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Abstract

Choosing an appropriate benchmark is not unproblematic for academics or practitioners. Index construction methodologies vary from index to index as tradeoffs are made between the breadth of market coverage and the investability of the securities in the index. This paper examines the nuances between the most commonly used global securitized real estate benchmarks. A comparison of their construction methodologies, returns, and risk is performed, and the correlations between the various benchmarks are assessed. The composition of global securitized real estate markets is also analyzed. We conclude that the GPR General Property Share Index and the S&P/Citigroup World Property Index are more appropriate to examine the performance of the market as a whole, while the GPR 250 Property Share Index and the FTSE EPRA/NAREIT Global Real Estate Index are better suited to evaluate portfolio performance.

Keywords: Global Securitized Real Estate, REITs, Benchmark, Index Characteristics, Performance

JEL Classifications: R33, G11

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1 Introduction

Real estate investments may be performed directly or indirectly. Direct real estate refers to investments in real and tangible assets. It is an illiquid and heterogeneous asset class that is uncorrelated with financial assets (Eichholtz and Hartzell, 1996; Quan and Titman, 1997; and Hoesli, Lekander, and Witkiewicz, 2004) and has good inflation hedging characteristics (Fama and Schwert, 1977; Hartzell, Heckman, and Miles, 1987; and Hoesli, Lizieri, and MacGregor, 2008). Indirect real estate refers to pooled investments in real estate. These pooled investment vehicles can be non-listed or listed. Non-listed vehicles offer better diversification opportunities than listed ones, but they are less liquid and almost exclusively for institutional investors (Hoesli and Lekander, 2008). Listed securitized real estate vehicles constitute homogeneous, liquid, and diversified investments with low transaction costs whose value should follow the direct real estate market, in the long-run anyway, although stock market fluctuations may have an impact in the short-term. Such securities are referred to as Real Estate Operating Companies (REOCs) in the U.S. and as property companies in the U.K. when they are listed as any other company would be, and as Real Estate Investment Trusts (REITs) when they meet certain conditions to gain tax-transparency.

From an international perspective, the global real estate industry has been transformed in the last decade by the proliferation of REIT legislation in an increasing number of countries. The U.S. REIT served as a model for these legislations, but each country created their own set of rules. In a general manner, REITs worldwide have to comply with certain operational restrictions, financing limitations, and shareholder requirements. Operational restrictions refer to regulations concerning the type of assets that can be invested in, the possibility of engaging in real estate development activities, diversification requirements,
and portfolio trading activities. Financing limitations make reference to the maximum authorized levels of debt in the capital structure of the real estate companies. Lastly, shareholder requirements refer to the minimum number of investors required, the maximum percentage of ownership allowed for a single investor, and whether listing is mandatory. Albeit these requirements are set to ensure the stability of the real estate investment companies and to protect the shareholders, substantial differences exist in REIT-like structures across countries. Tax-transparent legislation does not ensure that all countries treat listed real estate companies in the same way. In fact, tax-transparency is more or less the only thing these regimes have in common.

Overall, operational restrictions are relatively homogeneous across countries concerning the percentage of equity to be invested in real estate, generally standing at around 75%. However, regarding the type of assets, development activities and investments in real estate securities, there is no consensus. In 22 of the 31 countries where there is a REIT status, at least 80% of income must be distributed as dividends. As for leverage, it is constrained in 25 of the countries examined. It ranges from 20% of income generating assets in Bulgaria, to twice the equity in South Korea. The minimum number of investors and ownership limits vary greatly across countries. The highest minimum initial capital requirements are generally observed in Europe (40 million in Italy, 29 million in Greece, and 15 million in France and Germany). Twelve countries including the U.S. and Australia have no such requirements. Finally, in 17 of the 31 countries, listing is mandatory.

One topic which has not been the focus of much attention is that of choosing an appropriate benchmark for global REIT markets, or stated more generally, a benchmark for global securitized real estate markets. The principal indices used to measure the performance of securitized real estate globally are the FTSE
EPRA/NAREIT Global Real Estate Index, the Global Property Research General Property Share Index (GPR General), the Global Property Research 250 Property Share Index (GPR 250), the S&P/Citigroup Global Property Index, and the Datastream Real Estate World Index. For both academics and practitioners the existing nuances between indices are often unclear. The main objective of this paper is therefore to present the composition, market coverage, and investability of these indices. We also examine whether there are significant differences in the return and risk characteristics of these indices and whether they are highly correlated or not. The other objective of the paper is to analyze the performance of global securitized real estate markets.

This paper has several practical implications. First, portfolio managers will gain a better understanding of which benchmark is the most meaningful given their investment objectives and constraints. Further, the results should be useful for academics in selecting a benchmark to track price changes on global securitized real estate markets. Finally, investors will gain more knowledge on the composition and performance of global real estate security markets.

The paper is presented as follows. Section 2 provides a description of the size, growth, and composition of global securitized real estate markets. Section 3 compares the construction methodology, as well as the returns and risk, of the most commonly used global securitized real estate benchmarks, and analyzes the degree of correlation between the indices. Section 4 analyzes the performance of global real estate securities. The conclusions are discussed in Section 5.

2 Market Size and Composition

This section contains a discussion of the size and growth of global real estate securities markets (2.1). We also analyze the composition of international securitized markets in terms of geographical areas, tax-transparency status and
investment focus (2.2).

2.1 Market Size

The last decade has seen a proliferation of real estate securities around the world. By the end of 2007, REITs had been introduced in 31 countries while several others were considering such legislation. Figure 1 depicts the growth of global real estate securities in terms of market capitalization and number of stocks for 1984-2007. Securitized real estate’s global market capitalization as measured by the GPR General Global Index has grown from $28 billion in 1984, to $234 billion in 1995, and to $1.14 trillion in 2007. This index is based solely on investment companies, but if we consider the whole securitized real estate universe (i.e., if developers and construction companies are included), the market capitalization has grown to $1.5 trillion in 2006.\(^1\)

During the last decade, the number of stocks has not increased as vigorously as has the market capitalization, hence, evidencing a change in average company size. Indeed, the average company size grew from $206 million in 1984 to $2.4 billion in 2007 (Figure 2). This means that over a 20-year period, real estate securities went from being small caps to mid caps. Although the classification into small or mid caps can vary among brokers, small caps are generally defined as companies with a market capitalization of between $200 million and $2 billion, and mid caps as companies with a market capitalization of between $2 billion and $10 billion.

This growth has likely been driven by real estate appreciations as well as by an increasing demand for real estate securities during the period. These two factors, which are interrelated, are likely to exert opposite effects in the future, at least in the largest market which is that of the U.S. On the one hand, real estate

\(^1\)To our knowledge, this is the most recent evaluation of the whole securitized real estate universe.
prices in the U.S. have been decreasing since 2007, but demand for real estate securities is likely to continue increasing. Figure 3 shows that pension funds’ strong demand for real estate assets should continue. Their target and current allocations to real estate vary across countries, but a clear intention of increasing their exposure to real estate in most markets is evident. Some new investments might be allocated directly, but the bulk of them, especially those done abroad, are likely to be done by means of securitization. The recent adoption of REIT legislation in many countries is certainly a result too of pressures from the demand side.

2.2 Market Composition

We consider various dimensions when analyzing the composition of global securitized real estate markets. Such dimensions include regional and country weights, as well as the percentage of REITs, investment focus, and sector breakdown in each region. To illustrate how the conclusions drawn depend on the chosen benchmark, we compare a geographical breakdown done with the GPR General Index to one done with the FTSE EPRA/NAREIT Global Real Estate Index. The regional breakdown of global real estate securities is presented in Figure 4. According to the GPR General Index, the Americas have the biggest share with 42%, followed by Europe with 31%, and Asia with 27%. With the FTSE EPRA/NAREIT Index, the Americas represent a similar share of the global market (39%) but Asia is significantly larger (42%) and Europe merely represents 19% of the world market. The discrepancies result from the fact that the GPR General Index includes developing activities in all the continents, while the FTSE EPRA/NAREIT Index only includes them in Asia.

The importance of individual countries in the global market also depends on the benchmark being used. Figure 5 shows that the largest markets with the
GPR General Index are those of the U.S. (39%), Germany (12%), Hong Kong (10%), the U.K. (8%), and Australia (7%). This ranking changes significantly if the breakdown is performed with the FTSE EPRA/NAREIT Index. With such a benchmark, the largest markets include the U.S. (36%), Hong Kong (14%), Australia (13%), Japan (13%), and the U.K. (8%). As explained above, the increase in share of the Asian countries is due to the exclusion of development companies in the Americas and Europe with the latter index. As for the contrasting size of the German market, it is due to the inclusion of bank-funds (German open-ended funds) in the GPR General Index and not in the FTSE EPRA/NAREIT Index.

For the tax-transparency status, investment focus, and sector breakdowns, we use the FTSE EPRA/NAREIT Global Real Estate Index due to data availability issues. As with the regional breakdown, the interpretations should be put into perspective by fully understanding the type of constituents that compose the index (this issue is addressed thoroughly in the following section). The percentage of REITs and Non-REITs varies greatly across continents and also countries. As shown in Figure 6, REITs represent 95% of the securitized real estate market in North America, 66% in Europe, and only 40% in Asia. Investing in REITs is not exactly the same as investing in Non-REITs. For starters, REITs dispose of a tax waiver at the corporate level that Non-REITs do not have, and secondly, REIT returns have been found to be more predictable than Non-REIT returns (Serrano and Hoesli, 2008). The latter result is likely a consequence of the tax status giving REITs more real estate-like features. An example of this would be the stable cash flows that direct real estate and REITs have in common.

Another factor differentiating global real estate securities is their investment focus. A regional breakdown by investment focus is depicted in Figure 7. In
North America and Europe, approximately 90% of securitized real estate investments are focused on rental investments, i.e., income producing real estate, while in Asia, rental investments amount to only 39%. In fact, a major factor differencing Asian markets is that they are mainly dominated by property developers (Newell and Chau, 1996; and Liow, 1997). Non-rental activities such as construction and development are riskier than rental investments; therefore, it is not surprising that real estate securities in Asia are more volatile.

Finally, real estate securities in the various regions invest differently across sectors (Figure 8). The reason for this could be related to the aforementioned differences in legislation across countries. In North America, real estate securities tend to concentrate their assets in a specific sector as they can obtain economies of scale by diversifying geographically within the country with the same REIT legislation. Therefore, all the sectors are relatively well represented in the market as such economies of scale will be sought for. In Europe and Asia, the generally smaller size of the countries and the differences in REIT legislation across countries make geographical diversification more difficult, so real estate securities generally diversify across sectors. As a result, 55% of real estate companies diversify across sectors in Europe and as much as 61% do it in Asia.

3 Global Securitized Real Estate Benchmarks

This section first provides a description and analysis of the various benchmarks available for securitized real estate markets (3.1). We also provide return, risk, and correlations for the various benchmarks (3.2).
### 3.1 Benchmarks Characteristics

A benchmark is a standard used for comparison. Indices are commonly used in finance to measure the performance of individual or aggregated assets. An index becomes a benchmark when it is used as a reference point to quantify the relative performance of an asset or a portfolio of assets. Therefore, benchmarks are useful to evaluate the performance of active investment strategies or to summarize the performance of any given segment of the market. Such segmentation may be geographical, by asset class, industrial sector, size, or any other criteria. It is thus important to have a suitable benchmark that reflects the specificities of the market or portfolio to be analyzed. Choosing an appropriate benchmark is not unproblematic for academics or practitioners. Index construction methodologies vary from index to index as tradeoffs are made between the breadth of market coverage and the investability of the securities in the index. This section is devoted to understanding the nuances between the major securitized real estate benchmarks.

Table 1 provides a comparison of the main global securitized real estate benchmarks.\(^2\) With the exception of the GPR General Index that is available since 1984, the remaining indices analyzed exist since around 1990. Their market capitalization as of the end of 2007, ranges from $660 billion for the GPR 250 Index to $1,138 billion for the GPR General Index. The index covering the largest number of stocks (more than 500) and countries (more than 35) is the S&P/Citigroup World Property Index. All indices are free float adjusted and have size and liquidity screens, except for the GPR General Index that is only screened for size. Concerning the property sectors included in the indices, all the benchmarks include office, industrial, retail, residential, and diversified sectors. The GPR Indices also include hotels and the GPR 250 Index includes healthcare.

\(^2\)Datastream’s Real Estate World Index is not included in the exhibit due to limited information on its construction methodology.
The FTSE EPRA/NAREIT Global Real Estate Index and the S&P/Citigroup World Property Index cover a broader range of property sectors such as the storage, resorts, healthcare, and specialty sectors.

The criteria for inclusion of companies in the indices varies somewhat. First of all, the required real estate activity for inclusion in the index is a little less stringent for the S&P/Citigroup World Property Index as well as for the FTSE/EPRA NAREIT Asia Real Estate Index. Second, the minimum size of the companies included in the indices is lowest for the GPR General Index and highest for the FTSE EPRA/NAREIT Global Real Estate Index. Third, the liquidity constraints for the constituent companies are stronger for the GPR 250 Index and for the FTSE EPRA/NAREIT Global Real Estate Index. Overall, we conclude that the GPR General Index and the S&P/Citigroup World Property Index are more appropriate to examine the performance of the market as a whole. That is because the former index has the largest market coverage in terms of market capitalization, and the latter in terms of number of countries and stocks covered. However, to evaluate the performance of active investment strategies, the GPR 250 Index and the FTSE EPRA/NAREIT Global Real Estate Index are better suited, as the investability of their constituents allows for the replication of such indices. To better understand the existing differences, we continue by describing the construction methodologies of each of these indices.

3.1.1 FTSE EPRA/NAREIT Global Real Estate Index

The FTSE EPRA/NAREIT Global Real Estate Index aims to represent general trends in listed real estate stocks worldwide. The index provides a complementary set of indices that include regional and country indices, Capped indices (i.e., with a 10% weighting cap placed on individual constituents), Dividend+ indices (i.e., higher yielding stocks; those with a one-year dividend yield forecast greater than 2%), Global Sectors, Investment Focus, and REIT and Non-REIT indices.
Based on worldwide real estate stocks, it is a free float weighted index to ensure that only the investable opportunity set is included. Companies are eligible for inclusion in the index if they meet specific geographic financial standards that demonstrate that the majority of earnings or total assets are the result of relevant real estate activity, defined as the ownership, trading, or development of income-producing real estate. The universe covered by this index is limited to companies providing an audited annual report in English. For North America and Europe, companies must derive at least 75% of their EBITDA from relevant real estate activities in their respective region. For Asia, the threshold is 60% and relevant real estate activities also include the construction of residential homes for sale.

Non-constituents are considered for inclusion at a quarterly review if their investable market capitalizations are equal to or greater than their respective regional index by 0.10%, 0.10%, and 0.30% for North America, Europe, and Asia, respectively. Newly listed real estate companies (IPOs) are included in the index after their first day of trading only if their free float market capitalization is equal to or greater than 0.15%, 0.20%, and 0.40% for North America, Europe, and Asia, respectively. In order to provide stability to the composition of constituents of the index, the required thresholds for inclusion are higher than those needed for exclusion. Liquidity, calculated as the median daily trading per month, is assessed on an annual basis to ensure that the index is tradable. That is, non-constituents are eligible for inclusion if their median daily trading per month exceeds 0.05% of their shares for more than 10 of the 12 months prior to the review. On the other hand, existing constituents failing to trade at least 0.04% of their shares in issue for more than 4 of the 12 months prior to

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3 The respective amounts in millions of dollars as of the end of 2007 are: $302, $149, and $1,026.

4 Considering the minimum investable market capitalizations as of the end of 2007, the median daily trading per month should exceed $151,000, $74,500, and $513,000 for North America, Europe, and Asia, respectively.
the review will be dropped.

The FTSE EPRA/NAREIT Global Real Estate Index is available as a capital return, a total return, and a net total return index calculated at a daily frequency. It is calculated using the chained Paasche methodology. The index has a base value of 1000 as of December 31, 1999. The inception date however is December 29, 1989. The stock prices used are the actual closing mid-market or last trade prices where available. The number of shares outstanding for each constituent security is amended only when the total shares outstanding held within the index system change by more than 1% on a cumulative basis. Free float, cross-holdings, and foreign ownership limits are adjusted on a quarterly basis. Dividends paid by a company are reinvested in the index at the ex-dividend date. The main calculation currency is the Euro although other currencies are also employed. Foreign exchange rates used in end-of-day calculations are the WM/Reuters closing spot rates. For the indices disseminated in real-time, Reuters’ real time foreign exchange rates are used.

The property sectors included in the FTSE EPRA/NAREIT Global Real Estate Index are: healthcare, self storage, industrial, office, industrial/office mixed, residential, retail, lodging/resorts, specialty, and diversified. A REIT is assigned to a particular property sector when at least 75% of its gross invested assets are invested in one specific property type. The selection and base weighting of stocks and countries will be adjusted on a quarterly basis. The sum of the weighted individual constituents of each country constitutes the country weights of the index. A company will normally be allocated to the country of listing where it is most liquid. However, other factors taken into account may

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5 The net total return index uses a net dividend calculated by deduction of withholding taxes (and other relevant taxes) at a rate applicable to non-resident individuals who do not benefit from double taxation treaties. The withholding tax rates are those applicable to Luxembourg holding companies.

6 If accumulated changes in the number of shares outstanding are greater than or equal to 10%, or if they represent $2 billion of a company’s total market capitalization, the amendment takes place between quarters.
include, but are not limited to, the investor protection regulations under which
the company is governed, the country where the company is resident for tax
purposes, market perception, and currency trading.

3.1.2 GPR General Property Shares Index

The aim of the GPR General Index is to represent the behavior of the securitized
real estate market worldwide. It is a value-weighted index based on worldwide
real estate stocks. It includes listed property companies as well as bank-funds.\(^7\)
Companies are eligible for inclusion in the index if they derive at least 75% of
their operational turnover from investment activities (property investment
companies) or from investment and development activities combined (hybrid
property companies). Additionally, the companies included in the index must
have a market capitalization over $50 million for two consecutive months. In
case there is an initial public offering (IPO), the new company is included in
the index after its first day of trading only if its free float market capitalization
ranks among the top 150 companies.

The GPR General Index is a total return index calculated at a monthly
frequency. Total returns are composed of price (capital) returns and dividend
(income) returns. Dividends paid by a company are reinvested in the index
at the ex-dividend date. The index has a base value of 100 at its base date
(December 31, 1983). The stock prices used to calculate the index are the most
recent end of month closing trade prices of the stock exchange of primary listing.
Foreign exchange rates used are the WM/Reuters London close rates.

The property sectors included in the GPR General Index are: Office, res-
idential, retail, industrial, hotel, and diversified. A company is assigned to a
particular property sector when it derives at least 60% of its operational turnover

\(^7\)The GPR General Quoted Index is a sub-index of the GPR General Index in which the
bank-funds are excluded.
from one specific property type. The selection and base weighting of stocks and
countries is adjusted on a monthly basis. The country weights of the index are
constituted by the sum of the weighted individual constituents of each country.
However, if more than 75% of a company’s operational turnover is derived from
a country different than the country of the company’s primary stock listing, the
company is attributed to the index of the country where the assets are located.

3.1.3 GPR 250 Property Shares Index

The GPR 250 Index is a value-weighted index based on the 250 real estate stocks
with highest average monthly trading volume in US dollars over the previous
year. The aim of the GPR 250 Index is to represent the behavior of the leading,
most liquid securitized real estate companies worldwide. Companies eligible
for inclusion in the index are those deriving at least 75% of their operational
turnover from investment activities or from investment and development activi-
ties combined, case in which, at least 25% of the operational turnover must
come from investment activities. In addition, inclusion is only considered if the
companies’ free float, calculated as the stock price times the available amount
of shares outstanding, is greater than $50 million for two consecutive months.
IPOs are included in the index after its first day of trading only if its free float
market capitalization ranks among the top 150 companies.

The GPR 250 Index is a total return index calculated at a daily frequency
since December 31, 1999. Previous to this date it was calculated at a monthly
frequency. The index has a base value of 100 at its base date that is December
31, 1989. The stock prices used are the most recent closing trade prices of the
stock exchange of primary listing. Changes in free float are implemented on the
first trading day of each month. Dividends paid by a company are reinvested

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8The GPR 15 Real Time Index is a sub-index of the GPR 250 Index that reflects the most
liquid property companies in Europe.
in the index at the ex-dividend date. Foreign exchange rates used are the WM/Reuters London close rates.

The property sectors included in the GPR 250 Index are: Office, residential, retail, industrial, hotel, healthcare, and diversified. A company is assigned to a particular property sector when it derives at least 60% of its operational turnover from one specific property type. The selection and base weighting of stocks and countries is adjusted on a quarterly basis. The country weights of the index are constituted by the sum of the weighted individual constituents of each country. However, if more than 75% of a company’s operational turnover is derived from a country different than the country of the company’s primary stock listing, the company is attributed to the index of the country where the assets are located.

### 3.1.4 S&P/Citigroup Global Property Index

The aim of the S&P/Citigroup Global Property Index is to reflect the risk and return characteristics of the investable universe of publicly traded property companies. It only includes equity property companies, where at least 75% of the revenue comes from equity property-related activities, and excludes mortgage and hybrid property companies. With over 500 constituents from more than 35 countries, the index provides four sub-indices covering developed, emerging, global REIT, and developed REIT markets. The S&P/Citigroup Global Broad Market Index (BMI) constitutes the universe of stocks from which the constituents of the S&P/Citigroup Global Property Index are drawn.\(^9\) Therefore, companies must be domiciled in one of the 53 countries covered by the BMI.

Companies are eligible for inclusion in the index if they derive at least 60% of their revenue from real estate development, management, rental, and/or direct investment in physical property. Additionally, the companies’ float-adjusted...
market capitalization must be over $100 million and it must post a minimum value traded of $25 million for the 12 months preceding the annual reconstitution date. An index constituent whose float-adjusted market capitalization falls beyond $75 million or whose trading value is less than $15 million during the preceding 12 months will be excluded from the index at the annual reconstitution date. However, if a constituent’s float-adjusted market capitalization falls below $25 million, deletion from the index will occur after a five day notice period. IPOs that meet size requirements are added to the index at the next quarter rebalancing. If an IPO ranks among the top five companies of a particular country, it may be added sooner.

The S&P/Citigroup Global Property Index is available in price returns, total returns, net returns, and hedged indices at a daily frequency.\textsuperscript{10} It is calculated using a base-weighted aggregate methodology. The index has a base value of 100 at its base date that is December 31, 1997. However, the inception date is different to the base date, so this index starts on July 30, 1989.\textsuperscript{11} The stock prices used are closing prices. Shares are adjusted for corporate actions on their ex-dates. By adjusting for corporate actions such as dividends, splits, spin-offs, share issuance, etc., the index is able to represent stock market performance and not reflect the corporate actions of its constituents. The indices are available in six currencies (USD, GBP, JPY, CAD, EUR, and AUD) although other currency calculations are available upon request. Foreign exchange rates used in end-of-day calculations are the WM/Reuters mid-market fixings. The selection and base weighting of stocks are fully reconstituted on a yearly basis unless there is a 5% or greater change in shares, case in which the adjustment is made after a five day notice period.

\textsuperscript{10}The net total return index uses a net dividend calculated by deduction of withholding taxes (and other relevant taxes) at a rate applicable to non-resident individuals who do not benefit from double taxation treaties. The withholding tax rates are those applicable to Luxembourg holding companies.

\textsuperscript{11}The sub-indices may have different base and inception dates.
The property sectors included in the S&P/Citigroup Global Property Index are: Hotel/resort and entertainment, industrial property, office space, healthcare property, retail property, storage property, specialty, residential, and diversified. The sum of the weighted individual constituents of each country constitutes the country weights of the index. A company will be allocated to a country on a case-by-case basis including the country of incorporation, primary exchange, liquidity, geographic source of revenues, geographic location of assets, and headquarters of the company. The index is available on world, regional, and country levels. It may also be customized depending on the investor’s needs.

### 3.1.5 Datastream Real Estate World Index

Datastream’s Real Estate World Index aims to represent securitized real estate markets worldwide. The Thomson Datastream database constitutes the universe from which the index is drawn. Companies included in the index represent around 75-80% of the total market capitalization. Suitability for inclusion in the index is determined by market value and availability of the data. There are no liquidity requirements as well as no adjustments for non-public holdings of shares or for cross-holdings. The index constituents are reviewed at a quarterly basis and re-set to represent the new top group of stocks by market value.

### 3.2 Return, Risk, and Correlations

The summary statistics and correlations of the main indices used to measure the performance of securitized real estate returns are presented in Table 2. Mean monthly returns and standard deviations vary somewhat across indices. The FTSE EPRA/NAREIT Global Real Estate Index has the highest mean and the Datastream Real Estate World Index has the highest standard deviation, while the GPR General Index has the lowest mean and standard deviation. In terms
of correlation, all the indices are highly correlated with the lowest correlation being 0.93. This means that even if some differences exist, these indices are very synchronized.

4 Global Real Estate Securities Performance

In this section, we analyze the performance of real estate securities. The analysis is undertaken by means of the data from Global Property Research. Table 3 shows summary statistics for global real estate securities across regions and countries, as well as correlation coefficients. The regional data are in U.S. dollars and the country data in local currency. In terms of risk and return, Asia presents the highest returns as well as the highest standard deviation. Europe on the other hand evidences the lowest returns and standard deviation, while the Americas lie in between. The strongest correlation between continents is that between the Americas and Europe (0.54), while the correlation of Asia with the Americas and with Europe lies at 0.38 in both cases.

It is important to keep in mind that property companies generally have different investment strategies depending on the region or country in which they operate. For instance, property companies in the United States generally diversify across states while focusing on one property type, whereas in Europe, property companies generally diversify across property types while focusing on one local market (Boer, Brounen, and Op t Veld, 2005; and Glascock and Kelly, 2007). In Asia, the story is similar to that in Europe but property markets are mainly dominated by property developers (Newell and Chau, 1996; and Liow, 1997) and by investors in search of potential capital gains rather than rental income (Ooi and Liow, 2004). This makes property companies in Asia more volatile than in the other continents.

The countries presenting the highest return and volatility are Hong Kong,
Singapore, and Japan. Those with the lowest return and risk parameters are Germany, Switzerland, and the Netherlands. Correlations across countries are generally low. Among the countries with highest correlation we find Hong Kong and Singapore (0.58), France and the Netherlands (0.49), the U.S. and the U.K. (0.43), and the U.S. and Canada (0.43). As expected, the lowest correlations are those between countries belonging to different continents. As a matter of fact, a continental factor has often been cited in the literature as an important driver of returns (Eichholtz, Huisman, Koedijk, and Schuin, 1998; and Hamelink and Hoesli, 2004).

Exhibit 12 shows the decomposition of global securitized real estate returns in their income and capital constituents. Unsurprisingly, the variation of securitized real estate’s total returns is particularly caused by the volatility of its capital returns. Income returns on the other hand, are relatively stable through time. Such stability may be explained by the stable cash flows resulting from generally long-term fixed leases.

These stable income flows are generally distributed as dividends since REITs must generally distribute most of their taxable income. Exhibit 13 displays the mean dividend yields across regions and countries for the period 2001-2007. We observe that countries with established REIT regimes generally have higher dividend yields due to the aforementioned distribution rule. On the other hand, Non-REITs usually have lower yields as the performance of these companies is often driven by development activities and real estate appreciations. The global mean yield is 4.2%. The Netherlands presents the highest mean yield (6.4%), while Japan presents the lowest mean yield (1.2%). The distribution rule is also the probable reason why REITs dividend yields have usually been higher than those of common stocks and bonds.
5 Conclusion

The growth of the global securitized real estate market has been largely boosted by the introduction of REIT legislation in an increasing number of countries. However, these legislations are not identical and not all the property companies apply for REIT status, so some differences exist between real estate securities of different countries. In general, the securitized real estate market in North America is mainly composed of geographically diversified REITs investing in a specific property sector of income-producing real estate. In Europe and Asia, real estate securities are primarily diversified across property sectors. In Europe, real estate securities invest mostly in income-producing real estate and REITs account for two-thirds of the market, while in Asia, only 40% of real estate securities have REIT status and their investments concentrate on construction and development activities.

After analyzing the composition of global securitized real estate markets, a comparison of the principal benchmarks used to measure the performance of global real estate securities was made. Although these benchmarks present high correlations, their risk and return characteristics differ somewhat as the indices define their own tradeoffs between the breadth of market coverage and the investability of the securities in their indices. Overall, we conclude that the GPR General Index and the S&P/Citigroup World Property Index are more appropriate to examine the performance of the market as a whole. That is, among other things, because the former index has the largest market coverage in terms of market capitalization, and the latter in terms of number of countries and stocks covered. However, to evaluate the performance of active investment strategies, we find that the GPR 250 Index and the FTSE EPRA/NAREIT Global Real Estate Index are better suited as the investability of their constituents allows for the replication of such indices.
Lastly, we have discussed the performance of global real estate securities. Returns, standard deviations and correlations were examined across regions and countries. Overall, risk and returns are found to be the highest in Asia, followed by the Americas and then by Europe. We have also observed that countries with established REIT regimes generally have higher dividend yields. Finally and as expected, the lowest correlations are found between countries belonging to different continents.
References


Figure 1: Growth of the Global Securitized Real Estate Market, 1984-2007

Source: Global Property Research.
Figure 2: Average Company Size Per Year

Figure 3: Pension Fund Allocations to Real Estate

Source: Global Property Research and author’s calculations.

Figure 4: Global Securitized Real Estate Regional Breakdown

Source: Global Property Research and FTSE EPRA/NAREIT.
Figure 5: Global Securitized Real Estate Geographic Breakdown

Source: Global Property Research and FTSE EPRA/NAREIT.
Figure 6: REIT/Non-REIT Breakdown by Region

Source: European Public Real Estate Association.

Figure 7: Investment Focus Breakdown by Region

Source: European Public Real Estate Association.
Figure 8: Sector Breakdown by Region

Source: European Public Real Estate Association.

Figure 9: Decomposition of Global Securitized Real Estate Total Returns, 1990-2007

Source: FTSE EPRA/NAREIT.
Figure 10: Mean Dividend Yields for the Period 2001-2007

Notes: All countries have REIT legislation except for Sweden and Switzerland. REITs were introduced in Hong Kong and France in 2003 and in Germany and the U.K. in 2007. Source: FTSE EPRA/NAREIT.

Source: Global Property Research and author’s calculations.
Table 1: Summary of Global Real Estate Securities Indices

<table>
<thead>
<tr>
<th>Family</th>
<th>FTSE EPRA/NAREIT</th>
<th>Global Property Research</th>
<th>S&amp;P/Citigroup Global Property</th>
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<tbody>
<tr>
<td>Available Indices</td>
<td>Regional and Country, Capped, Dividend+, Global Sectors, Investment Focus, and REITs and Non-REITs</td>
<td>GPR General, GPR General Quoted, GPR 250, GPR REITs, and GPR 15</td>
<td>World Property, Emerging Property, Global REIT, World REIT</td>
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<table>
<thead>
<tr>
<th>FTSE EPRA/NAREIT Global Real Estate</th>
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<th>S&amp;P/Citigroup World Property</th>
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<td>Monthly</td>
<td>(Daily since Dec.31.1999)</td>
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<td>Weighting</td>
<td>Free Float</td>
<td>Market Cap</td>
<td>Free Float</td>
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<td>Market Cap as of Dec.31.2007 ($ Billion)</td>
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<td>1138</td>
<td>660</td>
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<tr>
<td>Number of Stocks</td>
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<td>405</td>
<td>250</td>
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<tr>
<td>Number of Countries</td>
<td>22</td>
<td>27</td>
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<td>Investability</td>
<td>Free Float</td>
<td>Size screen</td>
<td>Free Float adjusted, size and liquidity screens</td>
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Table 1 (continued): Summary of Global Real Estate Securities Indices

<table>
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<tr>
<th></th>
<th>FTSE EPRA/NAREIT Global Real Estate</th>
<th>GPR General</th>
<th>GPR 250</th>
<th>S&amp;P/Citigroup World Property</th>
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<tr>
<td><strong>Inclusion Criteria</strong></td>
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<tr>
<td><strong>Real Estate Activity</strong></td>
<td>&gt; 75% of EBITDA in NA and Europe, &gt; 60% in Asia (includes construction of residential homes for sale)</td>
<td>At least 75% of operational turnover derived from investment activities or from investment and development activities combined. Both listed property companies and bank-funds are included.</td>
<td>At least 75% of operational turnover derived from investment activities or from investment and development activities combined (case in which 25% of operational turnover must come from investment activities)</td>
<td>&gt; 60% of revenue (includes development activities)</td>
</tr>
<tr>
<td><strong>Min. Market Cap</strong></td>
<td>Free Float Mkt Cap &gt; 0.15%, 0.20%, 0.40% for NA, Europe, and Asia, respectively.</td>
<td>Mkt Cap &gt; $50M</td>
<td>Free Float Mkt Cap &gt; $50M</td>
<td>Float-adjusted Mkt Cap &gt; $100M</td>
</tr>
<tr>
<td><strong>Liquidity</strong></td>
<td>Median daily trade per month must exceed 0.05% of shares for more than 10 of the 12 months prior to the review.</td>
<td>No liquidity constraints</td>
<td>250 most liquid property stocks worldwide</td>
<td>Min. $25M traded in last 12 months</td>
</tr>
<tr>
<td><strong>IPOs</strong></td>
<td>Free Float Mkt Cap &gt; 0.15%, 0.20%, 0.40% for NA, Europe, and Asia, respectively.</td>
<td>Free Float Mkt Cap ranks among the top 150 companies</td>
<td>Free Float Mkt Cap ranks among the top 150 companies</td>
<td>IPOs that rank among the top 5 companies of a particular country</td>
</tr>
</tbody>
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| **Attributed Sector** | At least 75% of gross invested assets come from one specific sector. | At least 60% of operational turnover comes from one specific sector. | At least 60% of operational turnover comes from one specific sector. | At least 60% of revenue comes from one specific sector.
| **Attributed Country** | Country of listing where it is more liquid. However, residence for tax purposes and investor protection regulations, market perception, currency trading, and other factors could be taken into account. | Country of primary stock listing. If more than 75% of operational turnover is derived from a different country, company attributed to country where assets are located. | Country of primary stock listing. If more than 75% of operational turnover is derived from a different country, company attributed to country where assets are located. | Case-by-case basis depending on the country of incorporation, primary exchange, liquidity, geographic source of revenues, geographic location of assets, and headquarters of the company. |

Note: Datastream’s Real Estate World Index is not included in this table as its construction methodology is not available.
Table 2: Summary Statistics and Correlations of Global Real Estate Securities Indices (Monthly Data for the Period 1990-2007)

<table>
<thead>
<tr>
<th>Panel A</th>
<th>FTSE EPRA/NAREIT</th>
<th>GPR General</th>
<th>GPR 250</th>
<th>S&amp;P/Citigroup World Property</th>
<th>Datastream Real Estate World</th>
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<tr>
<td>MEAN (%)</td>
<td>0.87</td>
<td>0.60</td>
<td>0.70</td>
<td>0.80</td>
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<tr>
<td>STD. DEV. (%)</td>
<td>4.56</td>
<td>3.65</td>
<td>4.43</td>
<td>4.53</td>
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<tr>
<td>MIN (%)</td>
<td>-14.48</td>
<td>-12.36</td>
<td>-14.21</td>
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<tr>
<td>MAX (%)</td>
<td>18.01</td>
<td>14.20</td>
<td>12.16</td>
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<table>
<thead>
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<th>Panel B</th>
<th>FTSE EPRA/NAREIT</th>
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<th>GPR 250</th>
<th>S&amp;P/Citigroup World Property</th>
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Table 3: Summary Statistics and Correlations of Real Estate Securities across Regions and Countries (Monthly Data for the Period 1984-2007)

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<th>World</th>
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<th>Europe</th>
<th>Asia</th>
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<tr>
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<td>STD. DEV. (%)</td>
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<th>Panel B</th>
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