					
Portugal					
Russia					
Saudi Arabia					
Singapore					
South Africa					
South Korea					
Spain					
Sweden					
Switzerland					
Taiwan					
Thailand					
Turkey					
United Arab Emirates	1.00				
United Kingdom	0.43	1.00			
United States	0.54	0.61	1.00		
Venezuela	0.36	0.06	0.21	1.00	
Vietnam	0.18	-0.04	0.20	0.35	1.00

F. Back Testing the GDP Forecasts

We first purchased forecasts from both Economy.com and Global Insight in December 2007 and so 2008/2009 was a two year out forecast in 2007. Our most recent data download is December 2010 from both Global Insight and Economy.com and so we can now look back at what actually happened in 2008 and 2009 and compare it to the predictions made in 2007. We wanted to do the back test for both GDP and employment growth. However, as in the United States, there is a long lag in corrections to the employment series. As a result, there is still too much disagreement between the two services for what actually happened to employment across our set of countries in 2008/2009. It is an entirely different story for GDP growth. While it is apparent in the table that follows that there are some differences in the "actual" 2008/2009 numbers, the correlation between the two series is 0.99. This makes a back test of forecasts for GDP growth possible. The following table first presents the average 2008/2009 forecast for GDP growth from the two services – it is this average that is used in our forecasts. This is followed by actual growth in 2008/2009 and then a column showing the deviation between actual and forecast. We then present data for Global Insight and Economy.com separately for the 25 largest countries in terms of GDP.[7]

Table 14: Back Testing GDP Growth

Country	Statistics for Average of the Two Forecasts			Statistics for Global Insight			Statistics for Economy.com		
	Forecast	Actual	Diff	Forecast	Actual	Diff	Forecast	Actual	Diff
Australia	9.78	2.20	7.58	10.72	1.86	8.86	8.85	2.55	6.30
Belgium	7.89	1.73	6.16	7.89	1.70	6.19		1.76	
Brazil	11.57	8.24	3.33	17.08	7.90	9.18	6.06	8.59	-2.53
Canada	5.42	-2.75	8.16	6.97	-2.75	9.71	3.87	-2.75	6.62
China	22.62	20.14	2.48	24.98	19.82	5.16	20.26	20.46	-0.19
France	5.96	1.44	4.52	7.71	1.43	6.28	4.21	1.46	2.75
Germany	4.15	0.32	3.82	7.01	0.29	6.71	1.29	0.35	0.93
India	16.78	3.57	13.21	14.81	3.23	11.58	18.76	3.92	14.84
Indonesia	11.58	12.00	-0.42	10.91	12.00	-1.09	12.25	12.00	0.25
Italy	4.11	0.30	3.81	6.60	0.28	6.33	1.62	0.32	1.30
Japan	10.89	7.67	3.22	11.93	7.67	4.26	9.86	7.68	2.18
Mexico	4.97	-6.62	11.59	4.46	-6.73	11.18	5.48	-6.52	11.99
Norway	7.21	0.05	7.16	11.28	-0.04	11.32	3.13	0.13	3.00
Poland	9.74	2.96	6.78	16.31	2.87	13.44	3.16	3.04	0.12
Russia	14.10	1.10	13.01	14.93	1.00	13.93	13.27	1.19	12.08
Saudi Arabia	12.11	1.35	10.75	12.11	1.35	10.75			
South Korea	7.03	-10.71	17.73	6.20	-10.87	17.07	7.85	-10.55	18.40
Spain	6.05	1.23	4.82	8.82	1.22	7.60	3.28	1.23	2.04
Sweden	6.85	-5.53	12.39	11.23	-5.66	16.89	2.47	-5.41	7.88
Switzerland	7.96	6.89	1.07	8.71	6.89	1.82	7.21	6.88	0.32
Taiwan	9.16	-1.73	10.89		-1.67		9.16	-1.78	10.94
Turkey	12.14	-1.58	13.72	18.36	-1.64	20.00	5.91	-1.53	7.44
United Kingdom	4.77	-11.76	16.52	6.13	-11.83	17.96	3.40	-11.69	15.09
United States	4.46	0.22	4.24	4.12	0.22	3.90	4.79	0.22	4.57

[7] The 2008-2009 GDP forecasts for the Netherlands from Economy.com had an error due to problems with a conversion from Euros. Thus, we do not use the Netherlands in the table even though it is the 16th largest country in terms of GDP.

Note that Global Insight did not have a forecast for Taiwan in 2007 – they do now. Note also that Economy.com did not have statistics for either Belgium or Saudi Arabia but they have added Belgium within the last year. The correlations of forecast to actual are as follows:

Average forecast:	0.68
Global Insight:	0.64
Economy.com	0.58

Note that the correlation of actual to forecast when done for either Economy.com or Global Insight only uses their particular version of actual; however, as stated earlier, the actual GDP growth is highly correlated across the two services. We get the comforting result that the average of the two forecasts gives better results than using either forecast separately. This validates our forecasting strategy of using multiple sources of information for the important demand side variables. We do see that Economy.com did worse than Global Insight. Economy.com's 2008/2009 forecast was especially poor for South Korea, India and the United Kingdom relative to actual 2008/2009 GDP growth When the average of the two forecasts is used, we see that the biggest misses were the three countries listed above plus Turkey and Russia.

Overall, our conclusion is that the GDP forecasts for the top 25 countries in terms of GDP contain valuable information for use in forecasting appreciation returns. However, the GDP growth forecasts for the second 25 countries is substantially worse with only a 0.18 correlation of actual growth to predicted growth. For this reason, we will split our forecast into two groups based on GDP. The Netherlands will be included in the top group since it is the 16th largest country in terms of GDP.

G. Additional Variables from the World Bank and Other Data Sources

In this section we present statistics on other variables from a variety of sources with the World Bank being the source for the majority. We present statistics for several variables that could theoretically impact returns and were included in preliminary versions of the forecasting model. The actual regressions contain a much smaller subset of these variables. The World Bank maintains a database on over 200 countries with over 700 variables which is available at no cost from the World Bank website. While the data set is extensive, it is historical data that is not updated frequently. For example, for many variables, data for 2009 is still not available. In addition, statistics are missing for some countries for some or all of the variables (Taiwan is not in the World Bank database) and so missing values were filled in through the use of an internet search.

Table 15: Additional Variables

Country	Trans (JLL)	Enroll Tertiary	Expend per cap secondary	Fresh Water	Carbon Dioxide Emissions	Change in Dependency Ratio
Argentina	3.30	62.20	19.97	1.92	3.55	-3.62
Australia	1.22	71.84	15.80	3.14	18.00	4.02
Austria	1.71	50.28	26.32	1.89	7.89	1.41
Belgium	1.46	60.79	32.99	0.14	9.88	1.90
Brazil	2.95	22.22	13.14	3.31	1.75	-7.37
Canada	1.23	60.60	20.50	4.44	16.25	2.21
Chile	2.72	45.10	13.02	3.96	3.79	-3.95
China	3.14	15.71	11.50	0.74	2.56	-1.78
Colombia	3.96	28.46	12.55	3.84	1.39	-5.63
Costa Rica	3.32	20.81	17.10	3.20	1.42	-7.47
Czech Republic	2.15	41.05	23.02	0.25	11.40	7.95
Denmark	1.50	70.47	34.72	0.09	9.57	4.48
Egypt	3.62	29.26	11.50	-3.77	1.92	-4.77
Finland	1.53	88.48	31.87	3.01	11.26	7.24
France	1.28	54.60	26.73	1.04	6.15	4.81
Germany	1.38	54.60	21.07	0.26	9.86	1.90
Greece	2.60	75.67	20.95	1.67	8.20	2.35
Hong Kong	1.76	32.39	17.35	-2.49	5.40	-4.34
Hungary	2.33	53.94	23.20	-0.50	5.57	2.96
India	3.11	11.03	16.44	0.07	1.13	-6.44
Indonesia	3.46	16.74	4.90	2.48	1.33	-4.88
Ireland	1.27	55.61	22.26	2.43	10.63	5.96
Israel	2.38	56.09	20.35	-2.26	10.08	-0.05
Italy	1.89	59.22	27.67	1.14	7.46	4.04
Japan	2.30	53.15	22.38	1.22	9.33	11.06
Malaysia	2.30	28.52	15.50	3.08	5.62	-9.64
Mexico	3.14	23.12	14.30	1.31	4.08	-7.27
Netherlands	1.38	56.86	25.31	-0.41	9.02	4.92
New Zealand	1.25	74.54	20.95	4.35	8.52	0.78
Norway	1.75	75.47	28.73	4.40	8.45	-0.56
Peru	4.00	32.39	8.99	4.02	1.03	-6.12
Philippines	3.15	28.73	9.20	1.62	1.01	-5.42
Poland	1.99	60.21	23.54	0.34	8.14	0.50
Portugal	1.82	54.00	34.30	1.27	5.62	1.41
Russia	2.64	71.00	10.00	3.42	9.84	0.13
Saudi Arabia	3.66	26.21	18.31	-2.38	12.70	-15.20
Singapore	1.73	32.00	13.62	-2.04	13.90	-5.12
South Africa	3.11	3.04	17.00	-0.09	7.78	-4.57
South Korea	2.09	88.67	22.02	0.32	8.95	-3.03
Spain	1.58	64.18	23.63	0.96	6.87	5.88
Sweden	1.25	76.38	32.34	2.93	5.52	4.36
Switzerland	1.87	43.27	27.17	1.67	5.70	1.65
Taiwan	2.71	32.00	17.35	1.07	10.00	-4.64
Thailand	3.02	32.00	15.50	1.17	3.46	-4.07
Turkey	2.90	29.06	14.84	1.08	3.07	-7.36
United Arab Emirates	2.93	22.23	7.26	-3.43	32.41	-10.41
United Kingdom	1.24	60.05	23.74	0.86	9.28	2.03
United States	1.25	77.66	23.85	2.20	20.15	1.96
Venezuela	4.18	44.97	8.18	3.26	6.36	-3.81
Vietnam	4.25	9.64	17.26	1.41	0.73	-12.33

Notes

1. Transparency Index (Jones Lang LaSalle) – quantifies real estate market transparency
2. Enrollment in Tertiary Education (World Bank) – gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires as a minimum condition of admission, the successful completion of education at the secondary level.
3. Expenditures Per Capita on Secondary Schools as a Percent of GDP (World Bank)
4. Fresh Water (Gleick) – total renewable fresh water supply in km^3 per year (log per capita)
5. CO2 Emissions (World Bank) – emissions per capita in metric tons
6. Change in the Dependency Ratio (World Bank) – rolling five year change in the ratio of the number of individuals 0 to 14 plus 65 or older to individuals 15 to 64.

H. Spatial Data

We know from our work in the United States that density measures are quite important in distinguishing between longer term appreciation prospects across cities. We also know that measuring density is difficult as metropolitan area boundaries may or may not include surrounding hinterlands. Further, natural boundaries such as lakes and mountains are difficult to factor in properly. Therefore, GRE commissioned an effort to use Geographic Information System ("GIS") technology to better define density in several of the most important cities in each of our 50 countries in addition to developing several alternative climate summaries.[8]

Here we present a table for two density measures: population per square kilometer in a 50 kilometer radius of the city center and percent cropland within a 20 kilometer radius from the city center. The population density measure is similar to what we use in our domestic forecasting model where we have the area in square miles for every county in an MSA and the population in each county. However, boundaries of cities are much less well defined globally and so the radius measure seemed to be the best option. We have density based on a radius of 5, 10, 20, and 50 kilometers. We present statistics on the 50 kilometer radius in the table below because this measure worked the best empirically – it consistently generated statistically more significant results than other radius choices. The second measure that we use is the percent of cropland in the city. We considered several measures such as the percent of impervious surface and percent park land in addition to the cropland measure. We chose the percent cropland variable because we considered it to be the best indicator for buildable land in a city, which theoretically should have a negative effect on long term appreciation since cities with lots of buildable land are less constrained on the supply side. A 20 kilometer radius works best for this variable in terms of statistically significant coefficient estimates in the regression analysis.

[8] Details on the methods along with satellite images that help illustrate the differences across cities and comprehensive statistics on the wide range of measures can be found in "The Geography of Major International Cities: Population, Climate, and Land Use as Indicators of Value for Global Real Estate," by Stephen J. Walsh, 2008.

Table 16 presents statistics for the two density measures. For some countries we have statistics for more than one city, in which case the statistics below represent simple averages. This is clearly not optimal, but our return series are at the country level and so we need a country level summary measure. This summary measure is obviously better in a country where most of the major real estate is concentrated in one dominant city. Overall, the higher Asian densities are striking.

Table 16: Density Measures

Country	Log Pop Density 50 KM Ring	Percent Cropland 20 KM Ring
Argentina	7.94	16.97
Australia	6.52	6.70
Austria	6.08	42.27
Belgium	6.67	55.71
Brazil	7.81	3.79
Canada	7.33	5.61
Chile	6.80	12.24
China	7.30	21.18
Colombia	6.88	25.77
Costa Rica	5.76	18.87
Czech Republic	5.86	51.06
Denmark	6.75	7.61
Egypt	7.88	32.40
Finland	6.38	10.29
France	6.76	34.25
Germany	6.64	31.30
Greece	7.01	0.07
Hong Kong	8.40	8.75
Hungary	6.21	31.16
India	8.05	10.97
Indonesia	8.22	0.96
Ireland	6.05	0.00
Israel	6.94	8.98
Italy	6.63	62.25
Japan	8.61	0.14
Malaysia	6.51	5.05
Mexico	7.84	12.64
Netherlands	6.80	53.58
New Zealand	5.89	0.41
Norway	5.57	0.34
Peru	7.44	0.07
Philippines	8.30	4.58
Poland	6.26	34.68
Portugal	6.59	22.37
Russia	7.48	14.43
Saudi Arabia	5.69	0.00
Singapore	7.22	0.55
South Africa	6.85	5.28
South Korea	7.71	11.59
Spain	7.03	4.14
Sweden	6.25	0.89
Switzerland	6.07	35.62
Taiwan	7.64	28.28
Thailand	7.37	4.17
Turkey	8.12	6.52
United Arab Emirates	5.78	0.00
United Kingdom	7.18	5.28
United States	6.73	1.61
Venezuela	6.38	12.24
Vietnam	6.94	29.32

Note that the density is in log form and so the range of the variable is somewhat constrained. However, we do see the very high density measures for many Asian countries with Japan and Hong Kong at the top of the list. In contrast, the percent cropland, proxying for developable land, has a great deal of variability across countries with several European countries high on the

list such as Austria and Belgium. However, it is important to note that in all cases, a country is only represented by its main city or cities in these statistics.

III. Global Forecasting Model and Regression Results

The model has the same basic form as our alternative MSA level model for MSAs with a long time series in NCREIF[9]:

$$R_{ti} = \pi_1 + \pi_2 S_{ti} + \pi_3 D_{ti} + \pi_4 C_i + \pi_5 R_{t-1,i} + \ldots + \pi_k R_{t-m,i} + v_{ti}$$

R_{ti}: annual total return for country i at time t where we use the 23 countries in the IPD database.

S_{ti}: supply side proxy for country i at time t. Possible proxies are population density either for the dominant city in the country or a set of dominant cities or simply country level population density and the percent of cropland within a twenty kilometer radius of the center of the city. We have shown in the United States that density is highly correlated with actual supply side growth – very dense cities such as San Francisco and New York have low supply side growth while Las Vegas has high supply side growth and low population density. Eventually, we hope to get better information on historical construction starts.[10]

D_{ti}: demand side variables in country i at time t. In the United States, we have found that income per capita has a very strong correlation with the relative value of commercial real estate. Unfortunately, forecasting services do a poor job of forecasting income growth at the MSA level. However, at least initially, we will use a closely related variable, GDP growth, as one of our demand side variables in the hope that growth in GDP at the country level will be easier to forecast (we have been told by Economy.com that this is one of their two best international variables). We also use employment growth which is the variable we depend on in the United States and which can be consistently defined across countries

C_i: a set of country dummies that capture unobserved, time invariant differences across countries. Ideally, the model will work so well that these variables will not be significant predictors – our goal as we continue to refine the models will be to make them as insignificant as possible.

$R_{t-1,i}$: annual total return in country i at time t-1. This variable measures momentum in real estate returns.

[9] Please refer to Appendix B for a discussion of research initiated by GRE with various academics on country specific models. This work was an important forerunner to this set of models. They and others will be helpful as we continue to modify the models going forward. Copies of the papers produced from this research are available upon request.

[10] A related problem is we do not know the stock of buildings. However, we have shown in the United States that using population in the city is a reasonable proxy for stock of buildings.

$R_{t-m,i}$: annual appreciation return in country i at time t-m. This set of variables captures additional momentum terms while longer lags capture reversion.

υ_{ti}: error term (represents unobserved factors).

The tables that follow present two sets of regression results for the all property type and one set for the four specific property types – residential, office, retail, and industrial. For the all property type, the first regression includes GDP (ch_gdp_12), employment (ch_emp_12), and population (ch_pop_12) growth along with a set of country level dummy variables. The omitted dummy is the United States and so all dummy coefficients are relative to the United States after controlling for growth in GDP, employment, and population. Country factors that do not change materially through time, such as population density, cannot be included in this regression since they would be perfectly collinear with the country dummies. However, this regression provides us the following information. First of all, it shows us how well the three economic variables do at explaining variation across countries – the ideal result is that these variables would make the country dummies insignificant and we see that they come close to accomplishing this goal with only the dummies for Austria, Germany and Switzerland significant at the 5% level.

We considered all the variables in Table 15 for inclusion in the models and also tried to include GDP per capita as a proxy for wealth. Unfortunately, GDP per capita was not significant even when we used dummies to control for Germany and Norway – two countries that are outliers.[11] The only variable in Table 15 that had explanatory power after we included both GDP and employment growth in each model was the change in dependency ratio which, as expected, had a negative impact on total returns. The lack of significance for the education variables may be due to lack of variation in the set of IPD countries. In the future, we will develop better measures for other World Bank concepts through our work with leading academics in various areas. See the conclusion for more details. In addition, we also tried the spatial variables (Table 16) and included the one with the highest explanatory power in each equation.

It should be noted that the regressions that follow do not include lagged returns to control for momentum and reversion. We made the decision to drop these variables in the present version of the model due to the short time series on some countries – countries such as France and Italy would for all practical purposes drop from the model if these terms were included. We felt that it was more important to maintain as much cross sectional variation as possible in the regressions rather than including country level historical returns. Note that GDP growth includes both GDP growth over the past year and previous year and so it may partly proxy for momentum and reversion in our models. Each year, as we add additional years of returns to the data set, we will revisit this issue. A final point is to note that the sample sizes in these models are much smaller than we have available from NCREIF in the United States (MSA level data). Thus, we get the expected result that t statistics tend to be lower.[12] Finally, not all variables were

[11] Note that using rent data which is available for emerging markets which are not represented in the IPD data may well show the expected importance of wealth.

[12] We are using robust regression methods and so no R^2 is generated for the models. Robust regression methods rather than standard regression methods were used because the results tended to be more stable since robust

significant for all models. If a variable was insignificant but of the theoretically correct sign, we left it in the model because statistical significance at standard levels is harder to obtain with small sample sizes.

regressions down weight the influence of outliers.

Regressions by Property Type

All Property Types

```
Robust regression                                       Number of obs =     293
                                                        F( 25,   267) =    2.84
                                                        Prob > F      =  0.0000

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_emp_12 |   .9724771   .3037034     3.20   0.002      .374519    1.570435
   ch_pop_12 |  -.1638025   1.725027    -0.09   0.924    -3.560188    3.232583
   ch_gdp_12 |   .1786412   .0517661     3.45   0.001     .0767195     .280563
   Australia |  -1.313396   2.461048    -0.53   0.594    -6.158926    3.532134
     Austria |  -7.919732   3.633936    -2.18   0.030    -15.07455   -.7649168
     Belgium |  -6.253849    3.85016    -1.62   0.105    -13.83439    1.326688
      Canada |  -2.682124    2.42025    -1.11   0.269    -7.447326    2.083078
     Denmark |  -1.681451    3.14127    -0.54   0.593    -7.866262    4.503361
     Finland |  -4.265535   3.106519    -1.37   0.171    -10.38193    1.850856
      France |  -.9414319   2.919185    -0.32   0.747    -6.688982    4.806119
     Germany |  -7.466928   3.093096    -2.41   0.016    -13.55689   -1.376966
     Ireland |  -1.702323   2.496804    -0.68   0.496    -6.618251    3.213606
       Italy |  -6.067054   3.557154    -1.71   0.089    -13.07069    .9365851
       Japan |  -2.722565   3.598365    -0.76   0.450    -9.807344    4.362214
 South_Korea |  -1.903754   4.082016    -0.47   0.641    -9.940789    6.133281
 Netherlands |  -1.725413   2.783376    -0.62   0.536     -7.20557    3.754744
  New_Zeland |  -2.157153   2.639699    -0.82   0.415    -7.354426     3.04012
      Norway |  -.8234606   3.034508    -0.27   0.786    -6.798069    5.151148
      Poland |   .8375382   4.133562     0.20   0.840    -7.300985    8.976062
    Portugal |  -2.535141   3.066489    -0.83   0.409    -8.572716    3.502434
South_Africa |   2.046267   2.750741     0.74   0.458    -3.369636     7.46217
       Spain |  -5.671009   3.227133    -1.76   0.080    -12.02487    .6828571
      Sweden |  -2.355492   3.058647    -0.77   0.442    -8.377628    3.666643
 Switzerland |  -6.464055    3.24239    -1.99   0.047    -12.84796   -.0801496
United_Kin~m |   .2042061   2.692509     0.08   0.940    -5.097044    5.505456
       _cons |   9.754292   2.652666     3.68   0.000     4.531488     14.9771
------------------------------------------------------------------------------
```

```
Robust regression                                       Number of obs =     294
                                                        F(  4,   289) =   14.11
                                                        Prob > F      =  0.0000

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_emp_12 |   .7714512   .2630493     2.93   0.004     .2537158    1.289187
   ch_gdp_12 |   .1241968   .0497389     2.50   0.013     .0263004    .2220932
 log_dens_50 |   1.323942     .69696     1.90   0.058    -.0478194    2.695703
ch_depend_~5 |  -.5305266   .1052777    -5.04   0.000    -.7377349   -.3233182
       _cons |  -1.745053   4.817086    -0.36   0.717    -11.22607    7.735967
------------------------------------------------------------------------------
```

Residential

```
Robust regression                                       Number of obs =     161
                                                        F(  2,   158) =    6.07
                                                        Prob > F      =  0.0029

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_pop_12 |   2.618387   1.428779     1.83   0.069    -.2035835    5.440357
       c_20k |  -.0805486   .0294408    -2.74   0.007    -.1386969   -.0224004
       _cons |   9.889714   1.025178     9.65   0.000     7.864893    11.91454
------------------------------------------------------------------------------
```

Office

```
Robust regression                                       Number of obs =     298
                                                        F(  4,   293) =   13.58
                                                        Prob > F      =  0.0000

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_emp_12 |   1.131798   .2883186     3.93   0.000     .5643598    1.699236
   ch_gdp_12 |   .1521361   .0555623     2.74   0.007     .0427843    .2614879
 log_dens_50 |   2.021659   .7718387     2.62   0.009     .5026081    3.540709
ch_depend_~5 |  -.4517781   .1185595    -3.81   0.000    -.6851144   -.2184419
       _cons |  -8.215684    5.30137    -1.55   0.122    -18.64928    2.217908
```

Retail

```
Robust regression                                       Number of obs =     289
                                                        F(  4,   284) =   17.30
                                                        Prob > F      =  0.0000

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_gdp_12 |   .0611782    .047191     1.30   0.196    -.0317103    .1540666
   ch_pop_12 |   3.056498    .824944     3.71   0.000     1.432717    4.680278
 log_dens_50 |   .4133364   .6622721     0.62   0.533    -.8902482    1.716921
ch_depend_~5 |  -.5419393   .1013629    -5.35   0.000    -.7414572   -.3424215
       _cons |    5.46765   4.540807     1.20   0.230    -3.470257    14.40556
------------------------------------------------------------------------------
```

Industrial

```
Robust regression                                   Number of obs =     278
                                                    F(  5,   272) =    7.94
                                                    Prob > F      =  0.0000

------------------------------------------------------------------------------
total_return |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   ch_emp_12 |   .3142514   .3036631     1.03   0.302    -.2835774    .9120803
   ch_gdp_12 |   .0885009   .0512554     1.73   0.085    -.0124068    .1894085
   ch_pop_12 |   2.133936   .9943538     2.15   0.033     .1763278    4.091544
       c_20k |   -.024812   .0264441    -0.94   0.349    -.0768732    .0272492
ch_depend_~5 |  -.3245869   .1174893    -2.76   0.006    -.5558908    -.093283
       _cons |    7.88936   .9863938     8.00   0.000     5.947423    9.831297
------------------------------------------------------------------------------
```

IV. Forecast Rankings by Property Type

The regression results can be used to predict appreciation for the five year period from 2011 to 2015. While we only have IPD data for 23 countries (including the United States), we can produce forecasts for all countries since we have the explanatory variables for all countries. However, it is well known that forecasts tend to be less accurate if they are "out of sample." In other words, the more different the values for the explanatory variables for countries not included in the regressions from countries included in the regressions, the less reliable the forecast. The following table sheds some light on this issue. We present separate statistics for the key explanatory variables (GDP and employment growth) for non-IPD and IPD countries for the past five years and then for the forecast period. We see that GDP and employment growth, as expected, has been higher in the non-IPD countries than the IPD countries over the past five years but the range of values is similar and confidence intervals around the means overlap because of the large standard deviations. The results for employment growth are similar. In the forecast period, we see that non-IPD countries are expected, on average, to have higher growth than IPD countries. However, the range of values for the variables is clearly within the range of values for the IPD countries for the estimation period.

A final point about the value of forecasting for all countries, whether they have IPD data available or not, is that an inspection of our regression results shows that GDP and employment growth are highly significant for all property types except residential. Regression analysis simply gives weights that should be attached to these variables that provide information on their relative importance for the various property types. The fact that we get reasonable weights gives us confidence that our regression results can sort out the winners and losers in our set of 50 countries over the next five years as long as the forecasts for the inputs are accurate. Because our back tests indicate that the forecasts for the top 25 countries[13] in terms of GDP are far more accurate than the second 25 countries, we separate our forecast into two groups.

[13] Being a top 25 country by GDP does not necessarily imply being a top 25 investment prospect. For example, Saudi Arabia is a top 25 country from a GDP perspective, but the large amount of domestic capital suggests that it is unlikely to be an investment target of interest.

Table 17: Comparison of IPD and Non-IPD Countries for GDP and Employment Growth

Variable	Sample Size	Mean	STD Deviation	Min	Max
	Statistics for Non-IPD Countries for the Last Five Years				
GDP Growth	135	11.81	13.03	-37.19	38.42
Employment Growth	135	1.69	2.76	-17.78	14.71
	Statistics for IPD Countries for the Last Five Years				
GDP Growth	115	5.09	10.23	-18.50	25.92
Employment Growth	115	0.62	2.10	-7.88	6.01
	Statistics for Non-IPD Countries for the Forecast Period				
GDP Growth	135	9.64	4.16	-4.43	21.51
Employment Growth	135	1.65	0.88	-1.37	4.03
	Statistics for IPD Countries for the Forecast Period				
GDP Growth	115	5.36	4.28	-5.05	21.99
Employment Growth	115	0.93	0.92	-2.51	5.26

Before presenting the forecast, we first present the inputs to the forecast based on an average of the Economy.com and Global Insight forecasts for GDP, employment and population growth. In the separate sections on Economy.com and Global Insight, we saw that neither service had complete coverage across the 50 countries. The following imputations were used:

1. If GDP, employment or population growth was missing for either Global Insight or Economy.com, we used values for the variables from the provider with a forecast.

2. Employment growth is missing from both services for Costa Rica, Saudi Arabia and the United Arab Emirates. We set employment growth to 50% of population growth for these three countries.

Table 18: Forecast Values for Inputs to the Forecast for 2011-2015

Country	GDP Growth	Emp Growth	Pop Growth	Log Pop Density 50 KM Ring	Percent Cropland 20 KM Ring	Change in the Dependency Ratio
Argentina	8.92	3.82	0.97	7.94	16.97	-3.03
Australia	6.80	1.37	1.05	6.52	6.70	4.73
Austria	4.26	0.65	0.08	6.08	42.27	1.63
Belgium	3.51	0.56	0.10	6.67	55.71	3.19
Brazil	8.80	1.60	1.09	7.81	3.79	-7.68
Canada	3.95	1.48	0.81	7.33	5.61	3.74
Chile	8.53	2.46	0.84	6.80	12.24	-2.66
China	18.12	1.29	0.62	7.30	21.18	-0.35
Colombia	6.57	1.37	1.12	6.88	25.77	-4.42
Costa Rica	8.01	0.67	1.34	5.76	18.87	-6.43
Czech Republic	9.41	0.82	-0.12	5.86	51.06	10.08
Denmark	6.05	0.45	0.18	6.75	7.61	4.87
Egypt	9.52	2.16	1.64	7.88	32.40	-3.77
Finland	4.34	0.17	0.11	6.38	10.29	9.42
France	4.45	0.94	0.44	6.76	34.25	5.64
Germany	3.60	0.29	-0.10	6.64	31.30	1.26
Greece	2.67	0.44	0.07	7.01	0.07	3.65
Hong Kong	7.19	1.52	0.60	8.40	8.75	-0.91
Hungary	8.27	0.42	-0.28	6.21	31.16	4.20
India	15.58	2.18	1.31	8.05	10.97	-6.67
Indonesia	12.61	2.62	1.01	8.22	0.96	-5.29
Ireland	5.18	2.31	1.14	6.05	0.00	6.82
Israel	8.24	1.97	1.50	6.94	8.98	-0.04
Italy	3.11	0.76	-0.09	6.63	62.25	4.58
Japan	1.16	0.13	-0.27	8.61	0.14	11.56
Malaysia	10.35	2.18	1.60	6.51	5.05	-7.80
Mexico	7.22	1.10	1.04	7.84	12.64	-7.36
Netherlands	4.03	0.47	0.27	6.80	53.58	6.01
New Zealand	4.92	1.30	0.85	5.89	0.41	1.85
Norway	8.71	0.79	0.41	5.57	0.34	0.92
Peru	6.21	2.28	1.18	7.44	0.07	-5.87
Philippines	10.49	2.44	1.80	8.30	4.58	-5.79
Poland	9.30	0.18	-0.12	6.26	34.68	3.70
Portugal	3.69	0.68	0.17	6.59	22.37	2.30
Russia	14.49	0.97	-0.52	7.48	14.43	2.62
Saudi Arabia	10.11	1.04	2.09	5.69	0.00	-12.74
Singapore	7.97	0.84	0.82	7.22	0.55	-2.53
South Africa	7.25	2.38	-0.03	6.85	5.28	-3.08
South Korea	11.91	1.21	0.19	7.71	11.59	-2.03
Spain	4.73	1.15	0.14	7.03	4.14	6.05
Sweden	6.18	0.63	0.27	6.25	0.89	6.68
Switzerland	3.98	1.05	0.27	6.07	35.62	2.49
Taiwan	7.41	1.58	0.16	7.64	28.28	-4.19
Thailand	8.92	1.11	0.52	7.37	4.17	-1.95
Turkey	9.41	2.94	1.15	8.12	6.52	-7.00
United Arab Emirates	9.65	1.09	2.19	5.78	0.00	-7.10
United Kingdom	7.36	0.88	0.34	7.18	5.28	3.31
United States	4.76	1.61	0.94	7.82	1.61	2.86
Venezuela	15.90	1.91	1.49	6.38	12.24	-3.17
Vietnam	9.75	1.33	1.22	6.94	29.32	-11.17

These inputs along with the regression coefficients presented above can be used to produce a numeric five year total return forecast for each country. In our domestic work, with the wealth of data available at the city level, this numerical forecast would be the final output from our forecast. However, for the global forecast, where some of the variables are imperfect proxies for underlying concepts and where many high growth countries are also high risk, the numerical forecast cannot be used as a final product. Instead we combine our forecast for total return by country over the next five years with Global Insight's overall risk ranking by country presented above. In order to combine the two sets of numbers we standardize both sets of numbers so that each has a mean of zero and a standard deviation of one. We then create two sets of rankings by taking the standardized total return forecast and subtracting the standardized risk rank using weights of 0.5 and 2.0 for risk. The lower risk measure fits for a world without major disruptions while the higher risk measure would be appropriate for ranking if the global economy hits a major stumbling block such as a trade war or revolution in important countries. The weight of 0.5 emphasizes economic factors while the weight of 2.0 gives much more weight to risk. In portfolio construction, we look at both rankings to structure a set of investments which maximizes risk adjusted return assuming the two scenarios are equally likely. However, this can be changed as appropriate as time unfolds lending an additional portfolio management tool. (See Appendix B for further details.)

We then rank the countries with a "1" indicating the top ranked country. This is done using the all property forecast and then for each of the property type forecasts. Tables 19 and 20 present the results

Table 19: Rankings for a Five Year Forecast with 0.5 Risk Weight

Country	All Property	Residential	Office	Retail	Industrial
Top 25					
Australia	14	3	12	11	7
Belgium	20	23	22	20	21
Brazil	3	7	4	3	3
Canada	9	4	8	7	6
China	11	19	11	16	15
France	22	17	23	19	18
Germany	15	18	16	18	17
India	2	8	3	2	2
Indonesia	4	9	2	5	5
Italy	24	25	24	22	25
Japan	23	12	17	24	22
Mexico	8	13	7	6	10
Netherlands	19	21	19	17	20
Norway	13	5	14	9	8
Poland	17	22	20	21	19
Russia	21	24	21	25	24
Saudi Arabia	7	1	10	1	1
South Korea	5	15	5	12	11
Spain	25	14	25	23	23
Sweden	18	6	18	14	14
Switzerland	12	16	13	13	12
Taiwan	6	20	6	10	13
Turkey	1	10	1	4	4
United Kingdom	16	11	15	15	16
United States	10	2	9	8	9
Second 25					
Argentina	13	22	10	17	16
Austria	17	23	17	15	17
Chile	3	8	4	6	6
Colombia	15	18	15	13	14
Costa Rica	10	10	13	4	5
Czech Republic	24	25	23	25	25
Denmark	18	12	18	18	18
Egypt	6	14	5	9	8
Finland	20	13	20	22	22
Greece	23	20	24	24	24
Hong Kong	2	9	2	7	7
Hungary	22	24	21	23	23
Ireland	25	3	25	19	19
Israel	12	7	11	10	9
Malaysia	5	5	6	3	3
New Zealand	16	4	16	12	11
Peru	9	11	8	11	12
Philippines	4	6	3	5	4
Portugal	19	21	19	21	21
Singapore	1	2	1	2	2
South Africa	11	15	12	14	13
Thailand	14	16	14	16	15
United Arab Emirates	8	1	9	1	1
Venezuela	21	17	22	20	20
Vietnam	7	19	7	8	10

Table 20: Rankings for a Five Year Forecast with 2.0 Risk Weight

Country	All Property	Residential	Office	Retail	Industrial
Top 25					
Australia	7	4	5	6	4
Belgium	15	18	14	14	16
Brazil	16	15	16	17	17
Canada	1	1	1	1	1
China	23	24	23	24	24
France	12	12	13	11	12
Germany	8	11	8	8	8
India	19	19	18	18	18
Indonesia	20	21	19	20	20
Italy	21	23	21	21	22
Japan	13	8	12	16	15
Mexico	22	22	22	22	21
Netherlands	6	9	6	7	7
Norway	5	5	7	2	2
Poland	14	16	15	15	14
Russia	25	25	25	25	25
Saudi Arabia	17	10	20	9	9
South Korea	9	13	9	12	11
Spain	24	14	24	23	23
Sweden	3	2	4	4	3
Switzerland	2	6	2	5	5
Taiwan	10	17	11	13	13
Turkey	18	20	17	19	19
United Kingdom	11	7	10	10	10
United States	4	3	3	3	6
Second 25					
Argentina	24	24	24	24	24
Austria	5	10	5	6	6
Chile	3	6	3	4	3
Colombia	22	22	22	21	21
Costa Rica	10	12	11	10	10
Czech Republic	15	16	16	16	16
Denmark	6	5	6	7	7
Egypt	16	18	15	17	17
Finland	8	4	7	8	8
Greece	23	20	23	23	23
Hong Kong	2	8	2	5	5
Hungary	19	19	19	20	20
Ireland	17	7	17	12	12
Israel	11	9	10	11	11
Malaysia	9	11	9	9	9
New Zealand	4	2	4	3	2
Peru	20	17	18	19	18
Philippines	14	13	12	14	13
Portugal	13	14	14	13	14
Singapore	1	1	1	1	1
South Africa	12	15	13	15	15
Thailand	21	21	21	22	22
United Arab Emirates	7	3	8	2	4
Venezuela	25	25	25	25	25
Vietnam	18	23	20	18	19

While we see some differences by property type, the dominating effect of the GDP and employment growth forecasts[14] for all property types causes more uniform rankings than we see in our domestic work where we have property specific supply side numbers. We also get the expected result that the stable European and Asian countries along with the United States move up in the rankings in Table 20 where risk is given substantially higher weight. Most of these mature economy countries are forecast to have below average GDP and employment growth over the next five years, but they also have substantially lower risk.

V. Conclusion

As in our domestic work, the top-down perspective is critical, but only one element in the investment process. It provides the starting point for discussions with managers on specific opportunities and gives us direction by geography and property type when making overall portfolio allocation decisions. Internationally it is even more critical that we explore these ideas with local market experts, pursue those that survive a rigorous examination, and modify the top-down model to reflect the reality on the ground.

As with our domestic models, we always seek ways to improve the integrity of the econometric work by adding theoretically important explanatory variables and by considering alternative dependent variables such as the CBRE rent series. The continuing research initiatives described In Appendix B will help us systematically evolve the models to the changing international real estate marketplace.

[14] Globally, forecasting employment growth is much harder due to both lower quality data in some countries and to the different sizes of the informal sector. Still, as with all international work, some insight is far better than no insight and our data providers do provide insight on the employment growth dimension.

APPENDIX A: HISTORICAL RETURN RELATIONSHIPS

Figure 1: Capital Return for US versus Several Countries

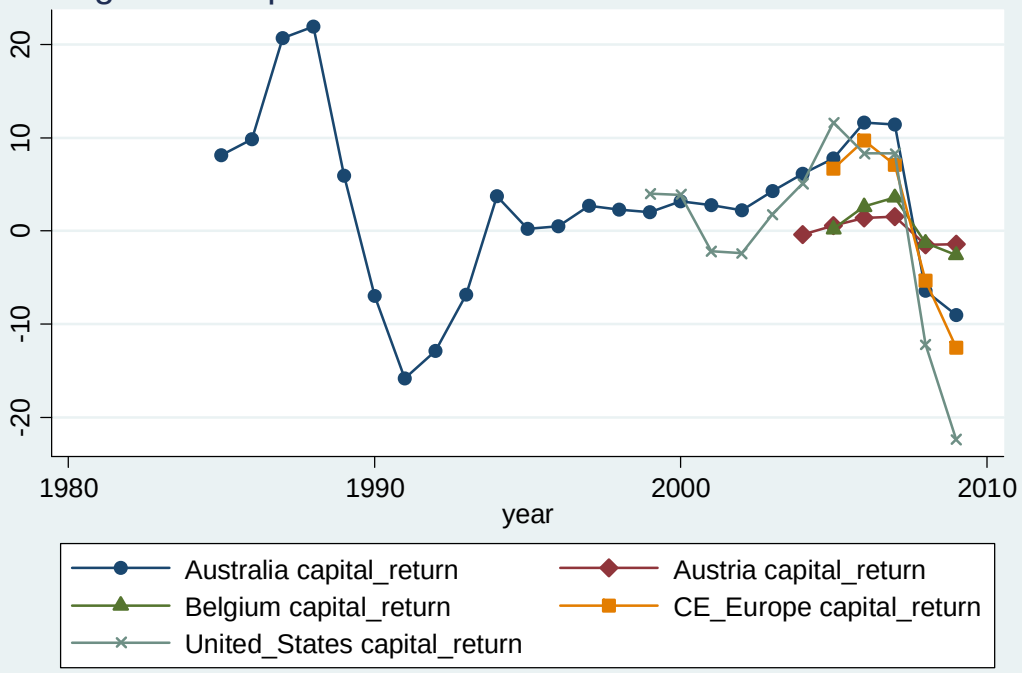
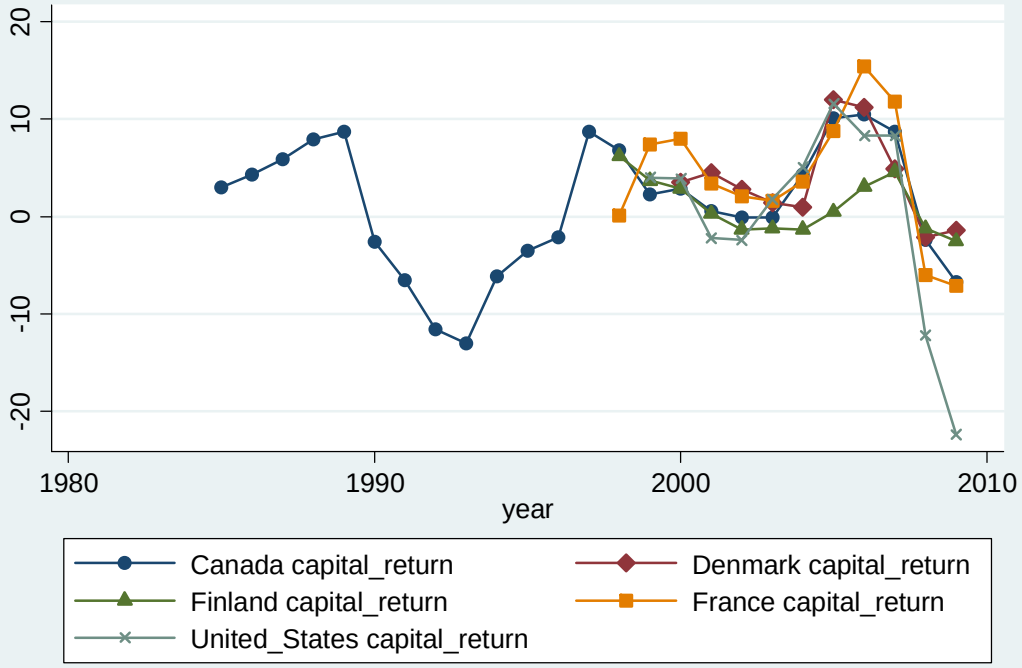


Figure 2: Capital Return for US versus Several Countries



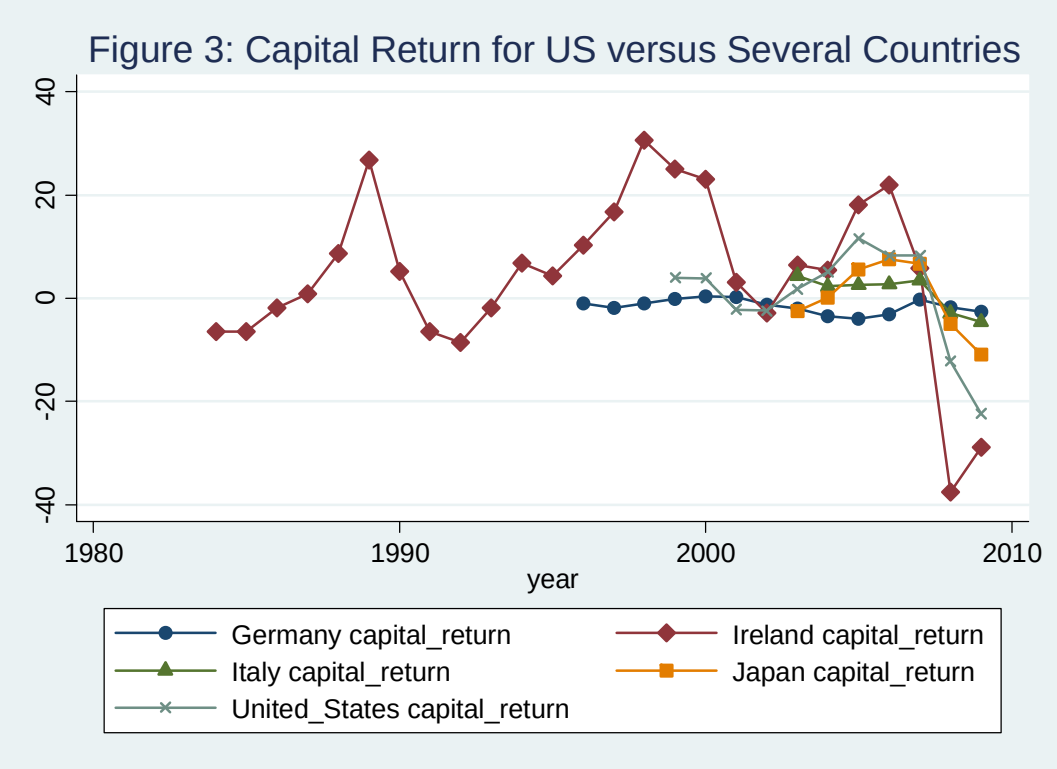


Figure 3: Capital Return for US versus Several Countries
40
20
0
-20
-40
1980
1990
2000
2010
year
Germany capital_return
Ireland capital_return
Italy capital_return
Japan capital_return
United_States capital_return

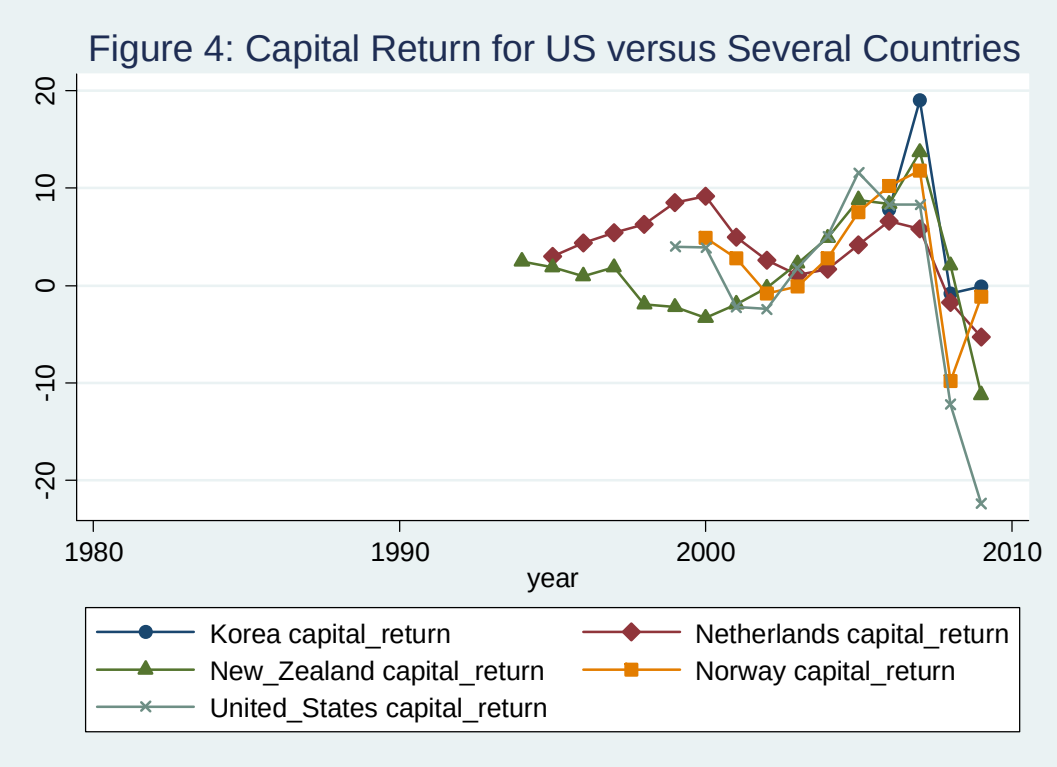


Figure 4: Capital Return for US versus Several Countries
20
10
0
-10
-20
1980
1990
2000
2010
year
Korea capital_return
Netherlands capital_return
New_Zealand capital_return
Norway capital_return
United_States capital_return

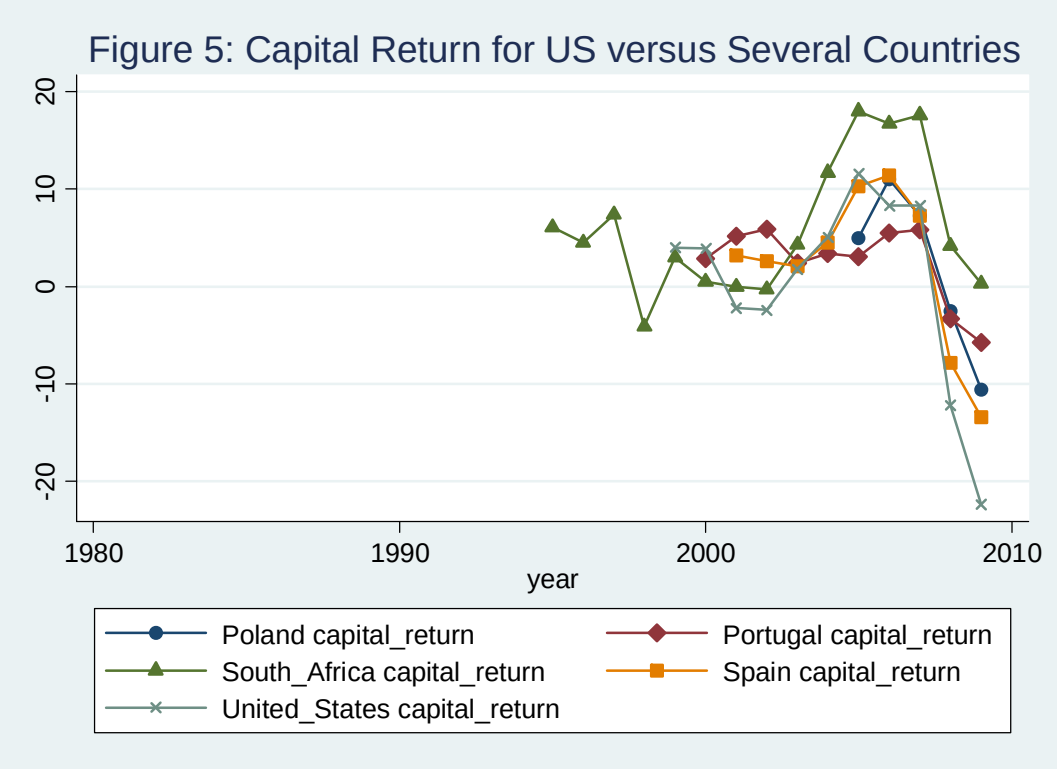


Figure 5: Capital Return for US versus Several Countries
20
10
0
-10
-20
1980
1990
2000
2010
year
Poland capital_return
Portugal capital_return
South_Africa capital_return
Spain capital_return
United_States capital_return

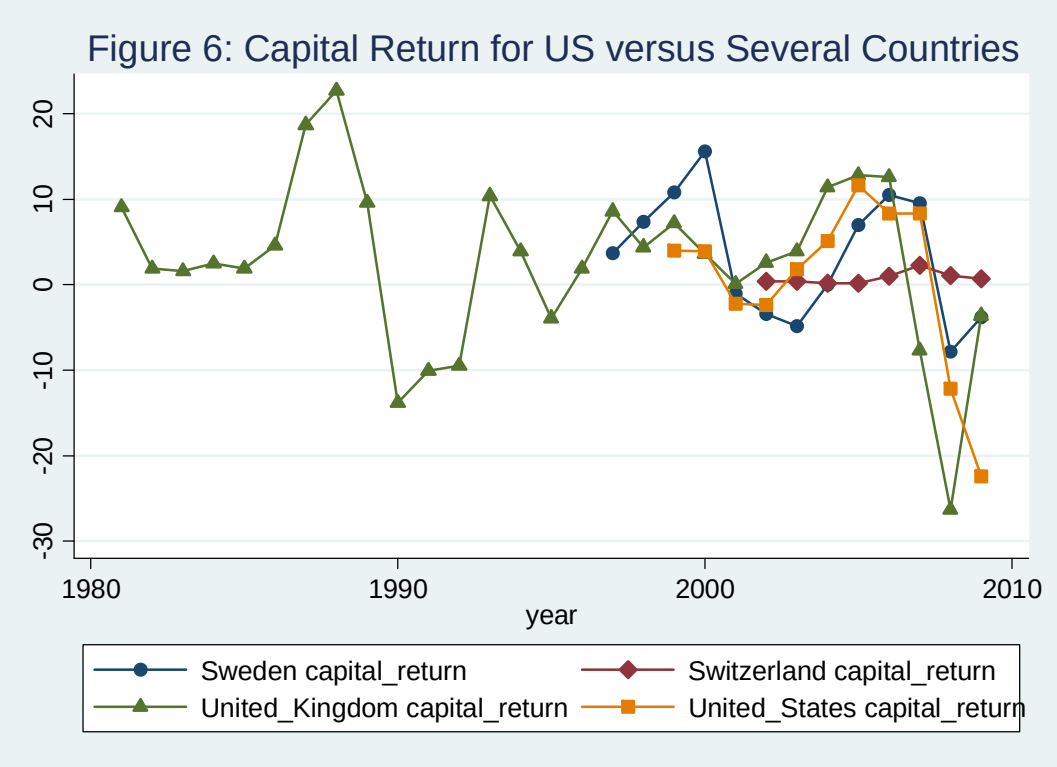


Figure 6: Capital Return for US versus Several Countries
20
10
0
-10
-20
-30
1980
1990
2000
2010
year
Sweden capital_return
Switzerland capital_return
United_Kingdom capital_return
United_States capital_return

Figure 7: Income Return for US versus Several Countries

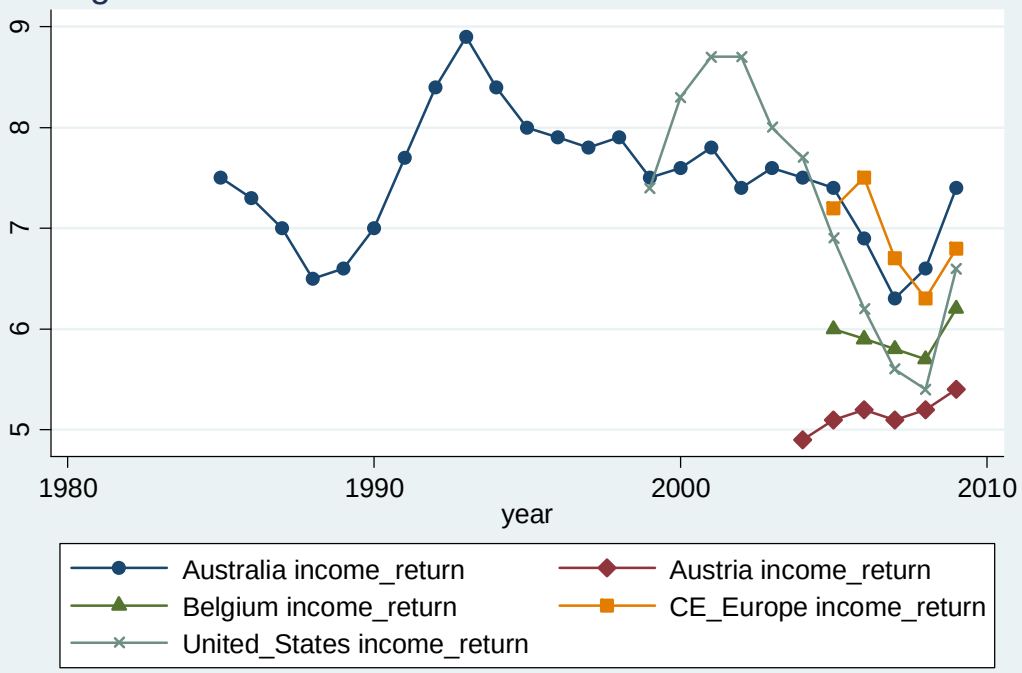


Figure 8: Income Return for US versus Several Countries

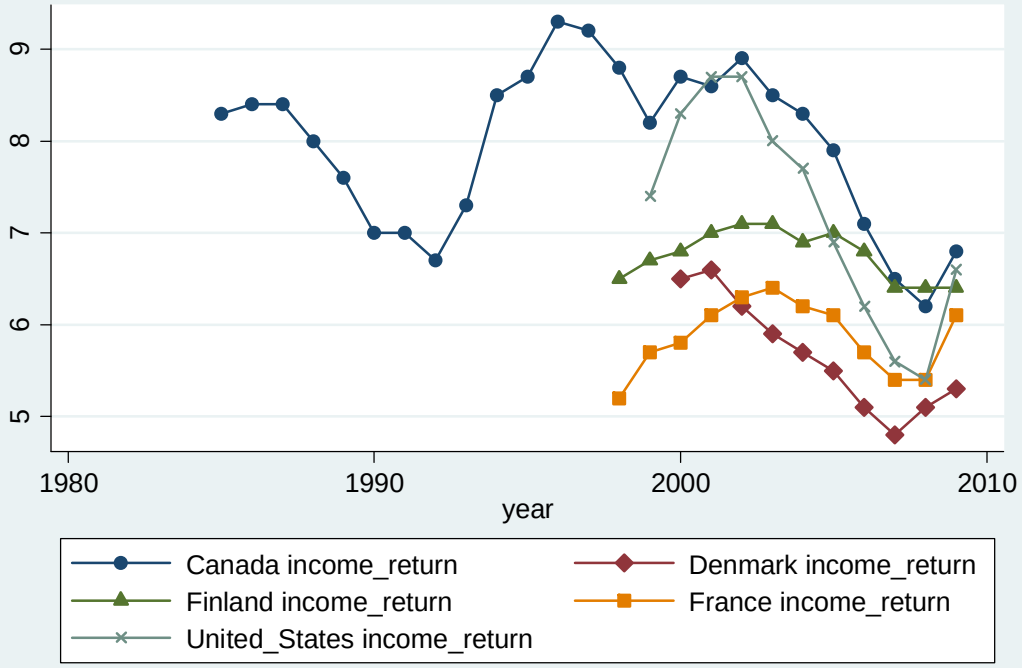


Figure 9: Income Return for US versus Several Countries

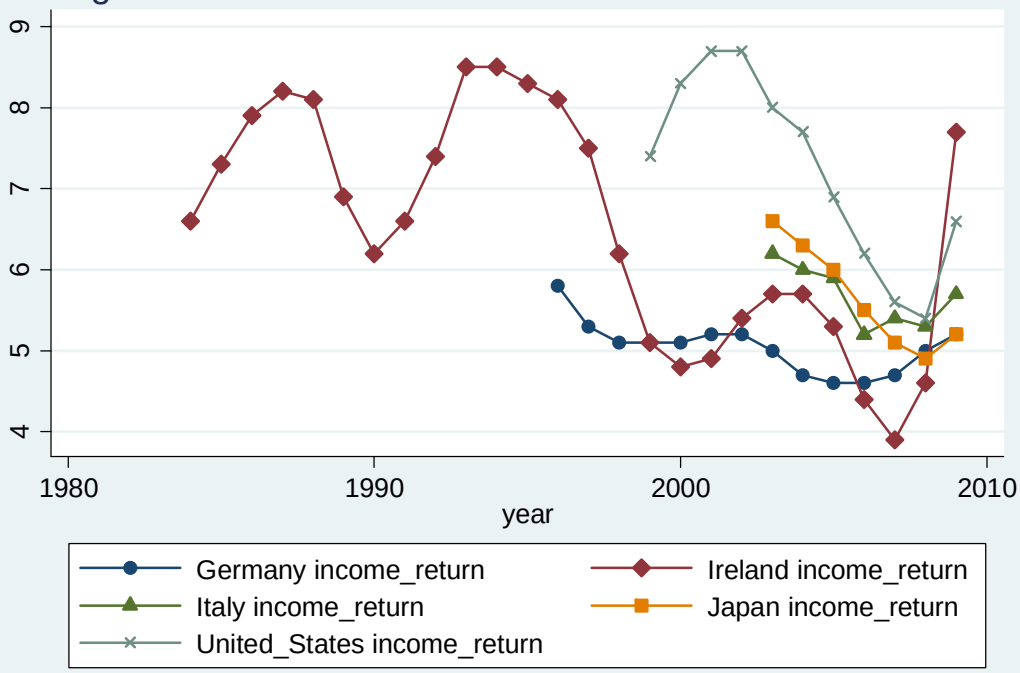


Figure 10: Income Return for US versus Several Countries

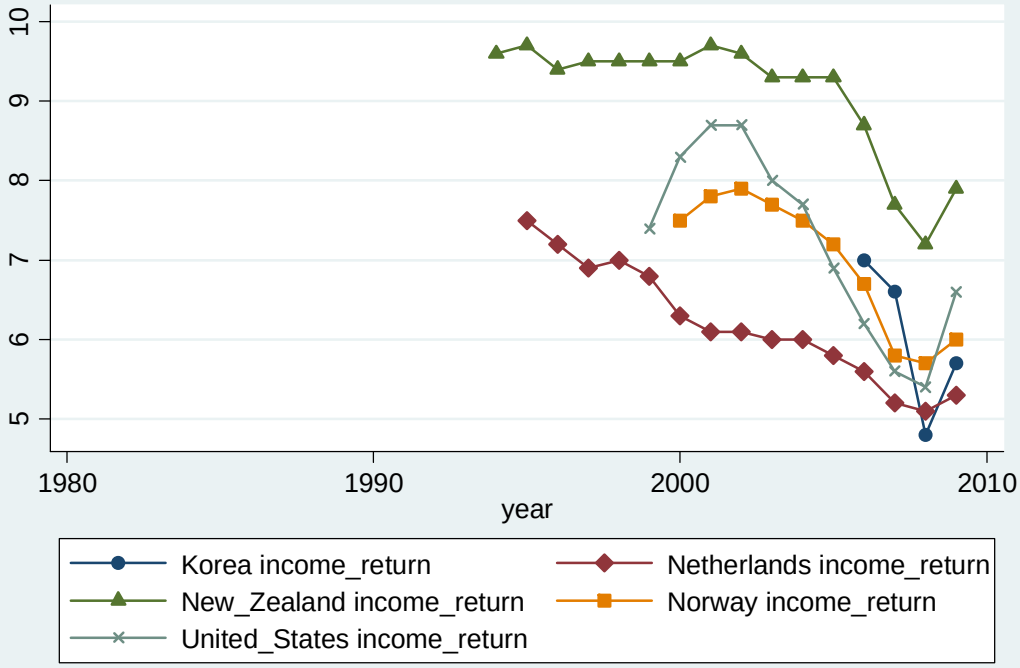


Figure 11: Income Return for US versus Several Countries

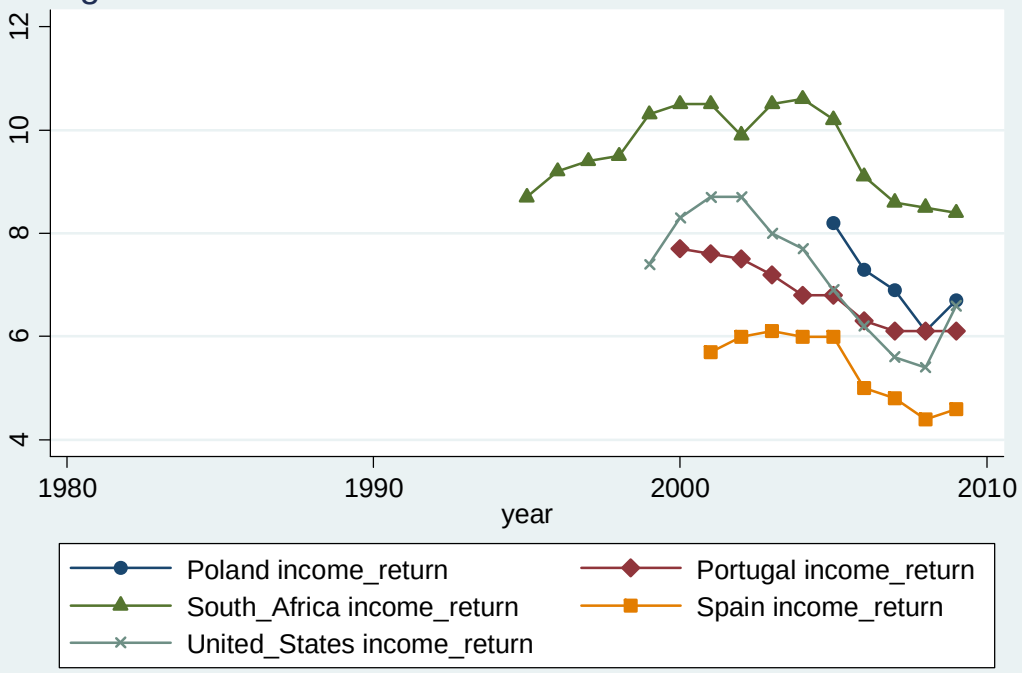


Figure 12: Income Return for US versus Several Countries

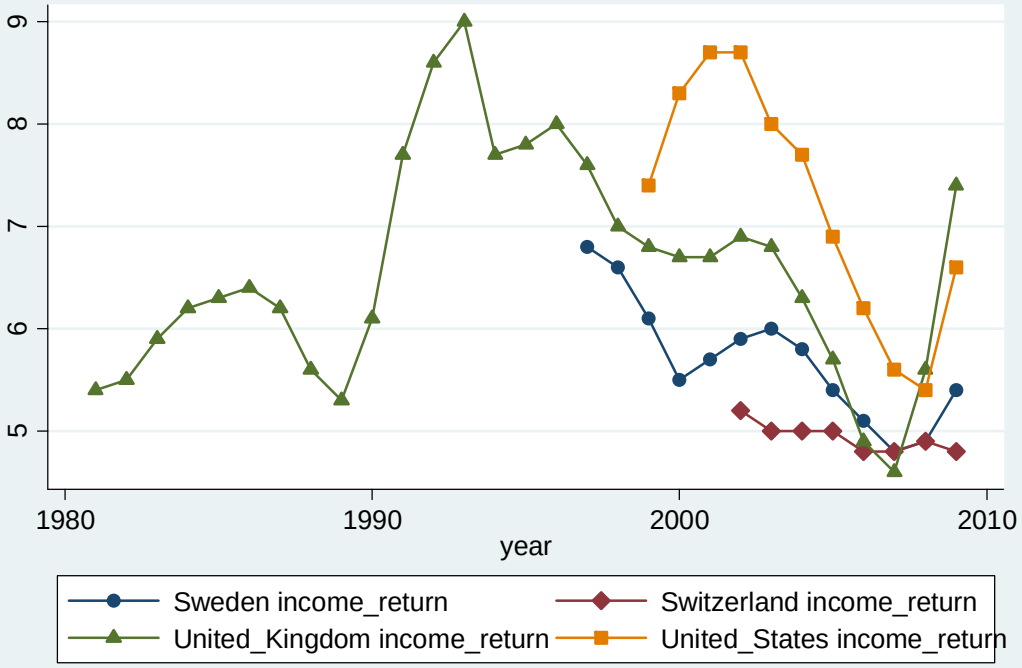


Figure 13:Total Return for US versus Several Countries

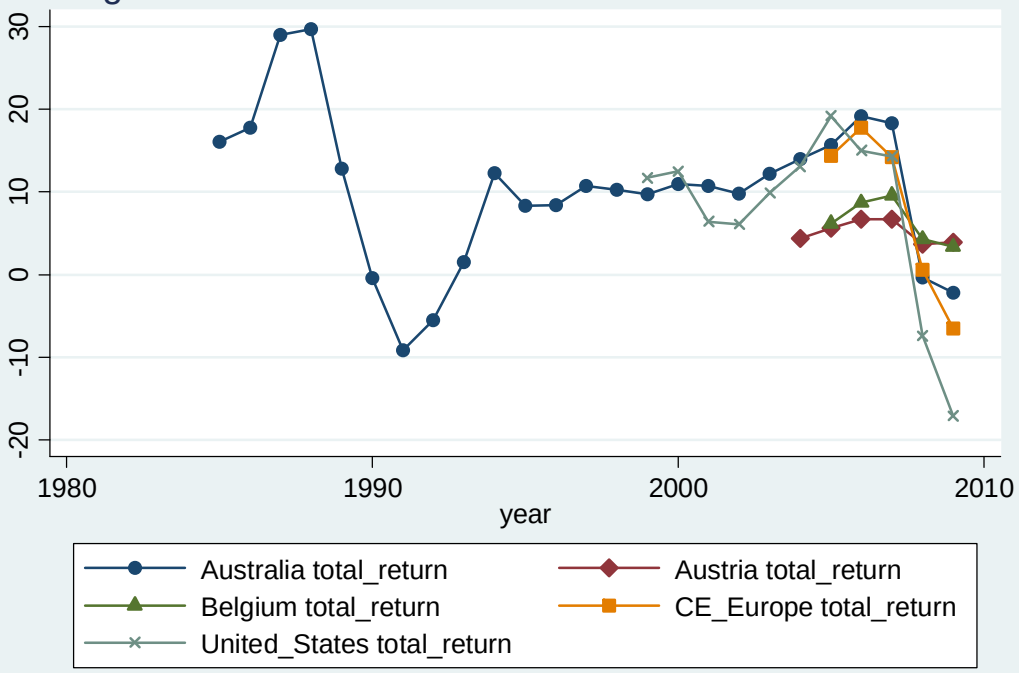


Figure 14:Total Return for US versus Several Countries

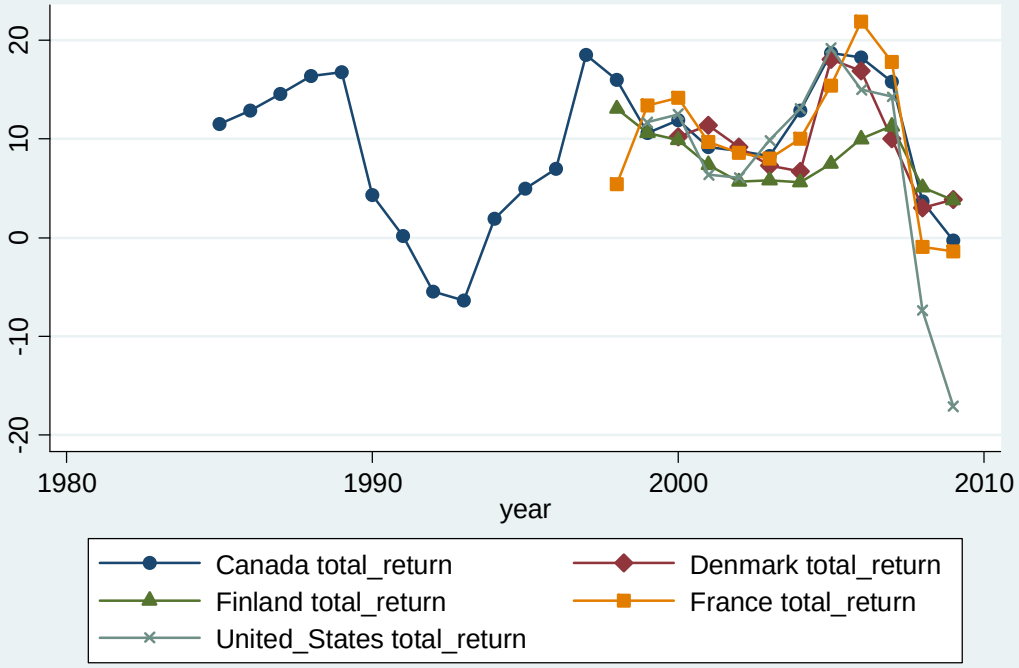


Figure 15:Total Return for US versus Several Countries

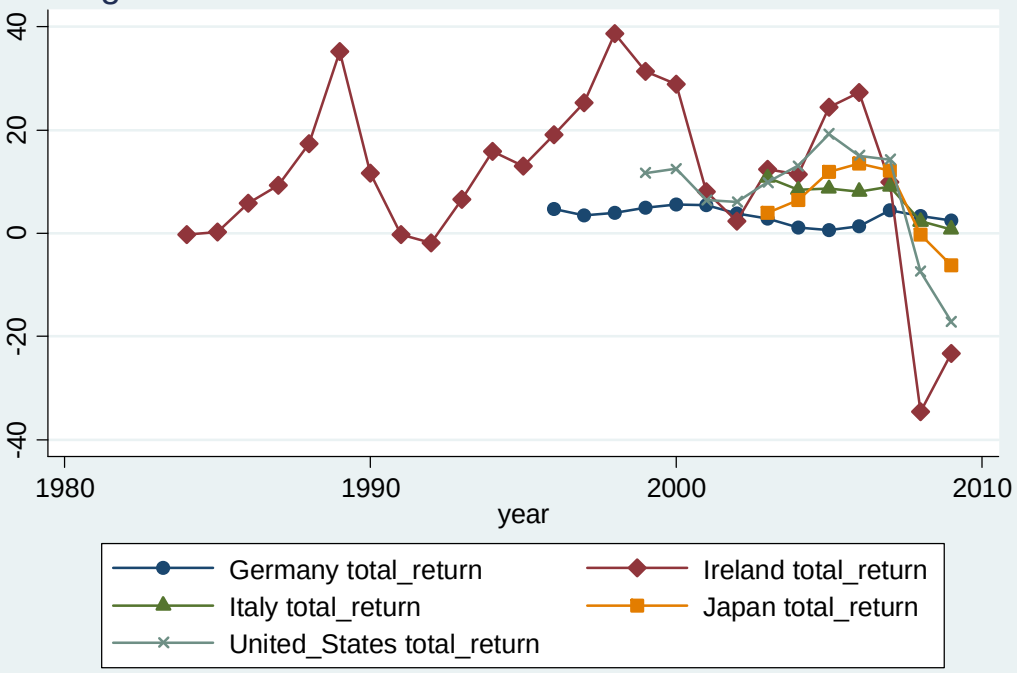


Figure 16:Total Return for US versus Several Countries

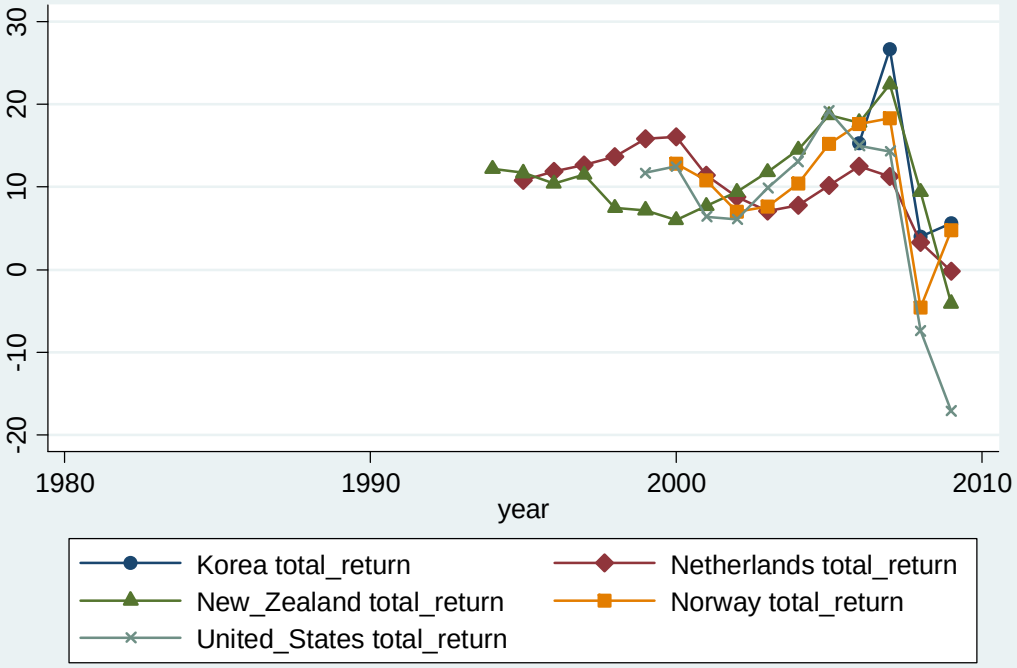


Figure 17:Total Return for US versus Several Countries

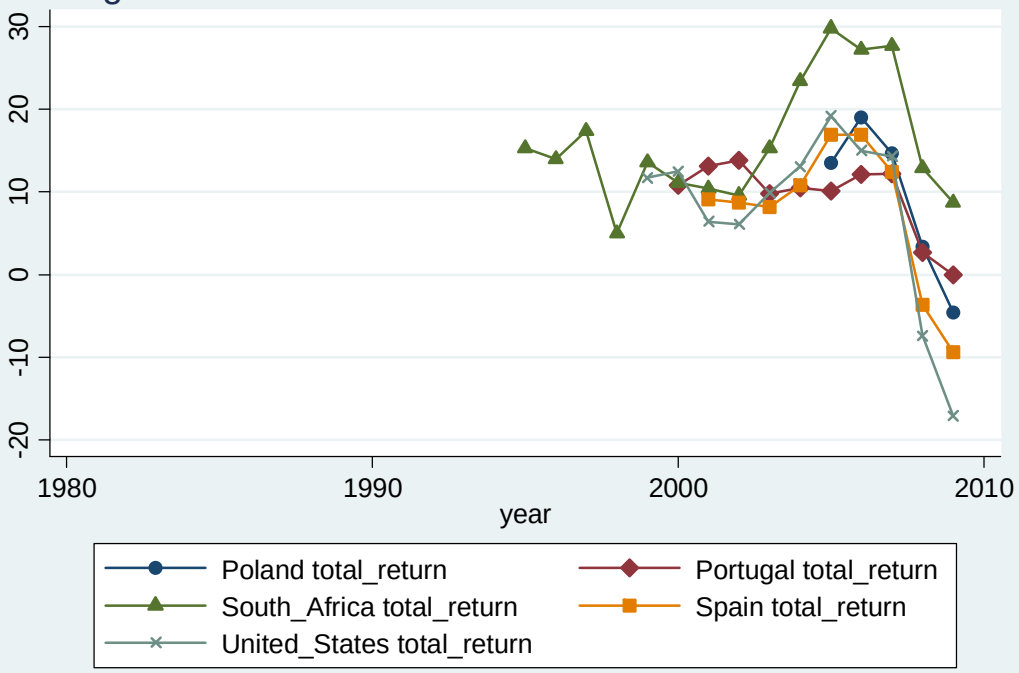
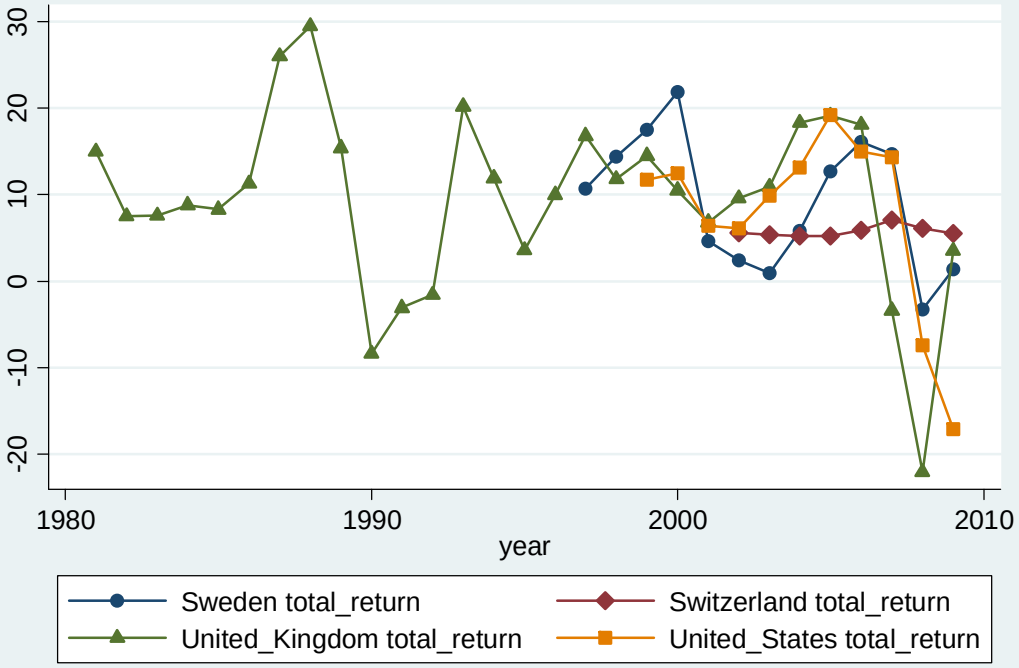


Figure 18:Total Return for US versus Several Countries



APPENDIX B: CONTINUING RESEARCH INITIATIVES

As part of the modeling of prospective returns and creating economic geographies for diversification analysis[15], GRE uses the appropriate outside research talent to provide needed expertise in important areas. The professional services we buy (Global Insight, Economy.com, IPD, etc.) are very inclusive, but we still continue to seek a competitive advantage by going beyond the traditional variables that they supply in certain areas which we deem critical.

In 2006, we initiated the global dimension of our activity with four projects. We asked well known European real estate finance professors to use the best available data and technology to try and create top-down models in the United Kingdom, France, Germany and Italy.[16] This work was very instructive. The scholar charged with developing a model for the United Kingdom was able to combine regional level data on appreciation from IPD with demand side variables from Cambridge Econometrics to produce a model that did a good job of explaining appreciation. The major drawback of the model was the lack of a supply side control variable – a problem that we face for all countries outside of the United States. The scholar that tried to develop a model for Germany was able to produce a model that did a reasonable job of modeling rent growth in the apartment property type but was unable to find sufficient data to estimate models for other property types (note that IPD only has 11 years of data across all property types for Germany and it coincides with the period of reunification). The efforts in France and Italy were not as successful, which perhaps could have been predicted by the fact that IPD has a short time series in these two countries. Probably the most important lesson that was learned from this exercise is that cross country models that capture both time series and cross sectional variation in appreciation may be the most fruitful avenue for obtaining stable models. This is the approach that we used in the preceding sections.

Starting in 2007 and continuing to the present, we used the 2006 insights to begin constructing our in-house top-down forecast of property returns internationally. In this effort, we discovered several places where we needed more insight than was available from our data suppliers. Further, as we evaluated investment opportunities globally from the bottom-up, there were certain important longer term considerations that we thought should have more prominence in our modeling.

Consequently, we continue to pursue a wide set of research initiatives which we believe will eventually make our global models and forecasts even better. The list of projects is ever evolving and will certainly be added to over time:

1. Rents around the world are initially (and possibly always) perplexing. Why should a B office building in Mumbai rent for more than an A office building in New York? Part of the answer is that when an economy booms, it takes a while for property development to catch up with new demand. Still, at some point, rents are connected to both overall national wealth and wealth per capita. We believe that this rent to wealth connection is worth some additional academic work. What we hope to

[15] See "Economic Diversification in International Commercial Real Estate," by David K. Guilkey, PhD, Mike E. Miles, PhD, and Jennifer Cianelli Cooper.

[16] Copies of the papers produced from this research are available upon request.

obtain from this effort is a measure of when market conditions have caused the current rent to run well past a sustainable level. Knowing whether the latest spike is part of a longer term sustainable trend or a bubble is vital to successful investing. We consider this to be an "in-house" research effort that will be developed as better data becomes available.

2. In the United States, several vendors such as Dodge, Reed Construction, and REIS Research provide supply side information at the property type level for either the major MSAs, in the case of REIS, or all MSAs, in the case of Dodge and Reed, with the time series extending back into the 1970's. Not only is information on new construction or building starts available along with forecasts of future activity, they also have measures of the inventory of buildings. Unfortunately, a consistent set of supply side information is not available globally. While there is some historical information on construction activity and inventories of buildings, frequently in databases put together by individual brokers, the series are spotty across countries. In addition, we tried to put together supply side series from broker information over twenty years ago while at Prudential and found the lack of consistency in the data across firms to be very troublesome. While gathering such information is a daunting task, our MSA level models in the United States have consistently shown that supply side variables are equally important as demand side variables such as employment growth. Therefore, we feel that it is essential to make an attempt to improve upon the meager information that is currently available. This may be more of an "in-house" project with some academics from various regions of the world acting in an advisory capacity.

3. We know that the last 5-10 years have seen the greatest increase in global income per capita in history. This has come in spite of significant political and military turmoil. A major reason is the increase in technology enhanced global trade. In following port activity in the United States, one can see many ongoing efforts to expand a particular metropolitan area's global connectedness. Internationally, this is an even bigger factor. We are hence considering supporting an academic look at the evolution of global logistics. How have volumes and destinations changed over the last two decades and how are they expected to change over the next 10 years? Clearly, our global data providers are thinking about such issues, but we believe that the importance of logistics suggests that we can obtain a comparative advantage by having a more precise look.

4. While our data from Global Insight provides us with country level risk measures that give information on a variety of factors such as security, tax, legal, economic, political and operational risks associated with each country, it does not directly pick up a country's quality of life. Similar to an important theme in our domestic model, we believe that over the long-term people and businesses will want to be where there is a certain level of livability. Natural factors such as weather and physical beauty play some role in this decision, but government plays an even more important role in establishing culture, safety, entrepreneurship and optimism (or lack thereof).

Further, do governments allocate their resources evenly across the country or does one city dominate their efforts? The question that we aim to answer is one at the intersection of quality of life and government facilitation. Looking forward, which governments are best equipped to deal with crime prevention, cultural enhancements, recreational improvements (e.g., public parks), race relations and entrepreneurship?

5. In the United States, we do not factor religious considerations into our work in any way. Religious considerations are neither part of our regular forecast nor our out year forecasts. Internationally, this omission may not be acceptable. Consequently, we are considering engaging the appropriate academic talent to evaluate how the spread of religious and philosophical views has been evolving and what future changes are expected from this evolution of thought. We are not sure exactly how this will factor into our models and forecasts and it is clear that whatever results we obtain will be subjective and possibly hard to quantify, but traveling internationally one cannot miss the importance of such views in global business patterns, security, and politics.

6. Our models only capture the overwhelming importance of oil through the effect of assumptions made by Economy.com and Global Insight about future oil prices on forecast GDP and employment growth. However, as global oil reserves shrink, there could be profound effects on global trading patterns (goods from China becoming much more expensive, for example) and even global political stability. As with several of our continuing research interests, there is not likely to be a perfect econometric approach. Still, by keeping these issues clearly in focus we will do a better job of anticipating changes.

7. Food self sufficiency and food price inflation is another "what will be different" item to consider. As nations become richer, they eat better and more meat means ever more corn is needed which compounds the peak oil problem in 6 above. This has been going on for quite some time. For example, the obesity rates in China have gone up tremendously in the last 20 years due to changes in diet. The potential future difference is what happens when several nations switch to being net importers (as Egypt recently has) without the resources to buy (and subsidize) in an increasingly expensive global market.

8. Growth of the middle class is a new/hot academic topic that may eventually provide a better predictive variable than overall population growth for some property types. The measures are still rudimentary, but the idea of combining growth in this segment with overall GDP growth is conceptually appealing.

9. Climate change seems to always remain a "new issue" with ongoing scientific work. For us, this means looking at rivers as well, particularly the Nile and Mekong. Here we see multiple nations collectively working on competing interests from food to water to hydroelectric power. This will be an early and concrete example of how well

nations can work together on issues that extend beyond their borders. Clearly, any region that makes above average progress has a leg up on other markets.

10. Prudential is working on overall real estate value as a function of threshold GDP. This may be an interesting cyclical measure of pricing. We will continue to monitor their work in the hope of picking up another element underlying relative returns.

In all of this ongoing and potential external research, we want to work with the right academics for the particular task and help them shape the research in order to get the maximum investment benefit. We will encourage publication of results since we want the effort to be of academic quality. What we want for our investment work is the detailed data behind the conclusions. The new data (the information not available from professional services) can then be applied to or analyzed in conjunction with our in-house modeling. As in the United States, it comes down to doing more homework.