Forecasting Office Capitalization Rates and Risk Premia in Emerging Markets

by

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Postgraduate Diploma in Business
Administration, 2003
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Master of Science in Real Estate Development

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Abstract

As international property investors increasingly understand and appreciate the benefits of diversification and look to achieve higher returns, cross-border real estate investment has increased. In this context, the issue of the country risk premium is crucial as these types of investments present a wide range of risk and return opportunities that need to be understood and, ideally, quantified. Naturally, the decision of whether or not to invest begins with an assessment of how much additional return is required to compensate for the additional risk associated with a particular country. Establishing these risk premiums is particularly difficult since cross-border investors often lack local market knowledge and encounter transparency issues when trying to gain an understanding of the market. These questions matter particularly to institutional investors looking to make allocation decisions across geographically diversified holdings.

Given the problem of appropriate pricing in emerging markets, this study will attempt to forecast capitalization rates for these markets using widely available macroeconomic data and property-related market ratings. This cross-sectional study will employ univariate and multivariate regressions. We will initially identify various factors with a significant relationship to cap rates in markets where real estate pricing data is available. Office cap rate data from Real Capital Analytics (RCA), Jones Lang LaSalle-LaSalle Investment Management and Investment Property Databank (IPD) for sets of 23 to 25 overlapping countries will be used as dependent variables in the analysis.

Once the significant factors have been established, we will extrapolate the model out to markets that have the necessary background data, but lack usable cap rate information. In other words, we will forecast cap rates for countries that lack data – as is typical for emerging markets. Using this forecast, we can then estimate a "risk factor" by subtracting an appropriate risk-free rate and by adding a income growth proxy - the country's GDP growth.

This study hopes to reveal key factors that will help institutional investors looking to invest in countries other than their own. It will attempt to provide a basic guideline of cap rates and risk-factors for office properties in emerging markets. Understanding the drivers behind pricing differences can help us better predict how cap rates would change with underlying changes in local macroeconomic, political, and property market factors.

Thesis Supervisor : William Wheaton
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CHAPTER ONE: INTRODUCTION

Over the last twenty years, international institutional investors have become increasingly sophisticated with respect to their real estate portfolios. The application of modern portfolio theory within real estate allocations shows that diversification enhances overall performance, increasing returns and reducing volatility. Today no serious investor would consider solely investing in a single property type, nor holding real estate assets in a single country. Not only has real estate become accepted as an essential component of any investment portfolio, it has become an arena with a wide variety of options. The evolution has been direct: the late 1980's and early 1990's were marked by a burgeoning interest in international real estate investments among American institutions. During the 1990's the impetus for investing in international real estate came from the poor performance of American real estate from 1987 to 1992. The 2000's brought increasing allocations to real estate from institutions coupled with record performance, which brought attention to the sector.[1] The aggressive pricing of the recent domestic property boom has also driven total return-driven investors to look abroad.

International real estate investments have been on the rise, even though they carry a wide variety of additional risks which require detailed scrutiny to be successful. In making investment decisions, investors face significant hurdles: a lack of local market knowledge and, almost always, an absence of hard data. This problem is aggravated in emerging and frontier markets where newcomers can encounter dauntingly opaque situations.

Successful investment requires understanding on two levels, micro and macro. At the local level, an intimate knowledge of the unique aspects of the property or properties is essential. Real estate is a not a homogenous product. Transaction particulars can vary widely and significantly impact returns. An investor cannot not simply delve into a hot market, it is important to find the right deal in that market. Having said that, investments are strongly influenced by the macro level of larger market and country-level forces; thus, analysis of real estate investments must include a broader context. This thesis will focus on the wider, macro view.

Our approach is based on capitalization rate data available for approximately twenty-five countries, coupled with a series of factors for each country. Our cap rate data comes from Real Capital Analytics (RCA), Jones Lang LaSalle-LaSalle Investment Management, and the Investment Property

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[1] Kevenides, HA 2002, International real estate investment risk analysis, (Journal of Real Estate Portfolio Management), p. 61.

Databank (IPD). The analysis is cross-sectional, as many emerging markets lack sufficient data history to attempt a time series approach. These factors cover a range of economic, political, stability, and property rights elements. In order to explain the cross sectional variation in cap rates for office properties internationally, we identify factors that could potentially generate differences in expected growth rates and risk across countries. Some are objective, such as GDP per capita, and others more subjective, such as the Economist Intelligence Unit's estimation of property rights protection. Using univariate and multi-variate regression techniques, we construct cap rate forecasts by isolating significant factors for countries that lack property pricing data but that are covered by the macroeconomic indicators. In so doing we will attempt to provide a method for looking at country-level and market-level risks.

These forecasts will provide quantitative estimates of relative investment risks for different countries. They should prove useful to investors trying to establish return thresholds for their cross-border investments. Our analysis endeavors to add rigor to a process often dominated by rough estimates of relative risk. Some less sophisticated managers assign an arbitrary international risk premium – an incremental additional return requirement assigned to all investment strategies focused outside of the investor's domestic market. [2] This simplistic approach has been described as an "ignorance premium" by investors comfortable in the international space, as it implies that all foreign investments are riskier than those done at home.

We will divide our study into eight chapters. Following our introduction, the second chapter will work to define emerging markets in terms of their main attributes and their differences from more developed markets. In our third chapter, we will describe different elements of investment risk in cross-border transactions. While our focus will remain on emerging markets, many of the considerations apply to all foreign investments. The fourth chapter will present a review of the relevant literature that has informed our research. From there we will present our own analysis methodology, in the fifth chapter. The sixth chapter will introduce the results of this analysis and describe the process by which we arrived at our final models. The seventh chapter will use the models we have derived to construct capitalization rate forecasts and risk factor estimates for countries that have the relevant factor data but lack pricing estimates. We will conclude with some ideas for further research in this field.

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[2] Deal, M. & Rosso, C. 2001, Foreign investment in Latin American real estate: A comparison of Argentina, Brazil and Mexico, (Thesis: Massachusetts Institute of Technology), p. 52.

CHAPTER TWO: INVESTING IN EMERGING MARKETS

2.1 The investment universe

The countries in which firms choose to invest is a function of their risk - return appetites. For purposes of discussion, we can divide the investment universe into three main categories: developed/core, maturing, and emerging markets. Core markets are well-developed, mature countries (e.g. the US, the UK, Germany and Japan) that are fully integrated into the global capital markets and have lower long-term country risk. The second category, maturing markets, have a higher degree of country risk than developed markets either because they are less advanced or because emerging economies surround them; some examples include South Korea, Greece, and Portugal. The emerging markets category, our focus, including Turkey, India, and Brazil, are areas that have the highest degree of country risk among markets still considered invest-able.[3] Within the emerging markets space, some investors demarcate a subcategory, the frontier market, containing countries that are just encountering exposure to cross-border investors. This chapter will focus on emerging markets and frontier markets, the reasons for investing in international real estate, the sources used to make investment decisions, and the challenges faced while investing in emerging markets.

2.2 Defining Emerging Markets

The term "emerging markets" has been in use more than two and a half decades, since its first employment in 1981 to describe Thailand.[4] It is intended to denote areas undergoing rapid economic change. Initially, the phrase was applied to fast-growing economies in Asia, the so-called Asian Tigers, and after 1992, in Eastern Europe to describe the former communist bloc countries. Today the landscape looks very different, with countries such as South Korea essentially graduated from emerging status. Investors are now well acquainted with the "BRIC" of Brazil, Russia, India, and China, and are beginning to focus on what Goldman Sachs has coined as the "N-11" (Next-Eleven), countries following behind the BRICs in terms of development.[5]

No generally accepted definition exists of what constitutes an emerging market. While a full range of risk profiles are certainly available when investing globally, it is more difficult to demarcate the investment universe into categories. In terms of market size, Connor and Liang categorize emerging

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[3] Conner, P. & Liang, Y. 2005, <u>Ask Not Why International, Ask Why Not International</u>, p. 8.

[4] March 05, 2008 When Are Emerging Markets No Longer 'Emerging'?: Knowledge@Wharton Magazaine http://knowledge.wharton.upenn.edu/article.cfm?articleid=1911. Antoine W. van Agtmael, then deputy director of the capital markets department of the World Bank's International Finance Corporation, coined the phrase "emerging markets" at an investor conference in Thailand in 1981. At the time, Thailand was grouped with other poor countries in the "Third World." He felt that the tag "Third World" was discouraging investors from putting funds to work in Thailand and other poor countries with development potential and that the term "emerging" would help in the endeavor.

[5] "N-11" Countries are Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, and Vietnam

markets as being countries with per capita incomes less than $9000. 156 nations fit this definition, encompassing 84% of the world's population and 75% of sovereign states, but representing only 20% of global GNP (Gross National Product).[6] Standard & Poor's classifies countries as "emerging" if their stock market meets at least one of several general criteria: a low or middle-income economy, a low ratio of the country's market capitalization to its GDP, the existence of discriminatory controls for non-domiciled investors, or a lack of market regulation and operational efficiency.[7]

Figure 2.1 - GDP per Capita, Purchasing Power Parity - 2006

Figures in Thousands of U.S. Dollars
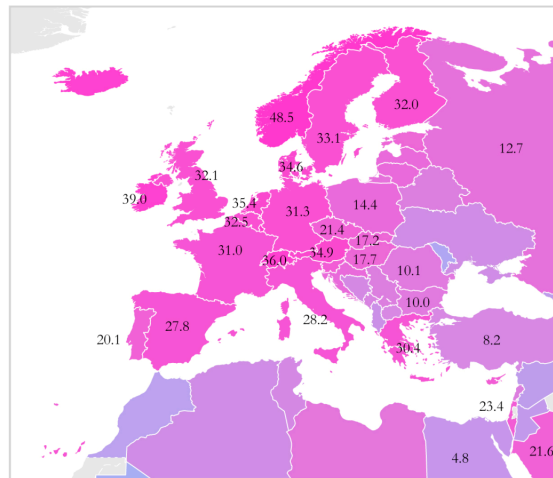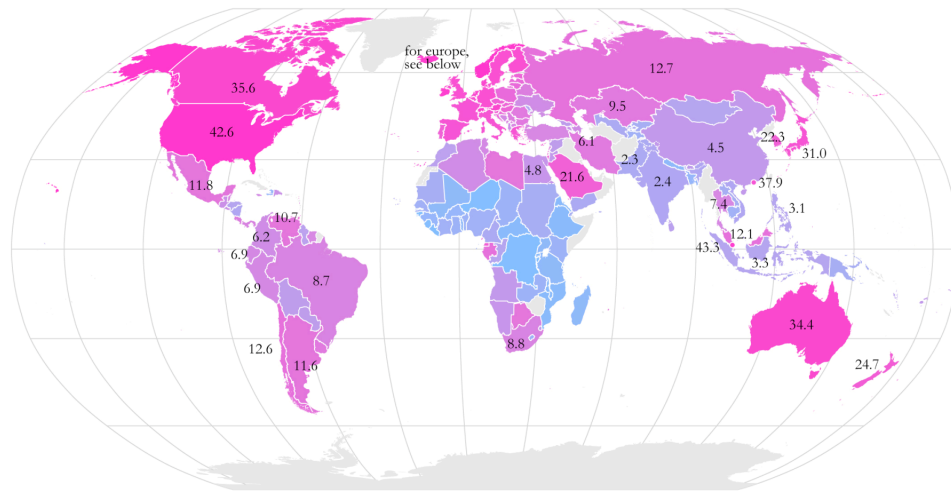
Source: World Bank World Development Index

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[6] Ibid, p. 15.
[7] http://www2.standardandpoors.com/spf/pdf/index/SP_Emerging_Markets_Indices_Methodology _Web.pdf

Wharton Management Professor Mauro Guillen describes another problem: "Once you start to put so many countries in the same category, the category loses meaning. While South Korea, Singapore and Taiwan share characteristics, once you put them in a bucket with India, Mexico, Argentina, Indonesia and Poland, it's no longer meaningful. The term 'emerging markets' has become a victim of its own success."[8] Nevertheless we find the term useful in order to broadly describe our area of interest – emerging markets, those at the edge of the current investment space. In forming our definition, we have focused on the key respects in which emerging markets clearly differ from developed markets: the overall size of their economies, the relative size of their financial markets, their fiscal and political stability, and their application of the rule of law.[9]

2.2.1 The Frontier Markets Concept

Within the broad term "emerging markets", the universe of markets has been further subdivided into emerging markets and frontier markets. Frontier markets describe the smallest, least developed, least liquid countries within the emerging markets basket. Frontier markets are "small *emerging* emerging markets". Examples of frontier markets include Bulgaria, Croatia, Kazakhstan, Nigeria, Sri Lanka and Vietnam.[10]

The frontier markets concept gains importance when companies such as Standard & Poors (S&P) and Morgan Stanley Capital International (MSCI) group them into investment indices. MSCI's Emerging Markets Index is a commonly used benchmark for emerging market equities.[11] This is a free-float adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets. MSCI subdivides the index into 25 emerging markets and 18 frontier markets. S&P cover 57 markets with their capitalization-weighted Emerging Market Indices of securities markets, which are designed to serve as benchmarks consistent across national boundaries. These groupings by multinational companies show how frontier and emerging markets have started gaining acceptance among investors as they provide easy ways to deploy capital in these markets. This type of mechanism furthers investor interest in these markets and raises the question of where the next hot market will be.

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[8] March 05, 2008 When Are Emerging Markets No Longer 'Emerging'?: Knowledge@Wharton
(http://knowledge.wharton.upenn.edu/article.cfm?articleid=1911)
[9] Hooke, J.C. 2001, Emerging markets: a practical guide for corporations, lenders, and investors, p. 93-120.
[10] MSCI Barra (Morgan Stanley Capital International Barra) – Frontier Markets Index as of July 2008
[11] MSCI International Equity Indices. Available: http://www.mscibarra.com/products/indices/equity/ [2008, June/02]

2.3 The Current State of International Investment

There is ample data on the overall size of international real estate investment, and it provides background for understanding this investment space. Figure 2.2 below illustrates that cross border investments in real estate are on the rise – both in terms of absolute values and percentage, according to Jones Lang Lasalle estimates. Cross border investment represents just under half (45%) of total investment flow, and U.S. investors represent just 9% of the cross border investors.

Figure 2.2 Global Direct Commercial Real Estate at a Glance

	H1 2007	H1 2006
Total Transactions	$385 bn	$309 bn
Cross - Border (% total)	$172 bn (45%)	$137 bn (44%)
Inter- Regional (% total)	$115 bn (30%)	$96 bn (31%)
Major Market (% of total global real estate transactions by value)		
	USA $163bn(42%)	USA $119bn(39%)
	UK $54bn(14%)	UK $48bn(15%)
	Germany $36bn(9%)	Germany $26bn(9%)
	Japan $30bn(8%)	Japan $26bn(8%)
Major Cross- Border Investors (% of total global real estate cross-border purchases by value)		
	Global$51bn (36%)	Global $46bn (41%)
	UK $18bn(12%)	USA $12bn(10%)
	USA $13bn(9%)	UK $9bn(8%)
	German $13bn(9%)	Irish $7bn(6%)

Source: JLL Global Real Estate Capital - October 2007

Irrespective of the differences between countries, foreign direct investments have increased in emerging markets, since 2003, just as they have in developed markets. Trends in investment volume up and down are similar for developed and emerging markets – though as we will see returns are not necessarily correlated between the two. While we might expect investment to drop somewhat in 2008 as a result of the global credit crisis, the long-term trend is positive. Standand and Poor's project that foreign direct investment will increase in the coming years. Figure 2.3 below splits developed and emerging markets and shows increases for both sides.

Figure 2.3 - Foreign Direct Investment Inflows 1999-2010

Source: Standard and Poors
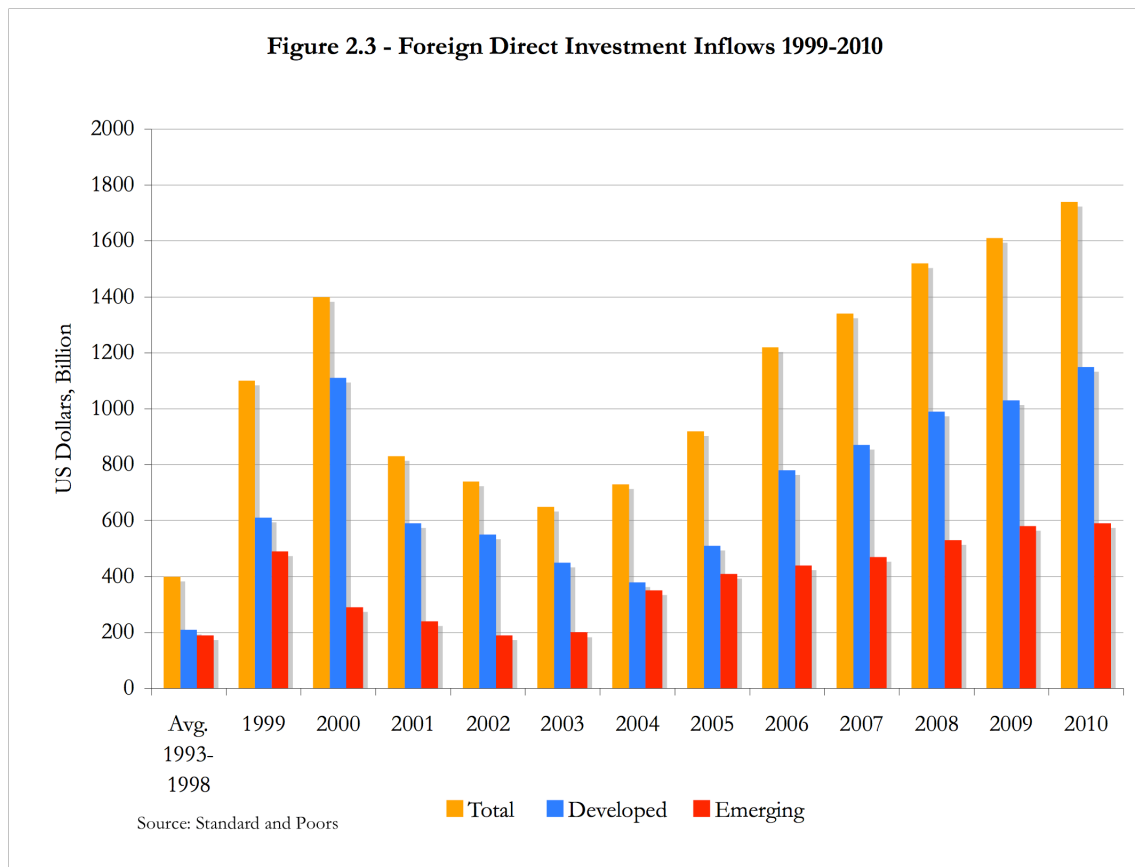
The emerging markets space is subject to high levels of volatility in terms of investment flow, and huge differences scale. Figure 2.4 shows the top Emerging Market FDI recipients in 2006. From the figures below the graph, we can see year-on-year changes in investment. Countries like Poland have seen drastic changes in FDI flows from the previous year. This illuminates the volatility and dynamism of the foreign investment universe.

Figure 2.4 - Top Ten Emerging Markets FDI Recipients, 2006

Country	Yearly Change in FDI (vs. 2005)
China	-3%
Hong Kong	15%
Singapore	55%
Russia	92%
Mexico	5%
Turkey	75%
Poland	108%
Brazil	8%
Chile	45%
India	42%

Source: Standard and Poors
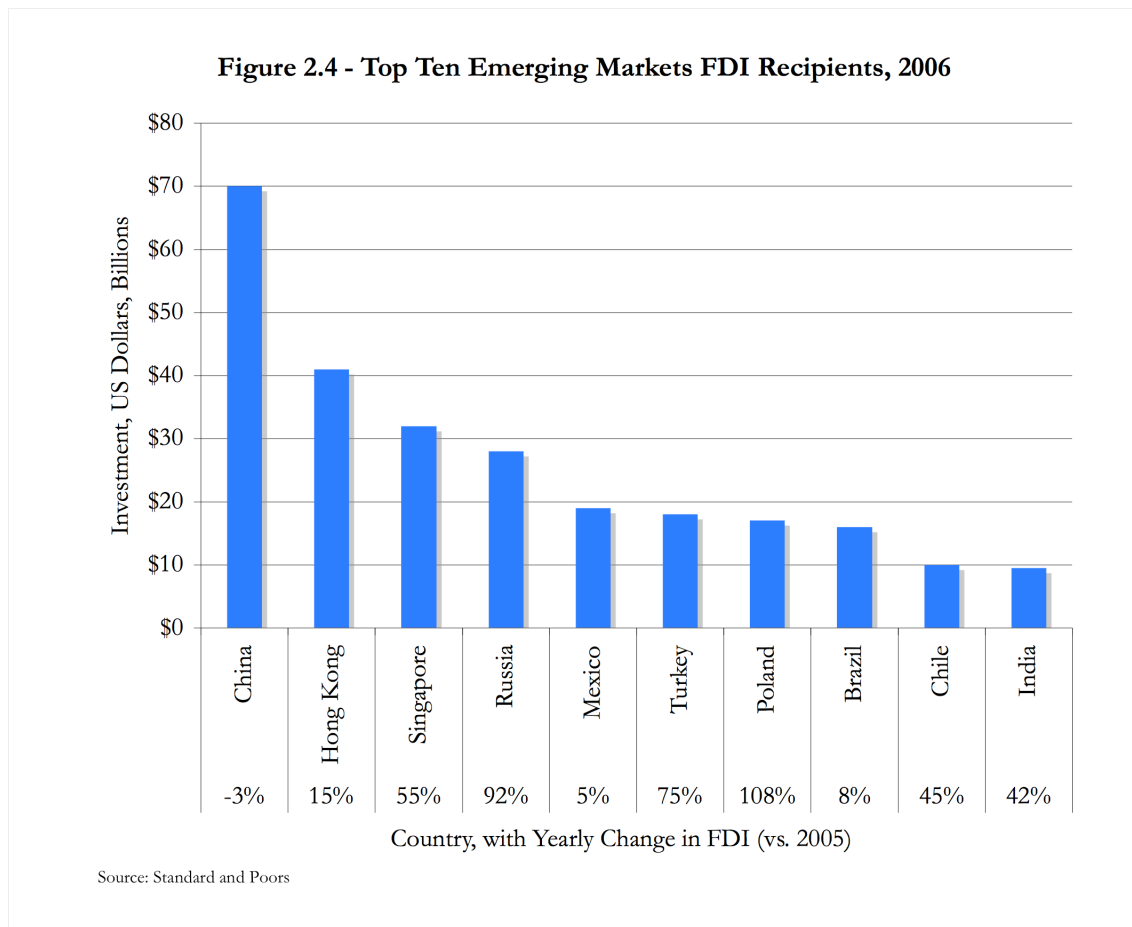
2.4 Reasons for investing in emerging markets

Previous research has looked at the motivations and methods of cross-border investment. This thesis does not explore these questions in particular. However, this background is relevant to our study, so we will look at the available body of work to provide grounding for our analysis.[12]

In the last few years' significant structural changes have contributed to the opportunities that are available in the overseas markets. In Europe, economic uplift for accession countries into the EU (European Union) has helped Central European economies (CEE), while adhesion to the Euro has boosted countries like Spain and Ireland. In Asia, China has experienced rapid industrialization and growth, supported by a government increasingly comfortable with capitalism, and with foreign investment. India's growth has been almost as impressive. In Latin America, the continued integration of Mexico's economy with those of the US and Canada has fundamentally transformed the investor's views of the opportunities there.[13] Put simply, a wide range of countries have recently experienced significant structural changes that make them more attractive for foreign investors.

Demographics

While developed markets generally exhibit very low single-digit growth rates, many emerging markets sustain high levels of growth both in GDP and in GDP per capita. In addition, demographics favor emerging markets, which have eighty percent of the world's inhabitants and generally growing populations. By contrast, developed countries like Japan and Italy, both of which have negative population growth, require immigration to help maintain stable populations.[14] The U.S. Department of Commerce estimated that over 75 percent of the expected growth in the world's trade over the next two decades will come from developing countries, particularly large emerging markets, which account for over half the world's population, but only 25 percent of its gross domestic product.[15] As such, opportunities may await investors who seek to achieve more favorable returns.

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[12] The body of work looked at is:
 Asian Real Estate Investment: Data Utilization for the Decision Making Process – MIT Thesis by Keun Huh (2007) The author of this thesis interviewed 5 interviewees from large renowned institutional real estate investors, not only on the U.S domestic but also on the international scale.
International Real Estate Investments by US Pension and Endowment Funds – MIT Thesis by Michael J. Mullins (2004) Eleven US institutional investors participated in this study - eight were from the top 35 pension funds and three were from the top six U.S. endowment funds.
Prudential Real Estate Investors have also written articles on this subject. References are included in the bibliography.
[13] Conner, P. & Liang, Y., p. 8.
[14] *How to deal with a falling population* The Economist, July 26th 2007
[15] http://www.franchise-chat.com/resources/franchising_in_emerging_markets.htm

Investor Perceptions

According to interview research by Mullins (2004), the most commonly cited advantages of international real estate investments were higher returns (45%), the ability to "buy value" in certain markets through early entry, and portfolio diversification (36%).[16]

Figure 2.5 - Advantages of Investing in International Real Estate

What do you perceive to be the greatest advantages of IRE?	
a) Higher returns	45%
b) Diversification	36%
c) Pool of international talent	18%
d) More opportunties	9%
e) Inefficency in local markets	9%
f) Discounts	9%
g) There is no diversification	9%
h) Provides information on markets	9%
j) Large untapped markets	9%
k) Less local competition	9%

Source: Mullins, M.J. 2004, International Real Estate Investments by US Pension and
Endowment Funds, Thesis: Massachusetts Institute of Technology.

Favorable Return Benefits

Investors often look to invest in international real estate to achieve relatively higher returns not available in their domestic real estate markets. However research by Prudential Real Estate Investors (PREI) suggests that it may be difficult to obtain a higher return on an absolute *and* risk-adjusted basis.[17] PREI does point to a few instances when the risk-adjusted returns are higher, for example:

1. By getting into markets early. Investing in markets which have very high growth potential in the very preliminary stages of growth can enable investors to benefit from yield compression as prices converge with more mature markets. This is a very typical investment strategy for these markets.

2. Through exporting value-added services of the investor's domestic market. Companies can sell their in-house knowledge, which they have perfected over time in a developed and mature market. Both direct investment and sale of property services could easily take the form of joint ventures between an international and a local partner.

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[16] Mullins, M.J, 2004, International Real Estate Investments by US Pension and Endowment Funds, (Thesis: Massachusetts Institute of Technology), p. 35.
[17] Liang, Y. et al., 1999. Myths and realities of international real estate investing. (Prudential Real Estate Investors) , p. 4-5.

3. By providing capital into markets where capital is undersupplied. In these instances, the international firm has a potential advantage over local players, as they are likely coming for a more capital-rich environment.

Diversification Benefits

Diversification was the second key reason for investing abroad. With globalization increasingly linking global financial markets, the correlations between stock markets and bond markets of the world are rising.[18] Therefore, investing abroad in these asset classes may not result in the diversification imagined. However, real estate has not experienced the same increase in correlations, as it remains a more local, insulated asset class. Thus, investing internationally in real estate can provide diversification benefits for investors at the overall portfolio level – causing diversification to be more effective for real estate than it is for stock and bond portfolios.[19] Studies measuring the diversification benefits of real estate and other asset classes suggest real estate provides lower correlations within its class, than either stocks or bonds within their respective classes.[20]

Eichholtz, Huisman, Koedijk and Schuin (1999) show that real estate markets on the same continent have a tendency to move together, meaning that real estate investors must seek diversification opportunities on other continents. They find evidence of significant continental factors for Europe and North America; those in Asia-Pacific are much smaller. Generally, correlations are higher between country markets within a given region than between country markets across different regions.[21]

Stephen Lee's study of Asian investment indicates that the benefits of international investment into emerging markets lend support to arguments in favor of international diversification: lower portfolio risk arises from low correlation across countries and higher returns arise from faster growing economies.[22]

Diversification may push investors into investing abroad, but it also entails information costs that are substantially higher than those of investing in domestic markets.[23] The higher information and

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[18] Liang .Y, 2003 , A Bird's eye view of global real estate markets, p. 1.
[19] Eichholtz, P.M.A., 1996a, Does International Diversification Work Better for Real Estate than for Stocks and Bonds?, (Financial Analysts Journal) p.60. – Though the extent of this benefit would obviously depend on the markets in question.
[20] Eichholtz, 1996, Eichholtz and Hartzell, 1996, Eichholtz et. Al, 1998, Liu and Mei, 1998, Liu, Hartzell and Hoeseli, 1997
[21] Eichholtz, P., Huisman, R., Koedijk, K. & Schuin, L. 1998, Continental Factors in International Real Estate Returns, (Real Estate Economics) p.1-17.
[22] Lee, S.L. , 2001, The Risks of Investing in the Real estate Markets of the Asian Region, (Working paper : Department of Land Management and Development), p.5.
[23] Eichholtz, P et.al., 1998 p.3.

transaction costs of direct property markets relative to public stock markets may translate into relatively lower risk-adjusted returns, due to higher up-front research and due diligence costs. International investors always face a trade-off between diversification benefits and information costs. If information costs rise high enough to counteract potential benefits of international diversification, international investment may well not occur. As such, concerns about transaction costs may result in a stronger focus on the home market. Therefore, real estate investors might rationally prefer to invest as close as possible to their home country, where distance can be interpreted not simply in terms of physical distance, but also in terms of market structure and legal environment. On the other hand, if the returns on real estate in their home country are highly correlated with those of neighboring countries, the investor will be better off by investing in other continents to benefit from lower correlations. The diversification decision is partly a tradeoff between information costs and continental influences in the returns of a given country.

2.5 The Process of Investment

Going from an allocation decision to an actual investment is a complicated process. Two MIT Center for Real Estate theses specifically explored the steps involved in entering a market, the sources used to make the investment decisions, and the challenges identified in the investment process.[24] We reference this work as it provides context to the macro-level analysis that we are undertaking.

Entering a New Market

Keun (2007) found that deal introductions to the investing company represented the most common way to enter an emerging market, regardless of how long the company has been in the industry or the market.[25] Generally, investors would not start with a "top-down" approach, looking at macroeconomic factors; rather they sought the best opportunity in a range of countries. Therefore, they invest in a given market not through a review of numerous target markets, but by finding a particularly promising deal. That said, Mullins(2004) found that the vast majority of investors used some combination of top down (funds soliciting investments to fill allocations) and bottom up (investments are brought to the fund) approaches (as shown in Figure 2.6). In other words, while not the starting point, macro-level analysis does an important place in most investors decision makings processes. In terms of market research, endowment funds were more likely to rely on in-house research, while plan sponsors were more likely to rely on investment advisors.[26] Institutional

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[24] Keun , H. (2007) and Mullins, M.J. (2004)
[25] Keun , H, p.18.
[26] Mullins, M.J. , p. 27

investors tended to see the deal structure, project selection, and market selection as the domain of the fund manager, while they saw the choice of the fund itself as their decision.[27]

Figure 2.6 - Investment approach

How does your fund pursue International Real Estate Investments?	
a Only Bottom Up approach	9%
b Only Top Down approach	0%
c Combination of both above approaches	64%
d Other (Specify)	18%

Source: Mullins, M.J. 2004, International Real Estate Investments by US Pension and Endowment Funds, Thesis: Massachusetts Institute of Technology.

2.6 Challenges for International Investors

The key challenges identified in real estate investing were personnel-related: finding the right investment manager and securing suitable local partners. These were followed by obstacles associated with identifying high quality institutional properties abroad and lack of data. Other challenges such as currency risk and regulatory environment were deemed important but understood to be a normal byproduct of cross-border investment.[28]

Figure 2.7 - Greatest Challenges

What are the greatest challenges to succesful international investing ?	Score
a Finding experienced investment advisor/fund manager	53.6
b Finding suitable local partners (developement and asset manager)	37.3
c Identifying institutional quality opportnities abroad	24.5
d Evaluating investments (data availbaility, legal reviews, etc,)	21.8
e Illiquid local markets (disposition)	20.0
f Taxation differences between countries	19.1
g Other(Specify)	18.2
h Local regulatory environemtns (land use. Etc.)	13.6
i Cultural differences/barriers	10.0
j Difficulty repatriating profits and capital	7.3
k Currency risk	6.4
l Finding suitable local service providers (property management)	0.0

Source: Mullins, M.J. 2004, International Real Estate Investments by US Pension and Endowment Funds, Thesis: Massachusetts Institute of Technology.

While excess returns can be a motivation for entering emerging markets, they come from making riskier investments. The model we propose takes into account some of the important challenges or risks in investing in real estate in emerging countries. The next chapter explores the different risks that must be mitigated to secure investment in the international real estate market.

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[27] Ibid.
[28] Ibid.

CHAPTER THREE: RISKS IN INTERNATIONAL INVESTMENTS

"Risk entails two essential components: Exposure and Uncertainty. Risk, thus is an exposure to a position of which one is uncertain."[29]

The international investment decision consists of two steps - assessing the risks involved in a particular country and establishing the quality of the real estate transaction itself. The first part of this chapter provides a broad definition of risk. We follow with a discussion of the various risks involved in cross-border real estate investing, and end with a brief note on the risk and return framework of real estate investments.

3.1 Risk Defined

According to the Capital Asset Pricing Model (CAPM), risk in any investment can be subdivided into systematic and idiosyncratic risk.[30] Idiosyncratic risk is the risk unique to a particular asset and is therefore diversifiable by the investor. Since investors can eliminate this risk, they do not look for it to be compensated in the form of higher returns. In contrast, systematic risk, also known as market risk, or beta risk, is undiversifiable and therefore warrants an increased return to the investor. Only risks that are systematically related to the market portfolio are reflected in the required return of the investment.

When this model is applied to a large basket of stocks, such as the S&P 500, one can isolate the two risks from each other with a reasonable degree of confidence and produce an estimate of Beta – relative volatility of a stock with respect to that of the market portfolio. Doing the same with real estate is difficult, if not impossible, to break down into Beta and the other pieces of CAPM, as a result of its heterogeneous nature (no two properties are the same), and asset-level illiquidity. Indeed, research into international listed property companies globally has found no correlation between Beta and expected return, meaning that our understanding of risk must be constructed in a different way.[31] Nevertheless the distinction between market and idiosyncratic, property-level risks is still relevant, even if we cannot reliably quantify Beta, as it provides a framework for discussing the various types of risk.

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[29] Holton, G.A. 2004, Defining Risk (Financial Analysts Journal), p.20.
[30] William Sharpe et al., 1965, Theory of CAPM (Capital Asset Pricing Model)
[31] Eichholtz P.M.A and Huisman R, 2001 ,The Cross Section of Global Property Share Returns ,(A Global Perspective of Real Estate Cycles), p. 89-102.

3.2 Types of Risks

The risks facing foreign investors can be broadly classified into country risk, market risk and deal risk.[32] The first two we could consider systematic risks, while the third is idiosyncratic. Country risk constitutes factors common to all foreign investment and business activity - general national political stability, barriers to capital flows, and currency exchange issues. At market level, we encounter a second set of potential risks, due more to the nature of the property business at the local level – the regulation of property rights, the liquidity of the market, the availability of reliable information, and the potential for changes in the tax structure. Lastly, there are risks associated with a particular deal – these relate to the terms of the transaction itself and as such are not a focus of this paper.

3.2.1 Country Risk

Analysis of country risk is the starting point for internationally active real estate investors. According to Saunders and Lange (1996), for international investment decisions considerations of country risk dominate asset investment decisions. To break down this large subject, we will subdivide country risk into political risks, rule of law risks, economic risks, and financial risks, describing salient issues for each.[33]

Political Risks

Broadly speaking, political risk encompasses the possibility that sovereign host government will unexpectedly change the rules of the game under which companies operate.[34] Diamonte et al. (1996) find that fluctuations in political risk significantly impact returns in emerging markets. Another study by Lim finds that internal political stability ranks second highest in factors influencing investment decision-making.[35] Political risk is typically associated with the developing world. However as Lee (2001) points out, all countries, even developed ones, face some degree of political risk. What makes analysis difficult is the variability of political risks across business domains - Kevenides (2002) shows that measures of political risk effect on companies depend on the industry, size and relevance of the company to the country. This means that a nation such as Russia may have a different position towards foreign real estate investment than towards foreign investment in natural resources such as oil.[36] Kevenides suggests that a good indicator of the degree of political risk is the seriousness of

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[32] Liang, Y. et al., p.3.
[33] The Euromoney Country Risk (ECR) assessment uses a similar framework for its ratings.
[34] Butler and Joaquin, 1998 , A Note on Political Risk and the Required Return on Foreign Direct Investment (Journal of International Business Studies), p.1
[35] Lim, LC, AS Adair, and WS McGreal. 2002. The perception of real estate investment opportunities in southeast asia. (Pacific Rim Property Research Journal), p. 163-82 -conducts a survey of Asian and UK property investors
[36] "The greater the perceived benefit of the company to the economy and more expensive its replacement by a purely local operation, the smaller the risk of expropriation".- Kevenides , p. 65

capital flight, which can be proxied by the country's balance of payment figures. Capital flight arises for a particular country when the government unexpectedly changes some of the rules and regulations in an unexpected manner.[37] Within political risk, there are a number of more specific issues that merit more detailed explanation.

Expropriation Risk

In terms of political risk, expropriation, the seizure of assets, is certainly a worst-case scenario for any investor. However, contrary to popular perception, Lee (2001) shows that expropriation has largely ended and in some countries has reversed (where the governments have invited back the expropriated foreign investors). He shows that expected loss due to expropriation does not have a large weight in the decision-making processes of the foreign investor. More of a concern these days is that expropriation be meted out in the manner of small and onerous changes in regulatory, tax, and currency policies. This is known as "creeping expropriation."[38]

Repatriation Risk

The risks of repatriation, those of exiting an investment and a country, are present both in developed and developing markets. Issues could include limits on the ownership of equity or debt and the blockage of fund repatriation. According to one study, fund repatriation is the number one concern in most of the conversations with foreign investors.[39] These risks would not be reflected in domestic real estate returns since they apply only to the foreign investors.

Coup d'etat and Insurrection

While property investors generally do not invest in countries or areas prone to violent conflict, the issue of regime change, coup d'état, or insurrection is present in many countries. Turkey and Thailand have both recently had non-violent coups, meaning that even if the country has not descended in chaos, the potential for changes in the legal and business environment is very real.

Rule of Law Risks - Legal System

The laws that affect international investments are continuously evolving and in the case of emerging markets may not coincide with prevalent international practices. Dispute resolution in emerging markets is slow and in many cases is not on par with the standards of the developed west.[40] Winning

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[37] It has been mentioned in Joaquin, Butler(1998) that a definition of political risk which only focuses on the negative outcomes is inadequate and hence this should capture both the positive and negative outcomes of political events.
[38] Hooke, J.C, p. 100
[39] Lee , S.L,. p. 13.
[40] Hooke, J.C., p.101-103

a judgment may not necessarily mean that the plaintiff can collect the money or award.[41] Even if successful in court, it may take years to collect compensation. A plaintiff company may do better if it is a very large company in its own home country, but foreign investors will not have this advantage. Indeed a foreign investor might simply decide it more sensible to walk away than to spend large amounts on a legal fight with limited chances of success.

Rule of Law Risks - Crime and Corruption

Many emerging markets have tangible corruption associated with real estate.[42] The resultant bribes and payoffs increase the cost of doing business in these emerging markets. As outsiders are perceived to be wealthier than local players, foreign companies are easy targets.[43] At the same time, Western corporations are wary of having their brands tainted by bribery scandals, meaning that in areas like Russia that are rife with corruption, large companies absolutely require intermediaries.

Economic Risks

Macroeconomic Risk

Macroeconomic risks are associated with changes in the strength of the underlying economy as seen in factors such as GDP growth, inflation, and interest rates. Economic volatility can wreak havoc with the predictions of demand and pricing.[44] For example in April 2008, Vietnam's year-on-year inflation reached 21%, causing the bank to increase its base rate from 8.75% to 12%, while allowing banks to allow depositors rates of up to 18%. This drastic change in the economic landscape has had a major impact on investors' ability to deploy capital.

Fiscal Policy Risk

Kevenides (2002) proposes measuring fiscal irresponsibility as a risk indicator, proxied by government deficit as a percentage of GNP. Cases of high irresponsibility are those in which a government over-promises to its citizens relative to its actual tax revenue, resulting in deficits. The study goes on to say that increases in this deficit corresponded to higher chances of property expropriations. In a similar vein, Kevenides states that the better the country's economic outlook, the less likely it is to face political and social turmoil. An effective proxy for this notion is Moody's country ratings on foreign currency bonds.

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[41] Ibid
[42] Lee, S.L (2001) points out that corruption is likely to be a problem in implementing an investment strategy in the emerging markets of the Asian Region
[43] Hooke J.C, p. 104-105
[44] Ibid , p.57-59

Currency Risk

Investors can hedge currency fluctuations for many markets in order to mitigate risks associated with changes in relative value. However, in emerging markets the cost of hedging using the traditional methods may be high, as a result of the long investment hold and more volatile nature of many emerging market currencies. Eun and Resnick (1988) studied the empirical relationship between stock returns and currency exchange rates and concluded that exchange rate risk may mitigate the gains of diversification. Lee (2001) also notes that the rate of return faced by investors from a foreign-based investment can be significantly impacted by the change in the foreign country's exchange rate compared with the investor's domestic currency. However, the risks faced by investors in foreign assets will be only marginally greater than those of the local country returns, as long as the correlation between the local foreign market returns and the exchange rate is low or negative.

Interest Rate Risks

Since real estate investments tend to be highly leveraged, the rate of return earned by investors is affected by changes in interest rates. Research by Eicholtz and Huisman has shown that local interest rates are an important factor in listed property companies' returns.[45] Having said that, U.S. investors sometimes source leverage in the local markets, where interest rate hedges are widely available, giving them the potential to hedge this risk.

3.2.2 Market Level Risks

Institutional Risk

One of the barriers to overseas investment is institutional complexity and variation in market conduct.[46] Considerable differences exist in the characteristics of the real estate market participants: the developers, investors and real estate service providers. These disparities affect the characteristics, quality and comparability of the market information generated. Across markets, the variety in the lease lengths, transaction costs, real estate taxes, broker fees, and on-rent occupancy costs add to the complexity of multi-market investing. Differences in the building practices and inter-personal business conventions in each country can further complicate doing business.[47] These differences reflect the relative maturity of the market, the acceptance of real estate as an asset class, and the structure of the investing institutions in that country.

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[45] Eichholtz P.M.A and Huisman R, 2001 ,The Cross Section of Global Property Share Returns ,(A Global Perspective of Real Estate Cycles), p. 89-102.
[46] Lee , S.L, p.15.
[47] Kevenides, p. 65

Information Quality

As international markets encompass different countries with different administrative, legislative and fiscal regimes, coupled with different property market codes, and valuation conventions, issues arise regarding the compatibility of property data on a cross border basis.[48] In emerging markets, the quality of information is obviously not on par with the kind of information that is generally available in the western markets, so companies planning to invest in emerging markets need to do thorough due diligence. However, while there is some uniformity in the nature of the real estate service providers due to globalization, there is evidence that in some cases even large firms cannot perform to the Western standard of due diligence due to lack of data. While a brand name advisor implies consistent quality of service, this is not always the case.

Transparency Risks

Antoniou et al (1997) note that the emerging markets are made up of informed and uninformed investors, both of whom operate in an unreliable information environment. This implies that the foreign investors who may wish to enter emerging markets face serious disadvantages. There is some evidence that local firms perform significantly better than non-domestic investors because of their information advantage. Eichholtz et al. (1998 b) reports that internationally diversified, listed property companies tend to achieve lower returns than domestic property companies without the compensation of lower risk. The authors state that these lower returns reflect the higher information cost faced by foreign investors, costs that lead them either to buy overpriced buildings or to fail in identifying under-priced investments. Hooke points out that even in markets with better informational efficiency, a manager with an international portfolio still needs special knowledge, interpretation skills and local contacts.[49] In this context, Jones Lang Lasalle has developed its yearly transparency index to rank countries across the world to better highlight differences in market opacity.

Liquidity Risk

Liquidity risk relates to the amount of time required to find a motivated buyer for a particular investment. The capacity to exit an investment successfully is a crucial component of the investment process, and one that can seriously harm an investor's return. Markets can suffer from low liquidity, depending on the number of other players in the given market, as well as tax issues related to ownership and transactions. Indeed many investors describe market depth as a key issue in selecting markets. Slovenia may have a high GDP and European Union membership, but its population of

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[48] Keogh and D'Arcy, 1994;, D'Arcy and Keogh ,1997a
[49] Hooke, C.J, P.114-124

Chapter Three – Risks in International Investments

only 2.1 million means that few international investors will want to take the time to set up a presence, preferring the Ukraine, with its 41 million inhabitants.

These market level risks have been incorporated in this study by using proxies such as the EIU's Degree of Property Rights Protection, the World Bank's Days to Enforce Contract, Days to Build Warehouse, and Days to Register Property metrics, as well as the JLL Transparency Index.[50]

3.2.3 Deal Level Risk

Deal-level risks are generally associated with the real estate transaction itself. As such, they are idiosyncratic risks, and can in theory be limited through diversification. Deal specifics play a significant role in determining the hurdle rate of real estate investments.[51] Within a transaction, we can define *local area* and *site-specific* risks. The former include the understanding of the economic feasibility of the neighborhood around the site such as absorptions of similar projects, the details of the area's population, and the income growth in the area. Site-specific risks involve the risks of getting approvals, environmental clearances, land titles etc. for a particular project. Liang and Gordon (2003) note that in case of "rationed" emerging markets, strong-deal risk-level mitigations need to be present to counter the country risk such that the deal hurdle rate can be lowered.[52] A typical example of the deal risk mitigant would be leasing to a multinational corporation with rents denominated in the US dollars or Euros. Deal level risk is not a focus of this paper as it is very difficult to model. It is practically impossible to devise country-level factors for these kinds of issues.

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[50] See Chapter 6.2 for explanation of variables used for various risks.

[51] Liang, Y., and Gordon N.M, 2003, A Bird's eye view of global real estate markets (Prudential Real Estate Investors) , p. 14.

[52] The Liang and Gordon (2003) study classifies emerging market into two groups – prime and rationed. This is similar to the classification done in Chapter 2 of this of emerging and frontier markets. The prime group consists of higher growth and lower risk emerging markets such as China, Malaysia, Hungary , Poland while the rationed group are countries perceived to be highly risky (examples of which are Argentina, Indonesia, Vietnam and Ukraine).

3.3. Risk Return Framework

It is clear that real estate investment in emerging markets involves more risk than similar commitments in developed economies. The two options available to Western investors are 1) devise structures to hedge away risk, or 2) require a higher rate of return from the investment.

The gradient of these returns for various types of countries has been discussed in a paper by the Prudential Real Estate Investors and is shown in the table below. These gradients are somewhat dated, however they give an idea of the risk-return framework that institutional investors might use. The hurdle rate ranges differ for core, value-added and opportunistic investments in different market types.

Figure 3.1 - Prudential's Risk - Return Matrix

		Investment Strategy		
		Core	Value Add	Opportunistic
Market Type	Core	9%	12%	18%
	Core Plus	11%	14%	20%
	Emerging	15%	18%	24%

Source: Prudential Real Estate Investors : A Bird's Eye Viw of Global Real Estate Markets (March 2003)

This required return is the subject of many studies, some of which have been included in the literature review in this thesis, the next chapter.

CHAPTER FOUR: LITERATURE REVIEW

Two types of studies are relevant to our research: those that look into capitalization rates and those that investigate emerging markets. The first group considers capitalization rates for institutional quality assets and the factors that influence them, principally with regard to metropolitan markets in the United States. Another body of research explores risk in international and emerging markets, generally trying to provide frameworks for quantifying country and real estate risks for international investors. Our analysis attempts to combine the two techniques by applying capitalization rate multivariate modeling to an international, emerging markets context.

4.1 Capitalization Rate Studies

The various capitalization rate studies share a common initial assumption - that there are two sets of influences on cap rates – the discount rate and the projected income growth. The discount rate reflects the opportunity cost of capital, taking into account the risk-free rate of borrowing and any market risks. The income growth element consists of various factors that shape property investors' expectations of income growth. Thus the equilibrium cap rate mirrors the marginal investor's minimum required return. At any given time, the prevailing cap rate in the market may deviate from the equilibrium level due to the asset market inefficiencies. Each of these studies has used various real estate industry and economic elements as proxies for the above mentioned factors.

Sivitanidou and Sivitanides (1996) seek to shed light on the underlying determinants of inter-metropolitan cap rates differentials. The study uses market cap rates for 43 metropolitan markets from the National Real Estate Index, using cross-sectional data from 1995 and, for comparison purposes, from 1991. The authors conclude that office capitalization rates across metro markets are largely driven by certain critical market indicators that influence investor expectations and risk perceptions. Market conditions indicators (vacancy, office stock, completion rate and absorption rate) help shape the underlying factors (discount rate, NOI growth rate, risk premium and the lagged cap rate) on which cap rate is dependent. They also conclude that the cap rates do not adjust rapidly to changes in the metropolitan market conditions – since the significance and magnitude of lagged cap rates is seen to be high. They find that 1991 factors exert weaker effects than the 1995 factors, which they explain as the influence of recessionary conditions of that period. The authors posit that real estate cycles may also strengthen or weaken the influence of the various factors that affect cap rates.

A second paper by the same authors (1999) also focuses on metropolitan office markets, exploring the significance of national and local factors in the movement of cap rates. They use average cap rates for 17 office markets during 1985 to 1995 from the same source as the previous study. They break the cap rate into two parts – the equilibrium rate, and the disequilibrium deviation at any given point in time. The first factor is dictated by prevailing market realities - changes in exogenous factors that shape the discount rate or the income – for example growth expectations that influence asset pricing. The second factor reflects dislocation from the market equilibrium arising from inefficiencies such as informational opacity, the high transaction costs associated with real estate, and the lengthy institutional decision-making processes. They find that local market factors are more important than national macro-factors, although national cap rate trends do have some impact at a local level. Their findings indicate the degree to which real estate, at least across a large country such as the United States, is very much influenced by the specific conditions in each market. The study also concludes that the real estate investor may be able to diversify some of the cap rate risk by spreading investments across office markets that exhibit substantial behavioral differences in terms of factors identified in this analysis.

Sivitanides, Southard, Torto, and Wheaton (2001) examine panel data of average capitalization rates over 16 years and across 14 metropolitan markets from NCREIF (National Council for Real Estate Investment Fiduciaries) for four property types. Their research explores whether capitalization rates move with the opportunity cost of capital and reflect expectations about future income growth and risk. The cap rate levels exhibit persistent differences across markets as a result of variations in fixed market characteristics. The study concludes that capitalization rates move with the said factors, but only if the appraisers form expectations about future income growth by looking myopically backward, and not forward. This study also concludes that it is possible to reliably forecast appraisal-based capitalization rates based on forecasts of market rents and interest rates. It suggests that appraisal-based valuations do move with the risk free rate, indicating that real estate markets do require a higher return when the risk free rate rises.

Chirchnea, Miller, Fisher, Sklarz, and White (2007) study the effect of various factors - demand growth, supply constraints, liquidity risk - that drive geographical cross-sectional variation in cap rates for multifamily properties. This study utilizes data from Real Capital Analytics for multifamily properties. It explains the variation in the gap between the cap rates and the risk free rates of various MSA's by saying that only geographically specific characteristics are responsible. It also concludes

that there is a strong and robust relationship between supply constraints, liquidity, and cap rates. It notes that earlier studies concentrated on the demand drivers of rental growth, as this was assumed to be a driver of cap rates. This study differs from previous studies by examining the supply side factors in the context of the Gordon growth model, in addition to the demand effects on the model. The paper concludes that MSA's with more stringent supply constraints and more liquidity have lower cap rates than the other MSA's. It also suggests that supply side constraints have a more discernable impact on cap rate variations relative to direct growth measurements.

Patrick Rowe (2007) does a cross-sectional analysis of cap rates for 25 markets in the US. He analyses both apartment and office markets separately for two different periods of time ranging from 1996 to 2002. The period of time was selected such that there was sufficient data to evaluate subsequent, *ex-post* rental growth, appreciation, and employment growth. The study attempts to gain a better understanding of which local market factors the market uses to price real estate assets and whether the market was accurately pricing future rental growth. It concludes that there is a disconnect between the financial theory and the results. In particular, no consistent relationship between cap rates and subsequent income growth is found. By back testing the actual rental growth, the pricing mechanism of the market is proven to be inefficient for predicting future income growth across both the property types, in both time periods. Rowe also uses a simple concept of a fair market price line to develop an investment strategy that takes advantage of the apparent inefficiencies and inability of the market to properly price future income growth into real estate asset prices. The study differs from Sivitanides, who found greater relevance in the market factors.

Ruth Hollies (2007) examines the relationship of office yields to other variables in a framework similar to that of Sivitanides and Sivitanidou (1999). Her method shares some important aspects with our own approach. The risk free interest rate, factors associated to real estate risk, and assumptions about potential income are evaluated for a large number of office markets in various countries over a five-year period. The explanatory variables that are used are macroeconomic factors such as inflation, GDP per capita, a liquidity index, long term and short-term interest rates, and property data – the JLL Transparency index, annual lease lengths, and rents. In the first part, the study examines the univariate relationship between the office yields and the various factors mentioned above. The next part of this study consists of a multivariate study between yields and some of the factors with which univariate regressions had been done. The study categorizes countries into pools of all locations, transparent, and non-transparent locations, with one pool for Europe, and compares modeled cap rates to those observed by JLL. The study suggests that yields are generally higher in less transparent

markets. The author agrees that this conclusion is not at all surprising, and that the regression equations of non-transparent countries have a higher intercept (which could be due to many explanatory variables being left out of the study). The study uses a variety of estimation methods, but Hollies shows that none of the models can explain yields sufficiently well due to data constraints (the model does not include all explanatory variables in all the markets). This study also concludes that high yielding non-transparent markets behave differently from the other transparent markets.

Our study differs from Hollies' research in that we initially differentiate the models based on the different risk factors associated with investing in real estate markets and then construct a hybrid model of the risks using the significant factors. Then we proceed to calculate a "risk factor" for the countries forecasted. In addition, our study compares two data sources - Real Capital Analytics and Jones Lang Lasalle – LaSalle Investment Management, using both transaction-based and subjective estimates of cap rates for purposes of comparison.

4.2 Risk Premia for International Markets

The literature for the quantitative study of risk premia can be broadly divided into two types of methods: market-based and categorization-based methods. The market approach directly estimates country risk premiums through publicly traded securities. The market approach thus assumes that the market is efficient and can price correctly. The categorization method assigns a risk premium to the various categories of country risk – political risk, economic risk, legal risk, currency risk, etc. – to build-up an overall country risk premium. Both methodologies aim to provide the hurdle rate that companies should look at while investing in particular countries.

Liang, Y. & McIntosh (2000)[1] provide a framework for systematically estimating country risk premiums for both developed and developing countries. This study estimates country risk using stock market returns of 53 countries tracked by Morgan Stanley Capital International and country credit ratings provided by Institutional Investors and Euromoney. This methodology links country risk with equity market returns and calculates the expected return of the country. This paper deals with the country risk premium and does not look at real estate risk premium or the market risk associated with a real estate investment.

LaSalle Investment Management's Investment Strategy Annual 2000 introduces the categorization method - the building up an appropriate hurdle rate for any particular cross border investment.[53] The categorization method essentially involves assigning a risk premium to various categories of risks over the investor's own risk free rate (investor's country's risk free rate) in order to build an overall risk premium.[54] This study points out that the most interesting opportunities for offshore investors arise when local capital is sidelined. The drawback of this method is that there is a high correlation between some risks, such as country risk and currency risk, meaning there is a risk of double counting the risk premiums.

Building on the above two studies, Rosen and Dyke (2001) quantify global risk factors and calculate hurdle rates across countries using those risk factors. The authors build a two-equation model. One of the equations determines the economic and the financial risk in the country based on a set of economic variables, while the second equation explains the real estate market risk using the calculated economic risk as one of the factors. This study uses 1999 data for 45 countries, which are essentially economic and real estate market variables. This model uses stepwise regression to deduce variables, which have highest statistical importance in explaining the dependent variable. In the first equation, the Treasury yield spread between the country and the U.S. is taken as the dependent variable. In the second equation the office market yield is used as the dependent variable. The hurdle rates are calculated, keeping the base hurdle rate for opportunistic office investment in U.S. at 20%. The hurdle rates of the countries are deemed to be proportional to the fitted cap rates that are obtained from the above two-equation model. This study assumes that the majority total return comes from the contribution of the income generated by the property. This study does not build up the cap rate, as the categorization method does, and instead estimates each of the rates from market data.

Gale and Bloom follow Gordon's categorization method in their 2008 paper. The starting point for the model used in this study is the U.S. Treasury rate. To this is added 200 bps to arrive at the baseline – the U.S. Real Estate Hurdle rate.[55] They then add three layers of risk – country risk, real estate risk and currency risk to the Hurdle rate. This study also adds the components for U.S. inflation, local market inflation, and taxes to the model to finally arrive at the nominal pretax investment hurdle, net of fees. However, the risk weightings used for this study are subjective and derived from APG Investments, conversations with representatives of PREI, and LaSalle Investment

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[53] *Investment Strategy Annual 2000*, This article builds up to the hurdle rate for Korea as an example.
[54] Risks included are Ownership Management Structure, Leverage, Operations, Market Fundamentals, Property market Transparency, Currency Risk and Country Risk.
[55] It is assumed that the U.S investor perceives that a real estate investment in the US should give 200 bps premium over the risk free rate

Management. This study avoids using the extended historical measures of incremental return and volatility to calculate risk premia since Gale and Bloom find the extended historical data is a poor guide. They note that local government policies, such as the introduction of free floating currencies, reduced debt balance, and openness to investment, have increased return stability in the last 15 years, reducing consistency across the time series.

Our approach takes elements from the above studies and attempts to marry capitalization rate methodology in an emerging markets risk framework. In the following chapter we will discuss the methodology of our analysis.

CHAPTER FIVE: METHODOLOGY

5.1 Selection of Relevant Factors – Creating the Price Model

Our approach is to apply capitalization rate analysis previously used on domestic markets to an international context. Hollies has applied a similar technique to multiple countries, using property level data. However, our study uses two sets of data, compares between the results, and then takes the approach one step further by forecasting risk factor for the various countries. Our technique is based on classic multivariate regression:

$$y = \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \beta_5 \chi_5 \ldots + \varepsilon_1$$

Where y is the given cap rate, either from JLL or RCA's basket of countries. β_1 is the coefficient for the factor χ, which in our case would be something like the country's GDP growth. In order to establish significant factors, three sets of regressions were done (Figures 6.1-6.9) to arrive at the final "hybrid" pricing models. The country sets were 23 and 25 countries, respectively. IPD data did not cover enough markets to be run as a separate regression set, and was used primarily to check JLL and RCA data sets.

Figure 5.1 - Regression and Analysis - Process
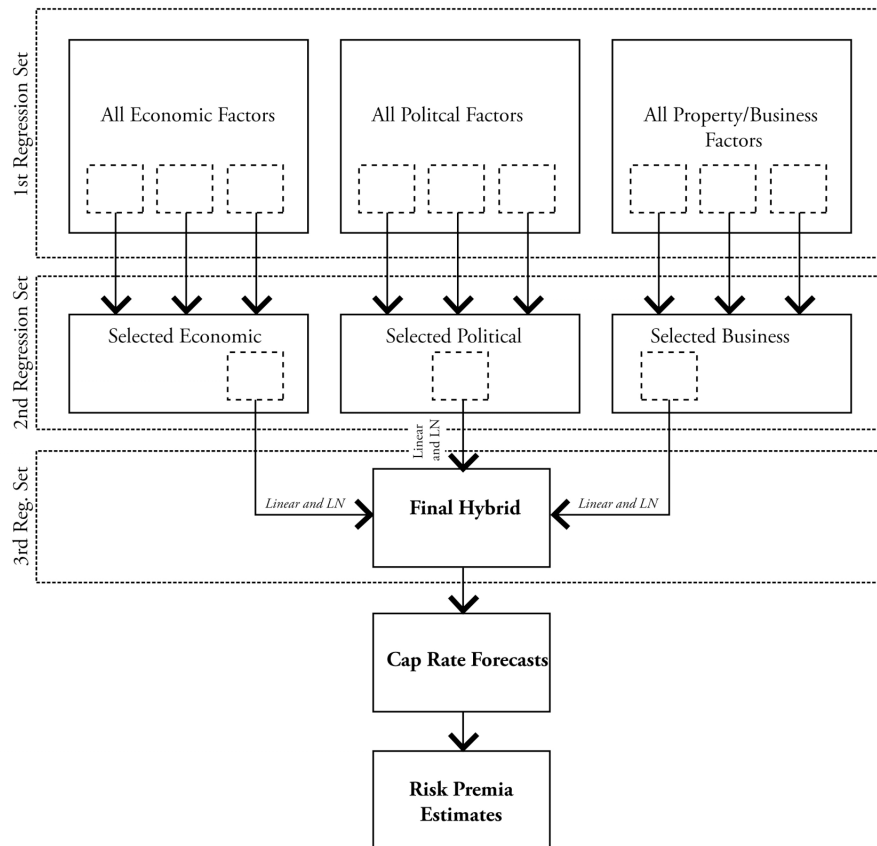
Our criteria for selection of the factors were consistency across the two data sets, with a sign in the logical direction, and a T-statistic approaching the 90% significance level. Given the limited sample size, a lower level of significance than the more typical 95% level was deemed appropriate. Some factors had significant T-statistics for both data sets, but with opposite signs. These factors were discarded.

5.2 Forecasts of Cap Rates

Cap rates are only available for a small fraction of world's countries; hence our interest in forecasting into emerging and frontier markets. There are two sets of forecasts that we have attempted through this study. The first is capitalization rate forecasts for institutional quality office properties.[56] The second set forecasts the risk factors for investing in the property type, by subtracting our proxies for the risk free rate and by adding one for rental growth.

Capitalization Rate Forecasts

We created our forecasts for fifty two countries using our final, "Hybrid" pricing model. There were fifty countries with sufficient data to enable predictions, of which twenty-six already had capitalization rates provided by either IPD, JLL, or RCA. Our technique uses multiple factors to replace the three elements of the standard yield composition – the risk free rate, the risk premium, and the expected appreciation. In other words, we are using macro-factors as proxies for the various risk elements. These factors we use do not have a one-to-one correlation with any of the three components (i.e risk free rate, risk premium or expected appreciation). Put another way, no one macroeconomic factor takes the place of, for example, the risk premium. Rather together the factors attempt to simulate the result. This is an important point. As we will see in the risk factor modeling, we have no accurate way of modeling appreciation. GDP growth is our best approximation, but this is a rough proxy at best. Having said that, it is also worth noting the implied assumption – that these macro factors relate to country risk and market level risk but not the property level risk. Country risk and market level risks do affect investment returns (otherwise, investors would be indifferent to these factors).

We arrive at the fitted capitalization rates by filling in the factor coefficients from the regression model (the β_x) of the final "hybrid" pricing model, multiplying them by each country's relevant data,

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[56] The study uses cap rates of "prime" properties (JLL – La Salle Investment Management), central business district and suburban properties (RCA). A more concentrated sample of property type price information would yield cap rate forecasts for a specific type of office properties.

and then summing the result to arrive at the cap rates.[57] This is described in the following diagram, Figure 5.2:

Figure 5.2 - Regression Process

$$y = r_f + r_p - g$$

JLL/RCA Cap Rate   Macroeconomic/Market Factors

$$y = ?_1 x_1 + ?_2 x_2 + ?_3 x_3 + ...$$

Coefficients discovered through regression

$$y_{forecast} = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + ...$$
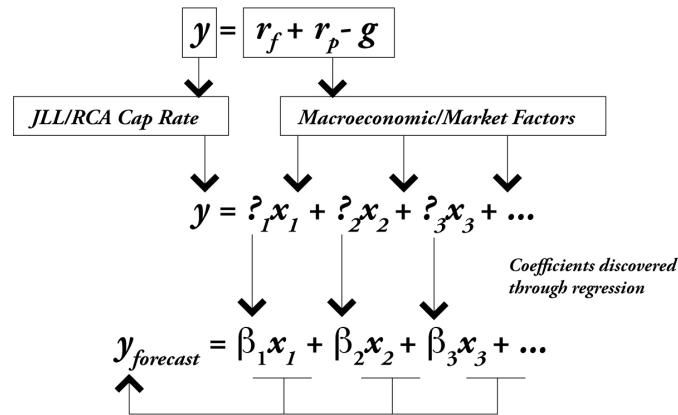
Breakdown of the Capitalization Rate to Estimate Risk

Our approach is based on the simple yield equation, which breaks the capitalization rate into component parts:

$$y = r_f + r_p - g$$

Where y represents the cap rate, r_f the risk free rate, r_p the investors risk premium, and g the expected rental growth.[58]

The risk free rate is the simplest component of the equation – it should represent the investor's riskless rate of borrowing. It is worth noting however that with international investments, this figure can vary considerably between investors. A U.S. institution might have a risk free rate of 5%, when borrowing locally in the U.S, whereas a Turkish investor might encounter a local rate of 15% or more. We have elected to use long term bonds as our risk free rate as they are widely available and provide a good equivalent measure for the type of long term investment that real estate represents.

Unfortunately there is no data that provides a consistent forecast for rental growth across multiple markets. We have used the GDP annual growth/inflation of the particular country for which we are forecasting as a proxy for the rental growth. This is an imperfect measure as it only describes the

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[57] See Figure 7.2 for cap rate forecasts
[58] See Appendix 2 for derivation

increase in demand of economic activity. It does not address the question of supply, which presumably would track the increase in demand arising from growth - to some degree. Rewriting the above equation to isolate the risk factor, we get the following, figure 5.3. Long term bonds are our proxy for a risk free rate, our forecast cap rates provide the yield, and GDP growth provides the income appreciation portion.

Figure 5.3 - Risk Factor Approach

Forecast Cap Rates

Long Term Bond Yields — GDP Growth

$$r_p = -r_f + y + g$$

5.3 Capitalization Rate Data Sources

Real Capital Analytics
RCA is an independent research company that collects transaction data globally through a network of information providers. Though the number of transactions per country varies widely, RCA offers a useful service in collecting objective data – only closed transactions are recorded. We received cap rate data for office properties for 25 countries, representing transactions that took place in 2007 and 2008. The data is truly comprehensive for the United States and United Kingdom, but relatively limited in foreign markets, meaning that we were obliged to use countries that had as few as five transactions per year. To arrive at country-level cap rate figures, we averaged each country's transactions to arrive at a single number. A more sophisticated regression technique was explored, but did not provide statistically significant results.[59]

Jones Lang Lasalle - Lasalle Investment Management (JLL)
This global property services company has offices in every major market in the world. Its data comes from their brokers and agents and therefore can give a good synthetic idea of pricing in markets where transactions may be limited. While there is a subjective element to the figures, this can actually help to add a level of reality to the cap rates, for example in situations where transaction volumes are limited. The estimates are not distorted by individual property-level factors, the way a transaction-based estimate would be. We have data for office properties in 24 countries, representing JLL's

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[59] Fitted cap rates were obtained for each country after regressing the cap rates against property age, location of property, area of the property and the date of transaction. However, the fits exhibited low
r^2 values, and it was decided to proceed with average results instead.

estimates of market pricing in 2007. For a few countries, the cap rate data from different markets has been averaged to arrive at a single cap rate figure for the country. While this does sacrifice some of the precision of the original data, it is a necessary constraint on the regression techniques we are using.

Investment Property Databank

IPD is one of the most well respected commercial real estate data sources and is known for its rigorous, appraisal-based pricing methodology. IPD provides benchmarking and other data services in the most developed markets. Like RCA, IPD is solely an information provider, lessening the likelihood of bias in the results. We used IPD initial yield figures and for some countries averaged the pricing in the markets that were covered. We have data of 13 countries of office properties from this source.

Below is a table (Figure 5.4), which shows the coverage of the cap rate data for the various markets we have forecasted. We show countries where we received inputs from our three data sources. In addition we show which markets are considered "emerging" and which "frontier" by the MSCI Barra index. While we are able to forecast for a number of emerging markets, we were only able to forecast for two frontier markets – Romania and Bulgaria.

Following the table are comparative graphs of our three different data sets - JLL, RCA, and IPD (Figure 5.3 to 5.5) - to give an indication of how closely their estimates match each other.

Figure 5.4 Country Coverage List

Country Name	Forecast	Data Available			*MSCI Barra Indices Country Coverage		
		JLL	RCA	IPD	Developed Market	Emerging Market	Frontier Market
Argentina	X					X	
Australia	X	X	X		X		
Austria	X		X		X		
Belgium	X	X	X		X		
Brazil	X	X				X	
Bulgaria	X						X
Canada	X		X		X		
Chile	X					X	
China	X	X				X	
Colombia	X					X	
Czech Republic	X	X	X	X		X	
Denmark	X		X		X		
Ecuador	X						
Egypt, Arab Rep.	X					X	
Finland	X				X		
France	X	X	X	X	X		
Germany	X	X	X		X		
Greece	X				X		
Hong Kong	X	X	X		X		
Hungary	X	X				X	
India	X	X				X	
Indonesia	X	X				X	
Ireland	X		X	X	X		
Israel	X		X			X	
Italy	X	X	X	X	X		
Japan	X	X	X	X	X		
Malaysia	X					X	
Mexico	X					X	
Netherlands	X				X		
New Zealand	X				X		
Norway	X				X		
Pakistan	X					X	
Peru	X	X				X	
Philippines	X	X	X			X	
Poland	X			X		X	
Portugal	X				X		
Romania	X	X	X				X
Russian Federation	X					X	
Singapore	X				X		
Slovak Republic	X						
South Africa	X					X	
South Korea	X					X	
Spain	X	X	X	X	X		
Sweden	X	X	X	X	X		
Switzerland	X		X	X	X		
Thailand	X	X				X	
Turkey	X					X	
United Kingdom	X	X	X	X	X		
United States	X		X		X		
Venezuela, RB	X						

*See Appendix 1 for entire list of countries in MSCI Barra Indices

Figure 5.5 - Cap Rate Comparison JLL + RCA
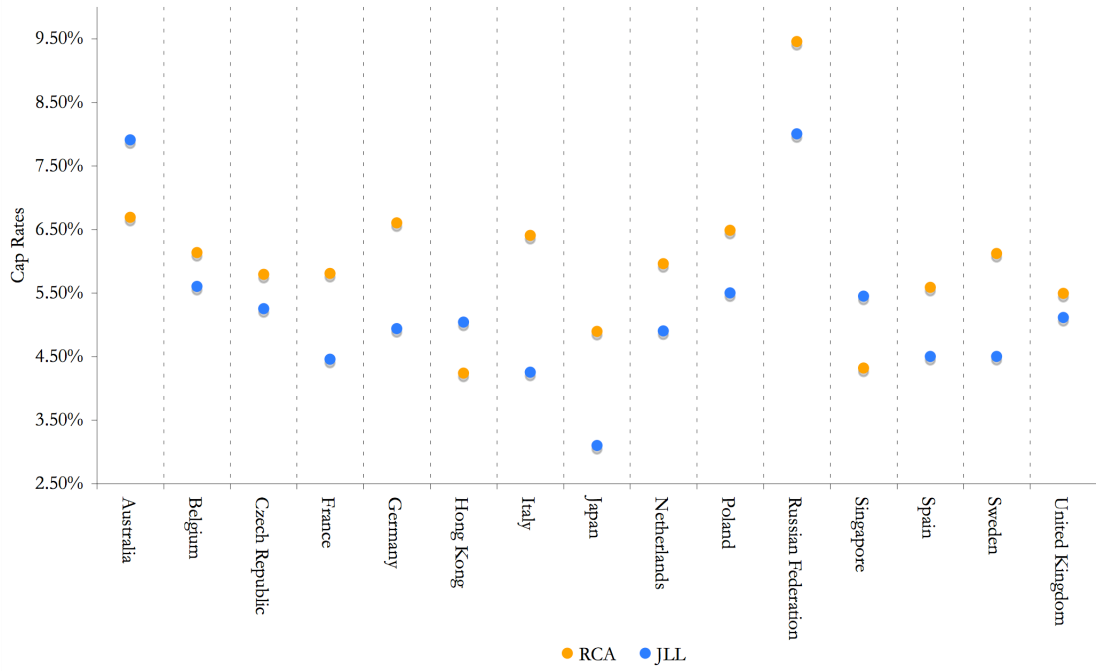
Figure 5.6 - Cap Rate Comparison JLL + IPD
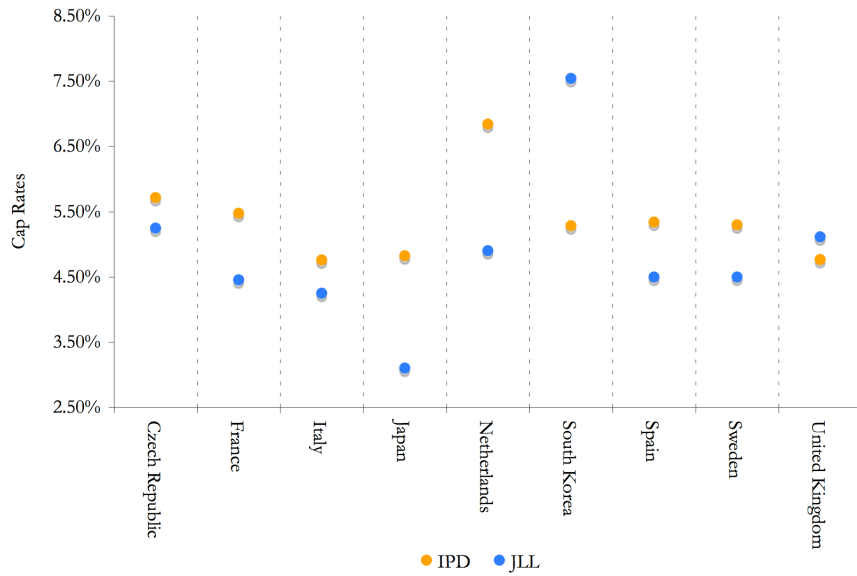
Figure 5.7 - Cap Rate Comparison of RCA and IPD Data
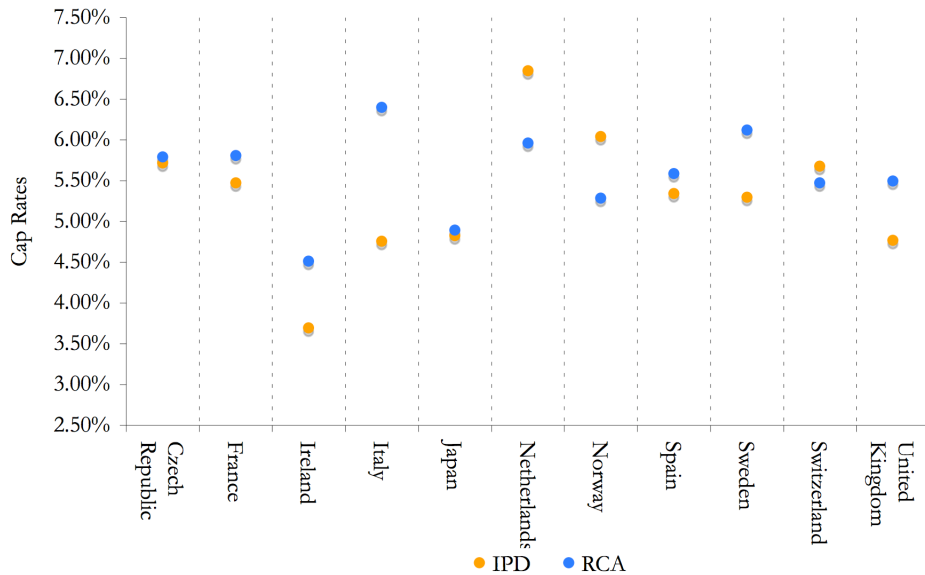
5.4 Factor Data Sources

World Development Indicators

The World Development Indicators (WDI) publication is the World Bank's annual compilation of data about development. It contains statistical data for over 800 development indicators and time series data from 1960-2006 for 227 economies. The WDI cover social, economic, financial, natural resources, and environmental indicators. The majority of our factor data came from this source.

Economic Intelligence Unit

The Economist Intelligence Unit provides independent analysis and subjective ratings of the institutions, rule of law, bureaucracy, and business environment in each of sixty countries. We have selected ratings that could be expected to have a relationship with office cap rates, both as a proxy for the political situation, and to describe certain property market characteristics.

Other Sources: We have also sourced country credit data from Moody's Investor Services, long term bond data from Bloomberg, and real estate market transparency data from Jones Lang Lasalle – Lasalle Investment Management.

5.4.1 Economic Factors

WDI GDP per Capita, Purchasing Power Parity

This is a measure of overall wealth, which in itself says a great deal about a country's stability and the strength of their institutions. We would expect richer nations to have generally lower cap rates as their wealth would translate into increased stability, a better legal and political infrastructure, and a relatively larger demand for commercial real estate. We elect to use the Purchasing Power Parity (PPP) method, as this takes into account the differences in the costs of goods and services between countries. While an imperfect technique, it does make some allowance for the differences in the costs of constructing and maintaining real estate – offices cost less to clean in Mumbai than in London.

WDI GDP Growth

GDP growth is a very important measure because it provides a credible way of following rental growth expectations. A growing economy would normally be expected to equate to increased demand for office space – this would have a tendency to push rents up, and cap rates down. Rental growth itself is a very difficult element of cap rates to predict with accuracy, so we will use GDP growth as a proxy in our risk factor estimations. The forward looking nature of rental growth produces differences of opinions between experts, making it very difficult to get a consistent set of estimates across markets. In addition, rental growth forecasts are simply not available for many markets, in particular the less developed ones.

WDI GDP Growth Rate 20-Year Standard Deviation

If growth has been volatile over time, it might imply a riskier economic environment, and investors more hesitant to make a long-term commitment unless the prices were relatively lower. Higher variance would therefore equate to higher cap rates.

WDI Inflation

Although contained within GDP growth, this measure would impact values in the opposite direction. Higher inflation might increase the "sticker price" of an asset, but in a foreign currency this would likely be offset by a lower exchange rate. Higher inflation would result in higher cap rates.

WDI Inflation 20 Year Standard Deviation

As with growth standard deviation, higher standard deviation should indicate the volatility of the economy. Higher standard deviations would therefore result in a more risky business environment

and thus higher cap rates, as high inflation would have a tendency to depress the value of the local currency.

WDI Consumer Price Index (vs. 2000)

This figure describes inflation as seen from the individual's perspective. It is perhaps more likely to impact consumer spending, and therefore retail and residential real estate more than office space. However, we include it as alternate way of considering inflation.

Ten Year Bond Yield

We use this measure to approximate the local risk free borrowing rate. While there is some debate about whether a short-term instrument, such as a T-Bill, is a more appropriate measure, we have elected to use the longer-term bonds, as they better match the duration of a real estate investment. These bonds may incorporate a liquidity premium, and making them not totally risk free in the absolute sense. Nevertheless, they provide a realistic alternative to the real estate investment – the kind that long term investors might consider as an alternative. Higher government bond rates discourage investment and borrowing, as it becomes increasingly attractive to buy bonds, rather than invest elsewhere. This would indicate in a positive relationship between bond yields and cap rates.

WDI Real Interest Rate

This measures real, rather than the nominal interest rate by subtracting inflation. In other words it shows the real cost of risk-free borrowing in the country, once price escalation has been factored out.

Moody's Government Bond Rating

We include this measure as it indicates the relative stability of the government's bond issues and thereby the likelihood of financial crisis in the country. According to Moody's: "These ceilings represent the highest ratings that an issuer of foreign currency obligations is likely to receive to account for foreign currency transfer risk and systemic risk in the nation."[60] Rating services provide a respected, third-party perspective on a country's fiscal situation and are widely available, making them a likely reference point for investors.

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[60] Source: Moody's Website – http://www.moodys.com/moodys/cust/loadbussum.aspx?section=busline&busLineId=7

WDI Country Population

Larger markets are less expensive to invest into because there is an increased chance of repeat investment in the same legal and political environment. Larger markets are also more liquid, making it easier to exit investments at the end of the hold period.

WDI % Urban Population

Cities are an indication of the development of an economy, and offices are an urban (or at least a suburban) phenomenon. We might expect a slight negative correlation with cap rates.

WDI % Urban Growth

Growing cities would increase demand for office space, which should push up rents and decrease cap rates. Urban growth could be seen as a weak proxy for the rental income growth component of the cap rate.

WDI 5 Year Population Growth Average

Positive demographics are very important for the demand aspect of the space market. Continually growing populations would increase demand and result in higher prices in the space markets.

5.4.2 Political Factors

EIU Political Environment Rating (10=high)

This rating by the Economist describes the overall political situation, and should be negatively correlated with cap rates.

EIU Political Stability Rating (10=high)

Again, greater stability should have a negative impact on cap rates, even though the political situation does not always have a direct impact on the business of real estate.

5.4.3 Property-Business Factors

WDI Days to Enforce Contract

This factor indicates the rule of law and level of bureaucracy in the country. The inability to enforce agreements is often cited as a concern when investing in emerging markets. A greater number of days to enforce contracts would result in higher capitalization rates, as it implies increased risk premiums due to issues with the rule of law in the country.

WDI Days to Build Warehouse

This gives indications of bureaucracy and local construction capacity, and should have a positive relationship with cap rates. More days to build a warehouse would result in higher capitalization rates. We do not consider this factor to be a measure of supply-constrained environments, as warehouses are a relatively standard product and are generally constructed on lower value land.

WDI Days to Register Property

This factor indicates bureaucracy in the real estate sphere. More days to register property should increase cap rates as it points to institutional and title risks.

EIU Degree of Property Rights Protection (5=high)

We include this factor as an alternative property rights measure to the three WDI indicators above. One would expect that greater surety for these rights would push cap rates down. Expropriation, as described in the section on country risk, is a major concern for cross-border investors.

EIU Market Opportunities Rating (10=high)

The Market Opportunities Rating is an evaluation of business prospects, published by the Economist Intelligence Unit. In areas with good opportunities, we would expect economic growth and increasing rents, thereby pushing down cap rates. It is also possible that areas with better opportunities would attract more interest from investors, leading to increased competition and higher asset prices.

EIU Overall Business Environment Rating (10=high)

The Overall Business Environment Rating is an indication of general business activity, published by the Economist Intelligence Unit. A healthy business environment would have a tendency to decrease cap rates through a combination of stable demand and the potential for increasing rents. This would lead to lower risk premiums and greater income growth components.

JLL Real Estate Transparency Index

This rating by Jones Lang Lasalle shows the amount of real estate market information available by country. JLL evaluates 82 markets in five areas: availability of investment performance indices, availability of market fundamentals data, the reporting of listed property company financials, regulatory and legal factors, professional standards and the transaction process.[61] More opaque

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[61] Jones Lang Lasalle – Lasalle Investment Management , 2008 Transparency Index

markets should be more inefficient, resulting in less aggressive pricing, and increased cap rates. Opacity also increases exit risks and increases the cost of making investment decisions.

Figure 5.8 shows a summary of expected signs for the various factors. We use this template as a reference when deciding which factors to keep for subsequent regression rounds.

Figure 5.8 - Regression Factor Expected Signs

Factor	Expected Sign
WDI GDP per capita, PPP (constant 25 international $)	−
WDI GDP growth (annual %)	−
WDI Stdev Growth Rate Annual % 20 Year	+
WDI Population (bigger markets should be more liquid)	−
WWDI % Urban (bigger markets should be more liquid)	−
WDI % Urb. Growth (demographics)	−
5 Yr Pop. Growth Average	−
WDI Inflation	+
WDI Inflation Std. Deviation 2yr	+
WDI - CPI	+
WDI Real Interest Rate	+
Moody's Rating Country Ceiling Foreign Currency Bonds (1=Aaa)	−
10 Year Bond Yield	+
EIU Political stability rating (10=high)	−
EIU political environment rating (10=high)	−
WDI Contract Enforce (Days)	+
WDI Time to Build Warehouse (Days)	+
WDI Property Registration (Days)	+
EIU Degree of property rights protection (5=high)	−
EIU market opportunities rating (10=high)	−
EIU overall business environment rating (10=high)	−
JLL Transparency Index (Lower = More Transparent)	+

CHAPTER SIX : REGRESSION RESULTS

6.1 First Round Regressions

The first set of regressions took a set of variables and grouped it under different risk models. The four models were economic, political, property business and GDP per capita PPP. (See Figure 6.1 and 6.2)

The initial set of results for RCA/JLL produced relatively high r² for the economic factors at 0.76/0.87, while property-business and GDP per capita regressions produced lower r² at 0.50/0.65 and 0.39/0.61 respectively, with the political factors at 0.25/0.50. For all three groups, factors were selected from these regressions based on consistency of sign across the JLL and RCA data sets, as well as for T-statistics that indicated significance.

Economic model

The economic factors seem to have the most relevance to cap rates, however this initial set has too many variables, overly limiting the degrees of freedom. For this reason, we select the most promising factors – GDP per capita, GDP growth, local interest rates, and the Moody's rating, to construct a more restricted variable set. By reducing the number of factors, we reduce overlap between the variables, potentially increased significance.

Political model

The political factors have a relatively limited impact on cap rates of 0.25/0.5. The expected signs of Political Environment Ratings were correct for both the RCA and JLL models Also , the RCA political environment shows a T-statistic of -1.60 (JLL is -1.15), quite close to a 90% significance level, which falls at 1.72 for 25 observations.

Property Business Model

In this model from the RCA data – the Property Rights Protection, GDP per capita, and the JLL Transparency Index exhibit 90% significance. The JLL index for the RCA model was unfortunately signed opposite to what we would expect – that a lower index score would reduce the cap rate. The JLL data set provided different results: GDP per capita, Property Rights Protection, and the Transparency Index were 90% significant, with the Economist Business Environment rating close.

GDP per Capita PPP

The expected sign for GDP per capita is correct for both the models.

Figure 6.1 First Set of Regressions: RCA Data

	Results	Expected Sign	Selected for 2nd Reg. Set

Economic Factors

Regression Statistics	
Multiple R	0.87133099
R Square	0.75921769
Adjusted R Square	0.51843539
Standard Error	0.00841711
Observations	25

	Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Intercept	0.01066248	0.26222659	+	
WDI GDP per capita, PPP (constant 25 international $)	-0.00000031	-0.77090825	-	
WDI GDP growth (annual %)	-0.00339571	-1.32884499	-	X
WDI Stdev Growth Rate Annual % 20 Year	0.00397630	0.66207596	+	
WDI Population	0.00000000	1.30569431	-	
WWDI % Urban	0.00030101	1.49341796	-	
WDI % Urb. Growth	-0.00803852	-0.71770746	-	
5 Yr Pop. Growth Average	0.01415407	1.28240689	-	
WDI Inflation	-0.00278479	-0.94175171	+	
WDI Inflation Std. Deviation 2yr	0.00003561	0.47090280	+	
WDI - CPI	0.00018441	0.69774876	+	
10 yr Bond Yield	0.00325662	0.98581475	+	X
Moody's Rating Country Ceiling Foreign Currency Bonds	0.00189816	0.16696522	+	X

Political Factors

Regression Statistics	
Multiple R	0.50758684
R Square	0.25764440
Adjusted R Square	0.19015752
Standard Error	0.01091531
Observations	25

	Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Intercept	0.09674931	7.07011694	+	
EIU Political stability rating (10=high)	0.00042858	0.14901016	-	X
EIU political environment rating (10=high)	-0.00484743	-1.60063975	-	X

Property Business Factors

Regression Statistics	
Multiple R	0.71265966
R Square	0.50788378
Adjusted R Square	0.30524770
Standard Error	0.01010999
Observations	25

	Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Intercept	0.22318292	3.14017072	+	
WDI Contract Enforce	-0.00000427	-0.41747960	+	X
WDI Time to Build Warehouse	-0.00000002	-0.00078857	+	
WDI Property Registration	-0.00000925	-0.18759196	+	X
EIU Degree of property rights protection (5=high)	-0.02130505	-2.25382111	-	X
EIU market opportunities rating (10=high)	-0.00112357	-0.43183486	-	X
EIU overall business environment rating (10=high)	-0.00333585	-0.47532932	-	X
JLL Transparency Index (Higher=Less Transparent)	-0.01375424	-1.69190055	+	X

GDP Per capita

Regression Statistics	
Multiple R	0.62135521
R Square	0.38608230
Adjusted R Square	0.35939023
Standard Error	0.00970806
Observations	25

	Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Intercept	0.08656386	12.55551757		
WDI GDP per capita, PPP (international $)	-0.00000081	-3.80319670	-	X

Figure 6.2 First Set of Regressions: JLL Data

Economic Factors

				Expected Sign	Selected for 2nd Reg. Set
Regression Statistics		**Results** Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Multiple R	0.93411726	Intercept	-0.00730067	-0.19002586	+	
R Square	0.87257506	WDI GDP per capita, PPP (constant 25 international $)	-0.00000094	-1.11930172	-	
Adjusted R Square	0.73356602	WDI GDP growth (annual %)	-0.00260810	-0.76322165	-	X
Standard Error	0.01071329	WDI Stdev Growth Rate Annual % 20 Year	0.00430156	0.98625164	+	
Observations	24.00000000	WDI Population	0.00000000	1.72622558	-	
		WWDI % Urban	0.00067249	1.76398088	-	
		WDI % Urb. Growth	0.00583018	0.61950659	-	
		5 Yr Pop. Growth Average	-0.00165969	-0.16980969	-	
		WDI Inflation	-0.00382782	-1.24108686	+	
		WDI Inflation Std. Deviation 2yr	-0.00003628	-1.28647867	+	
		WDI - CPI	0.00021840	0.77195473	+	
		10 yr Bond Yield	0.00170593	0.73859442	-	X
		Moody's Rating Country Ceiling Foreign Currency Bonds	0.00269716	1.36242502	+	X

Political Factors

Regression Statistics			Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Multiple R	0.70782971	Intercept	0.13780964	8.02517012	+	
R Square	0.50102290	EIU Political stability rating (10=high)	-0.00470570	-0.96310000	-	X
Adjusted R Square	0.45350127	EIU political environment rating (10=high)	-0.00524434	-1.15470005	-	X
Standard Error	0.01534344					
Observations	24					

Property Business Factors

Regression Statistics			Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Multiple R	0.80552542	Intercept	-0.03909937	-0.29426665	+	
R Square	0.64887120	WDI Contract Enforce	0.00000590	0.42462234	+	X
Adjusted R Square	0.49525234	WDI Time to Build Warehouse	0.00003238	0.77574837	+	
Standard Error	0.01474570	WDI Property Registration	-0.00002577	-0.41651169	+	X
Observations	24	EIU Degree of property rights protection (5=high)	-0.01626936	-1.72388504	-	X
		EIU market opportunities rating (10=high)	-0.00602561	-1.24545553	-	X
		EIU overall business environment rating (10=high)	0.02024703	1.59828587	-	X
		JLL Transparency Index (Higher=Less Transparent)	0.02623075	2.10258747	+	X

GDP Per capita

Regression Statistics			Coefficients	*t Stat*	*Sign (+/-)*	*Selected (X)*
Multiple R	0.78421677	Intercept	0.09258052	17.00978874		
R Square	0.61499595	WDI GDP per capita, PPP (international $)	-0.00000128	-5.92809038	-	X
Adjusted R Square	0.59749576					
Standard Error	0.01316780					
Observations	24					

6.2 Second Round Regressions

In the second round of regressions, we tested linear and log-linear approaches, the latter using the natural log of the cap rate against the independent variable sets. The two techniques produced broadly comparable results, with the linear log versions generally showing slightly lower r^2 and T-statistic figures. (See Figure 6.3 to 6.6)

Again, economic factors had the greatest capacity to explain cap rates, for both data sets. Property-business factors were second best, and again the political factors were shown to be the worst measure of cap rates, when considered independently. R-squared results for JLL were consistently higher than RCA. However, RCA's data had a more reasonable set of results in a couple of key measures.

Economic Factor Results

The r^2 results range from 0.58 to 0.79 across the four models tested. The reduced number of elements in the economic regression set produced more significant results – GDP growth and Moody's Index were all close to 90% significant or above for RCA's data. The r^2 factors were lower than the first set of regressions for both the JLL and the RCA data. Worryingly, JLL produced a counterintuitive sign for GDP growth – positive, instead of negative. This would suggest that higher growth correlates with higher cap rates, which seems very unlikely. From this set of regression results, the factors that were chosen were 10 year Bond Yield (since they had the correct sign), Moody's Rating Foreign Currency Bonds (since they had high significance and correct signs) and GDP growth (since they had significant and correct signs in one of the models).

Political Factor Results

The r^2 results range from 0.20 to 0.50 across the four models tested. The political regression results varied substantially between RCA and JLL with respective T-statistics of about 0.25 and 0.50, respectively. Of the two factors, the more general Political Environment factor produced more significant results(though neither achieved 90% significance) across the two data sets and had the same expected sign for both the models. For the next step, the Political Environment Rating was initially retained and then dropped in the final hybrid, as it produce an insignificant result for both data sets when used in the initial test of the third set.

Property-Business Factor Results

The r² results range from 0.46 to 0.64 across the four models tested. The World Bank measures—Days to Enforce Contract and Days to Register Property—produce insignificant results for both data sets, in addition to having counterintuitive signs. Neither were retained for our last regression set. The Economist Intelligence Unit measures similarly lacked a convincing relationship with cap rates, except for the property rights protection measure. The Market Opportunities provided expected signs, but insignificant t-statistics. The Business Environment factor was statistically insignificant. We retained the EIU Degree of Property Rights Protection for the final regression model.

Figure 6.3 Second Set of Regressions: RCA Data

Results			Coefficients	t Stat	Sign (+/-)	Expected Sign	Selected for 3rd Reg. Set
Economic Factors							
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*		*Selected (X)*
Multiple R	0.75722339	Intercept	0.04998086	5.33690592	+		
R Square	0.57338726	WDI GDP growth (annual %)	-0.00310847	-1.91844696	-		X
Adjusted R Square	0.48806471	WDI Stdev Growth Rate Annual % 20 Year	-0.00038214	-0.09887149	+		
Standard Error	0.00867847	10 yr Bond Yield	0.00283669	1.52698497	+		X
Observations	25	Moody's Rating Country Ceiling Foreign Currency Bonds	0.00758234	1.80753695	+		X
Political Factors							
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*		*Selected (X)*
Multiple R	0.50758684	Intercept	0.09674931	7.07011694	+		
R Square	0.25764440	EIU Political stability rating (10=high)	0.00042858	0.14901016	-		
Adjusted R Square	0.19015752	EIU political environment rating (10=high)	-0.00484743	-1.60063975	-		X
Standard Error	0.01091531						
Observations	25						
Property Business Factors							
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*		*Selected (X)*
Multiple R	0.71265964	Intercept	0.22316021	3.53385471	+		
R Square	0.50788377	WDI Contract Enforce	-0.00000426	-0.43866544	+		
Adjusted R Square	0.34384502	WDI Property Registration	-0.00000924	-0.20287288	+		
Standard Error	0.00982515	EIU Degree of property rights protection (5=high)	-0.02130205	-2.53223916	-		X
Observations	25	EIU market opportunities rating (10=high)	-0.00112414	-0.46338351	-		
		EIU overall business environment rating (10=high)	-0.00333485	-0.49728165	-		
		JLL Transparency Index (Higher=Less Transparent)	-0.01375497	-1.75235887	+		
GDP Per capita							
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*		*Selected (X)*
Multiple R	0.62135521	Intercept	0.08656386	12.55551757			
R Square	0.38608230	WDI GDP per capita, PPP (international $)	-0.00000081	-3.80319670	-		
Adjusted R Square	0.35939023						
Standard Error	0.00970806						
Observations	25						

Figure 6.4 Second Set of Regressions (Natural Logs) : RCA Data

		Results			Expected Sign	Selected for 3rd Reg. Set
Economic Factors						

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.75431068	Intercept	-2.99974369	-20.04087934	+	
R Square	0.56898460	WDI GDP growth (annual %)	-0.04700253	-1.81497985	-	X
Adjusted R Square	0.48278153	WDI Stdev Growth Rate Annual % 20 Year	-0.02629612	-0.42568511	+	
Standard Error	0.13870642	10 yr Bond Yield	0.05253996	1.76953876	+	X
Observations	25	Moody's Rating Country Ceiling Foreign Currency Bonds	0.129231051	1.927512995	+	X

Political Factors

Regression Statistics			Coefficients		Sign (+/-)	Selected (X)
Multiple R	0.46613359	Intercept	-2.311921103	-10.34739244	+	
R Square	0.21728053	EIU Political stability rating (10=high)	0.017616654	0.375135077	-	
Adjusted R Square	0.14612421	EIU political environment rating (10=high)	-0.080230356	-1.622558305	-	X
Standard Error	0.17822019					
Observations	25					

Property Business Factors

Regression Statistics			Coefficients		Sign (+/-)	Selected (X)
Multiple R	0.67578632	Intercept	-0.294298025	-0.278935883	+	
R Square	0.45668715	WDI Contract Enforce	-1.37197E-05	-0.084476234	+	
Adjusted R Square	0.27558287	WDI Property Registration	-4.13126E-05	-0.054284246	+	
Standard Error	0.16415493	EIU Degree of property rights protection (5=high)	-0.296485667	-2.109463939	-	X
Observations	25	EIU market opportunities rating (10=high)	-0.018515799	-0.456820859	-	
		EIU overall business environment rating (10=high)	-0.071138548	-0.63491658	-	
		JLL Transparency Index (Higher=Less Transparent)	-0.23178704	-1.767411701	+	

GDP Per capita

Regression Statistics			Coefficients		Sign (+/-)	Selected (X)
Multiple R	0.61494452	Intercept	-2.412381697	-21.86426552		
R Square	0.37815677	WDI GDP per capita, PPP (international $)	-1.27554E-05	-3.739894915	-	
Adjusted R Square	0.3511201					
Standard Error	0.1553609					
Observations	25					

Figure 6.5 Second Set of Regressions: JLL Data

	Results			Expected Sign	Selected for 3rd Reg. Set
Economic Factors					

Regression Statistics		Results	Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.88617738	Intercept	0.03231736	3.51652744	+	
R Square	0.78531035	WDI GDP growth (annual %)	0.00322575	2.65773332	-	X
Adjusted R Square	0.74011252	WDI Stdev Growth Rate Annual % 20 Year	-0.00128567	-0.77936739	+	
Standard Error	0.01058086	10 yr Bond Yield	0.00139133	1.06556591	+	X
Observations	24	Moody's Rating Country Ceiling Foreign Currency Bonds	0.00308599	2.71521057	+	X

Political Factors

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.70782971	Intercept	0.13780964	8.02517012	+	
R Square	0.50102290	EIU Political stability rating (10=high)	-0.00470570	-0.96310000	-	
Adjusted R Square	0.45350127	EIU political environment rating (10=high)	-0.00524434	-1.15470005	-	X
Standard Error	0.01534344					
Observations	24					

Property Business Factors

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.79728582	Intercept	0.027119912	0.269518753	+	
R Square	0.63566468	WDI Contract Enforce	1.55338E-06	0.123701765	+	
Adjusted R Square	0.50707575	WDI Property Registration	-2.2943E-05	-0.375859338	+	
Standard Error	0.01457197	EIU Degree of property rights protection (5=high)	-0.01958827	-2.356326884	-	X
Observations	24	EIU market opportunities rating (10=high)	-0.00516953	-1.110523203	-	
		EIU overall business environment rating (10=high)	0.015416374	1.414108709	-	
		JLL Transparency Index (Higher=Less Transparent)	0.020480738	2.065313874	+	

GDP Per capita

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.78421677	Intercept	0.09258052	17.00978874		
R Square	0.61499595	WDI GDP per capita, PPP (international $)	-0.00000128	-5.92809038	-	
Adjusted R Square	0.59749576					
Standard Error	0.01316780					
Observations	24					

Figure 6.6 Second Set of Regressions (Natural Logs): JLL Data

Economic Factors

Regression Statistics		Results	Coefficients	t Stat	Expected Sign (+/-)	Selected for 3rd Reg. Set (X)
Multiple R	0.86340622	Intercept	-3.37376454	-21.69026416	+	
R Square	0.74547029	WDI GDP growth (annual %)	0.052792651	2.569955544	-	X
Adjusted R Square	0.69188509	WDI Stdev Growth Rate Annual % 20 Year	-0.002018043	-0.07227944	+	
Standard Error	0.17908075	10 yr Bond Yield	0.032576112	1.47408552	+	X
Observations	24	Moody's Rating Country Ceiling Foreign Currency Bonds	0.03503489	1.82130032	+	X

Political Factors

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.70066341	Intercept	-1.637565066	-6.0737934	+	
R Square	0.49092922	EIU Political stability rating (10=high)	-0.096479297	-1.257674201	-	
Adjusted R Square	0.44244628	EIU political environment rating (10=high)	-0.058160349	-0.81562859	-	X
Standard Error	0.2408995					
Observations	24					

Property Business Factors

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.77799672	Intercept	-3.394797716	-2.085238179	+	
R Square	0.60527889	WDI Contract Enforce	-1.30512E-05	-0.064237648	+	
Adjusted R Square	0.46596556	WDI Property Registration	-8.43807E-05	-0.08543977	+	
Standard Error	0.23576383	EIU Degree of property rights protection (5=high)	-0.330917805	-2.460371136	-	X
Observations	24	EIU market opportunities rating (10=high)	-0.097216297	-1.290794163	-	
		EIU overall business environment rating (10=high)	0.27310041	1.548331574	-	
		JLL Transparency Index (Higher=Less Transparent)	0.32650038	2.035003701	+	

GDP Per capita

Regression Statistics			Coefficients	t Stat	Sign (+/-)	Selected (X)
Multiple R	0.75586254	Intercept	-2.369913608	-26.54713146		
R Square	0.57132817	WDI GDP per capita, PPP (international $)	-1.91071E-05	-5.414915594	-	
Adjusted R Square	0.55184309					
Standard Error	0.21597704					
Observations	24					

6.3 Third Round Regressions

In our last set of regressions, we combined the most promising elements from the economic, political, and property-business regression sets to construct a "hybrid" model, using factors from the different groups. The intention was to create a model using a minimum of factors that could explain a maximum of the cap rates from the two data sets.

Our initial results, in this final round, showed the political environment factor with a positive sign. It should have shown a negative sign, since a higher index figure relates to greater stability and transparency in the political process. In both cases, the figure was positive, and was insignificantly small. For this reason, our final results eliminate the political factors altogether. This would suggest that political factors are either less of a concern to investors, or that the Economist ratings system does not accurately reflect perceived risks.

Again, the linear and natural log approaches produced largely similar results with similar r^2 and t-statistics. Overall the log results did not convincingly show an exponential relationship between the factors and the cap rates. The linear results generally had higher r^2 results. The overall r-squared for JLL was 0.75/0.78, meaning that the model can explain approximately 75% of cap rate pricing. For RCA, the r-squared was lower – 0.60/0.60, but RCA had no unexpected sign, where as JLL had one.

Similar to the second regression set, JLL produced an opposite sign for the GDP growth factor, and it was significant to the 90% level. This implies that JLL's pricing estimates bear no real relation to current country GDP growth, and it is entirely illogical that higher growth would increase cap rates. If the economy is growing, we should expect office rents to increase, and cap rates decrease, as we should reasonably expect to pay relatively more per dollar of current rent. This result suggests that the JLL model compensates incorrectly for a crucial factor, growth, that we know to be a key driver of cap rates in the real world.

In terms of 90% t-statistics, for RCA only GDP growth was clearly significant (-2.7/-2.8) though Bond Yield was close at (1.22/1.53). For JLL, only the Moody's rating had a significant result (2.22/1.83) with the expected sign.

Thus of the four regressions in this round, the RCA linear version produced no unexpected signs, and a slightly higher r^2 value than the natural log version – making it the best suited model of the group.(Refer Figure 7.2 and 7.3 for the RCA linear version forecasts)

Figure 6.7 Third Set of Regressions (Linear and LN) : RCA Data

		Results			Expected Sign
Hybrid					
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*
Multiple R	0.776228315	Intercept	0.095424798	2.474417748	+
R Square	0.602530396	WDI GDP growth (annual %)	-0.003140507	-2.729600005	-
Adjusted R Square	0.523036476	10 Year Bond Rate (End 2007)	0.002226757	1.227506971	+
Standard Error	0.008376805	Moody's Rating Country Ceiling Foreign Currency Bonds	0.004171936	1.325057497	+
Observations	25	EIU Degree of property rights protection (5=high)	-0.008090709	-1.215288412	-

Hybrid with Natural Logs					
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*
Multiple R	0.775295016	Intercept	-2.207329912	-3.59306953	+
R Square	0.601082362	WDI GDP growth (annual %)	-0.053132879	-2.899006338	-
Adjusted R Square	0.521298834	10 Year Bond Rate (End 2007)	0.044244216	1.531066979	+
Standard Error	0.133441773	Moody's Rating Country Ceiling Foreign Currency Bonds	0.050438206	1.005641897	+
Observations	25	EIU Degree of property rights protection (5=high)	-0.142482941	-1.343514233	-

Figure 6.8 Third Set of Regressions (Linear and LN) JLL Data

		Results			Expected Sign
Hybrid					
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*
Multiple R	0.882841553	Intercept	0.037170119	1.350602424	+
R Square	0.779409208	10 Year Bond Rate (End 2007)	0.001496384	1.116200892	-
Adjusted R Square	0.732969041	WDI GDP growth (annual %)	0.002729815	1.968149525	+
Standard Error	0.010725287	Moody's Rating Country Ceiling Foreign Currency Bonds	0.002763286	2.43940516	+
Observations	24	EIU Degree of property rights protection (5=high)	-0.001289311	-0.287898447	-

Hybrid with Natural Logs					
Regression Statistics			*Coefficients*	*t Stat*	*Sign (+/-)*
Multiple R	0.863365872	Intercept	-3.37581576	-7.345357338	+
R Square	0.745400629	WDI GDP growth (annual %)	0.05228759	2.257480803	-
Adjusted R Square	0.691800761	10 Year Bond Rate (End 2007)	0.032866469	1.468091183	+
Standard Error	0.179105251	Moody's Rating Country Ceiling Foreign Currency Bonds	0.034620742	1.830185702	+
Observations	24	EIU Degree of property rights protection (5=high)	-0.000366622	-0.004902305	-

6.4 Conclusions

Using our approach of predicting capitalization rates using only macroeconomic data and property market proxies, our approach resulted in a range of r^2 from 0.61 - 0.78. The challenge we faced was that the pricing information was only available for a relatively limited number of countries, about twenty-five, some of which are developed nations (Refer Figure 5.2 for country coverage).

Given the sample size, it is not surprising that there was a fair amount of noise in the results. An estimation error in a single factor would be enough to significantly distort the results. In fact, with the JLL data, it was found that the elimination of one country from the hybrid regression set could push r^2 from 0.78 to 0.87.[62]

The regression process did successfully eliminate a number of irrelevant factors. We found that certain groups of factors were insignificant to cap rates. The demographic factors we tested such as Population, % Urban Population, % Urban Growth produced low T-stats and counterintuitive signs. We might have expected demographic factors to have a more direct impact on property pricing, as they clearly do have an influence on space demand, yet it would seem that this is too far from the considerations of investors to influence pricing on a day to day basis. All of the World Bank Development estimations we tested – Days to Enforce Contract, Days to Build Warehouse, Days to Register Property also produced similarly poor results. Not one of the factors came close to having a significant, logical relationship with our cap rate date. This is a surprising result in the regressions as we expected the WDI estimates to be significant at least to some extent with the country cap rates, given their direct relationship with property markets.

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[62] We experimented with removing Australia from the JLL data set as the residual was very high. However, for the final regressions Australia was retained in the JLL data set, due to our already limited sample size.

CHAPTER SEVEN: COUNTRY FORECASTS

The generally reasonable regression results show the strength of the modeling approach. While they lack enough precision to be used as pricing targets, our intention was to provide a reliable, if rough, estimate of where pricing should fall relative to other countries. We have forecasted capitalization rates and from there created a proxy for risk factor for the countries forecasted. Our technique consists of filling in the dependent variables on the regression formula, where β represents the coefficient of each factor.

$$Cap\ Rate = \beta_1(GDP\ Growth) + \beta_2(10\ Year\ Bond\ Yield) + \beta_3(Moody's\ Rating) + \beta_4(Property\ Rights\ Protection)$$

The coefficients (β_x) of the variables have been taken from the third set of regressions in our analysis.[63] By forecasting with both JLL and RCA data sets, using a linear and log-linear approach, we have at least four projections per country. Some countries also have third party data points (i.e JLL), making some covered by up to seven estimations, enabling good comparison between our methods and those of the third party providers. The maps used in this section use the RCA linear forecast model, as this was deemed to be the best of our four final models.

Forecast Scope

We have forecasted cap rates for 50 countries. Approximately half, 26 countries, had pricing data available from one of the three data sources – JLL, RCA, IPD. The principal limitation regarding countries for which cap rates could be forecasted was the availability of Economist Intelligence Unit ratings. These are only available for 60 countries, while 7 of these lacked Moody's ratings and 3 lacked appropriate long term Bond Yield, resulting in the final set of 50 countries.

Forecast Overview

The graph in Figure 7.1 provides an indication of the overall correlation between the four forecast models and the three sets of base data. Each vertical line represents a single country, so the distance between points vertically indicates the discrepancy in the results. Every country has at least four forecasts from RCA and JLL, while market information from IPD, JLL, and RCA is shown where available. Unsurprisingly the linear and natural log forecasts from the same source (either JLL or RCA) track each other closely.

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[63] See Chapter 6 Section 6.3

Figure 7.1 - Four Forecasts vs. Given Cap Rates

Each vertical line represents one country

LN JLL · JLL · RCA · LN RCA · IPD Data · JLL Data · RCA Data
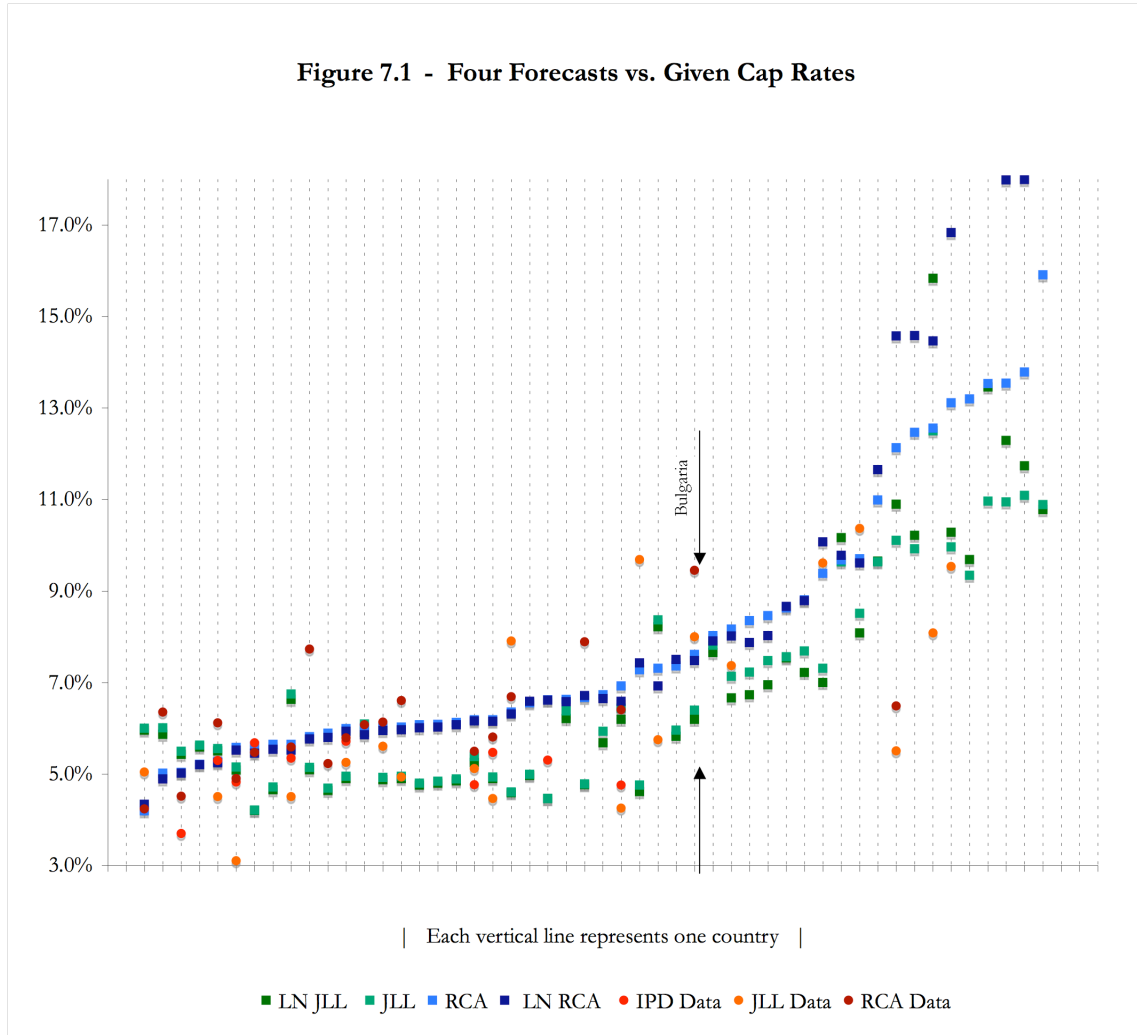
7.1 Country Forecasts

The graph, Figure 7.2, and map, Figure 7.3, shows results for all countries forecasted, along with average result, range, and relative price range. The relative price range shows the relative price difference between the high and low RCA cap rate forecast, the fact that between a 4% and a 5% cap rate there is 20% price drop, where as between 19% and 20% there is only a 5% drop. We include this figure to highlight the relative disparities between the Linear Log and Linear approaches. The average relative range of 17.1% shows the degree to which there is variation in the forecasts. This does not surprise us – after all, the RCA model only predicts about two-thirds of pricing.

Figure 7.2 - Forecast Capitalization Rates - Four Models

| Country Name	Log Model		Linear Model		High/Low Relative Range
	LN JLL	LN RCA	JLL	**RCA**	
Argentina	15.8%	14.5%	12.5%	**12.6%**	20.7%
Australia	5.0%	6.6%	5.0%	**6.6%**	24.2%
Austria	4.9%	5.9%	4.9%	**6.0%**	18.9%
Belgium	4.9%	6.0%	4.9%	**6.0%**	18.6%
Brazil	9.7%	18.1%	9.3%	**13.2%**	26.6%
Bulgaria	6.7%	8.0%	7.1%	**8.2%**	18.4%
Canada	4.6%	5.8%	4.7%	**5.9%**	21.2%
Chile	6.2%	7.5%	6.4%	**7.6%**	18.7%
China	8.2%	6.9%	8.4%	**7.3%**	11.0%
Colombia	10.9%	14.6%	10.1%	**12.1%**	10.2%
Czech Republic	5.9%	5.9%	6.1%	**6.0%**	1.7%
Denmark	4.9%	5.9%	4.9%	**6.0%**	18.2%
Ecuador	10.8%	23.6%	10.9%	**15.9%**	32.2%
Egypt	8.1%	9.6%	8.5%	**9.7%**	16.7%
Finland	5.5%	5.2%	5.6%	**5.3%**	4.3%
France	4.6%	6.3%	4.6%	**6.4%**	27.8%
Germany	4.8%	6.0%	4.8%	**6.1%**	21.7%
Greece	5.2%	6.2%	5.4%	**6.2%**	15.1%
Hong Kong	5.9%	4.9%	6.0%	**5.0%**	14.4%
Hungary	5.8%	7.5%	6.0%	**7.4%**	20.9%
India	10.2%	9.8%	9.6%	**9.7%**	4.8%
Indonesia	10.3%	16.8%	10.0%	**13.1%**	21.6%
Ireland	5.6%	5.2%	5.6%	**5.2%**	6.8%
Israel	5.7%	6.6%	5.9%	**6.7%**	15.6%
Italy	4.6%	7.4%	4.8%	**7.3%**	36.6%
Japan	4.2%	5.5%	4.2%	**5.6%**	25.2%
Malaysia	6.9%	8.0%	7.5%	**8.5%**	17.8%
Mexico	7.0%	10.1%	7.3%	**9.4%**	25.4%
Netherlands	4.8%	6.0%	4.8%	**6.1%**	21.1%
New Zealand	4.8%	6.7%	4.8%	**6.7%**	28.6%
Norway	4.9%	6.1%	4.9%	**6.1%**	20.8%
Pakistan	12.3%	18.0%	10.9%	**13.5%**	9.2%
Peru	9.7%	11.6%	9.6%	**11.0%**	12.1%
Philippines	10.2%	14.6%	9.9%	**12.5%**	18.1%
Poland	6.2%	6.6%	6.4%	**6.6%**	6.3%
Portugal	4.5%	6.6%	4.5%	**6.6%**	32.6%
Romania	7.6%	7.9%	7.8%	**8.0%**	4.7%
Russian Federation	7.2%	8.8%	7.7%	**8.8%**	18.0%
Singapore	6.0%	4.3%	6.0%	**4.2%**	29.7%
Slovak Republic	6.6%	5.5%	6.7%	**5.6%**	14.9%
South Africa	7.5%	8.7%	7.6%	**8.6%**	12.7%
South Korea	6.2%	6.6%	6.4%	**6.9%**	10.6%
Spain	5.1%	5.8%	5.1%	**5.8%**	12.4%
Sweden	5.1%	5.5%	5.2%	**5.6%**	8.9%
Switzerland	4.7%	5.5%	4.7%	**5.6%**	17.5%
Thailand	6.7%	7.9%	7.2%	**8.3%**	19.3%
Turkey	13.5%	19.4%	11.0%	**13.5%**	0.6%
United Kingdom	4.9%	6.2%	4.9%	**6.2%**	20.9%
United States	5.4%	5.0%	5.5%	**5.0%**	7.3%
Venezuela, RB	11.7%	18.0%	11.1%	**13.8%**	14.9%
			Relative Range Average:		*17.1%*

Figure 7.3 - Forecast Cap Rates - RCA Linear
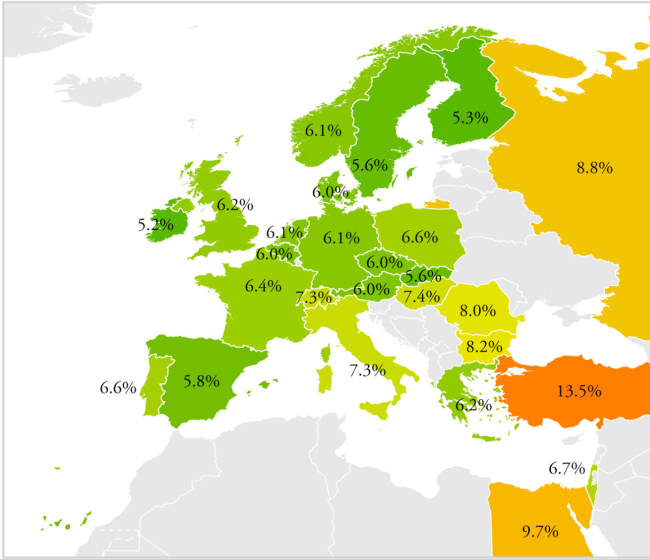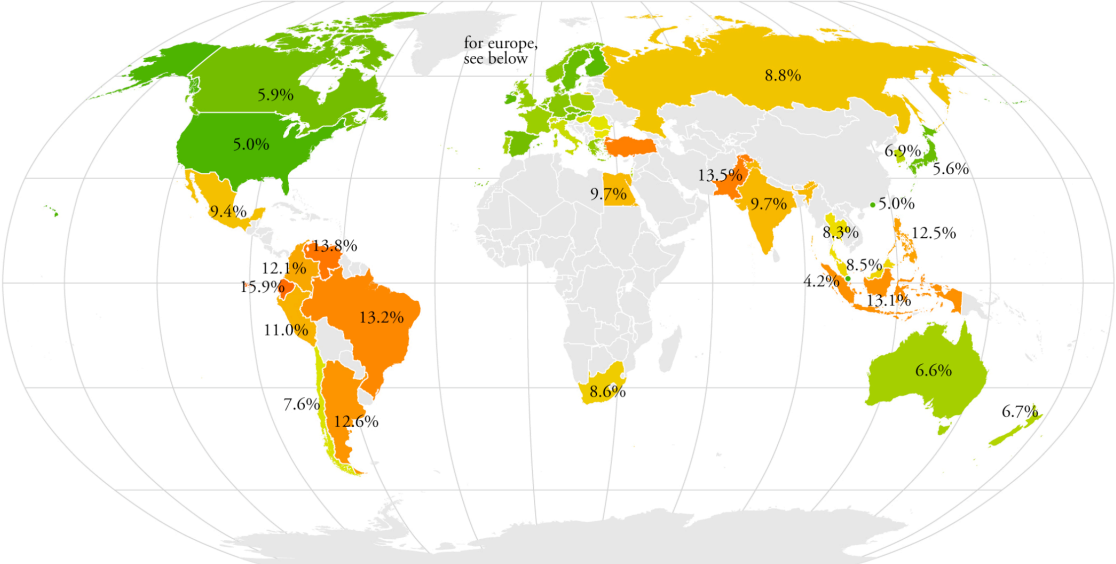
7.2 Country Forecast Comparison

The graphs below (Figures 7.4, 7.5, 7.6) show our cap rate predictions plotted with respect to JLL, RCA, and IPD cap rates. These cap rate predictions are from our RCA Linear Model and RCA Log Linear Model.[64] We have ordered them in increasing opacity, according to the 2008 JLL Real Estate Transparency Index. Our three charts are roughly comparable to JLL's High, Semi, and Low Transparency groupings. These graphs provide another look at how well our forecast matches other estimates, as well as how cap rates increase with opacity.

Figure 7.4 - Country Forecast Comparison
Hight Transparency (Index Below 2.00)
Square Represent Forecasts, Bars Represent Third-Party Data

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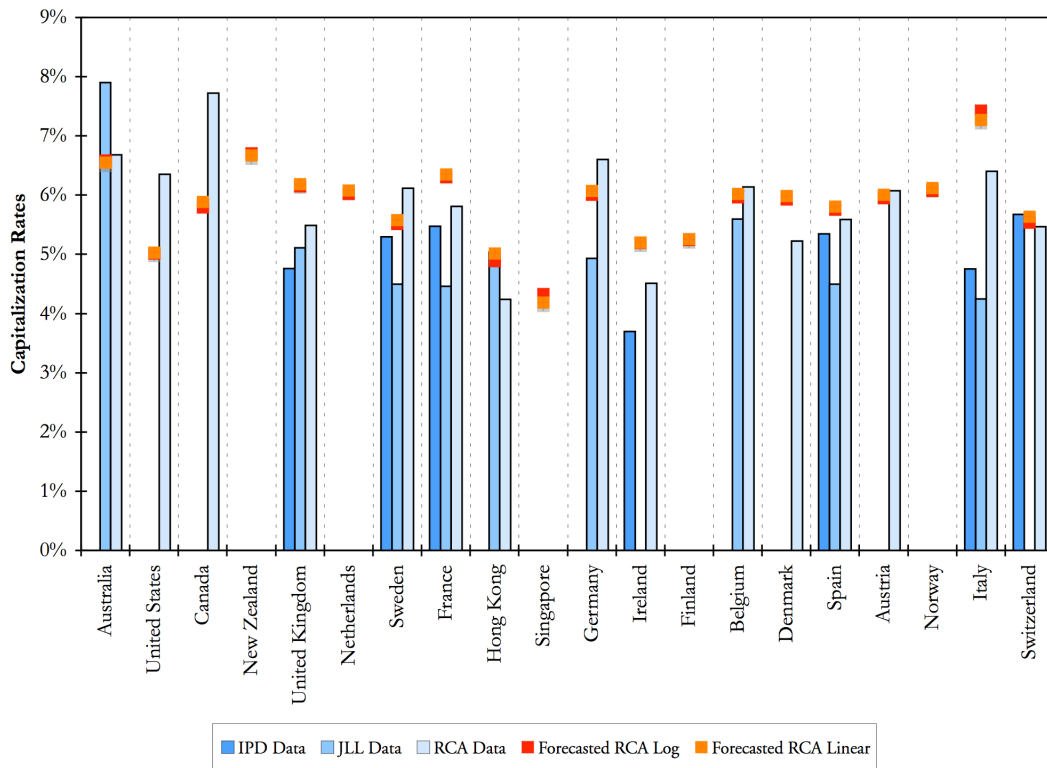
[64] We have chosen to show the RCA Linear and Log Linear Model in this figure since this model has the right signs for all the factors regressed. Refer Chapter 6, Section 6.4 for details.

Figure 7.5 - Countries Forecast Comparison
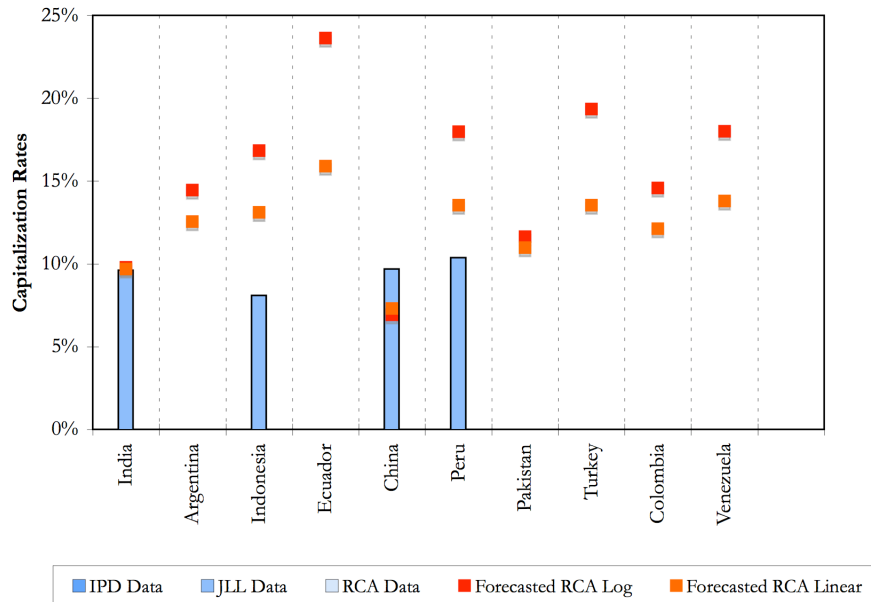Semi-Transparent (Index 2.0 to 3.5)
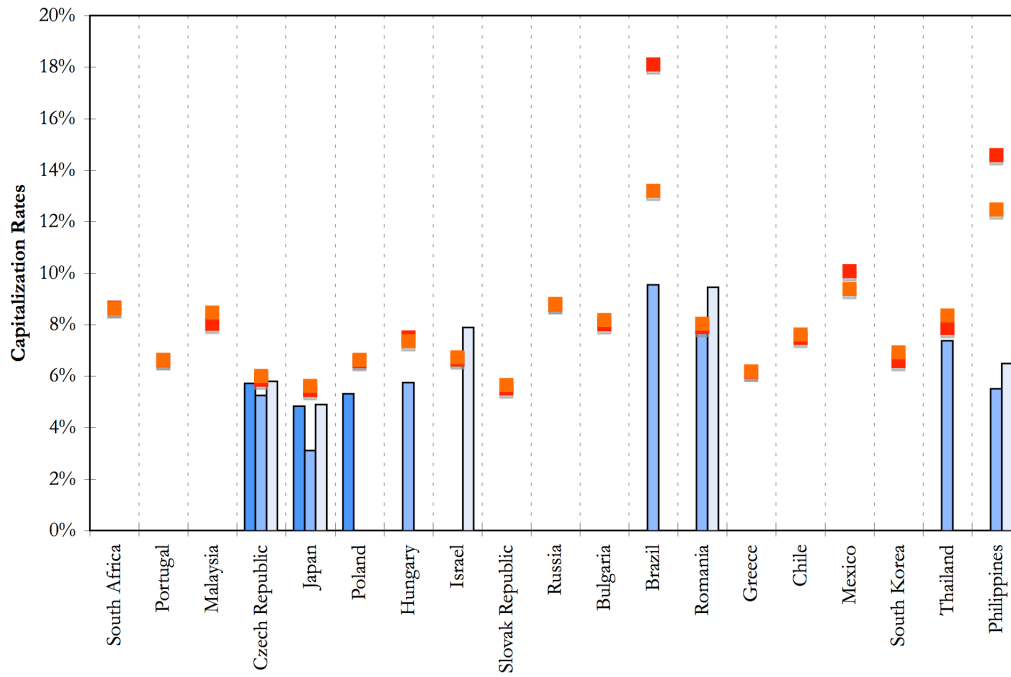
Figure 7.6 - Country Forecast Comparison
Low Transparency (Index 3.5 to 5.0)

| IPD Data | JLL Data | RCA Data | Forecasted RCA Log | Forecasted RCA Linear |

7.3 Capitalization Rate Forecasts vs. GDP per Capita

We plotted our forecast cap rates vs. GDP per capita PPP. These would seem to indicate that log-linear model better matches the results – as wealth decreases, cap rates have a tendency to increase dramatically. We are not surprised to see relatively good matches between our forecasts and GDP per capita as this overall factor incorporates many of the elements of risk that we have broken down into component parts, and as such, are highly correlated with GDP per capita.

Figure 7.7 - Log Linear Cap Rate Forecasts vs. GDP per Capita PPP

Figure 7.8 - Linear Cap Rate Forecasts vs. GDP per Capita PPP
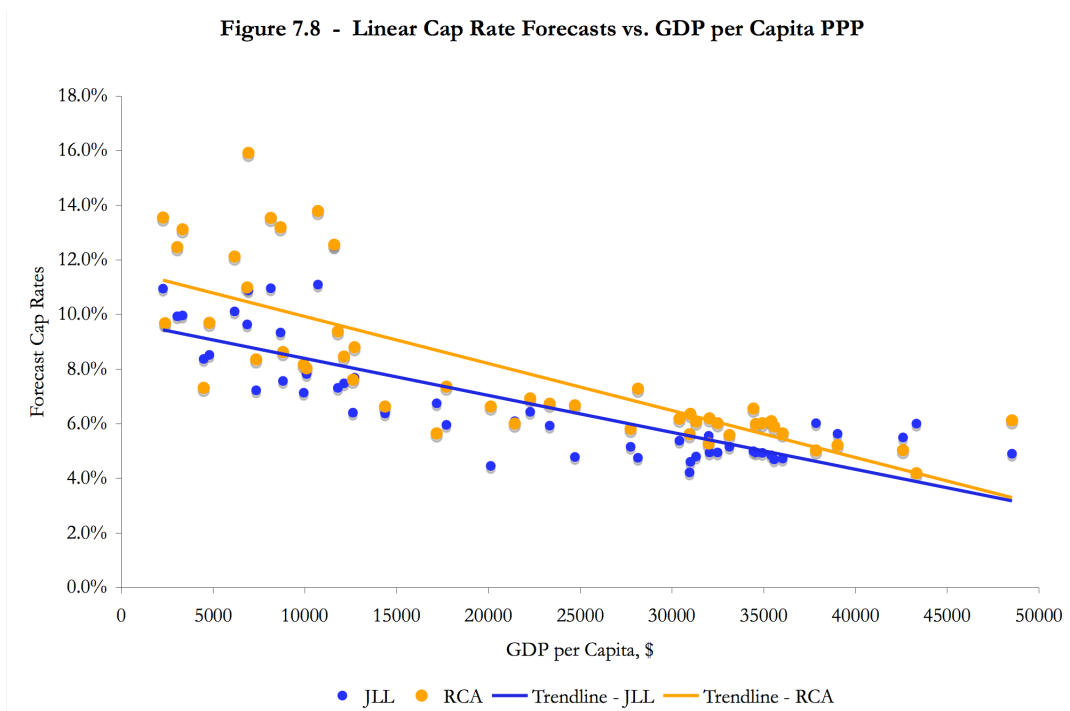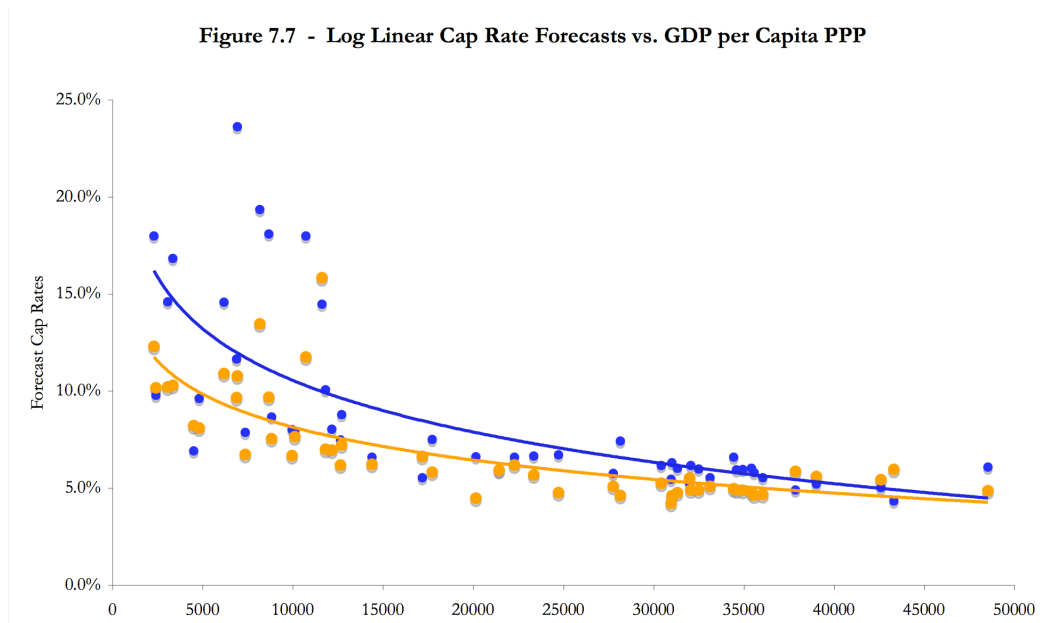
7.4 Risk Factor Forecasts

Using the forecasts as a base, we can move one step further and attempt to extrapolate a reasonable "risk factor" for each country. While we cannot construct a classic risk premium, we can provide an indication of relative risk between countries. These results are presented in Figure 7.9 and Map, Figure 7.10. Taking the familiar formula, $y = r_f + r_p - g$, we can insert our forecast for y. For g, we can use the country's GDP growth as a proxy. While growth does not perfectly correlate to the rent growth that g is intended to represent, it does provide a good corollary for market demand, and perhaps also for occupiers' ability to pay higher rents. Given that it does not address increases in the supply of space, it does lack precision, but at least it moves us in the right direction. For r_f we have two choices – using the risk free rate of the local country, or using the risk free rate of the U.S. investor. Using the U.S. bond yield could provide an indication of the risk free rate an American institution. This would be an obvious starting point as they evaluate markets in terms of risk premiums. Given the fact that many emerging markets have higher bond yields; this could result in higher projected risk factor for American investors compared to the local investors. The alternative approach is to use the local country bond yield. This would be more appropriate for local investors who likely have a higher local bond yield, thus resulting in a lower risk factor for those investors.[65] We can make the assumption that in many markets local investors, rather than foreign ones determine pricing. In this case, the U.S. investor would need to determine whether his own risk factor coupled with his risk free rate resulted in a higher or lower price than that set by the local market. For purposes of comparison, we have included both methodologies, as they are both relevant. Figure 7.9 and map 7.10 shows the risk factors for U.S and local investors and the difference between the two risk factors.

In these forecasts, we see that a couple of European countries have a lower risk premia than the U.S. (e.g. United Kingdom, Sweden, Spain, Switzerland). This is understandable – these European countries all had lower GDP growth figures, and some like the UK had lower forecast cap rates. Another noteworthy result is Turkey, which appears to have a negative local risk factor. This curious figure is a result of Turkey's long-term bond rate of 20.46%, well above the forecast cap rates of around 13.5%, highlighting the issue with local bonds. Our forecast would suggest that real estate was significantly less risky than government bonds, a rather counterintuitive idea, but perhaps an indication of the stability of the Turkish government.

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[65] Here we assume that there is an observed price for office space in a given market, and that local and foreign investors may be using different components to fix that price. Notably, that the foreign investor may have a lower home-country risk free rate, but a higher risk premium. The local investor on other hand might consider his home bond rate to be risk free (likely higher than the U.S.), and for reasons of market knowledge and local currency, might assign a lower risk premium. These two approaches could result in similar pricing.

Figure 7.9 - Risk Factors using Long Term Bonds

Risk Factor = y + g - rf = Cap Rate + GDP Growth - 10 Year Bond Rate

Country Name	American Perspective (U.S. Risk Free Rate) Implied Risk: RCA	Local Country Perspective (Local Rates) Implied Risk: RCA	US-Local Factor Difference RCA
Argentina	20.0%	11.5%	8.5%
Australia	5.0%	2.7%	2.4%
Austria	5.1%	4.3%	0.8%
Belgium	5.2%	4.2%	0.9%
Brazil	12.9%	1.6%	11.2%
Bulgaria	10.2%	8.9%	1.4%
Canada	4.7%	4.8%	-0.2%
Chile	7.6%	4.0%	3.6%
China	14.0%	13.6%	0.4%
Colombia	14.9%	6.0%	8.9%
Czech Republic	8.1%	7.2%	0.9%
Denmark	5.2%	4.3%	0.8%
Ecuador	15.8%	10.0%	5.8%
Egypt	12.5%	10.7%	1.8%
Finland	6.7%	5.9%	0.8%
France	4.3%	3.6%	0.8%
Germany	4.8%	4.2%	0.6%
Greece	6.5%	5.4%	1.1%
Hong Kong	7.7%	8.2%	-0.4%
Hungary	7.2%	3.3%	3.9%
India	14.9%	9.8%	5.1%
Indonesia	14.6%	6.4%	8.2%
Ireland	6.9%	6.0%	0.8%
Israel	7.8%	6.5%	1.3%
Italy	5.1%	4.0%	1.1%
Japan	3.8%	6.1%	-2.3%
Malaysia	10.3%	9.5%	0.8%
Mexico	10.1%	5.2%	5.0%
Netherlands	4.9%	4.2%	0.8%
New Zealand	4.6%	2.5%	2.1%
Norway	5.0%	4.0%	1.0%
Pakistan	16.4%	6.2%	10.2%
Peru	14.7%	11.0%	3.7%
Philippines	13.9%	6.9%	7.0%
Poland	8.7%	6.4%	2.3%
Portugal	3.9%	2.9%	1.0%
Romania	11.7%	8.7%	3.0%
Russian Federation	11.5%	9.7%	1.8%
Singapore	8.0%	8.7%	-0.7%
Slovak Republic	9.9%	9.0%	0.9%
South Africa	9.6%	3.8%	5.8%
South Korea	7.9%	6.0%	1.9%
Spain	5.6%	4.7%	1.0%
Sweden	5.7%	5.4%	0.4%
Switzerland	4.8%	5.6%	-0.7%
Thailand	9.3%	8.1%	1.3%
Turkey	15.6%	-0.8%	16.4%
United Kingdom	5.1%	3.8%	1.3%
United States	6.7%	6.7%	0.0%
Venezuela, RB	17.9%	12.2%	5.8%

Assumed U.S. Risk Free Rate 4.02%

Figure 7.10 - Risk Factor Forecasts
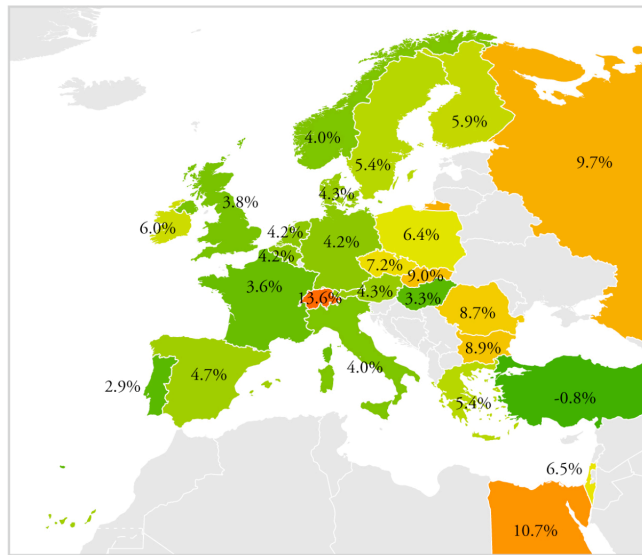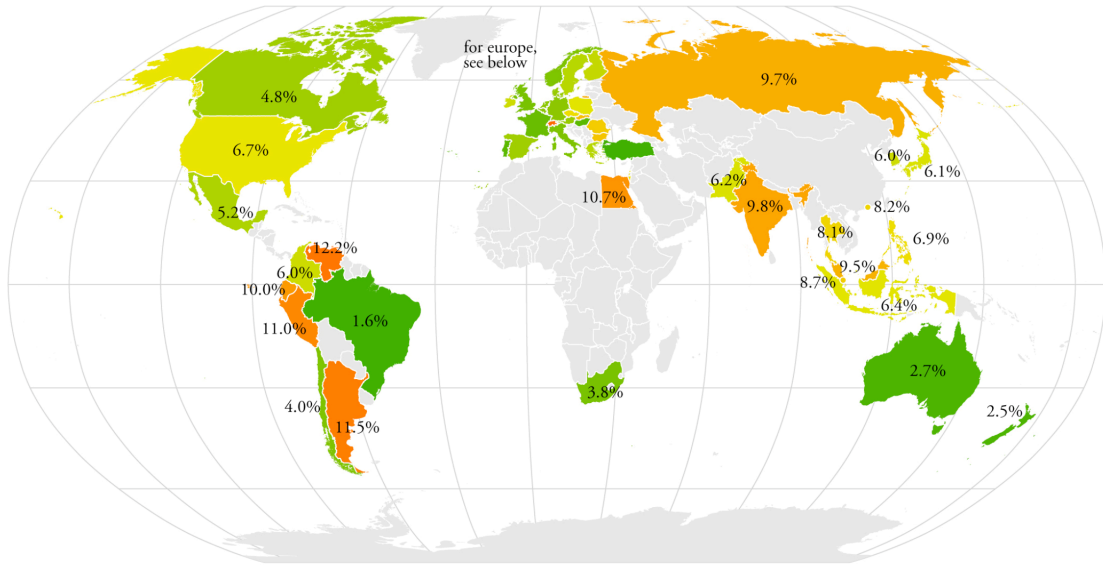
CHAPTER EIGHT: CONCLUSION AND FURTHER RESEARCH

In this paper we have shown a process for estimating country cap rates and risk factors for investing in markets that lack reliable pricing data. The country level cap rates and risk factor that have been forecasted in this method are for 2007 – 2008, the same as our data. Our process used third-party estimates of cap rates regressed against groups of economic, political, and market indicators for each country. Starting from a wide base of factors, we progressively eliminated ones that did not show statistical significance with relation to the given pricing information. Our final model uses just four factors: GDP Growth, Country Ten Year Bond Rates, Moody's Rating, and Property Rights Protection. This provides clues for investors about what factors actually have a relationship to current capitalization rates, and which do not – for example the fact that political factors generally showed less relevance to pricing. A model using these factors produced regressed returns with r^2 results between 0.60 and 0.78, meaning that we were able to describe a bit more than two-thirds of pricing in a given market. Using this model, we were able to construct forecasts for 50 countries, of which 24 had no third party pricing data and 12 are emerging markets.

The model is unable to allow for a number of key elements that impact real-world capitalization rates. First, they do not provide any kind of real specificity, as they are country-level rates. Aside from the very smallest markets, a country-level cap rate might have very little to do with observed rates in a given neighborhood of a given city. In addition, the model does not provide any real allowance for deal or partner risks – those associated with the specifics of individual business partners in individual transactions. This level of accuracy is most probably unattainable on a large scale, and would encounter issues of data consistency across markets. Regardless, it is beyond the scope of this paper. Rather what we have attempted is provide an understanding of *relative* pricing between markets, based on some key *consistently observable* market characteristics. In other words, it provides a good order-of-magnitude measure for office space, using data sources that are easily available.[66]

The risk factor that we have calculated can be considered an aspect of the return on the risk free rate that the companies should look at achieving. This risk factor could be pushed up or down by additional property level factors or partner level decisions, but it is a starting point and provides another idea of relative risk.

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[66] The Economist Intelligence Unit ratings come from a subscription service, but this is something that an institutional investor might well already have access to.

While we acknowledge the complicated nature of investing in international real estate, especially in emerging markets, these results should give investors a starting point for evaluation of new markets. Our research fits within a larger context of work into risk and emerging markets. Other studies have addressed the motivations and methods for cross-border investing. This study provides a tool for those investors to make comparative risk-return evaluations between each country.

Further Studies

Other Cross Sections

Further avenues for research could be to explore data sets from other time periods, to see whether this method holds for other time periods. In theory, historical information (to the extent that is available) should be used to check the validity of the model that has been proposed. Using historical data from the third-party providers (JLL, RCA) might actually improve accuracy by letting better transaction information filter through the system.

Future Forecast

Another avenue would involve using the model and variables to forecast for cap rates in the future. This would require forecasts of the different variables that have been used for this model.

Type of Data

If sufficient data existed, researchers could gain greater accuracy by using data from a specific type of property such as suburban or CBD to obtain a more narrow range of cap rate and risk premia forecasts.

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World Bank World Development Index - http://publications.worldbank.org/WDI/

Appendix 1 Markets & Countries used for some of MSCI Barra Indices

Markets	Developed Markets	Emerging markets	Frontier Markets
North America	Canada		
	United States		
Pacific	Australia		
	New Zealand		
Latin America		Argentina	
		Brazil	
		Chile	
		Colombia	
		Mexico	
		Peru	
Europe & CIS	Austria	Czech Republic	Bulgaria
	Belgium	Hungary	Croatia
	Denmark	Poland	Estonia
	Finland	Russia	Romania
	France	Turkey	Slovenia
	Germany		Ukraine
	Greece		Kazakhstan
	Ireland		
	Italy		
	Netherlands		
	Norway		
	Portugal		
	Spain		
	Sweden		
	Switzerland		
	United Kingdom		
Asia	Hong Kong	China	Vietnam
	Japan	India	Sri Lanka
	Singapore	Indonesia	
		Korea	
		Malaysia	
		Pakistan	
		Philippines	
		Taiwan	
		Thailand	
Middle East		Israel	Lebanon
		Jordon	Oman
			United Arab Emirates
			Qatar
			Kuwait
Africa		Egypt	Kenya
		Morocco	Mauritius
		South Africa	Nigeria
			Tunisia

Source: http://www.mscibarra.com/

Appendix 2 – Explanation of Methodology

The Risk and Return Relationship[67]
A fundamental point in the financial economic theory of capital Markets: expected returns are (and should be) greater for more risky assets. Expected return is risk free return plus the risk premium:

(1) $E[r_t] = r_{f,t} + E[RP_t]$

$E[r_t]$ is the expected total return of a given asset over future period t
$r_{f,t}$ is the return one could earn during period t from investing in a riskless asset (such as U.S. government Treasury bills or the country's equivalent)

$E[RP_t]$ is the expected risk premium that investors require on an ex ante basis for investing in the given asset. The expected risk premium is proportional to the amount of risk investors perceive to be involved in investing in the given asset.

Total Property Return[68]
Total Return from a property includes both the change in the capital value of the asset during the period and any income paid out by the asset to the investor during the period.
$$r_{,t} = (CF_t + V_t - V_{t-1})/V_{t-1}$$
$$= (CF_t / V_{t-1}) + ((V_t - V_{t-1})/V_{t-1})$$

$r_{,t}$ is the total return during period t
CF_t is the net amount f cash flow or income paid out to the investor from the asset during period t.
V_t represents the market value of the capital asset as of the end of period t.
V_{t-1} represents the market value of the capital asset as of the end of period t-1.

Total return can be broken down into income return and the appreciation return:

Income return:
$$y_{,t} = CF_t / V_{t-1}$$
$y_{,t}$ is the income return and is often referred to as the current yield

Appreciation return:
$$g_{,t} = (V_t - V_{t-1})/V_{t-1}$$
$g_{,t}$ is also referred as the capital return, capital gain, price change component or growth component. Thus the total return can also be written as

(2) $r_{,t} = y_{,t} + g_{,t}$

In an equilibrium market (from (1) and (2) above),
$r_{,t} = E[r_t]$
$y_{,t} + g_{,t} = r_{f,t} + E[RP_t]$

$$y_{,t} = r_{f,t} + E[RP_t] - g_{,t}$$

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[67] Geltner. D et al.. 2000 , Commercial Real Estate Analysis and Investments (Prentice Hall) p.186.

[68] Ibid, p.176.

Appendix 3 - Model Base Data for Final Regression Set

Country Name	WDI GDP Growth Rate	WDI Inflation	2007 Ten Year Bond Yields*	EIU Political Environment	EIU Property Rights Protection
Argentina	11.50%	10.90%	12.56%	5.8	3.00
Australia	2.50%	3.54%	6.38%	9.3	5.00
Austria	3.12%	1.45%	4.82%	8.7	5.00
Belgium	3.16%	1.79%	4.94%	8.2	5.00
Brazil	3.72%	4.18%	15.27%	6.2	3.40
Bulgaria	6.09%	7.26%	5.39%	5.8	3.40
Canada	2.80%	2.00%	3.84%	8.4	5.00
Chile	3.97%	3.39%	7.58%	7.8	5.00
China	10.70%	1.46%	4.40%	4.7	2.40
Colombia	6.79%	4.30%	12.91%	5.1	3.40
Czech Republic	6.07%	2.53%	4.92%	7.1	4.40
Denmark	3.20%	1.89%	4.86%	9.4	5.00
Ecuador	3.90%	3.03%	9.81%	4	2.60
Egypt	6.84%	7.64%	5.848%*	5	3.40
Finland	5.46%	1.57%	4.78%	9.5	5.00
France	1.99%	1.60%	4.78%	8	5.00
Germany	2.77%	1.71%	4.62%	8.8	5.00
Greece	4.34%	3.20%	5.14%	6.8	4.40
Hong Kong	6.75%	2.04%	3.62%	7.4	5.00
Hungary	3.90%	3.88%	7.93%	6.8	4.40
India	9.20%	5.80%	9.07%	5.5	3.40
Indonesia	5.48%	13.11%	12.18%	4.3	3.00
Ireland	5.70%	3.94%	4.86%	8.9	5.00
Israel	5.07%	2.11%	5.306%*	6	4.00
Italy	1.87%	2.09%	5.12%	6.7	4.00
Japan	2.20%	0.24%	1.75%	8.4	5.00
Malaysia	5.90%	3.61%	4.86%	6.9	4.00
Mexico	4.77%	3.63%	8.98%	5.9	3.40
Netherlands	2.85%	1.14%	4.79%	9.1	5.00
New Zealand	1.90%	3.36%	6.08%	9.5	5.00
Norway	2.90%	2.33%	5.03%	9.2	5.00
Pakistan	6.92%	7.92%	14.26%	3.5	3.00
Peru	7.74%	2.00%	7.71%	4.5	3.00
Philippines	5.45%	6.24%	10.979%*	4.8	4.00
Poland	6.13%	1.11%	6.35%	6.5	4.00
Portugal	1.31%	2.74%	5.03%	7.5	5.00
Romania	7.70%	6.58%	7.02%	5.5	3.40
Russian Federation	6.70%	9.68%	5.789%*	4.3	3.00
Singapore	7.88%	1.02%	3.36%	8.6	5.00
Slovak Republic	8.27%	4.48%	4.94%	7	4.00
South Africa	4.99%	4.64%	9.84%	5.3	5.00
South Korea	4.99%	2.24%	5.95%	7.1	5.00
Spain	3.85%	3.52%	4.97%	7.7	5.00
Sweden	4.19%	1.36%	4.41%	9.5	5.00
Switzerland	3.20%	1.06%	3.29%	9.7	5.00
Thailand	5.02%	4.64%	5.31%	6.1	4.60
Turkey	6.10%	10.51%	20.436%*	5.5	4.00
United Kingdom	2.90%	3.19%	5.31%	8.1	5.00
United States	5.67%	3.23%	4.02%	7.9	5.00
Venezuela	8.17%	13.66%	9.805%*	3.5	1.50

*Denotes countries which do not issue 10 year bonds, in these cases the longest term bond was selected.

Bibliography and Appendix