

Explaining the Variation in Residential Capitalization Rates Worldwide:

A Preliminary Investigation

by

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ABSTRACT

In an increasingly global investment climate, mobile capital interested in residential investment generally seeks the highest return on invested capital (cap rate). However, we observe a very large range in these values. Systematic differences may be explained by tax rates, demographics, regional factors, net migration, political structure and transition, homeownership rates, and other social and economic indicators. For this preliminary investigation, a set of data from Global Property Guide, an on-line investor-related service that has upper-end residential sales and rental information in over 100 countries, was augmented by World Bank data for 2010. A second data set by UN Habitat covers many less-affluent nations during a transitional period in the world economy during the 1990s is also available. For 2010, factors related to national affluence, availability of credit, and transaction costs were associated with lower residential cap rates. In 1998, only regional dummy variables for politics are significant for developing countries.

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1 INTRODUCTION

In an increasingly global investment climate, mobile capital interested in residential investment generally seeks the highest return on invested capital (gross cap rate). However, we observe a very large range in these values. Systematic differences may be explained by tax rates, demographics, regional factors, net migration, political structure and transition, homeownership rates, and other social and economic indicators.

Two data sets are employed to determine the variation in residential cap rates worldwide with revealed gross cap rates. The first set of data is from Global Property Guide, an investor-related service that has six years of recent, upper-end housing and tax information. OLS Regression analysis is used to determine relevant determinants of gross rent multipliers. The data set includes over 100 cities, with panel data available for about 70% of the cases. Preliminary results for 2010 show domestic credit, tax collections, and transaction rates are associated with cap rates on upper ends residential property.

The second data set is by UN Habitat covers many less-affluent nations during a transitional period in the world economy during the 1990s. The data addresses homeownership-to-income ratios, as well as rent-to-income ratios, and a dozen other socioeconomic factors. This is augmented by national level World Bank data and other on-line sources. Data are pooled and analyzed for 1993 and 1998. Regional dummy variables and, in one model, crime were associated with property returns

This paper is organized as follows: Section 2 summarizes the relevant literature. The model is set forth in Section 3, and data sources and collection are addressed in Section 4. Section 5 reports regression results for both data sets and Section 6 concludes and proposes future research.

2 LITERATURE REVIEW

Theoretically, the cap rate is a linear combination of the following economic variables (e.g., Mills and Hamilton, 1994, chapter 10; Himmelberg *et. al.*, 2005): real mortgage rate, the local taxation [property tax in the US and Arnona (municipal tax) in Israel], maintenance and renovation, and expected capital gain. Other factors include inflation rate and variance of housing prices.¹ Hence, empirical examination of the variability of cap rate should incorporate these basic economic explanatory variables.

Gwin and Ong (2004) examined cap rates worldwide in the context of homeownership rates, and at the effects of ethnicity/race and income on tenure choice. They utilize United Nations data from 1993 and 1998 in a cross-country analysis and find that, for higher income countries only, the price-to-rent ratio is an important factor in tenure choice and, furthermore, that greater income is associated higher ownership. They find no evidence for correlation between race or ethnicities and homeownership rates across countries. They also find that stronger laws and enforcement are associated with increased homeownership rates, and that transitional economies (formerly communist nations) are not associated with cross country differences in homeownership rates.

Himmelberg, Mayer and Sinai (2005) construct measures of the annual cost of single-family housing for 46 US metropolitan areas from 1980-2005 and compare them with income and rents to determine housing prices. They expect different results where house prices have sustained high levels. They find that for the period 1995-2004, the cost of owning rose somewhat relative to the cost of renting, but in most cities, not to levels that indicated houses were overvalued. They compute different price-to-rent ratios for all cities in their sample over the

¹ Theoretically, inflation rate should not have an impact on the cap rate if income taxation is symmetrical, i.e., interest payment can be deducted as an expense, but capital gain is fully taxed.

study period. Hence, they assert that many studies are potentially incomplete because they did not account for changes over time.

Fernandez, Aguirreamalloa, and Corres (2011) survey market risk premia across national boundaries. Their study addresses general investment such as equities, and venture capital, (although some respondents also mention real estate). Data from 56 countries is reported, and 20 were not included in the analysis due to small sample size. Market risk premia and equity returns were calculated among professors, analysts and company fund. Results found MRPS from a low of 4.5% and a high of over 22%, but most were between 5-8%.

Global Property Guide is an investment advisory service that tracks rental and sales prices, as well as investment-related tax, political, and economic factors pertinent to investors (Global Property Guide. 2010). Foreign investors are concerned with tax law, rent and price levels, tenant (or landlord) rights, and rates or return. Cap rates, residential sale prices, and rental data can be consistently measured over different markets, over time, on a city submarket basis.

Dietz and Haurin (2003) wrote a paper on homeownership rates published in JUE.

Barro (1999) studies the level of democracy in different nation-states and uses regression analysis with city panel data over time for over 100 countries and a 35 year period ending in 1995. Socioeconomic variables such as per capita GDP, years of education, colonial heritage, and religious affiliation (e.g., regional dummy variables), country size, urbanization and natural resource imports are used in his model. This demonstrates the ability to use national level data.

3 MODEL AND VARIABLES

In our empirical model the dependent variable is the reported rent divided by sale price (market cap rate). Independent variables are vectors of housing, market, demographics, political, and tax factors set forth thus:

$$\text{CapRate} = \beta_0 + \beta_1 \text{HOUSING} + \beta_2 \text{MARKET} + \beta_3 \text{TIMEPERIOD} + \beta_4 \text{POLITICAL} + \beta_5 \text{TAXLAW} + \beta_6 \text{DEMOGRAPHICS} + \beta_7 \text{CONTINENT} + \beta_8 \text{xxxx} + \beta_9 \text{xxxxx} + \varepsilon \quad (1)$$

Where:

CAP RATE is (monthly rent*12/Sales Price). We also may present a price to rent ratio, which is the inverse of the cap rate.

HOUSING characteristics include a vector of vacancy, new construction, homeownership rate, squatter %, buyers from outside the country/or city, unit size, location; and

MARKET characteristics such as GDP, credit availability, inflation and tax collections/services; and

TIME PERIODS indicates a time dummy for year; and

POLITICAL can mean transition economy, democracy; and

TAX LAW includes real estate taxes, capital gains taxes, and related sale/purchase, property tax, and or transaction costs, including preferred interest or RE treatment;

DEMOGRAPHICS includes net migration over population, median year of school completed, income or GDP/PC in PPP, poverty rate, life expectancy, informal unemployment or formal unemployment); and

CONTINENT DUMMY is a proxy for regional or developing country environments; and with the final “squiggly” as the error term.

The XXX variables should be added where available, and due to the nature of this preliminary work, suggestions are sought.

4 DATA SETS AND VARIABLES

Two data sets are employed to determine the variation in residential cap rates worldwide with revealed or stated gross cap rates: Global Property Guide and UN Habitat.

The first set of data is from www.GlobalPropertyGuide.com, an investor service that has six years of recent, upper-end housing and tax information. This data is intended for residential investors, and tracks middle and upper end investment type housing, largely in central cities and resort areas. The GPI team systematically tracks on-line sources (with limited hard copy as well) in the same geographic areas, over time, by consistent size strata. Rental and for sale housing data are collected, and a rent-to-sale price (cap rate) ratio is developed². The GPG data set also includes investor related data such as transaction costs, real estate tax rates, real estate law, etc.

In terms of geographic coverage, The GPG data set includes over 200 cities in 130 countries. The number of observations, pooling together date and size, overall cities, is Africa: 14 countries, 20 cities, 160 observations; Asia 14 countries, 26 cities, 630 observations;

² GPI has maintained a Global Property Guide research team in Manila, Philippines since 2006. The team culls housing rental data and housing for sale data from the www for the same upper-end rental districts, in capital cities geographic areas, over time. All listings research is conducted in English. Obvious outliers are removed, and data are only reported with a minimum sample size of about 20 (cite needed). Housing size strata depends on the city, but typically three or more size tranches are reported. Thus, this is not a random sample of properties, more oriented to upscale residents, ex-pats, and global investors than to locals. www.globalpropertyguide.com.

Caribbean 25 countries, 29 locales, 390 observations; Europe: 43 countries, 60 cities, >500 observations; Latin/South America 12 countries, 32 cities, >500 observations; North America 2 countries, 9 cities, 300 observations; Austral-asia 3 countries, 10 cities, 200 observations. When fully developed, this data set should have a sufficient sample size to run statistical analysis: 116 countries, 200 cities or locales, and over 2,500 observations, cross sectional pooled time. The current data set presented for this paper is only for 2010, for 72 cities, thus it represents only a small portion of its potential.

The second data set by UN Habitat covers many less-affluent nations during a transitional period in the world economy during the 1990s. The data addresses homeownership-to-income ratios, as well as rent-to-income ratios, and a dozen other socioeconomic factors. This basic data set is augmented by national level World Bank data and other on-line sources. Data are pooled and available for analysis for both 1993 and 1998, although there are many missing values. A panel study may be possible with up to 101 cities in both data sets. No more recent data are available, and this is a problem for making the analysis meaningful in today's market structure. The results for this paper rely upon 75 observations in 1998.

To both the GPG and UN Habitat data sets we added World Bank data on economic indicators, such as tax collections, mortgage credit, GDP, population, life expectancy, etc.

5 MODEL RESULTS

The Global property guide numbers are shown first, followed by the UN H data.

GPG 2010 results

Exhibit 1 shows descriptive statistics for the 2010 Global Property Guide data set. Cap rates average 5.7% among our sample, with a minimum of 1.2% and maximum cap rate of 34.0%. Average sales price is \$569,300 (US) and 27% of the properties were in developed countries.

The average male life expectancy is 71.1 years. The amount of debt credit extended as a percentage of GDP is 97.0%, and tax revenues collected (a proxy for government services) averages 28.9% of GDP. The last two variables were capital gains tax, averaging 12.8%, and transaction costs (both buying and selling property), stood at 14%³.

Exhibit 2 shows OLS regression outcomes obtained from the GPG 2010 cross-sectional dataset of cities around the world. This data set is exclusive, and represents upper-end, investor quality residential urban property. The respective dependent variables in the two left and right columns are *CAP-RATE* (rent-to-price ratio) and *PRICE* (the average home price of 120 sq. meters).

For cap rates, we report the outcomes obtained from the full model and from a stepwise regression set at a 10% significance level. We also run a parallel set of models with the dependent variable as sales price, with the same independent variables. The model has an adjusted R-Squared of .14, with a small but statistically significant F-statistic, at the low end of useful analysis, but suitable for exploratory work. Domestic credit and tax revenues both exhibit a negative sign, and are statistically significant at the 5%-level or better. The economic interpretation is that more credit and higher level of taxes/services are associated with LOWER rates of return on upper end rental property. This is likely indicative of competitive markets, and more people being able to afford to purchase upper end residential property. Capital gains tax and life expectancy are both statistically significant. The transaction costs variable is significant at the 5%-level, but positive. This appears surprising because economic theory would indicate that increased costs would be capitalized downward into purchase prices. However, because the dependent variable is a ratio, as property purchase transaction rates increase, sales prices come down, holding rents constant, so the cap rate then rises.

³ We also have other GPG variables available, such as investment climate, price change trends, and tenant law. A few of these were placed in the model but did not make the stepwise cut.

Exhibit 3 shows similar results for just cap rates as dependent variable, but adds a new variable for developed country. Once this is added, the credit variable becomes insignificant, and the developed country dummy is statistically significant at the 5% level. The latter might be the result of a highly developed credit market in developed economies. .

Moving along to the dependent variable of sales price, model results are shown on the right two columns of Exhibit 2. The R-Squared values are .39, substantially higher than for the cap rate models for upper end residential property. The F-statistic is significant. The domestic credit as a percent of GDP and male life expectancy variables are statistically significant at a 5% or higher levels, with a positive sign. Domestic tax collection as a percent of GDP is negative and significant. Thus we may conclude the effect of public services provided by those taxes is (negatively) overwhelmed by the taxes on income from real property. The capital gains tax and transaction costs variables are insignificant, but capital gains tax has a negative sign, as expected.

UN Habitat Model Runs for 1998

We also run OLS regression models for 1998 with up to 75 observations where most of the data were available. The UN Habitat cities are mostly in developing countries, and our data were for the period after which most formerly communist countries had already made a move toward capital markets (mostly by eliminating highly subsidized rents). The dependent variable in these models, which are shown as Exhibits models 4 and 5, is the price-to-rent ratio (inverse of cap rate). In Exhibit 4, the model's R-Square is .27 and the F-statistic is statistically significant. After running a stepwise regression, the transition economy variable is statistically significant and positive, indicating that formerly transition have a higher price-to-rent ratio (lower cap rate), holding all else constant. The cons variable was also positive and significant.

Exhibit 5 has a model with 25 observations, and an R-Square of .33. In this model of fewer cities, in the limited number of countries indicated, crime (negative) homeownership (positive) and regional dummies are statistically significant.

6 CONCLUSIONS AND FUTURE RESEARCH

The results of these preliminary estimates indicate that it is a major challenge to build and run models of international cap rates across countries and city markets. Data are not readily available, and those data sets that do exist have data gaps. Data need to be supplemented from well-known, trusted sources, such as World Bank data, but these data are typically at the national, rather than city, level, and this may indicate aggregation bias and issues related to data hierarchy.

The main findings indicate that in 2010, that lower cap rates are associated with tax revenue collections, availability of credit, and a dummy variable for developed country. Cap rates increase where transaction costs are high.

Future research

The Global Property Guide data shows promise, and the data and preliminary results presented in this paper only reflect the “tip of the (data) iceberg”, as size variation of units, and time (2005-2010 and forward), and changes in price trends have yet to be examined. Future research should focus on developing this information, boosting R Squared values, and considering the missing values.

The UN Habitat data set however, has not been updated since 1998, and has limited potential to assist in any international real estate analysis.

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Exhibit 1: List of Variables, Definitions, and Summary Statistics: 2010 data set

Name	Variable Definition	Avg.	Std.	Min	Max
<i>CAP_RATE</i>	the ratio between rent and apartment price	5.71×10^{-2}	3.23×10^{-2}	1.24×10^{-2}	0.34
<i>PRICE</i> (\$)	the average house price of 120 sq. meters in US \$\$	569,300.20	635,309.70	1,270.00	5,316,000
<i>DEVELOPED</i>	a dummy variable, which equals 1 for cities in developed countries and 0 otherwise	0.27	0.44	0	1
<i>DOMESTIC_CREDIT</i>	the ratio between the total credit and the GDP in percentage points	97.04	69.53	-18.40	293.00
<i>TAX_REVENUES</i>	the ratio between tax revenues and the GDP in percentage points	28.85	9.95	11.91	51.27
<i>MALE_LIFE_EXP.</i>	male life expectancy in years	71.06	7.58	47.41	80.00
<i>CAPITAL_GAIN_TAX</i>	capital gain taxation in percentage points	12.81	12.60	0	45.00
<i>TRANSACTION_COST</i>	Transaction cost in percentage points	0.14	0.15	0.02	1.09

Exhibit 2: Cap Rate and Housing Price Regressions Across Cities around the World

<u>Variables</u>	<u>CAP-RATE: FULL</u>	<u>CAP-RATE: Stepwise</u>	<u>PRICE: FULL</u>	<u>PRICE: Stepwise</u>
<i>CONSTANT</i>	5.79×10 ⁻² (24.27)***	5.72×10 ⁻² (24.98)***	413,780.20 (10.31)***	386,393.00 (10.87)***
<i>DOMESTIC_CREDIT</i>	-5.21×10 ⁻⁵ (-1.40)	-6.64×10 ⁻⁵ (-2.10)**	2,150.22 (3.52)***	2,042.57 (3.37)***
<i>TAX_REVENUES</i>	-3.72×10 ⁻⁴ (-1.56)	-4.48×10 ⁻⁴ (-2.13)**	-8,345.72 (-2.10)**	-7,387.96 (-1.89)*
<i>MALE_LIFE_EXP.</i>	-3.16×10 ⁻⁴ (-0.63)	-	23,693.31 (2.93)***	21,815.77 (2.79)***
<i>CAPITAL_GAIN_TAX</i>	-1.53×10 ⁻⁴ (-0.90)	-	-2,505.13 (-0.90)	-
<i>TRANSACTION_COST</i>	0.06 (1.66)	0.07 (2.09)**	857,183.40 (1.19)	-
Regression Statistics				
Observations	72.00	72.00	65.00	65.00
Adj. R-Squared	0.13	0.14	0.39	0.39
F-Statistic	3.17**	4.98***	9.19***	14.51***

Numbers in parentheses are t-values. significant values at 10%, 5% and 1% levels are marked with one, two and three asterisks, respectively.

Exhibit 3: Cap Rate Regressions Across Cities around the World: Developed Country Dummy

<u>Variables</u>	<u>CAP-RATE: FULL</u>	<u>CAP-RATE: Stepwise</u>
<i>CONSTANT</i>	0.06 (21.03)**	0.06 (23.28)***
<i>DEVELOPED</i>	-9.44×10^{-3} (-1.45)	-0.01 (-2.54)**
<i>DOMESTIC_CREDIT</i>	-3.34×10^{-5} (-0.85)	-
<i>TAX_REVENUES</i>	-4.27×10^{-4} (-1.79)	-3.96×10^{-4} (-1.90)*
<i>MALE_LIFE_EXP.</i>	1.53×10^{-4} (0.26)	-
<i>CAPITAL_GAIN_TAX</i>	-1.17×10^{-4} (-0.69)	-
<i>TRANSACTION_COST</i>	6.55×10^{-2} (1.79)	6.93×10^{-2} (2.04)**
<u>Regression Statistics</u>		
Observations	72.00	72.00
Adj. R-Squared	0.15	0.17
F-Statistic	3.04**	5.77***

Numbers in parentheses are t-values. significant values at 10%, 5% and 1% levels are marked with one, two and three asterisks, respectively.

Exhibit 4 . Stepwise Regression with 75 observations. 1998

Source	SS	df	MS			
Model	309457.827	1	309457.827	Number of obs =	75	
Residual	809213.733	73	11085.1196	F(1, 73) =	27.92	
Total	1118671.56	74	15117.1832	Prob > F =	0.0000	
				R-squared =	0.2766	
				Adj R-squared =	0.2667	
				Root MSE =	105.29	

price_to_r~t	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
transition	145.2563	27.49188	5.28***	0.000	90.46507 200.0476
_cons	39.41018	14.19675	2.78***	0.007	11.11611 67.70426

Significant t-values at 10%, 5% and 1% levels are marked with one, two and three asterisks, respectively.

Exhibit 5. Full regression model 1998

Source	SS	df	MS			
Model	166718.936	13	12824.5335	Number of obs =	25	
Residual	74604.3019	11	6782.20926	F(13, 11) =	1.89	
Total	241323.238	24	10055.1349	Prob > F =	0.1485	
				R-squared =	0.6909	
				Adj R-squared =	0.3255	
				Root MSE =	82.354	

price_to_r~t	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
arab_states	-175.3051	135.4421	-1.29	0.222	-473.4112	122.8009
asia	-193.5505	149.6415	-1.29	0.222	-522.9092	135.8082
highly_ind~d	(omitted)					
latin_amer~a	-370.604	182.5341	-2.03*	0.067	-772.3589	31.15081
transition	80.39707	67.20227	1.20	0.257	-67.51414	228.3083
formal_own~p	-506.3254	137.8403	-3.67***	0.004	-809.7098	-202.941
mortality_~1	5309.206	2379.075	2.23**	0.047	72.89784	10545.51
lnpop	-119.5021	53.3173	-2.24**	0.047	-236.8527	-2.151554
lnexpendit~e	54.982	25.96057	2.12*	0.058	-2.156833	112.1208
victims_of~1	-4.262436	1.64677	-2.59**	0.025	-7.886952	-.6379203
water	25.27432	219.4119	0.12	0.910	-457.648	508.1967
sewerage	-58.85062	195.5994	-0.30	0.769	-489.362	371.6608
electricity	-1133.212	595.0608	-1.90*	0.083	-2442.932	176.5082
telephone	-369.1505	230.62	-1.60	0.138	-876.7416	138.4406
_cons	2390.034	837.0543	2.86	0.016	547.6896	4232.378

Significant t-values at 10%, 5% and 1% levels are marked with one, two and three asterisks, respectively.