The Real Estate Risk Premium: *A Developed/Emerging Country Panel Data Analysis*

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The last decade coincided with a renewed interest in real estate from a broad range of investors. As noted by RREEF Research [2007], global direct real estate investment reached US$ 580 billion in 2006, increasing threefold since 2001. In an era of falling interest rates, in which financing became very inexpensive, global investors increasingly viewed real estate as a secure and remunerative investment. Over the same period, investments in emerging markets soared—real estate, in particular—due to their high growth prospects, a stabilized economic situation after the financial crises of the 1990s, a commitment to sound macroeconomic policies, an increasing integration into world financial markets, and fewer high-return investment opportunities in developed countries; hence, as capital flows poured into real estate, both in developed and emerging countries, capitalization rates followed a general downward trend. The cap rate is a measure of real estate return defined as the cash flows earned on investment divided by the price of the property. But, for all the excitement, one has to wonder if the price paid for a real estate asset is consistent with the country's "true" rate-of-return expectation, based on actual real estate and macroeconomic fundamentals, and the country's risk assessment.

In particular, we should expect the capitalization rate (cap rate) to at least reflect the opportunity cost of capital and the risk premium associated with the country's investment environment. Applying the capital asset pricing model (CAPM) to real estate returns, we can compare the direct real estate capitalization rate to the 10-year government bond yield. This bond yield incorporates two components. On the one hand, government bonds are usually perceived as a low-risk investment. Investors should expect a property market return at least equal to the opportunity cost of capital, as measured here by the government bond yield. On the other hand, as investors seek an optimal allocation of their portfolio across countries, government bonds should also incorporate a risk premium component. Because they are determined by some common country characteristics, this real estate premium should reflect the country's default risk. Finally, the investor's risk perception might also be determined by a whole series of country-specific real estate characteristics beyond the probability of default alone.

Hence, the objective of this article is to estimate the country risk premium in the office real estate market across a sample of emerging and developed countries. Specifically, we estimate the determinants of office capitalization rates for a panel of 52 countries between 2000 and 2006, based on a modified CAPM.

This article's contribution to the existing literature is twofold. First and foremost, very few studies investigate real estate in emerging countries, especially at a cross-country macro level. Empirical papers have mainly focused

on U.S. (Sivitanidou and Sivitanides [1996, 1999] and Sivitanides et al. [2001]) or European markets (Bond, Karolyi, and Sanders [2003]). But these markets are relatively stable due to their highly developed maturity levels compared to those of emerging markets. To obtain further insight on the pricing of risk by international investors, it becomes essential to enlarge the sample to developing countries in which we find greater variations in the characteristics that determine the risk premium. Furthermore, the inclusion of emerging markets is especially relevant considering the substantial boom in cross-border investments recently going to these countries.

Second, there are reasons to believe that an endogeneity problem exists between the long-term interest rate and the capitalization rate. To obtain unbiased results, our empirical methodology requires that we also estimate a model explaining the 10-year bond yield, bringing forth some further results on country risk assessments.

Our results show that the country sovereign risk, as measured by the 10-year government bond yield, is the most important determinant of the capitalization rate. It explains between 41% and 44% of the cap rate. Real estate variables also play a role, but to a lesser extent. Finally, both real estate and bond yields are characterized by country-fixed risk premiums.

EMPIRICAL MODEL

The capitalization rate, CAP, of a given real estate investment is typically defined as the ratio of net operating income, NOI_t, on the value of property, V_t, based on the property's market sales price at time t,

$$CAP_t = \frac{NOI_t}{V_t} \tag{1}$$

Following Sivitanidou and Sivitanides [1996], we can assume that NOI is equal to actual cash flows, CF_t, and that they can be approximated by rents. If investors are rational, the market sales price, P_t, should exactly reflect the sum of the discounted value cash flows they expect to receive in the present and in future years,

$$P_t = \sum_{t=1}^{T}\left[\frac{CF_t}{(1+d_t)^t}\right] = \gamma RENT_t\left\{\sum_{t=1}^{T}\left[\frac{(1+g_t)^t}{(1+d_t)^t}\right]\right\} \tag{2}$$

where d_t is an appropriate discount rate, g_t is the growth rate of rents, and γ is an approximation parameter. Substituting Equation (2) in Equation (1), we get a full definition of the cap rate,

$$CAP_t = \frac{\gamma RENT_t}{\gamma RENT_t\left\{\sum_{t=1}^{T}\left[\frac{(1+g_t)^t}{(1+d_t)^t}\right]\right\}} = \frac{1}{\left\{\sum_{t=1}^{T}\left[\frac{(1+g_t)^t}{(1+d_t)^t}\right]\right\}} \tag{3}$$

Because rents (or cash flows) are expected to rise, investors are assumed to fully take this increase into account in the valuation of the property. In fact, Equation (3) can also be interpreted as the growth-adjusted required nominal return on property. As in Jud and Winkler [1995], Sivitanidou and Sivitanides [1999], Hendershott and MacGregor [2005], and Yiu and Hui [2006], this required return on property can be derived using a modified CAPM,

$$d_t = (Rfree_t) + \beta[R_t - Rfree_t] + Rre_t \tag{4}$$

where $Rfree_t$ is the nominal risk-free rate, R_t is the nominal return on a given alternative investment (the opportunity cost of investing in real estate), Rre_t is a specific real estate risk premium, and β is the property beta measuring the sensitivity of the property return to the spread in the alternative investment. Thus, the CAPM, defined by Equation (4), assumes that, in the absence of arbitrage, the required rate of return on the real estate market should be equal to the return of any other type of asset, up to a risk factor. Otherwise, investors would transfer their funds from low-return assets to higher-return assets. Suppose that some country's office market is suddenly advantaged by a favorable zoning code. This event will probably attract new investors into the office market, raising office property prices. As a result, a compression of the overall office cap rate should occur. But as the office cap rate decreases, some investors might be induced to exit the market in favor of other assets generating a higher risk-adjusted return, thereby putting upward pressure on the market's office cap rate. Hence, the equality of rates of return would be achieved.

Risk is a relative assessment; therefore, we need to choose an appropriate discount rate, d_t, against which to measure risk. If we want to compare emerging and developed countries, we need a benchmark that reflects both the internal and international opportunity costs of investing

in real estate. Across countries, one indicator of country risk is the spread of the 10-year government bond yield with respect to the U.S. 10-year Treasury bond. The U.S. is generally perceived by international investors as the low-risk benchmark market. Within a given country, however, the government's own bond yield can be considered as a relevant opportunity cost as government bonds are considered a relatively low-risk investment. It follows that, in Equation (4), we define the return on the alternative investment R_t as the 10-year government bond yield (GovBond), while the risk-free rate, $Rfree_t$, should be set to the U.S. 10-year Treasury bond.

Substituting Equation (4) in Equation (3), the cap rate can be represented by the following reduced-form equation to be estimated:

$$CAP_{it} = \delta + \beta_1 \text{GovBond}_{it} + \beta_2 RE_{it} + \beta_3 \Delta CF_{it} + \tau_t + u_i + e_{it} \quad (5)$$

where i is the country index, t the annual time index, RE_{it} a matrix of variables measuring real estate–specific risk, ΔCF_{it} some variables approximating the expected growth in cash flows, τ_t time-specific effects, u_i country-specific effects, and e_{it} i.i.d. residual terms (idiosyncratic shocks). The time-specific effects capture global trends in the real estate market, such as the world real estate cycle, the global supply of funds being invested in real estate, the general "appetite" for risk of international investors, and so on. Equation (5) can be estimated with the fixed-effects (FE) estimator.

Panel Data and Identification of Country Risk Premium

From the CAPM model in Equation (4), and up to a general real estate risk factor, the cap rate cannot be permanently greater or less than the opportunity cost GovBond against the U.S. benchmark return, *except* if investors are assigning each country a specific risk assessment that depends on time-invariant characteristics or perceptions. It follows that, in Equation (5), u_i represents an over- or under-evaluation of the country's real estate return that is not explained by the model's determinants (e.g., a systematic component in the country's residuals across years). By the properties of the fixed-effects estimator, this systematic component is exactly equal to the coefficient of the country dummy (e.g., the country fixed effect, u_i). Then, the residual, e_{it}, becomes a true i.i.d. component that cannot be interpreted as a risk premium, because it is purely random. Hence, the estimated country effects, u_i, become our estimation of an intertemporal country-specific risk premium (up to our time sample) relative to the U.S.[1]

Notice that, in Equation (5), we do not actually use spreads. We define spreads relatively to the U.S. Treasury bond. But, in econometric terms, because U.S. Treasury bonds are constant across countries for a given year, using the spread or the actual level of cap rates will only affect the constant terms, δ, in the regression, when time effects, τ_t, are included. For identification purposes, we need to exclude one country when using country fixed effects, so we choose to exclude the U.S., the benchmark country. Then, the regression's intercept will directly measure the average spread across countries between office cap rates and government bond yields, plus the specific U.S. effect. This means that we could estimate the U.S. country-specific risk, whereas the U.S. Treasury bond yield is only the assumed risk-free rate. Hence, all country-specific effects can be directly interpreted relative to the U.S.-specific effect, given by the coefficient of the constant. Since government bonds are generally a less risky asset due to their higher liquidity level, we expect cap rates to be, on average, superior to government bond yields.

Using the fixed-effects estimator has another important advantage in our context. This article is one of the few attempts to study real estate risks in a large selection of emerging countries that are by now well integrated in the global property market. The drawback is that real estate data for emerging countries are scarce or nonexistent; for instance, variables measuring real estate investment volume, transparency of the market, zoning codes, land-use constraints, diversity in office space (share of services, manufacturing or government in office use), and so on are not readily available. But most real estate determinants—including the ones previously mentioned—are more or less constant in time over a seven-year period. In the fixed-effects framework, variables that do not vary much in time will likely appear as being nonsignificant.[2] Hence, even if it would be possible to find further data, these variables would be absorbed in the country effect, by the properties of the FE estimator.

Moreover, data scarcity implies that we cannot construct a long time series, which would have been more appropriate for studying the stochastic properties of the cap rate. Yet, with seven annual observations (from 2000 to 2006) and a sample of 52 developed and emerging countries, we can rely on a relatively large panel that

enables us to estimate country-specific risk components, similar to Sivitanidou and Sivitanides [1996, 1999].

Variables

Investors' growth expectations, ΔCF_{it}, are generally based on information currently available. Therefore, we will use the one-year lagged value (at time $t-1$) of the real GDP growth (GDP%(–1)) to approximate the expected growth of cash flows at time t.[3] Instead of using direct growth proxies, we can also rely on annual variations in the vacancy rate (VACANCY%(–1)). When the vacancy rate increases, we should observe a lower (or negative) rental growth rate, and when the vacancy rate decreases, the adjustment between demand and supply is tighter, and we should observe an increase in the rental growth rate. In our model, cash flows are approximated by rents. Hence, using data on rent levels, we also construct an index of real rents (RRENT), imputing the evolution of rents (in real terms) in each country from an initial index set to 100 for the first period (2000).[4] We expect that higher expectations of cash flow growth should increase the price of property and, thus, decrease the cap rate.

As a measure of real estate specific risk, RE_{it}, the liquidity of the market might be another important determinant of the capitalization rate. Ceteris paribus, investors may prefer to operate in a larger market to minimize transaction costs and hedge out the variability in price (Bernoth, von Hagen, and Schuknecht [2004] and Favero, Pagano, and von Thadden [2005]). A market with a large inventory and a more developed property market should guarantee investors less volatility in the standard deviation of returns, because market inefficiencies are lower than in an emerging property market. For these reasons, we expect illiquid markets to display higher capitalization rates to compensate for the larger transaction costs investors need to bear to invest in that market. To measure the liquidity of the real estate market, we use two variables. First, the total inventory divided by the city's area (DENSITY) gives an approximation of the market density level. We expect a negative correlation between DENSITY and cap rates because a higher density level should lower the investor's risks.[5] Second, we have constructed a dummy variable taking the value of one when public real estate investment vehicles (PREIV) are in operation in the country's real estate market (from the first year of existence), and zero otherwise. The existence of PREIV operators should enhance the liquidity of the real estate market.

We have observed that DENSITY is highly correlated with GDP per capita and with country sovereign risk (credit ratings). To single out the specific real estate liquidity risk, we have performed a regression in logs of DENSITY on GDP per capita. Then, the residuals from these regressions, labeled DENSITY-HAT, are taken as a liquidity variable, which becomes orthogonal to the country sovereign risk.

We also consider three qualitative country indices that might also affect risk perception. The three indices are compiled by the ICRG/PRS Group and are indices of bureaucracy quality (BUREAU); law and order (LAW), which assesses the strength and impartiality of the legal system and the popular observance of the law; and the investment profile (IPROFIL), which is a composite rating that combines three types of investment risks—contract viability/expropriation, profits repatriation, and payment delays.[6] The value of the country indices, which are based on the country ranking from low risk to high risk, increases with the level of country risk. We thus expect a negative coefficient for these determinants of the capitalization rate. Exhibit 1 summarizes the set of variables that will be used as determinants of the capitalization rate, with their expected sign.[7]

Estimation Methodology

The 10-year bond yield GovBond might be an endogenous variable in the capitalization rate Equation (5).

EXHIBIT 1
List of Variables for the Capitalization Rate Equation

Dependent Variable
Capitalization rate (CAP)

Determinants

Risk Premium
10-year bond yields (GovBond) (+)

Growth of Cash Flow
Real rent index in logs (RRENT) (–)
Vacancy rate (VACANCY%(–1)): annual changes (+)
Real GDP growth lagged one year (RGDP%(–1)) (–)

Real Estate Variables
Density of the market in logs (DENSITY): total inventory/area (+)
Existence of Public Real Estate Investment Vehicles (PREIV): 1 or 0 otherwise (–)

Qualitative Variables
Bureaucracy quality (BUREAU) (–)
Law and order (LAW) (–)
Investment profile (IPROFIL) (–)

To avoid this problem, we followed two empirical strategies. First, following Docker, Rosen, and Van Dyke [2004], we estimated an equation explaining the 10-year bond yield. Then, the fitted values obtained from this first step, labeled GovBond-HAT, were used in the cap rate regression instead of the actual value of GovBond. But unlike Docker, Rosen, and Van Dyke [2004] who used a single annual cross section, we were able to estimate a true country risk assessment, using panel data analysis. Equation (5) is then simply estimated by the FE estimator, using the fitted values of GovBond.

The second empirical strategy consists of estimating both equations (10-year bond yield and cap rate) in a Seemingly Unrelated Regression Equation (SURE) (Zellner [1962]) fixed-effects estimation, taking into account the correlation that might exist between the real estate and bond markets (see D'Argensio and Laurin [2008]). The two equations will presumably be related, because of common idiosyncratic shocks in the economy that affect the risk premiums on both markets.

Thus, we need to define an equation for GovBond. Based on the results obtained in D'Argensio and Laurin [2008], we chose to work with a restricted set of variables that best explain the risk on 10-year government bonds, while avoiding overfitting the model with numerous correlated variables.[8] The risk premium on government bonds should reflect the sovereign default risk on the country's public debt. Therefore, as determinants, we used a set of macroeconomic variables that measure the country's solvency and characterize its macroeconomic environment—government interest payments as a percentage of government revenues (IDEBT), foreign debt as a percentage of total debt (FOREIGNDEBT), international liquidities as a percentage of months of import cover (LIQUID), exports as a percentage of GDP (EXP), and real GDP growth (GDP%). The variable IMPULSE measures the contemporaneous effect of past financial crisis on short-term interest rates based on a stochastic analysis.[9] We also added a dummy indicator of past IMF lending (IMF5). Finally, to take into account global macroeconomic and financial conditions, we included time fixed effects.

Data

We focused on a set of 52 developed and developing countries (see the list of countries in the appendix, Exhibit A1) for which annual office market data are available on a consistent basis. For most of these countries, real estate figures are quite hard to find before year 2000. But from 2000 to 2006, we were able to construct an almost balanced databank, with only two missing observations for Venezuela in the years 1999 and 2000.[10] In total, we obtained a panel of 362 observations, with $T = 7$ annual observations (2000 to 2006) over $N = 52$ countries.

Office market data (cap rates, rents, vacancy rates, and inventory) were compiled using a combination of different real estate sources: Colliers, DTZ, Bentall, REIS, and Ober Haus Real Estate Advisors.[11] Furthermore, office market data include all classes of office space (A, B, and C) and are typically given at the metropolitan level. For most countries, the data are available consistently for a single city, the capital city, or the country's main metropolis. But for some countries, we have data on several important cities, so we chose to take the average value weighted by each city's total inventory. Data on annual government 10-year bond yields were taken from Bloomberg, Datastream, and Eurostat.[12] The International Monetary Fund's World Economic Outlook provides statistics on real GDP growth.

Data for the GovBond equation were taken from the IMF's World Economic Outlook, World Bank's World Development Indicator, Economist Intelligence Unit (EIU), and Moody's Country Credit Statistical Handbook.

To illustrate the relationship between both yields, Exhibit 2 relates the capitalization rate (in ascending order) with the long-term bond yields (annual average for the period 2004–2006). The bond yield trend across countries (the solid line) indicates a positive relationship with the capitalization rate, but with some large discrepancies. This relationship suggests that other determinants are driving capitalization rates, and we expect variables that characterize the office real estate market to also have an impact on the property market return.

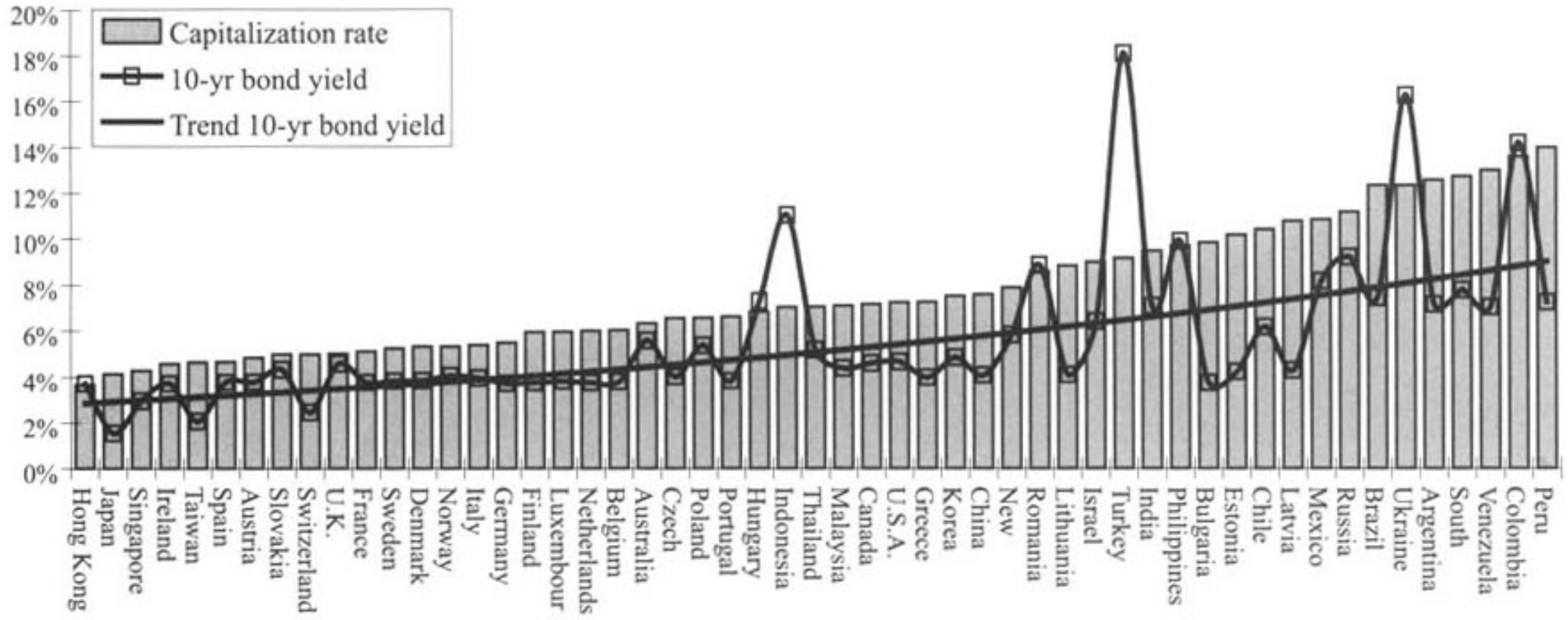
RESULTS

Exhibit 3 presents the single-equation regressions for the cap rate (first empirical strategy) using GovBond-HAT, the fitted values of the long-term bond yield. GovBond-HAT is computed using the estimated coefficients of the GovBond equation shown in Column 1B of Exhibit 3. The *F*-tests printed in the lower part of the exhibit evaluate the joint significance of country fixed effects or of time effects.

As expected, a strongly significant and positive relationship exists between the risk premium on government

EXHIBIT 2

Relationship between Capitalization Rates and 10-Year Government Bond Yields, 2004–2006 Average



Sources for the 10-year bond yields: Bloomberg, Datastream, and Eurostat. Sources for the cap rate: Colliers, DTZ, Bentall, REIS, and Ober Haus Real Estate Advisors.

bonds and the cap rate. GovBond alone explains about 44% of the real estate yield (Column 1A, Exhibit 3). Using the equation results in Column 1B of Exhibit 3, we can decompose GovBond-HAT into a component determined only by macroeconomic fundamentals and risk history variables (FUND)[13] and one representing the fixed country effects (EFFECT). The component EFFECT has a higher and more significant coefficient value than the FUND component (Column 2A, Exhibit 3), which shows that the fixed country perception on the government bond market is a more significant determinant of the real estate return than macroeconomic fundamentals.

Turning to the real estate liquidity variables in Column 3A of Exhibit 3, we find that DENSITY has a highly significant negative coefficient. Similarly, the existence of PREIV contributes to lowering the risk premium, but this indicator is not significant with country fixed effects as, over the years, it is mainly a constant country characteristic.

Column 3A of Exhibit 3 also shows the results for the growth proxies of NOI—real rents (RRENTS), the one-period change in the vacancy rate (VACANCY%(–1)), and lagged GDP growth (RGDP%(–1)). Contrary to our theoretical model, these variables have a positive impact on the cap rate. In the case of VACANCY%(–1), recall that a decreasing vacancy rate signals higher expectations of rent growth. Hence, the negative coefficient still indicates that the expected growth of NOI has a positive effect on cap rates. These growth variables might, in fact, be poor proxies for future NOI growth.

But this unexpected positive effect may also indicate that real estate prices are not adjusting instantly to NOI growth expectations. Theoretically, based on Equation (3), the evolution of rents should be taken into account fully in the valuation of property prices. Hence, the capitalization rate should evolve as a mean-reverting stationary process. But in reality, prices may not adjust perfectly and immediately to changes in rents. Indeed, Sivitanides et al. [2001] showed that, for the U.S. metropolitan markets, capitalization rates are not mean reverting over time (i.e., investors seem to appraise the time path of rental growth by looking myopically backward and not forward).

Note that when using VACANCY%(–1) we lose one year of observations; hence, we chose to work only with GDP% and RRENTS in the regressions that follow.[14] The FE results are presented in Columns 4A and 5A of Exhibit 3. The noteworthy outcome is the absence of significance for the NOI growth proxies. This is interesting; NOI growth proxies seem to be captured by the country fixed effect, as if investors are assigning a fixed growth expectation (up to the time sample) to each country's real estate market, notwithstanding the country's actual yearly growth figures.

In Column 6A of Exhibit 3, we investigate the sensitivity of the relationship between the 10-year government bond yield and the cap rate with regards to the level of economic development. More precisely, we estimate

EXHIBIT 3
Estimation Results for CAP Equation

	CAP Equation						GovBond Equation	
	1A	**2A**	**3A**	**4A**	**5A**	**6A**		**1B**
	OLS	**OLS**	**OLS**	**FE**	**FE + Time Effect**	**RE + Slope Change**		**FE + Time Effects**
GOVBOND-HAT	0.4269*** (10.73)	–	0.3874*** (9.75)	0.3829*** (8.03)	0.2155*** (2.89)	–	IDEBT	0.4228*** (5.19)
DENSITY-HAT	–	–	–0.0048*** (–4.79)	–0.0063 (–1.43)	–0.0134** (–2.09)	–0.0128* (–1.96)	FOREIGNDEBT	0.0027 (0.18)
PREIV	–	–	–0.0091*** (–3.59)	0.0016 (0.44)	0.004 (1.22)	0.0045 (1.24)	LIQUID	–0.0020** (–2.23)
LN(RRENTS)	–	–	0.0179** (2.48)	0.0028 (0.43)	0.0049 (0.72)	0.0058 (0.81)	EXP	0.0014 (0.11)
VACANCY% (–1)	–	–	–0.0044* (–1.96)	–	–	–	GDP%	–0.0641 (–0.82)
RGDP% (–1)	–	–	0.0356 (0.57)	0.0215 (0.42)	0.0709 (1.33)	0.0754 (1.35)	IMPULSE	0.0020*** (3.04)
Constant	0.0530*** (19.78)	0.0589*** (18.15)	–0.0232 (–0.75)	0.0422 (1.36)	0.0299 (0.9)	0.0269 (0.77)	IMF5	0.0155** (2.29)
FUND		0.3439*** (7.52)					Constant	0.035*** (3.29)
EFFECT		0.5496*** (13.77)						
Govbond-HAT *Developed Countries*	–	–	–	–		0.1204 (0.86)		
Govbond-HAT *Emerging Countries*	–	–	–	–		0.2141** (2.90)		
F-test Time Effects (*p-value*)	–	–	–	–	5.03 (0.0001)	5.00 (0.0001)		4.98 (0.0000)
F-test Country Effects (*p-value*)	–	–	–	27.71 (0.0000)	27.10 (0.0000)	13.01 (0.0000)		18.57 (0.0000)
No. of Observations	357	357	308	357	357	357		415
R^2	0.4446	0.4741	0.5533	0.8239	0.8575	0.8462		0.8576

*Notes: OLS estimation using White heteroscedasticity robust standard errors. Observations excluded when GovBond > 0.4. In parentheses below coefficient: t-statistics. * = significant at 10%; ** = significant at 5%; *** = significant at 1%.*

two distinct coefficients for GovBond-HAT, one for developed and one for emerging countries, within the same equation,

$$CAP_{it} = \delta + \beta_1(\text{GovBond} - HAT_{it} * D1) + \beta_2(\text{GovBond} - HAT_{it} * D2) + \beta_3 X_{it} + e_{it} \quad (6)$$

where $D1$ equals one for developed countries, and zero otherwise, and $D2$ is defined similarly for emerging countries and X is all other determinants following GovBond in Equation (5). Because the dummies $D1$ and $D2$ are constant in time, we need to estimate Equation (6) using the random effect estimator.[15] The results show that the relationship between sovereign risk and the cap rate is mostly driven by emerging countries. The coefficient for developed countries becomes insignificant, and the coefficient of emerging countries is almost identical to the unrestricted case of Column 5A of Exhibit 3. In a panel of emerging and developing countries, differences in sovereign risk between developed countries appears to be so marginal that they have almost no bearing on the cap rate.

Exhibit 4 shows the regression reported in Column 5A of Exhibit 3, but also reports the coefficients of the time effects, which are all significant. On average, the cap rate has decreased considerably since 2002—it was, on average, 0.68 percentage points (p.p.) higher in 2005, 1.52 p.p. higher in 2004, 1.71 p.p. higher in 2003, and 1.82 p.p. higher in 2002.

In Column 1C of Exhibit 4, we investigate the significance of area fixed effects for the 15 European Union member states before enlargements (EU), the European

EXHIBIT 4
Estimation Results for CAP Equation

	FE + Time Effect	Area Effects	Qualitative Index		
	5A	1C	2C	3C	4C
		OLS	OLS	OLS	OLS
GOVBOND-HAT	0.2155*** (2.89)	0.2752*** (7.09)	0.2528*** (5.04)	0.2745*** (6.11)	0.3180*** (6.54)
DENSITY-HAT	–0.0134** (–2.09)	–0.0013 (–1.33)	–0.0042*** (–4.66)	–0.0063** (–6.48)	–0.0056*** (–5.37)
PREIV	0.004 (1.22)	–0.0031 (–1.39)	–0.0032 (–1.47)	–0.0075*** (–3.52)	–0.0061** (–2.62)
LN(RRENTS)	0.0049 (0.72)	0.0206*** (3.41)	0.0102 (1.52)	0.0167** (2.53)	0.0196*** (2.84)
RGDP% (–1)	0.0709 (1.33)	0.1501*** (2.87)	0.0147 (0.27)	0.0505 (0.92)	0.0354 (0.65)
Constant	0.0299 (0.90)	–0.0348 (–1.30)	0.0481 (–1.47)	0.0133 (0.43)	–0.0034 (–0.10)
EU	–	–0.0223*** (–8.72)	–	–	–
ENLARG	–	0.0141** (2.54)	–	–	–
EU-ENTRY		–0.0198*** (–3.22)	–	–	–
Asia	–	–0.0248*** (–7.03)	–	–	–
Latin	–	0.0147*** (3.07)	–	–	–
OTHERS		–0.0081*** (–2.64)			
BUREAU	–	–	–0.0128*** (–5.43)	–	–
LAW	–	–	–	–0.0078*** (–5.74)	–
IPROFIL	–	–	–	–	–0.0032*** (–2.81)
D2000	0.0193*** (3.97)				
D2001	0.0141*** (3.38)				
D2002	0.0182*** (4.78)	See *F*-test	See *F*-test	See *F*-test	See *F*-test
D2003	0.0171*** (5.15)				
D2004	0.0152*** (4.56)				
D2005	0.0068** (2.41)				
F-test Time Effect (*p-value*)	5.03 (0.0001)	4.86 (0.0001)	3.6 (0.0018)	4.25 (0.0004)	3.49 (0.0023)
F-test Country Effects (*p-value*)	27.1 (0.0000)	–	–	–	–
No. of Observations	357	357	357	357	357
R^2	0.8575	0.6886	0.6013	0.6102	0.5702

*Notes: OLS estimation using White heteroscedasticity robust standard errors. Observations excluded when GovBond > 0.4. Country fixed effects are excluded with the use of area effects, qualitative risk variables, and credit ratings. In parentheses below coefficient: t-statistics. * = significant at 10%; ** = significant at 5%; *** = significant at 1%.*

countries that joined the EU in 2004 or 2007 (ENLARG), the Asian countries (ASIA), the Latin American countries (LATIN), and all the remaining countries (OTHERS).[16] Compared to the U.S.-specific effect (given by the constant), the 15 EU and Asian countries tend to post, on average, a lower cap rate of about 2.23 p.p. and 2.48 p.p., respectively, and Latin American countries have, on average, a higher level of cap rate of about 1.40 p.p. In the case of the EU enlargement countries (ENLARG), the cap rate tends to be higher (1.41 p.p.), but has decreased dramatically since 2004 (e.g., from the year of entry into the EU). To show this, we have constructed a dummy equal to one from the first year of entry into the EU, and zero otherwise (EU-ENTRY). This indicator is negative and significant; the cap rate of EU enlargement countries tends to be 1.98 p.p. lower in the first year of official EU membership relative to its pre-accession level.

The qualitative variables BUREAU (2C), LAW (3C), and IPROFIL (4C) are all significant at the 1% level, indicating that a better-rated country tends to have a lower cap rate, as expected.

SURE Results

Finally, Exhibit 5 reports the implementation of the second empirical strategy in which we estimate both equations (10-year bond yield and cap rate) in a SURE system with fixed effect (SURE-FE). Time fixed effects are also provided in all regressions. The coefficient of GovBond obtained from the SURE-FE indicates a positive and significant relationship between these two yields. We can estimate that a 1 p.p. increase in the 10-year bond yield rate will raise the cap rate by about 0.19 p.p. This point estimate may seem low, but the estimation already includes country-specific risk effects. The effect of the risk premium on the bond market is to be added to these permanent country risk assessments.

EXHIBIT 5

Estimation Results for CAP Equation—SURE-FE Regressions

CAP Equation		**GOVBOND Equation**	
GOVBOND-HAT	0.1921*** (6.26)	IDEBT	0.4894*** (11.63)
DENSITY-HAT	–0.0113*** (–4.28)	FOREIGNDEBT	–0.008 (–0.86)
PREIV	0.0041 (1.03)	LIQUID	–0.0021*** (–3.41)
LN(RRENTS)	0.0071 (1.56)	EXP	–0.0011 (–0.07)
RGDP% (–1)	0.0845*** (2.91)	GDP%	0.0208 (0.40)
Constant	0.0159 (0.73)	IMPULSE	0.0037*** (10.23)
		IMF5	0.0178*** (4.41)
		Constant	0.0149 ('1.93)
F-test Time Effect (*p-value*)	66.99 (0.0000)	*F*-test Time Effect (*p-value*)	19.08 (0.0040)
F-test Country Effects (*p-value*)	841.91 (0.0000)	*F*-test Country Effects (*p-value*)	1058.44 (0.0000)
No. of Observations R^2	357 0.879	No. of Observations R^2	357 0.9064

*Notes: Observations excluded when GovBond > 0.4. In parentheses below coefficient: t-statistics. * = significant at 10%; ** = significant at 5%; *** = significant at 1%.*

**In the case of the FE estimator, the total residuals z corresponds to the regression residuals e because the individual dummy variables are included in the model.*

More generally, in both the 10-yr government bond yield and the cap rate models, the country-specific risk effects are highly significant and they reveal the existence of time-invariant country characteristics or permanent risk perception that affects the risk premiums. This may indicate, for example, that investors tend to develop a fixed or preconceived risk assessment for each country which may or may not be related to the country's actual economic situation.

Results for the 10-Year Government Bond Spread

Results for the 10-year government yield equation are shown in Column 1B of Exhibit 3, and in Exhibit 5, right panel, for the SURE procedure. We expected the risk premium to increase with the level of indebtedness. Indeed, higher foreign debt (FOREIGNDEBT) and larger interest payments (IDEBT) tend to increase the risk premium. FOREIGNDEBT is not significant, however. The determining criterion for the risk premium is the capacity to honor short-term obligations, in particular, interest payments on debt, rather than the level of total debt. Similarly, greater liquidity should enhance a country's capacity to confront financial engagements, and thus reduce the risk of default. Thus, international liquidity (LIQUID) contributes to lowering the risk premium, but exports (EXP) are not significant in either GovBond regression.

We also expected a negative relationship between real GDP growth and the bond yield, but this variable is not significant either. The risk history, measured by IMPULSE and the indicator of past IMF lending (IMF5), both of which are highly significant, has a positive effect on risk premiums. Country fixed effects improve the fit of the regression, and similar to the CAP equation, they measure the country-specific sovereign risk premium not explained by macroeconomic fundamentals. The constant can then be interpreted as the U.S.-specific base risk rate in 2006, which was about 3.5%.

Country-Specific Risk Component

From Equation (5), we can estimate the *predicted* cap rate based only on the following three components:

$$\text{Predicted } CAP_{it} = (\delta + \tau_t + u_{\text{USA}}) + \beta_1 \text{GovBond}_{it} + \beta_2 RE_{it} + \beta_3 \Delta CF_{it} \quad (7)$$

EXHIBIT 6

Office Real Estate Risk Over- or Undervaluation versus the U.S. Risk Assessment, 2000–2006 Average

Country	Average Cap Rate	Average Predicted Cap Rate	Difference (Country Fixed Effect against the U.S.)	*t*-student of Fixed Effect
Argentina	11.78%	6.76%	5.02%	5.04***
Australia	6.55%	10.23%	–3.68%	–4.97***
Austria	5.04%	6.96%	–1.92%	–2.52**
Belgium	6.26%	5.96%	0.30%	0.37
Brazil	12.84%	9.65%	3.19%	3.55***
Bulgaria	13.71%	9.65%	4.06%	4.83***
Canada	7.83%	8.13%	–0.31%	–0.48
Chile	10.18%	7.36%	2.82%	3.74***
China	7.07%	8.80%	–1.73%	–2.23**
Colombia	12.53%	9.08%	3.45%	3.86***
Czech Rep.	7.99%	7.66%	0.33%	0.44
Denmark	5.96%	5.39%	0.57%	0.63
Estonia	12.29%	10.43%	1.86%	2.11**
Finland	6.42%	6.16%	0.26%	0.32
France	5.75%	4.31%	1.44%	1.37
Germany	5.41%	6.73%	–1.32%	–1.72*
Greece	7.61%	5.09%	2.52%	2.62***
Hong Kong	4.30%	7.16%	–2.86%	–4.14***
Hungary	8.04%	8.25%	–0.21%	–0.28
India	10.56%	8.54%	2.02%	2.68***
Indonesia	7.44%	8.81%	–1.37%	–1.63
Ireland	5.04%	7.95%	–2.91%	–3.88***
Italy	5.67%	8.00%	–2.32%	–3.63***
Japan	4.33%	5.70%	–1.37%	–1.83**
Korea	8.07%	7.95%	0.12%	0.18
Latvia	11.59%	10.57%	1.02%	1.08
Lithuania	11.36%	10.51%	0.85%	0.94
Luxembourg	6.42%	10.85%	–4.42%	–5.2***
Malaysia	8.41%	5.57%	2.84%	3.14***
Mexico	11.54%	8.80%	2.74%	3.75***
Netherlands	6.39%	7.13%	–0.74%	–1.1
New Zealand	8.30%	9.11%	–0.81%	–1.26
Norway	6.48%	7.63%	–1.15%	–1.54
Peru	13.25%	9.80%	3.45%	4.41***
Philippines	9.95%	4.64%	5.31%	3.84***
Poland	8.57%	7.69%	0.89%	1.16
Portugal	6.96%	5.52%	1.43%	1.64
Romania	11.90%	10.91%	0.99%	1.55
Russia	15.21%	10.03%	5.18%	5.69***
Singapore	4.03%	7.56%	–3.53%	–5.44***
Slovakia	8.57%	8.20%	0.37%	2.31***
South Africa	12.44%	10.11%	2.34%	3.45***
Spain	5.25%	7.24%	–1.99%	–2.97***
Sweden	5.78%	5.66%	0.12%	0.13
Switzerland	4.96%	5.02%	–0.05%	–0.06
Taiwan	5.12%	7.96%	–2.84%	–4.18***
Thailand	6.72%	8.83%	–2.12%	–2.72***
Turkey	10.50%	14.79%	–4.29%	–2.43**
U.K.	5.70%	4.34%	1.36%	1.28
U.S.A.	8.22%	8.22%	0.00%	nil
Ukraine	15.86%	12.70%	3.16%	3.31***
Venezuela	13.60%	8.82%	4.78%	6.15***

*Notes: * = significant at 10%; ** = significant at 5%; *** = significant at 1%.*

Using the results of the SURE-FE estimation (Exhibit 5), we can compute the average actual cap rate and the average predicted cap rate (excluding fixed effects) for each country, as shown in Exhibit 6. The third column of the exhibit gives the country fixed effect compared to the U.S. (the coefficient of the country dummy). The exhibit also reports the *t*-student and the significance of the fixed effect. A nonsignificant effect indicates that there is no significant over- or undervaluation of the cap rate relative to the U.S. In Exhibit 6, for example, according to transactional data, the average cap rate in Argentina between 2000 and 2006 was 11.78%, but the country's average predicted cap rate, based only on the 10-year government bond yield, real estate variables, and the U.S. time constant, should be equal to 6.76%. Thus, the difference of 5.02 p.p. between the two cap rates represents Argentina's country-specific effects, which means that, based on our assumption, the actual cap rate is over-evaluated by 5.02 p.p. Hence, Exhibit 6 presents our estimation of the intertemporal country risk premium in the office real estate market.

CONCLUSION

In this article, we have attempted to estimate the country-specific real estate risk premium by investigating the determinants of the office capitalization rate across a panel of developed and emerging countries. Our assumption, based on the CAPM, is that the capitalization rate should be at least proportional to the country's risk perception, as measured by the risk premium on the 10-year government bond yield. Our results show that the government bond yield is the main determinant of the cap rate. It explains 41% to 44% of the capitalization rate level. We estimate that a one-percentage-point increase in the government bond yield will raise the capitalization rate by about 0.19 p.p.

Real estate variables also play a role, but to a lesser extent. The liquidity variables have a significant and negative effect on the real estate risk premium because investors prefer to operate in larger markets in order to minimize transaction costs, hedge out price variability, and exploit the availability of a larger pool of exit strategies. The results regarding rental growth expectations are less conclusive. These variables do not have a high and consistent explanatory power on the capitalization rate, especially when fixed country effects are included in the regression as if investors are assigning a fixed growth expectation to each country. The mere fact, however, that they appear to be significant in some regressions might be an indication that real estate prices are not necessarily adjusting instantly to changes in the net operating income of the office building.

Future research on the determinants of the real estate capitalization rate—and its relationship with the risk premium on the bond market—will depend crucially on the availability of real estate data, especially for emerging countries. The next step will be to investigate this issue at the city level, which is more relevant to an understanding of real estate markets than is the national level. As already mentioned, it would also be interesting to consider a longer time series, because the capitalization rate seems to obey particular stochastic processes, in particular, the mean-reverting properties of the real estate yield. Finally, another line of research would be to examine how investors structure their risk assessment when investing in emerging property markets compared to developed ones. Across developed countries, differences in country risk levels are marginal. Therefore, we can assume that investors will grant more importance to real estate fundamentals than the level of country risk when conducting due diligence in a developed country's property market compared to an emerging country's property market. Investors may thus be much more sensitive to the higher investment risks associated with most emerging countries that might outweigh any favorable real estate conditions. Second, because emerging markets are largely demand driven, changes in the new office supply curve might have less of an effect on foreign investment decisions. Therefore, when investing in an emerging property market, an investor is likely to focus primarily on an analysis of the market's economic growth-rate potential (the demand) and investment risks (level of transparency, political stability, and profit repatriation) rather than the real estate cycle.

APPENDIX

Provided in this appendix is a list of the countries in the sample, a list of the cities in the sample, and the data sources. The countries are classified into emerging countries (1); European Union (EU) member states (15 countries) before enlargements (2); EU membership candidates that joined the EU in 2004 or 2007 (3); Asian countries (4); Latin American countries (5); and all other countries (6).

EXHIBIT A1
List of Countries in Sample

	1	2	3	4	5	6		1	2	3	4	5	6		1	2	3	4	5	6
Argentina	*				*		**Hungary**	*		*				**Poland**	*		*			
Australia							**India**	*						**Portugal**		*				
Austria		*					**Indonesia**	*			*			**Romania**	*		*			
Belgium		*					**Ireland**		*					**Russia**	*					
Brazil	*				*		**Israel**						*	**Singapore**	*			*		
Bulgaria			*				**Italy**		*					**Slovakia**	*		*			
Canada						*	**Japan**				*			**South Africa**						*
Chile	*				*		**Korea**	*			*			**Spain**		*				
China	*			*			**Latvia**	*		*				**Sweden**		*				
Colombia	*				*		**Lithuania**	*		*				**Switzerland**						*
Czech	*		*				**Luxembourg**		*					**Taiwan**	*			*		
Denmark		*					**Malaysia**	*			*			**Thailand**	*			*		
Estonia	*		*				**Mexico**	*				*		**Turkey**	*					
Finland		*					**Netherlands**		*					**U.K.**		*				
France		*					**New Zealand**						*	**U.S.A.**						
Germany		*					**Norway**						*	**Ukraine**	*					
Greece		*					**Peru**	*						**Venezuela**	*				*	
Hong Kong				*			**Philippines**	*			*									

EXHIBIT A2
List of Cities in Sample

Country	Available Cities
Argentina	Buenos Aires
Australia	Melbourne, Perth, Sydney
Austria	Vienna
Belgium	Antwerp, Brussels
Brazil	Rio de Janeiro, Sao Paulo
Bulgaria	Sofia
Canada	Calgary, Montreal, Ottawa, Toronto Vancouver
Chile	Santiago
China	Beijing, Guangzhou, Shanghai
Colombia	Bogota
Czech	Prague
Denmark	Copenhagen
Estonia	Tallinn
Finland	Helsinki
France	Paris
Germany	Berlin, Düsseldorf, Frankfurt Hamburg, Munich, Stuttgart
Greece	Athens
Hong Kong	Hong Kong
Hungary	Budapest
India	Bangalore, Chennai, Delhi, Mumbai
Indonesia	Jakarta
Ireland	Dublin
Italy	Milan, Rome
Japan	Tokyo
Korea	Seoul
Latvia	Riga
Lithuania	Vilnius
Luxembourg	Luxembourg City
Malaysia	Kuala Lumpur
Mexico	Mexico City
Netherlands	Amsterdam
New Zealand	Auckland, Wellington
Norway	Oslo
Peru	Lima
Philippines	Manila
Poland	Warsaw
Portugal	Lisbon
Romania	Bucharest
Russia	Moscow
Singapore	Singapore
Slovakia	Bratislava
South Africa	Cape Town, Durban, Johannesburg
Spain	Barcelona, Madrid
Sweden	Stockholm
Switzerland	Geneva, Zurich
Taiwan	Taipei
Thailand	Bangkok
Turkey	Istanbul
U.K.	London
U.S.A.	Atlanta, Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, Minneapolis, New York, Philadelphia, Phoenix, Pittsburgh, San Francisco, San Jose, Seattle, St. Louis, Washington
Ukraine	Kiev
Venezuela	Caracas

EXHIBIT A3

Sources of Data

Variables	Source
Interest rates	
10-year Treasury bond interest rate (or equivalent long-term rate)	Datastream; Bloomberg; Eurostat.
Monthly short-term interest rates	Datastream
Solvency variables	
Government debt (% of GDP/Government revenue)	Moody's Country Credit Statistical Handbook
Government interest payment/Government revenue	Moody's Country Credit Statistical Handbook
International liquidities as months of import cover	ICRG/PRS Group
External trade variables	
Exports of goods and services (% of GDP)	World Bank: World Development Indicator; EIU
GDP variables	
GDP (current U.S.$) GDP per capita (constant 2000 U.S.$)	World Economic Outlook World Economic Outlook
Other variables	
Existence of financial arrangements with IMF	International Monetary Fund
Qualitative index	
Bureaucracy quality, government stability, investment profile	ICRG/PRS Group
Moody's credit ratings	Moody's Sovereign Ratings List
Real estate variables	
Capitalization rate by city Vacancy rate by city Inventory by city (Sq.ft/yr) Rents by city (€/Sq.m/yr or U.S.$/Sq.ft/yr)	Colliers Office Global Insights; DTZ Property Market Analysis; Bentall; REIS; Ober Haus Real Estate Advisors; Property Management Association
Population by city PMA	www.citypopulation.com; REIS; Colliers; Australian Bureau of Statistics; National Statistical Institute of Bulgaria; National Statistical Office of Austria; National Institute of Statistics of Belgium
Existence of public real estate investment vehicles (PREIV)	Bloomberg
City area (km^2)	www.citypopulation.com

ENDNOTES

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[1]Lemmen and Goodhart [1999] similarly interpreted their country fixed effects in estimating European credit risk in a panel setting.

[2]The FE estimator is exactly equivalent to estimating an equation in which each variable is taken in deviation from its country average.

[3]Some empirical studies also use past inflation as a proxy for future growth in rents. However, in a cross-country estimation that includes emerging countries, the inflation rate is by itself a proxy for market risk and, therefore becomes much correlated with other measures of risk.

[4]By using an index, we avoid the issue of purchasing power differences across countries.

[5]We believe that real estate markets that are evaluated through their highest-and-best use (HBU) will display higher density levels (e.g., Manhattan versus Phoenix), thereby attracting more investment.

[6]We would have preferred to use some type of a real estate investment transparency index, such as the one provided by Jones Lang Lasalle (JLL). Unfortunately, JLL's transparency index is unavailable consistently across years and for all the countries in our sample.

[7]The real rent index (RRENT) and the two real estate risk variables DENSITY and PREIV are not in percentage format, contrary to the dependent variable CAP and the other

determinants. Thus, these variables are transformed into logs in all regressions, which will ensure a stronger fit.

[8]A more comprehensive description of the models can be found in D'Argensio and Laurin [2008] as well as several results for various specifications of the GovBond equation.

[9]IMPULSE is computed by simulating the effect of a shock (financial crisis) on future values of short-term interest rates for each country using an impulse response function based on the AR(12) estimates (see D'Argensio and Laurin [2008]).

[10]For Venezuela, we were not able to find consistent observations on real estate data for these two years.

[11]Colliers is a well-known real estate adviser. In addition, for emerging countries, we had to extract data from real estate advisers more involved in these markets. DTZ is one of the "big four" global real estate advisers operating across Europe, the Middle East, Africa, Asia Pacific, and the Americas. Bentall is a real estate advisory and property management services company in Canada and the U.S. Ober Haus is the largest and only real estate agency operating across the Baltic and Central European region including Poland, Estonia, Latvia, Lithuania, and Ukraine.

[12]For countries that do not have a government bond market or bonds with a 10-year maturity, we used the available rate that came closest to a long-term interest rate. In a few cases, we used the longest government bond yield available (typically, a 5-year maturity) or the lending rate. This situation primarily concerns countries with very high risk assessments so that the spread versus the U.S. bond yield still represents a good approximation of country risk.

[13]FUND corresponds to the predicted value of GovBond based on the X variables, the constant, and the time effects in the GovBond equation of Column 1B less the country fixed effect.

[14]In periods of strong economic growth, when the absorption rate in office space is generally higher than the pace of new supply, the vacancy rate will decrease rapidly putting upward pressure on rental rates.

[15]We used a random-effect Hausman–Taylor estimator (Hausman and Taylor [1981]).

[16]See the appendix, Exhibit A1, for a list of countries with their classification into the four areas.

REFERENCES

Bernoth, K., J. von Hagen, and L. Schuknecht. "Sovereign Risk Premia in the European Government Bond Market." Working Paper Series No. 369, European Central Bank, 2004.

Bond, S.A., G.A. Karolyi, and A.B. Sanders. "International Real Estate Returns: A Multifactor, Multicountry Approach." Working Paper No. 2003-8, Dice Center, 2003.

Daly, K., and M. Cavanaugh. "Sovereign Credit Ratings History since 1975." Standard & Poor's, May 2007.

D'Argensio, J.-J., and F. Laurin. "The Real Estate Risk Premium: A Developed/Emerging Country Panel Data Analysis." CORE Discussion Paper No. 2008/4, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, 2008.

Docker, B.H., K.T. Rosen, and D.T. Van Dyke. "Hurdle Rates for International Real Estate Investing." Working Paper No. 496, The Wharton School, University of Pennsylvania, Samuel Zell and Robert Lurie Real Estate Center, 2004.

Favero, C., M. Pagano, and E.-L. von Thadden. "Valuation Liquidity and Risk in Government Bond Markets." Working Paper, Fondation Banque de France, March 2005.

Froland, C. "What Determines Cap Rates on Real Estate?" *Journal of Portfolio Management*, 13 (1987), pp. 77–83.

Hausman, J.A., and W.E. Taylor. "Panel Data and Unobservable Individual Effects." *Econometrica*, 49 (1981), pp. 1377–1398.

Hendershott, P., and B.D. MacGregor. "Investor Rationality: Evidence from U.K. Property Capitalization Rates." *Real Estate Economics*, Vol. 33, No. 2 (2005), pp. 299–322.

Jud, D.G., and D.T. Winkler. "The Capitalization Rate of Commercial Properties and Market Returns." *Journal of Real Estate Research*, Vol. 10, No. 5 (1995), pp. 509–518.

Lemmen, J.J.G., and C.A.E. Goodhart. "Credit Risks and European Government Bond Markets: A Panel Data Econometric Analysis." *Eastern Economic Journal*, Vol. 25, No. 1 (Winter 1999), pp. 77–107.

Moody's Sovereign Risk Unit. *Moody's Statistical Handbook: Country Credit*. May 2007.

Chin H., E. Tointzi, and P. Hobbs. "Global Real Estate Investment and Performance 2006 and 2007." RREEF Research, March 2007.

Sivitanides, P., J. Southard, R.G. Torto, and W.C. Wheaton. "The Determinants of Appraisal-Based Capitalization Rates." Torto Wheaton Research, March 2001.

Sivitanidou, R.C., and P.S. Sivitanides. "Office Capitalization Rates: Why Do They Vary Across Metropolitan Markets?" *Real Estate Issues*, 21 (1996), pp. 34–39.

——. "Office Capitalization Rates: Real Estate and Capital Market Influences." *Journal of Real Estate Finance and Economics*, Vol. 18, No. 3 (1999), pp. 297–322.

Yiu, C.Y., and C.M. Hui. "Testing the Dividend-Ratio Model on Real Estate Assets." *Journal of Real Estate Practice and Education*, Vol. 9, No. 1 (2006), pp. 19–35.

Zellner, A. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Test for Aggregation Bias." *Journal of the American Statistical Association*, Vol. 57, No. 298 (1962), pp. 348–368.

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