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Original Paper

Country Legal Origin of Direct Real Estate Risk Premiums

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Abstract

This paper examines the institutional nature of legal origin and the total returns (TRs), derived from investing in a country's direct real estate, and via the adoption of a multi-factor APT model. Quarterly direct real estate data from the Jones Lang LaSalle Real Estate-Asia index is used for 13 cities in Asia and across 3 sectors (office, residential and retail) are obtained. Findings confirm the existence of smoothing effects that cause a temporal bias and a seasonal lag. The 1st and 4th order autoregressive model is adopted to de-smooth the TRs. De-smoothed data is used in conjunction with 2 macroeconomic variables (real GDP growth rate and interest rate) and 1 real estate risk factor (vacancy rate) to form the multi-factor structural model. A pooled panel analysis is conducted with the law-system dummies, denoting British legal origin and French legal origin, and the factor loadings (i.e., the sensitivity of the risk factor to the TRs). Macroeconomic and real estate risk factors in equilibrium affect the TRs. Vacancy rate commands high and significant premium owing to its direct impact on the TRs, relative to GDP growth rate and interest rate. Both the British and French legal origins have a significant relationship each on the TRs.

Keywords

Legal origin, direct real estate, total returns, risk premiums, smoothening, autoregressive model, pooled data analysis and multi-factor model

1. Introduction

In addition to country differences across countries, international direct real estate investors face a lack of data and the issues of appraisal smoothing in the available data. Because of these issues, many studies tend to either use securitized real estate data or incomplete, unsecuritized real estate data.

Although Barkham and Geltner (1995) as well as Kallberg et al. (2002) have found that the direct and indirect markets follow each other closely, others find that direct and indirect real estate investments are not similar. Studies such as that by Seiler et al. (1999) show that securitized real estate as in REITs (i.e., the real estate investment trusts) and the un-securitized real estate are not the equivalent from an investor point of view. Giliberto (1993) and Stevenson (2000) have shown that returns on securitized real estate have little correlation with direct real estate but instead are closely related to the common stock market. Therefore, this paper argues that REITS are not a suitable proxy for private real estate returns to assess the cost of equity for private real estate investments. Ziobrowski and Curcio (1991) use capital gains as proxy for direct real estate returns in Japan. Several studies have used the capitalization rates as proxy for returns to estimate the risk premiums. A decrease in capitalization rate need not imply that there is a decrease in the risk premium, Therefore, the capitalization rates seem to be a poor proxy for risk premium estimation. The lack of transaction-based data, as compared to the relatively large volume of transaction prices in the common stock market, has led to the problem of appraisal smoothing for direct real estate returns. Therefore, this paper seeks to address the following objectives:

- To estimate the direct real estate total returns for the selective Asian city;
- To estimate the associated risk premiums of key macroeconomic variables, like GDP growth rate and the interest rate, together with the direct real estate specific risk, like vacancy rate for the Asian city concerned;
- To examine the relationship between legal origins, denoting the country aspect. and the direct real estate total returns by the Asian city concerned;
- To examine the relationship between legal origins and the associated direct real estate risk premium of the Asian city concerned;

The first section of this paper provides the background, the study scope and methodology, the significance of the a paper and its objectives. The next (second section) discusses the literature on direct real estate investing risk premiums and the total returns. It also discusses endowment law, country development and the Arbitrage Pricing Theory. The third section discusses the descriptive statistics utilized while looking at the research design in general. The fourth section discusses the findings and analysis of the paper. The final (fifth) section summarises the paper and it offers some suggestions for future work.

2. The Related Literature

The literature revolves on how risk premiums are estimated for international real estate investing. In particular, it looks at whether or not macroeconomic variables and specific real estate risk variables, play significant parts in the overall risk profile of such investing globally. The literature looks at studies that explore whether or not legal origins are significant factors in accounting for the different total returns from various cities globally. Liu and Mei (1992) postulate that two common risk factors help to explain the various expected returns on the different asset classes. These common risk factors can be proxied by a common stock market factor and a bond market factor. Among the implications, the first suggests that the real estate market is already integrated in the common stock and bond markets. An analysis of these latter two markets helps to understand real estate pricing.

Secondly, the implication is that there is no specific real estate risk premium, which is associated with real estate investing (Mei & Lee, 1994). The study by Liu and Mei (1992) differed significantly from an earlier one by Liu, Hartzell, Greig and Grissom (1990). The methodology is adopted by the earlier study (Jorion & Schwartz, 1986) to test for the presence of a super risk premium associated with the real estate asset class. The existence of a real estate risk premium is discovered when appraisal-based returns are utilised. Mei and Lee (1994) conclude that real estate contributes to the systematic risk of a portfolio, and that the concept of risk premium can be extended to the real estate asset class. There is the presence of a real estate factor premium on top of a common stock and bond factors in asset pricing. In such a 3-factor world where real estate is now a systematic factor, a real estate exposure is needed to capture the relevant real estate factor premiums (Liu & Mei, 1992). Having ascertained the presence of a real estate risk premium, numerous studies have sought to quantity this premium. Breidenbach, Muller and Schulte (2006) have adopted the CAPM model in assessing the real estate risk premium based on investors' relative risk appetite. Pai and Geltner (2007) reiterate that there is actually different risk premium for different real estate type, with apartments being viewed as the most risky, to be followed by retail and lastly CBD office. They applied the Fama-French model and discovered that there is inherently a larger premium for larger properties. Size and types of direct real estate investments affect the real estate premiums demanded by investors (Pai & Geltner, 2007).

2.1 The Country Legal Origin

The idea of how legal origin can affect country structure can be traced back to the Law and Finance theory, which predicts that the historically determined differences in legal traditions help explain international differences in financial systems today (Porta, Silanes, Schleifer, & Vishny, 1998). In particular, the theory focuses on differences between the two most influential legal origins, i.e. the British legal origin and the French legal origin (Hayek, 1960). British legal origin facilitates the ability of private property owners to transact confidently, with positive repercussions on financial development (North & Weingast, 1989). This is opposed to the French legal origin, where state dominance has produced a legal tradition that focuses more on the rights of the state, and less on the rights of individual investors (Hayek, 1960). Legal origin can explain cross-country differences in private property rights protection (Beck, Demirguc-Kunt, & Levine, 2003). It can account for the common stock market development, where countries that originated from the French legal origin, have significantly lower levels of common stock market development than the British legal origin countries (Beck, Demirguc-Kunt, & Levine, 2003). In countries under the French legal origin, we can predict that a direct real estate investment in such countries will garner a higher real premium than otherwise in a British legal origin country (Ho et al., 2007, 2014, 2016; Lerner & Schoar, 2005).

2.2 The Real Estate Data De-Smoothing

Reliability of direct real estate data has to be verified before the risk premium can be assessed. For valuation-based indices, inaccuracy can be inadvertently introduced (Ho et al., 2007, 2014, 2016). This is caused by the inherent valuation smoothing and temporal aggregations that would mask the true volatility of returns (Matysiak, 1995). Geltner and Webb (1994) find that smoothing is consistent with the optimal interference of the market value of individual properties when the observed price information is noisy. In particular, smoothing in individual appraisal reports results in less informative aggregate price indices. The main root of the problem is ultimately traceable to the nature of direct real estate valuation. As the volume of transactions is limited and the holding periods are usually long, direct real estates' capital values (CVs) are derived from comparison methods. The adverse effect on the accuracy of valuation-based indices, is the smoothening problem of the CVs and temporal aggregation. The relevant de-smoothing technique so adopted is the autoregressive de-lagging model by Geltner and Miller (Ho & Chua, 2007).

It is noteworthy that this paper's data is obtained from the JLL REIS-Asia (Jones Lang Lasalle Real Estate Intelligence-Asia) dataset. The consistent JLL REIS-Asia data set is provided as the chargeable subscription for the JLL REIS-Asia clients. Such a data set is a valuation-based index that contains the TRs of 13 pan-Asia cities located in 8 countries, covering 90 buildings of international grade-A investment quality for each prime office, retail and residential sectors. JLL REIS-Asia only permits the release of historical data from its data set for externally requested research. For this paper and on good will, JLL REIS-Asia only makes available the historical time period from 2002 Q1 to 2009 Q3 (30 quarters), just long enough to enable meaningful analysis of the direct real estate risk premiums.

2.3 The Arbitrage Pricing Theory Model

This paper adopts the arbitrage pricing theory (APT) model. The APT model is introduced and tested by Ross (1976 and 1977). The APT model estimates the sensitivity of the TR of each direct real estate sector to the fluctuation of macroeconomic variables and specific real estate market risk factors. The APT model is explicit that a direct real estate sector's risk premium should be 0 if it bears no risk. Grissom et al. (1987) discover that their study of city and regional macroeconomic markets do capture the risk factors, and that a more robust prediction of TRs can arise from regional APT models. Ling and Naranjo (2002) adopt a 2-stage ordinary least-square regression and found that the specific country factor is significant in explaining the cross-country real estate returns. Bond et al. (2003) establish that the country specific risk factor is significant for most of the countries under study. The inference is that the overall risk factor in cross-country investments is an agglomeration of variables that include the macroeconomic and specific real estate risk factors (variables).

It is imperative to reiterate that this paper is meant as the follow-up study that is in contrast to the study by Ho et al. (2016), who have estimated betas from the same historical dataset permitted by JLLREIS-Asia, to so obtain risk premiums for relevant macroeconomic variables, direct real estate variables and the regions of Table 1. The multi-factor model is adopted and simplified to eq (1).

$$ATR = C(1) + C(2)*LGDPF + C(3)*IRF + C(4)*VRF + C(5)*DUM\_NA + C(6)*DUM\_SA \qquad (1)$$

Results of the international direct real estate risk premium estimates are presented in Table 1 by macro-economic variables and only by region (i.e., North Asia, South Asia and the US). The French and English legal origins are excluded from this paper and from Table 1's variable column.

Table 1. International Direct Real Estate Risk Premium Estimates (2003Q1 to 2009Q2)

Variable	Risk premium (%)
Real GDP growth lagged by 1 quarter	-0.7%*
Annual Inflation Rate	-1%*
Vacancy Rate	2.5%*
North Asia (dum_na=1)	7.4%
South Asia (dum_sa=1)	9.1%
Risk Free Rate (dum_na=dum_sa=0)	**7.2%**

Risk premiums correspond to those risk factors under the variable column of Table 1. The pooled panel data span the period from 2003Q1 to 2009Q2. *denotes statistical significance at the 0.01 level.

Source: Authors, 2012; Eviews Version 6.

Source: Authors, 2016; 2019.

Table 1 shows that the South Asia region has the highest risk premium (9.1%), to be followed by North Asia region (7.4%) and the US (7.2%). The results may be a function of the different country-specific legal origin, financing, the law for property rights and related tax incentives. Porta et al. (1998) alludes to the differences in prevailing international financial systems. Beck et al. (2003) reiterate that the legal origin of countries explains cross-country differences in private real estate rights protection, land acquisition and direct real estate premiums. Unlike the French legal origin, under which the rights of the state dominate individual rights, the British legal origin preserves the sanctity of individual rights (Hayek, 1960), to promote financial development (North & Weingast, 1989). The implication is that countries under the French legal origin have higher risk premiums than those countirs under the English legal origin (Ho et al., 2007, 2014, 2016).

Given wide differences of the direct real estate risk premiums for cities in the same region, the local-specific institutional milieu, rather than the historical legal origin, underpins the direct real estate risk premiums. For e.g., it is doubtful whether or not the risk exposure owing to the "yellow-red shirt" political divide in Thailand and the separatist's struggles in The Philippines, is a function of the historical French legal origin. Therefore, the association of legal origin for the institutional environment with the direct real estate risk premium, though real, can be tangential.

Table 2. International Direct Real Estate Risk Premium Estimates (2003Q1 to 2009Q2)

City	Institutional Environment - English (E) / French (F) Legal Origin	Region - North (N) / South (S) Asia	Real Estate Risk Premium
Shanghai	F	N	10.5%
Tokyo	F	N	8.0%
Beijing	F	N	7.7%
Seoul	F	N	3.8%
Manila	F	S	15.2%
Bangkok	F	S	12.2%
Jakarta	F	S	7.5%
Hong Kong	E	N	10.8%
Singapore	E	S	10.1%
Delhi	E	S	8.2%
Mumbai	E	S	7.6%
Kuala Lumpur	E	S	7.2%
Chennai	E	S	6.7%
US	E	-	2.8%

Source: Authors, 2019.

From Table 2, Seoul (3.8%) is the safest real estate market in Asia, to be followed by Chennai (6.7%), Kuala Lumpur (7.2%) and Jakarta (7.5%). It is noteworthy though that Mumbai (7.6%) is portrayed to be safer than Tokyo (8.0%), Singapore (10.1%), Shanghai (10.5%) and Hong Kong (10.8%) that are perhaps the most heralded markets in Asia. Similarly, Delhi (8.2%) compares favourably to Tokyo (8.0%) and more favourably to Singapore, Shanghai and Hong Kong (Table 13). It is not surprising that Manila (15.2%) and Bangkok (12.2%) emerge as the riskiest markets in Asia given the wars in ‘The Philippines’ and the yellow-red shirt political divide in Thailand.

2.4 The Data

The predominant model in this paper adopts the multi-factor APT regression analysis. Macroeconomic and specific real estate risk premiums are duly estimated. The JLL REIS-Asia data is the dataset, made available on good will, for this paper. Table 3 presents the cities concerned and the availability of the dataset for each sector analysis:

Table 3. Summary of Cities and the Real Estate Sectors Used in Study

City	Variable	Office (O)	Residential (R)	Retail (T)
Bangalore	BG	X		
Beijing	BJ	X	X	X
Bangkok	BK	X	X	X
Hong Kong	HK	X	X	X
Jakarta	JK	X	X	X
Kuala Lumpur	KL	X	X	X
Manila	MN	X	X	X
Mumbai	MB	X		
Seoul	SL	X		
Shanghai	SH	X	X	X
Singapore	SG	X	X	X
Taiwan	TW	X		
Tokyo	TK	X		
Total Number of cities		**13**	**8**	**8**
United States	US	X	X	X

Source: Authors, 2019.

All data are denoted in US$ terms to facilitate comparison across cities. Real estate variables are taken from the JLL REIS-Asia data that include the capital value, based on NFA (net floor area), the net effective rent and the vacancy rate, which on the whole captures the specific risk for the direct real estate market. The quarterly annual TRs are de-smoothed using the Geltner and Miller auto-regressive, de-lagging model on the assumption of a 100% occupancy rate. This is based on eq (2) from Brown and Matysiak (2000) and (Ho et al., 2007, 2014, 2016).

$$R_t = \frac{CV_t - CV_{t-1} + RV_t}{CV_{t-1}} \quad (2)$$

where R_t *denotes the return at time t,* CV_t *denotes the capital value at time t,* CV_{t-1} *denotes the capital value at time t -1 and* RV_t *denotes the rental value at time t.*

Macroeconomic factors, like real GDP growth rate and the inflation rate for the various cities are obtained from the DataStream online database system. The real GDP growth rate is obtained by taking the log difference of the real GDP prices provided by DataStream. The macroeconomic variables will not be de-smoothed as they are not subjected to temporal bias and the seasonality lag. The specific real estate risk factor, namely the vacancy rate, is obtained from the permitted JLL REIS-Asia dataset.

2.5 Data De-smoothing and De-lagging

This paper adopts the autoregressive de-lagging model of Geltner and Miller (2007) to de=smooth the

13 cities' returns that conform to temporal aggregation and the seasonality lag. The un-smoothed return is obtained from eq (3):

$$r_t^* = a_1 r_{t-1}^* + a_4 r_{t-4}^* + (wr_t - w\mu) \tag{3}$$

where r_t^* *= return in quarter t;* r_t *= unsmoothed (liquid, or full information) return, characterised by a lack of autocorrelation;* a_1, a_4 *= factors reflecting autocorrelation (including seasonality, i.e. the fourth-order lag) to be estimated in the auto-regression model;* w, μ *= a weight and a constant chosen to give the unsmoothed returns the desired mean and volatility;* $(wr_t - w\mu)$ *= the "residuals" of the auto-regression (zero mean and autocorrelation) =* e_t .

Eq (4) is re-expressed as:

$$r_t = \mu + (1/w)e_t \tag{4}$$

where e_t *is the auto-regression residual and* μ *is the mean of the unsmoothed return.* With the assumption that the temporal lag will not bias the long run mean return, we would obtain a result of $w = (1 - a_1 - a_4)$

2.6 The Direct Real Estate Risk Framework

In estimating the direct real estate risk premiums for an international real estate deal under writing, this paper utilises a summation of the base lending rate: i.e., a direct real estate premium and a specific risk premium that is inherent to a country's direct real estate sector. Such a specific premium includes the liquidity, transparency, definition, and tenure premiums (Ho, 2007). This paper examines the relationship and risk involved when investing in a country that is either under British (English) Legal Origin or French Legal Origin. The APT model reiterates that there is an equilibrium relationship between returns on risky assets and a small set of macroeconomic factors (variables) that can influence the returns on risky assets significantly. It is assumed that investors take advantage of an arbitrage opportunity by basing their decisions on the beta of an asset with a near identical yield, regardless of their risk aversion and wealth. Compared to the Capital Asset Pricing Model (CAPM), the APT has several key advantages.

First, it is not necessary for returns to be normally distributed. Secondly, several sources of specific risks exist in the economy, rather than just a singular market risk as assumed by CAPM. This paper adopts the multi-factor APT model owing to its several advantages. The risk factor loadings of the direct real estate returns are estimated in the form of a 2-step multi factor times series and cross-sectional multiple regression analysis models. Real GDP growth rate and annual inflation rate represent the macroeconomic variables used while the vacancy rate represents the direct real estate risk factor. An error term is introduced to capture risks that cannot be explained by these 3 variables.

$$R_{i,t} = R_{i,t}^f + \beta_{1,i} X_{1,i,t}^C + \beta_{2,i} X_{2,i,t} + \beta_{3,i} X_{3,i,t} + \varepsilon_{i,t} \tag{5}$$

where subscript i indicates the i^{th} *real estate sector and t indicates time t;* $R_{i,t}$ *= total desmoothed returns of a city in real estate sector i;* $R^f_{i\,t}$ *= risk-free rate;* $X^C_{1,i,t}$ *= the conditional variable, real GDP growth lag 1;* $X_{2,i,t}$ *= quarterly annual inflation rate;* $X_{3,i,t}$ *= vacancy rate;* $\beta_{k,i}$ *= risk of the total returns* *of real estate sector i to k^{th} economic variable (k = 1, 2, 3) and $\varepsilon_{i,t}$ = error term. The null hypothesis of the multi-factor model is H_0: $\beta_k \neq 0$ (where $k = 1, 2, 3$). β_k is the sensitivity of real estate total return to the corresponding risk factor k.*

Once the betas of each direct real estate sector are obtained, they are utilised as the direct real estate risk factor loadings to estimate the cross-sectional risk premiums. Such risk premiums are represented by the coefficients of the betas in eq (6).

$$\overline{R_i} = C + \lambda_1 \beta_{1,i} + \lambda_2 \beta_{2,i} + \lambda_3 \beta_{3,i} + \lambda_4 DUM\_BC_i + \lambda_5 DUM\_FC_i + \varepsilon_i \tag{6}$$

where subscript i indicates the i^{th} real estate sector. $\bar{R}$ = average total returns of each city from 2002Q4 to 2009Q2 of each real estate sector i; C = intercept which represents the risk free rate and dummy variable for US; $\beta_{k,i}$ (where k = 1, 2, 3) = betas that are derived from eq (4); λ_k (where k =1, 2, 3) = cross section risk premium to risk factor k; DUM_BC = dummy variable of real estate investment areas sorted by legal origins. DUM_BC=1: British Common Legal Origin. DUM_FC=1: French Civil Legal Origin; ε_i = error term and it captures the risk premiums that are not explained by $\beta_{k,i}$ (where k = 1, 2, 3). The null hypothesis is H_0: $\lambda_k \neq 0$. If λ_k is significantly different from zero, then there is a risk premium for the return of the real estate market on the risk factor k.

Table 4 shows the variables for the estimation of the cross-sectional risk premium model.

Table 4. Variables for the Estimation of Property (Direct Real Estate) Risk Premium Model

Variable	Description
ATR	Quarterly Annual Total Return
GDP	Quarterly Real GDP Growth Rate
IR	Quarterly Annual Inflation Rate
VR	Quarterly Vacancy Rate
DUM_BC	DUM_BC: British Common Law Legal Origin
DUM_FC	DUM_FC: French Civil Law Legal Origin

Source: Author, 2016.

3. Results and Findings

3.1 De-smoothing the Office Sector Data

The smoothed total returns are obtained from the JLL REIS=Asia Dataset and are estimated from eqs (2) and (3). The total returns are then de-smoothed via the Geltner and Miller auto-regressive model to account for the temporal bias and the seasonality lag. Table 5 shows the de-smoothing results.

Table 5. Smoothed Office Returns

City\Year	2003	2004	2005	2006	2007	2008	Average
Bangalore	15.98%	15.25%	17.04%	12.33%	24.50%	16.72%	16.97%
Beijing	16.26%	12.67%	12.95%	11.06%	11.51%	16.76%	13.53%
Bangkok	14.87%	13.62%	16.96%	11.55%	12.72%	4.7%	12.40%
Hong Kong	-1.87%	14.07%	15.07%	6.59%	11.00%	11.74%	9.43%
Jakarta	9.76%	8.55%	10.45%	13.22%	8.78%	9.21%	10.00%
Kuala Lumpur	7.92%	2.03%	8.41%	9.42%	10.32%	9.27%	7.90%
Manila	6.94%	7.76%	13.02%	19.2%	17.23%	10.75%	18.87%
Mumbai	15.46%	22.17%	14.74%	27.78%	24.64%	8.41%	12.48%
Seoul	11.15%	8.72%	11.56%	14.08%	12.97%	1.4%	10.62%
Shanghai	6.02%	6.81%	9.75%	10.96%	16.77%	19.70%	11.67%
Singapore	4.23%	6.20%	7.17%	16.21%	27.50%	2.39%	9.98%
Taiwan	2.93%	5.65%	6.73%	7.51%	8.81%	10.51%	8.77%
Tokyo	0.85%	8.02%	12.54%	17.21%	12.87%	1.13%	7.02%

Source: Authors, 2019.

From the data, the CBD office sectors of Manila, Bangalore and Beijing recorded the top 3 highest average returns over the years at 18.87%; 16.97%; and 13.53% respectively. This is in spite of the more matured cities like Singapore, Hong Kong and Shanghai, whose returns average around 10% each. We infer that investing in the developing cities office sectors will yield greater returns especially when the city itself is experiencing growth from an influx of financial or manufacturing activities. With more companies and with both multi-national corporations (MNCs) and local players setting up offices, the sector itself will experience boom times. The dataset, though, is a smoothed one and may not reflect the most accurate of scenarios. It is essential to de-smooth the data such that our analysis is not affected by temporal bias and the seasonality lag. Using this treated dataset, we then subject it to the Geltner auto-regressive, de-lagging model to de-smooth it. The regression estimation output for de-smoothing the office total returns is shown in Table 6.

Table 6. Regression Estimation Output for Office Data

City	Coefficient	01	04	Residual	R-Squared	Durbin-Watson Stat
Bangalore	0.224145	-0.001146	-0.354109	-0.223745	0.136790	1.926008
Beijing	0.060094	-0.653197	1.492354	6.791262	0.259884	2.077949
Bangkok	0.105862	0.429660	-0.077576	-0.360950	0.165236	1.671020
Hong Kong	0.044525	0.402784	0.218634	-0.119989	0.196569	1.777604
Jakarta	0.069970	0.056254	0.249728	0.553630	0.593844	1.614983

Kuala Lumpur	0.086333	0.199936	-0.349176	0.499571	0.375721	1.528246
Manila	0.056463	0.149356	0.492460	0.221092	0.459202	1.976037
Mumbai	0.056842	0.694707	0.088533	-0.573176	0.347204	2.210962
Seoul	0.035474	0.248903	0.357399	-0.602869	0.217593	1.924995
Shanghai	0.028928	0.846420	-0.045551	-0.240315	0.309121	2.02411
Singapore	0.009960	0.910669	0.222303	-0.284151	0.601051	2.363531
Taiwan	0.041020	-0.069234	0.447331	0.319715	0.304056	2.000632
Tokyo	0.044430	0.739406	-0.175732	-0.199387	0.320936	1.947390

Source: Authors, 2019.

The de-smoothed total returns of say the Shanghai office sector can be expressed as:

$$SHO = 0.028928 + 0.846420\ (SHO01) – 0.045551\ (SHO04) – 0.240315\ (RESID01\ SHO) \quad (6)$$

Eq (6) can be represented by:

$$SHO = 0.028928 + 0.846420 r_{t-1} – 0.045551\ r_{t-4} – 0.240315\ e_t \quad (7)$$

where r_t = Shanghai Office returns in quarter t; r_{t-1} = Shanghai Office returns lagged by 1 quarter; r_{t-4} = Shanghai Office returns lagged by 4 quarter and e_t = the "residuals" of the auto-regression (zero mean and autocorrelation). Estimation output of the equation displays an adjusted R^2 of 30.9%, with the Durbin-Watson statistic of 2.024 and significant t-ratios for most of the variables.

We can see that the Durbin-Watson stats for the TR values are largely in the range of 1.5 to 2.3. The implication is that there is almost zero auto-correlation that may affect our results, indicating the possibility of more accurate data. The R-Squared figures suggest that de-smoothed returns deviate substantially from the mean, revealing the impact of smoothing effects. The descriptive statistics for the de-smoothed office data TRs are presented in Table 7.

Table 7. Descriptive Statistics for De-smoothed Office Data

City	Period	Observations	Total Returns (Mean)	Total Returns (SD)	Skewness	Kurtosis
Bangalore	03Q3 – 07Q3	17	16.73%	0.0395	0.136790	-0.42982
Beijing	02Q2 – 07Q3	22	12.60%	0.0209	0.259884	4.482536
Bangkok	02Q2 – 07Q3	22	19.52%	0.1179	0.165236	0.677717
Hong Kong	02Q2 – 07Q3	22	10.43%	0.288	0.196569	-0.88345
Jakarta	02Q2 – 07Q3	22	9.82%	0.0764	0.593844	4.173996
Kuala Lumpur	02Q2 – 07Q3	22	7.62%	0.0341	0.375721	1.181536
Manila	02Q2 – 07Q3	22	19.00%	0.3741	0.459202	1.125567
Mumbai	03Q3 – 07Q3	17	21.64%	0.1888	0.347204	0.596045
Seoul	02Q2 – 07Q3	22	8.20%	0.1640	0.217593	2.253709

Shanghai	02Q2 – 07Q3	22	15.88%	0.3341	0.309121	-0.13192
Singapore	02Q2 – 07Q3	22	-3.44%	0.5213	0.601051	7.294487
Taiwan	03Q3 – 07Q3	17	5.98%	0.0372	0.304056	0.676417
Tokyo	02Q2 – 07Q3	22	10.22%	0.1792	0.320936	-0.26161
United States	02Q2 - 09Q3	30	2.11%	0.0478	-	-

Source: Authors, 2019.

We notice that the mean returns that are derived from de-smoothed data are different from the mean returns obtained from smoothed data. Clearly, the smoothing effects are apparent in the real estate valuation process. Although the top 3 most attractive places to invest have changed, the theoretical understanding of investing in the growing and developing Asian countries has not. Based on the de-smoothed data, Mumbai, Bangkok, and Manila rank as the most attractive places to invest to reap average returns of around 20%. These 3 key cities are the main financial zones in their respective Asian countries. As the countries evolve economically, the office take-up rates should improve and both capital value and rental gains will increase significantly. The relatively consistent reading of the skewness statistics suggests that we can approximate a normal distribution in our analysis and use of the models.

3.2 De-smoothing the Residential Sector Data

The estimated smoothed TRs for the residential sector are provided in Table 8.

Table 8. Smoothed Residential Returns

City\Year	2003	2004	2005	2006	2007	2008	Average
Beijing	11.02%	13.04%	15.86%	16.98%	17.39%	16.96%	15.21%
Bangkok	13.31%	8.45%	9.27%	10.05%	9.01%	3.35%	8.90%
Hong Kong	2.50%	16.62%	6.27%	2.29%	7.82%	7.66%	7.19%
Jakarta	11.84%	10.06%	11.67%	12.02%	11.23%	11.05%	11.31%
Kuala Lumpur	8.14%	8.74%	10.48%	10.27%	11.82%	8.06%	9.58%
Manila	4.43%	12.41%	11.11%	19.50%	14.42%	9.49%	11.89%
Shanghai	-	-	10.16%	5.87%	9.96%	9.03%	7.39%
Singapore	4.04%	4.83%	4.59%	10.73%	16.49%	3.65%	10.49%

Source: Authors, 2019.

Once again, growing cities from developing Asian countries have the highest average TRs. Beijing, Manila and Jakarta rank as the top choices with average returns of 15.21%, 11.89% and 11.31%. Singapore recorded a comparatively high average return of 10.49%. This can be alluded to the fact that Singapore has always been seen as a safe and stable ‘haven’ for Asian direct real estate investing. Investment activities in the private residential market ensures that Singapore enjoys substantial TRs.

We next deploy the Geltner and Miller's auto-regressive, de-lagging model to achieve more accurate data. The resulting regression estimation output for de-smoothing the residential total returns is presented in Table 9.

Table 9. Regression Estimation Output for the De-smoothed Residential Data

City	Coefficient	01	04	Residual	R-Squared	Durbin-Watson Stat
Beijing	0.094297	0.658108	-0.304799	-0.348464	0.226509	1.737408
Bangkok	0.034318	0.676914	-0.076914	-0.367861	0.183593	2.082518
Hong Kong	0.075665	0.138893	-0.211129	0.110726	0.096799	2.01378
Jakarta	0.105899	-0.008469	0.065380	-0.049342	0.013113	1.955245
Kuala Lumpur	0.063170	0.202663	0.102186	0.004730	0.057251	2.016512
Manila	0.055844	0.627845	-0.059375	-0.432215	0.117540	2.071291
Shanghai	0.076573	0.267589	-0.281072	0.173500	0.355580	1.661793
Singapore	0.056842	0.694707	0.088533	-0.573176	0.347204	2.210962

Source: Authors, 2019.

The Durbin-Watson test statistic resides between the ranges of 1.6 to 2.2, implying that there is almost negligible auto-correlation and providing us with more accurate data. The R-Squared values highlight the smoothing effects and how the data will actually be when they are corrected for the smoothing effects. Wide deviation suggests the presence of de-smoothing and that the reliance on smoothed data will introduce inaccuracy in the analysis. The descriptive statistics for the de-smoothed residential total returns are provided in Table 10.

Table 10. Descriptive Statistics for De-smoothed Residential Data

City	Period	Observations	Total Returns (Mean)	Total Returns (SD)	Skewness	Kurtosis
Beijing	03Q3 – 09Q3	25	14.81%	0.09805	0.606368	0.516588
Bangkok	03Q3 – 09Q3	25	9.71%	0.134663	0.047298	-0.40361
Hong Kong	03Q3 – 09Q3	25	8.83%	0.081521	1.049103	5.472419
Jakarta	03Q3 – 09Q3	25	11.53%	0.032502	-0.57775	1.126059
Kuala Lumpur	03Q3 – 09Q3	25	9.18%	0.043809	-0.53687	0.728011
Manila	03Q3 – 09Q3	25	15.08%	0.198164	0.570976	1.023471
Shanghai	05Q3 – 09Q3	17	35.95%	0.035593	-0.76991	2.503086
Singapore	03Q3 – 09Q3	25	7.82%	0.066256	-1.07943	0.988794
United States	02Q2 - 09Q3	30	2.33%	0.2940	-	-

Source: Authors, 2019.

From Table 10, the de-smoothed TRs vary from the smoothed TRs. This further explains the presence of smoothing effects among the appraisal-based indicators. Beijing, Manila and Jakarta still rank as the foremost places to invest in residential real estate. However, it is noted that Shanghai has the highest TRs of 35.95%. This may well be due to the fact that Shanghai has always been the economic and financial hub of China and with the latter's rise in recent years, Shanghai has managed to ride on its 'coat tail' and to achieve such very high TRs.

3.3 De-smoothing the Retail Sector Data

The estimated smoothed total returns for the retail sector are presented in Table 11.

Table 11. Smoothed Retail Sector Returns

City\Year	2003	2004	2005	2006	2007	2008	Average
Beijing	13.39%	13.79%	16.19%	23.22%	16.49%	18.31%	16.62%
Bangkok	16.00%	12.33%	14.04%	17.72%	18.63%	10.27%	15.74%
Hong Kong	6.50%	20.39%	10.46%	7.21%	8.76%	8.62%	10.66%
Jakarta	17.38%	14.55%	12.45%	19.13%	15.29%	15.51%	15.76%
Kuala Lumpur	10.12%	10.51%	11.70%	11.78%	14.76%	14.44%	11.77%
Manila	9.22%	10.10%	12.17%	16.61%	16.49%	11.98%	12.92%
Shanghai	17.66%	18.13%	14.92%	22.42%	14.15%	17.07%	17.46%
Singapore	8.06%	9.29%	9.11%	13.11%	11.29%	7.96%	10.17%

Source: Authors, 2019.

Retail sector TRs wise and from Table 11, all cities record the average of double-digit returns. Shanghai and Beijing rank as the top most attractive places to invest. Their attractive TRs can be attributed to China's sustainable trade and robust economic growth. Next, we conduct Geltner and Miller auto-regressive, de-lagging model to de-smooth the data. The regression estimation output for de-smoothing the retail TRs is provided in Table 12.

Table 12. Regression Estimation Output for the De-smoothed Retail Data

City	Coefficient	01	04	Residual	R-Squared	Durbin-Watson Stat
Beijing	0.092043	0.713964	-0.231595	-0.638554	0.193992	2.002633
Bangkok	0.116854	0.431464	-0.235797	0.093693	0.236099	1.999392
Hong Kong	0.070406	0.098842	0.121161	0.509671	0.302095	1.907666
Jakarta	0.179895	-0.183612	0.000614	0.181723	0.007375	1.762189
Kuala Lumpur	0.097139	0.274548	-0.078470	-0.008764	0.076921	1.939766
Manila	0.067860	0.776536	-0.293442	-0.422535	0.231756	2.132179
Shanghai	0.174225	0.126695	-0.162922	0.354354	0.255131	2.070980
Singapore	0.049003	0.632463	-0.165728	-0.056952	0.364870	1.898654

Source: Authors, 2019.

From Table 12, it is observed that the Durbin-Watson statistic falls within 1.7 to 2.13, implying almost negligible auto-correlation among the data. The R-Squared generally falls within the range of 0.1 to 0.36, implying a wide deviation from the mean once the data is de-smoothed. The descriptive statistics for the de-smoothed retail TRs are presented in Table 13.

Table 13. Descriptive Statistics for De-smoothed Retail Data

City	Period	Observations	Total Returns (Mean)	Total Returns (SD)	Skewness	Kurtosis
Beijing	03Q3 – 09Q3	25	18.05%	0.10163916	1.5844416	6.09907081
Bangkok	03Q3 – 09Q3	25	14.61%	0.06250901	-0.0349725	-0.2169661
Hong Kong	03Q3 – 09Q3	25	10.47%	0.0861724	0.91718977	4.4639117
Jakarta	03Q3 – 09Q3	25	15.14%	0.04712326	0.17598555	0.50703857
Kuala Lumpur	03Q3 – 09Q3	25	12.27%	0.05335112	-1.1765619	2.66778139
Manila	03Q3 – 09Q3	25	13.77%	0.10512844	-0.3837107	0.4545417
Shanghai	03Q3 – 09Q3	25	17.16%	0.04502259	0.85724549	0.59385194
Singapore	03Q3 – 09Q3	25	8.77%	0.07136863	-0.3421468	-0.0533645
United States	02Q2 - 09Q3	30	3.37%	0.170	-	-

Source: Authors, 2019.

From Table 13 of the de-smoothed dataset, Shanghai and Beijing still rank as the top two most attractive places to invest in the retail sector. Singapore's retail sector surprisingly came in last in terms of the total average TRs over 6 years. This trend suggests that Singapore's retail sector is approaching saturation and that its TRs are gradually stabilising and evening out.

3.4 Empirical Estimation of the Risk Factor Loadings

Under the multi-factor APT model, the systematic risk premiums for the individual direct real estate cities in Asia are estimated. The 2 macroeconomic factors (Real GDP growth rate and annual inflation rate) and 1 direct specific real estate risk variable (vacancy rate) form the 3 risk-factor loads in the model. These risk factor loadings are modelled through the pool-panel ordinary least-square regression analysis. The beta value of each factor is obtained, as presented in Table 14.

Table 14. Definition of Variables

Variable	Description
ATR	Quarterly Annual Total Return (TR)
GDP	Quarterly Real GDP Growth Rate
IR	Quarterly Inflation Rate
VR	Quarterly Vacancy Rate
US Risk Free Rate	**7.2%**

Source: Authors, 2019.

As mentioned earlier, eq (8) is adopted for the analysis of sensitivity of the TR:

$$R_{i,t} = \beta_{1,i}X^{C}_{1,i,t} + \beta_{2,i}X_{2,i,t} + \beta_{3,i}X_{3,i,t} + \varepsilon_{i,t} \quad (8)$$

where subscript i indicates the i^{th} *real estate sector and t indicates time t.* $R_{i,t}$ *= total de-smoothed returns of a city in real estate sector i;* $X^{C}_{1,i,t}$ *= the conditional variable, real GDP growth lag 1;* $X_{2,i,t}$ *= quarterly annual inflation rate;* $X_{3,i,t}$ *= vacancy rate;* $\beta_{k,i}$ *= sensitivity of the total returns of real estate sector i to* k^{th} *economic variable (k = 1, 2, 3) and* $\varepsilon_{i,t}$ *= error term. It captures risks that cannot be explained by the three variables. The null hypothesis of the multi-factor model, from equation (6), is* H_0*:* $\beta_k \neq 0$ (where $k = 1, 2, 3$). β_k *is the sensitivity of real estate total return to the corresponding risk factor k.*

Eq (8) reflects the change in direct real estate return with respect to the change in GDP growth, inflation rate or the vacancy rate. This pooled-panel ordinary least-square regression model of eq (8) is conducted for the office, residential and retail sectors.

3.5 The Empirical Estimation of the Cross-Sectional APT model

The associated betas so derived are deployed as the risk factor loadings for the resulting, multi- factor APT model. These betas measure the sensitivity of the respective variables to the direct real estate TRs. After deploying the risk factor loadings, we can derive the risk premiums from the regressive coefficients of the risk factor loadings in our multi factor APT model. The mean TRs for various cities and their corresponding direct real estate sectors denote the dependent variable of the APT model. This paper groups by inspection the cities or countries according to their legal origins as presented in Table 15.

Table 15. Grouping of Cities According to Legal Origins

British Legal Origin	French Legal Origin
Bangalore	Bangkok
Hong Kong	Beijing
Kuala Lumpur	Jakarta
Mumbai	Manila
Singapore	Shanghai
United States	Taiwan
	Tokyo

Source: Authors, 2019.

From Table 15, the British legal origin refers to the law developed by judges through decisions of the courts. This is in contrast to the French legal origin that adopt statutes via the legislative process. Cities and/or countries in the Asian region like Singapore, Malaysia, India and Hong Kong adopt the British legal origin as their governing legislation. The other cities, though, adopt the French legal origin, for e.g., the Civil Law legislations in Ottawa, Canada. There are 4 distinct groups for Civil Law, namely, Napoleonic (Jakarta, Manila); Germanistic (Tokyo, Seoul, Bangkok, Taiwan); Scandinavian; and Chinese (Beijing, Shanghai). For this paper's APT model, cities under British legal origin are included collectively as the dummy variable termed "DUM_BC", while cities under French legal origin are included collectively asthea dummy variable termed "DUM_FC":

$$\overline{R_i} = C + \lambda_1 \beta_{1,i} + \lambda_2 \beta_{2,i} + \lambda_3 \beta_{3,i} + \lambda_4 DUM\_BC_i + \lambda_5 DUM\_FC_i + \varepsilon_i \quad (9)$$

where subscript i indicates the ith *real estate sector.* $\bar{R}$ *= average total returns of each city from 2003Q1 to 2009Q2 of each real estate sector i; C = intercept which represents the autonomous return;* $\beta_{k,i}$ *(where k = 1, 2, 3) = betas that are derived from cross- section risk premium to risk factor k. DUM_BC = dummy variable of British legal origin. DUMS1=1: British legal origin. DUM_FC = dummy variable of French legal origins. DUMS2=1: French legal origin; and* ε_i *= error term that captures the risk premiums that are not explained by* $\beta_{k,i}$ *(where k = 1, 2, 3).*

The null hypothesis is H_0*:* $\lambda_k \neq 0$*. If* λ_k *is significantly different from zero, then there is a risk premium for the return of the real estate market on the risk factor k. Cities that have British Common Law legal origins are Bangalore, Hong Kong, Kuala Lumpur, Mumbai and Singapore; Cities that have French Civil Law legal origins are Bangkok, Beijing, Jakarta, Manila, Seoul, Shanghai, Taiwan and Tokyo.*

The APT model estimations can be expressed in eq (10):

ATR = C(1) + C(2)*LGDPF + C(3)*IRF + C(4)*VRF + C(5)*DUM_BC + C(6)*DUM_FC (10)

The APT model estimates are presented in Table 14A. To avoid the dummy variable trap problem, the constant term, C, and the French-Civil-Law dummy (dum fc=1), are retained while allowing the British-Common-Law dummy to be removed. The associated base dummy, i.e., dum fc=0, becomes the base category against which the British-Common-Law dummy is assessed.

Table 16. The APT Model Estimates

Variable	**Output**
Constant, C	8.2035%*
Real GDP growth	0.6394% ***
Inflation rate	-0.0254%
Vacancy rate	2.7067% *
French Legal Origin (dum_fc=1)	4.1436%**
British Legal Origin (i.e., 8.2035%+0.6394%-0.0254%+2.7067%+0 =11.5242%)	11.5242%**
Risk Free Rate	**7.2%**
R-squared	0.375489
Adjusted R-squared	0.261942
Mean dependent var ATR	13.4156%

NB. Significant at the 1% level*; at the 10% level**; at the 29% level***.

Source: Authors, 2019.

The constant term C, real GDP growth rate, vacancy rate, the French-legal-origin dummy and the British-legal-origin dummy in relation to the French-legal-origin base dummy, are statistically significant in estimating the overall risk premiums of international direct real estate investment in the Asian region. High risk premiums among the 6 risk factors are only observed for vacancy rate (2.7%), the French-legal-origin dummy (4.1%), the British-legal-origin dummy (11.5%) and the constant C (8.2%) of our multi factor APT model , relative to the US risk free rate of 7.2%. However, real GDP growth rate is moderately significant with the relatively low risk premium of about 0.6%. It is implicit that the specific real estate risk has a more deterministic role in the overall risk profile of the direct real estate investment in Asia, as compared to macroeconomic variables. It is because the vacancy rate has a much direct impact on the performance of direct real estate investment than the macroeconomic variables.

Real GDP growth rate has a lower risk premium, owing to the fact that the Asia region on the whole has experienced robust and sustainable growth over the past decade. Historical economic performance of the Asia region for the past years means that this region is perceived to be comparatively less risky, and that the risk premiums accorded to the Asia region should be lower than in the past. Interest rate movements suggest a stabilised historical pattern. Generally, they hover around 0% to 5% up to the years 2007 to 2008, where most of the Asian countries' interest rates spike to above 5%. The relatively stable rates for most of the years suggest that lower premium is accorded to this macroeconomic variable.

Coefficients of the British and the French legal origins' dummies are significant at the 10% level for their high risk premiums of about 11.5% and 4.1% respectively. Both legal origins imply an association between legal origin and the direct real estate TRs. This trend is in line with the study by Beck, Kunt and Levine in their "Law, endowments, and Finance" paper. Their paper postulates that historically determined differences in legal origins can predict the difference in the economic development of countries as observed today (Beck, Demirguc-Kunt, & Levine, 2003).

Nevertheless, this paper suggests that the French legal origin is better perceived for its private direct real estate rights protection, as compared to the British legal origin by international investors in Asian direct real estate. It can be owing to the fact that in the French legal origin, its laws are codified and straightforward, leading to less ambiguous rulings. Instead, the British legal origin is based on case law and it is susceptible to various interpretations. Given the wide differences in risk premiums for cities in the same region, as presented in Table 17, that have similar country nature historical antecedent, it appears that the local-specific country milieu, rather than historical legal antecedent, underpins direct real estate risk premiums. For e.g., it is doubtful whether or not the risk exposure, owing to the "yellow-red shirt" political divide in Thailand and the separatist's struggles in "The Philippines", is a function of historical French legal origin antecedent. Therefore, the association of legal origin of the country nature with the direct real estate risk premium, though real, may be tangential.

Nevertheless, one may safely conclude, on the basis of the evidence in Table 17, that Seoul (3.8%) is the safest real estate market in Asia, to be followed by Chennai (6.7%), Kuala Lumpur (7.2%) and Jakarta (7.5%). It is noteworthy though that Mumbai (7.6%) is portrayed to be safer than Tokyo (8.0%), Singapore (10.1%), Shanghai (10.5%) and Hong Kong (10.8%) that are perhaps the most heralded markets in Asia. Similarly, Delhi (8.2%) compares favourably to Tokyo (8.0%) and more favourably to Singapore, Shanghai and Hong Kong (Table 13). Furthermore, it may not surprise any reader that Manila (15.2%) and Bangkok (12.2%) would emerge as the riskiest markets in Asia given the wars in "The Philippines" and the "yellow-red shirt" political divide in Thailand.

Table 17. International Direct Real Estate Risk Premium Estimates (2003Q1 to 2009Q2)

City	Country nature - English (E) / French (F) Legal Origin	Region - North (N) / South (S) Asia	Real Estate Risk Premium
Shanghai	F	N	10.5%
Tokyo	F	N	8.0%
Beijing	F	N	7.7%
Seoul	F	N	3.8%
Manila	F	S	15.2%
Bangkok	F	S	12.2%
Jakarta	F	S	7.5%
Hong Kong	E	N	10.8%
Singapore	E	S	10.1%
Delhi	E	S	8.2%
Mumbai	E	S	7.6%
Kuala Lumpur	E	S	7.2%
Chennai	E	S	6.7%
US	E	-	2.8%

Source: Authors, 2019.

Although the "Law, endowments and Finance" paper has suggested that the British legal origin is perceived to offer better protection, it must be noted that the dependent variable (i.e., the real estate TRs) in such a paper is determined by taking the TRs from the public market. TRs from the public markets may well be biased towards countries under British legal origin since the latter normally have more developed common stock market and financial systems. Instead, this paper utilises the direct real estate TRs from the private market and not from the wider public market. Results suggest that legal origin is a variable that affects the assessment of the riskiness of direct real estate investing in an Asian country and in its risk-return analysis. The French legal origin, with its codified law, is perceived to be more favourable for international real estate investing in the Asia region.

4. Conclusion

This paper ascertains the presence of appraisal smoothing. By adopting the Geltner and Miller (2007) 1st and 4th order autoregressive model to de-smooth the direct real estate TRs (total returns), a more robust set of direct real estate total returns can be obtained. The paper adopts the multi-factor APT (arbitrage pricing theory) model to examine the correlation of legal origins to an Asian city's direct real estate TRs. Various sensitivities of the direct real estate TRs, i.e., the betas or the risk factor loadings, are estimated with pooled-panel data via multiple regression analysis, resolved by ordinary least-square, and from which the associated risk factor loadings are determined. The 2 main legal origins, i.e., the British legal origin and the French legal origin, are the dummy variables, i.e., "the dummies" in the multi-factor APT model. The coefficients are then estimated and analysed to examine the extent of the correlation.

Given the wide differences in the risk premiums for cities in the same region, as presented in Table 18, that have similar historical country-legal-origin antecedent, it appears that the local-specific country milieu underpins the direct real estate risk premiums. For e.g., it is doubtful whether or not the risk exposure, owing to the "yellow-red shirt" political divide in Thailand and the separatist's struggles in The Philippines, is a function of the historical French legal origin antecedent. Therefore, the association of the legal origin of the country nature with the direct real estate risk premium, though real, may be tangential.

Although the "Law, endowments and Finance" paper suggests that the British legal origin is perceived to offer better direct real estate protection, it should be noted that the dependent variable (i.e.. the direct real estate TRs) in such a paper is determined by taking the TRs from the public market. TRs from the public markets may well be biased towards countries under the British legal origin since the latter normally have more developed common stock market and financial systems.

However and in this paper, we utilise the direct real estate TRs from the private market rather than the wider public market. Results imply that legal origin is a variable that affects the assessment of the riskiness of direct real estate investing in an Asian country and in its risk-return analysis. The French legal origin, with its codified law, is perceived to be more favourable for international real estate investing in the Asia region.

Results of the APT model estimates are reproduced from Table 18 below. To avoid the dummy variable trap problem, the constant term, C, and the French-legal-origin dummy (dum fc=1), are retained while allowing the British-legal-origin dummy to be removed. The associated base dummy, i.e., dum fc=0 becomes the base category, against which the British legal origin dummy is assessed.

Table 18. APT Model Estimates

Variable	Output
Constant, C	8.2035%*
Real GDP growth	0.6394% ***
Inflation rate	-0.0254%
Vacancy rate	2.7067% *
French Legal Origin (dum_fc=1)	4.1436%**
British Legal Origin (i.e., 8.2035%+0.6394%-0.0254%+2.7067%+0 =11.5242%)	11.5242%**
Risk Free Rate	**7.2%**
R-squared	0.375489
Adjusted R-squared	0.261942
Mean dependent var ATR	13.4156%

NB. Significant at the 1% level*; at the 10% level**; at the 29% level***.

Source: Authors, 2019.

Constant term C, real GDP growth rate, vacancy rate, the French-legal-origin dummy and the British-legal-origin dummy in relation to the French-Civil- Law base dummy, are statistically significant in estimating the overall risk premiums of international investing in direct real estate in the Asian region. High risk premiums among the 6 risk factors are only observed for vacancy rate (2.7%), the French-legal-origin dummy (4.1%), the British-legal-origin dummy (11.5%) and the constant C (8.2%) of our multi factor APT model, relative to the US risk free rate of 7.2%.

Real GDP growth rate is moderately significant with the relatively low risk premium of about 0.6%. It is implicit that the specific real estate risk has a more deterministic role in the overall risk profile of a direct real estate investing in Asia, as compared to macroeconomic variables. It is because the vacancy rate has a much direct impact on the performance of direct real estate investment than the macroeconomic variables. Real GDP growth rate has a lower risk premium, owing to the fact that the Asia region on the whole has experienced robust and sustainable growth over the past decade. Historical economic performance of the Asia region highlights that this region is perceived to be comparatively less risky, and that the risk premiums accorded to the region should be lower than in the past. Interest rate movements suggest a stabilised historical pattern, generally hovering around 0% to 5% up to the years 2007-2008, where most of the Asian countries' interest rates spike to above 5%. The relatively stable rates for most of these years suggest that lower premium is accorded to this macroeconomic variable.

Nevertheless, this paper suggests that the French-legal-origin is better perceived for its private direct real estate rights protection by international real estate investors in Asian direct real estate. It can be owing to the fact that in the French-legal-origin, its laws are codified and straightforward, leading to less ambiguous rulings. Instead, the British-legal-origin is based on case laws and it is susceptible to various interpretations.

There are other legal origin systems that fall outside the broad categories of the British and French legal origins, and they can include Muslim Law and Customary Law. To form a more robust and complete set of the direct real estate risk premium empirical model, more studies can be conducted to examine other risk premium variables, such as the cultural factor of a society, and to form a more comprehensive assessment of the relationship between direct real estate investing in an Asian city or country and its legal origin. Research that encompasses a longer study duration should provide for a detialed model, which may include other macroeconomic variables like the unemployment rate and the extent of real estate market transparency.

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Appendix

Appendix 1. Office Regression Estimation Outputs

Dependent Variable: BGO
Method: Least Squares
Date: 02/22/13 Time: 01:58
Sample (adjusted): 2003Q3 2007Q3
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.224145	0.104357	2.147867	0.0512
BGO01	-0.001146	0.485215	-0.002361	0.9982
BGO04	-0.354109	0.338986	-1.044611	0.3152
RESID01_BGO	-0.223745	0.444999	-0.502800	0.6235

R-squared	0.136790	Mean dependent var	0.167305
Adjusted R-squared	-0.062412	S.D. dependent var	0.067324
S.E. of regression	0.069394	Akaike info criterion	-2.295721
Sum squared resid	0.062601	Schwarz criterion	-2.099671
Log likelihood	23.51363	Hannan-Quinn criter.	-2.276233
F-statistic	0.686689	Durbin-Watson stat	1.926008
Prob(F-statistic)	0.576016		

Dependent Variable: BJO
Method: Least Squares
Date: 02/22/13 Time: 02:13
Sample (adjusted): 2003Q2 2007Q3
Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.060094	0.860087	0.069870	0.9477
BJO01	-0.653197	0.871772	-0.749275	0.4954
BJO04	1.492354	6.322710	0.236031	0.8250
RESID01_BJO	6.791262	16.53618	0.410691	0.7023

R-squared	0.259884	Mean dependent var	0.137288
Adjusted R-squared	-0.295203	S.D. dependent var	0.078062
S.E. of regression	0.088840	Akaike info criterion	-1.697114
Sum squared resid	0.031570	Schwarz criterion	-1.657393
Log likelihood	10.78845	Hannan-Quinn criter.	-1.965014
F-statistic	0.468185	Durbin-Watson stat	2.077949
Prob(F-statistic)	0.720432		

Dependent Variable: BKO
Method: Least Squares
Date: 02/22/13 Time: 02:03
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.105862	0.064371	1.644553	0.1223
BKO01	0.429660	0.355827	1.207496	0.2472
BKO04	-0.077576	0.250192	-0.310067	0.7611
RESID01 BKO	-0.360950	0.232245	-1.554175	0.1425

R-squared	0.165236	Mean dependent var	0.143892
Adjusted R-squared	-0.013642	S.D. dependent var	0.055630
S.E. of regression	0.056009	Akaike info criterion	-2.733493
Sum squared resid	0.043917	Schwarz criterion	-2.535633
Log likelihood	28.60144	Hannan-Quinn criter.	-2.706211
F-statistic	0.923733	Durbin-Watson stat	1.671020
Prob(F-statistic)	0.454895		

Dependent Variable: HKO
Method: Least Squares
Date: 02/22/13 Time: 02:05
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.044545	0.033519	1.328943	0.2051
HKO01	0.402784	0.267001	1.508551	0.1536
HKO04	0.218634	0.219328	0.996837	0.3358
RESID01 HKO	-0.119989	0.231311	-0.518733	0.6120

R-squared	0.196569	Mean dependent var	0.091496
Adjusted R-squared	0.024405	S.D. dependent var	0.093863
S.E. of regression	0.092710	Akaike info criterion	-1.725548
Sum squared resid	0.120332	Schwarz criterion	-1.527687
Log likelihood	19.52993	Hannan-Quinn criter.	-1.698265
F-statistic	1.141754	Durbin-Watson stat	1.777604
Prob(F-statistic)	0.366384		

Dependent Variable: JKO
Method: Least Squares
Date: 02/22/13 Time: 02:06
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.069970	0.028163	2.484447	0.0262
JKO01	0.056254	0.223767	0.251396	0.8052
JKO04	0.249728	0.154805	1.613177	0.1290
RESID01 JKO	0.553630	0.164768	3.360066	0.0047

R-squared	0.593844	Mean dependent var	0.102936
Adjusted R-squared	0.506810	S.D. dependent var	0.025959
S.E. of regression	0.018230	Akaike info criterion	-4.978324
Sum squared resid	0.004653	Schwarz criterion	-4.780464
Log likelihood	48.80492	Hannan-Quinn criter.	-4.951042
F-statistic	6.823164	Durbin-Watson stat	1.614983
Prob(F-statistic)	0.004597		

Dependent Variable: KLO
Method: Least Squares
Date: 02/22/13 Time: 02:07
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.086333	0.026231	3.291307	0.0054
KLO01	0.199936	0.254618	0.785240	0.4454
KLO04	-0.349176	0.224891	-1.552647	0.1428
RESID01 KLO	0.499571	0.270450	1.847183	0.0860

R-squared	0.375721	Mean dependent var	0.075563
Adjusted R-squared	0.241947	S.D. dependent var	0.042435
S.E. of regression	0.036946	Akaike info criterion	-3.565571
Sum squared resid	0.019110	Schwarz criterion	-3.367711
Log likelihood	36.09014	Hannan-Quinn criter.	-3.538289
F-statistic	2.808629	Durbin-Watson stat	1.528246
Prob(F-statistic)	0.078005		

Dependent Variable: MBO
Method: Least Squares
Date: 02/22/13 Time: 02:16
Sample (adjusted): 2003Q3 2007Q3
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.056842	0.085371	0.665820	0.5172
MBO01	0.694707	0.269700	2.575851	0.0230
MBO04	0.088533	0.295211	0.299899	0.7690
RESID01 MBO	-0.573176	0.363367	-1.577402	0.1387

R-squared	0.347204	Mean dependent var	0.216382
Adjusted R-squared	0.196558	S.D. dependent var	0.108883
S.E. of regression	0.097597	Akaike info criterion	-1.613613
Sum squared resid	0.123828	Schwarz criterion	-1.417562
Log likelihood	17.71571	Hannan-Quinn criter.	-1.594125
F-statistic	2.304775	Durbin-Watson stat	2.210962
Prob(F-statistic)	0.124779		

Dependent Variable: MNO
Method: Least Squares
Date: 02/22/13 Time: 02:08
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.056463	0.033722	1.674342	0.1162
MNO01	0.149356	0.423064	0.353034	0.7293
MNO04	0.492460	0.299771	1.642789	0.1227
RESID01 MNO	0.221092	0.323289	0.683883	0.5052

R-squared	0.459202	Mean dependent var	0.131109
Adjusted R-squared	0.343317	S.D. dependent var	0.063620
S.E. of regression	0.051555	Akaike info criterion	-2.899212
Sum squared resid	0.037211	Schwarz criterion	-2.701351
Log likelihood	30.09290	Hannan-Quinn criter.	-2.871929
F-statistic	3.962557	Durbin-Watson stat	1.976037
Prob(F-statistic)	0.030806		

Dependent Variable: SGO
Method: Least Squares
Date: 02/22/13 Time: 02:09
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009960	0.049989	0.199248	0.8449
SGO01	0.910669	0.622962	1.461837	0.1659
SGO04	0.222303	0.551109	0.403373	0.6928
RESID01 SGO	-0.284151	0.682282	-0.416471	0.6834

R-squared	0.601051	Mean dependent var	0.117746
Adjusted R-squared	0.515562	S.D. dependent var	0.090355
S.E. of regression	0.062889	Akaike info criterion	-2.501774
Sum squared resid	0.055370	Schwarz criterion	-2.303914
Log likelihood	26.51597	Hannan-Quinn criter.	-2.474492
F-statistic	7.030729	Durbin-Watson stat	2.363531
Prob(F-statistic)	0.004075		

Dependent Variable: SHO
Method: Least Squares
Date: 02/22/13 Time: 02:09
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.028928	0.048504	0.596402	0.5604
SHO01	0.846420	0.348424	2.429284	0.0292
SHO04	-0.045551	0.430623	-0.105780	0.9173
RESID01 SHO	-0.240315	0.216509	-1.109954	0.2857

R-squared	0.309121	Mean dependent var	0.097789
Adjusted R-squared	0.161075	S.D. dependent var	0.051716
S.E. of regression	0.047368	Akaike info criterion	-3.068593
Sum squared resid	0.031413	Schwarz criterion	-2.870733
Log likelihood	31.61734	Hannan-Quinn criter.	-3.041311
F-statistic	2.088012	Durbin-Watson stat	2.020411
Prob(F-statistic)	0.147828		

Dependent Variable: SLO
Method: Least Squares
Date: 02/22/13 Time: 02:10
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.035474	0.069238	0.512355	0.6164
SLO01	0.248903	0.348961	0.713267	0.4874
SLO04	0.357399	0.287011	1.245244	0.2335
RESID01 SLO	-0.602869	0.328299	-1.836340	0.0876

R-squared	0.217593	Mean dependent var	0.116800
Adjusted R-squared	0.049935	S.D. dependent var	0.046247
S.E. of regression	0.045078	Akaike info criterion	-3.167724
Sum squared resid	0.028448	Schwarz criterion	-2.969864
Log likelihood	32.50952	Hannan-Quinn criter.	-3.140442
F-statistic	1.297837	Durbin-Watson stat	1.924995
Prob(F-statistic)	0.314081		

Dependent Variable: TKO
Method: Least Squares
Date: 02/22/13 Time: 02:11
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.044430	0.028951	1.534667	0.1472
TKO01	0.739406	0.316205	2.338380	0.0347
TKO04	-0.175732	0.236952	-0.741636	0.4706
RESID01 TKO	-0.199387	0.239610	-0.832132	0.4193

R-squared	0.320936	Mean dependent var	0.102249
Adjusted R-squared	0.175422	S.D. dependent var	0.073483
S.E. of regression	0.066728	Akaike info criterion	-2.383267
Sum squared resid	0.062336	Schwarz criterion	-2.185406
Log likelihood	25.44940	Hannan-Quinn criter.	-2.355985
F-statistic	2.205536	Durbin-Watson stat	1.947390
Prob(F-statistic)	0.132761		

Dependent Variable: TPO
Method: Least Squares
Date: 02/22/13 Time: 02:11
Sample (adjusted): 2003Q2 2007Q3
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.041020	0.021130	1.941334	0.0726
TPO01	-0.069234	0.250397	-0.276497	0.7862
TPO04	0.447331	0.203821	2.194718	0.0455
RESID01 TPO	0.319715	0.428044	0.746921	0.4675

R-squared	0.304056	Mean dependent var	0.059765
Adjusted R-squared	0.154925	S.D. dependent var	0.039365
S.E. of regression	0.036188	Akaike info criterion	-3.607056
Sum squared resid	0.018334	Schwarz criterion	-3.409196
Log likelihood	36.46351	Hannan-Quinn criter.	-3.579774
F-statistic	2.038852	Durbin-Watson stat	2.000632
Prob(F-statistic)	0.154685		

Source: EViews version 7.

Appendix 2. Residential Regression Estimation Outputs

Dependent Variable: BJ
Method: Least Squares
Date: 02/26/13 Time: 00:05
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.094297	0.060319	1.563319	0.1329
BJ01	0.658108	0.352669	1.866078	0.0761
BJ04	-0.304799	0.256119	-1.190068	0.2473
RESID01_BJ	-0.348464	0.352642	-0.988152	0.3343

R-squared	0.226509	Mean dependent var	0.140211
Adjusted R-squared	0.116010	S.D. dependent var	0.063476
S.E. of regression	0.059680	Akaike info criterion	-2.653984
Sum squared resid	0.074796	Schwarz criterion	-2.458964
Log likelihood	37.17480	Hannan-Quinn criter.	-2.599894
F-statistic	2.049876	Durbin-Watson stat	1.737408
Prob(F-statistic)	0.137634		

Dependent Variable: BK
Method: Least Squares
Date: 02/26/13 Time: 00:06
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.034318	0.029692	1.155806	0.2607
BK01	0.676914	0.344061	1.967426	0.0625
BK04	-0.076956	0.232319	-0.331250	0.7437
RESID01_BK	-0.367861	0.337365	-1.090394	0.2879

R-squared	0.183593	Mean dependent var	0.079925
Adjusted R-squared	0.066964	S.D. dependent var	0.054839
S.E. of regression	0.052971	Akaike info criterion	-2.892504
Sum squared resid	0.058924	Schwarz criterion	-2.697484
Log likelihood	40.15630	Hannan-Quinn criter.	-2.838413
F-statistic	1.574160	Durbin-Watson stat	2.082518
Prob(F-statistic)	0.225364		

Dependent Variable: HK
Method: Least Squares
Date: 02/26/13 Time: 00:07
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.075665	0.032368	2.337613	0.0294
HK01	0.138893	0.462308	0.300433	0.7668
HK04	-0.211129	0.286854	-0.736014	0.4699
RESID01_HK	0.110726	0.482454	0.229506	0.8207

R-squared	0.096799	Mean dependent var	0.071169
Adjusted R-squared	-0.032229	S.D. dependent var	0.092265
S.E. of regression	0.093740	Akaike info criterion	-1.750937
Sum squared resid	0.184531	Schwarz criterion	-1.555917
Log likelihood	25.88672	Hannan-Quinn criter.	-1.696847
F-statistic	0.750215	Durbin-Watson stat	2.013718
Prob(F-statistic)	0.534413		

Dependent Variable: JK
Method: Least Squares
Date: 02/26/13 Time: 00:07
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.105899	0.048016	2.205491	0.0387
JK01	-0.008469	0.357775	-0.023671	0.9813
JK04	0.065380	0.215551	0.303314	0.7646
RESID01_JK	-0.049342	0.288640	-0.170947	0.8659

R-squared	0.013113	Mean dependent var	0.112292
Adjusted R-squared	-0.127871	S.D. dependent var	0.024319
S.E. of regression	0.025827	Akaike info criterion	-4.329180
Sum squared resid	0.014007	Schwarz criterion	-4.134160
Log likelihood	58.11475	Hannan-Quinn criter.	-4.275090
F-statistic	0.093012	Durbin-Watson stat	1.955245
Prob(F-statistic)	0.963071		

Dependent Variable: KL
Method: Least Squares
Date: 02/26/13 Time: 00:08
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.063170	0.043556	1.450321	0.1617
KL01	0.202663	0.434526	0.466399	0.6457
KL04	0.102186	0.293192	0.348528	0.7309
RESID01_KL	0.004730	0.438716	0.010781	0.9915

R-squared	0.057251	Mean dependent var	0.091492
Adjusted R-squared	-0.077427	S.D. dependent var	0.031400
S.E. of regression	0.032593	Akaike info criterion	-3.863816
Sum squared resid	0.022308	Schwarz criterion	-3.668796
Log likelihood	52.29770	Hannan-Quinn criter.	-3.809726
F-statistic	0.425097	Durbin-Watson stat	2.016512
Prob(F-statistic)	0.737025		

Dependent Variable: MN
Method: Least Squares
Date: 02/26/13 Time: 00:08
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.055844	0.042975	1.299450	0.2079
MN01	0.627845	0.385933	1.626821	0.1187
MN04	-0.059375	0.228631	-0.259697	0.7976
RESID01_MN	-0.432215	0.356210	-1.213373	0.2385

R-squared	0.117540	Mean dependent var	0.112984
Adjusted R-squared	-0.008526	S.D. dependent var	0.080316
S.E. of regression	0.080658	Akaike info criterion	-2.051554
Sum squared resid	0.136619	Schwarz criterion	-1.856534
Log likelihood	29.64443	Hannan-Quinn criter.	-1.997464
F-statistic	0.932370	Durbin-Watson stat	2.071291
Prob(F-statistic)	0.442520		

Dependent Variable: SG
Method: Least Squares
Date: 02/26/13 Time: 00:08
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.067481	0.023816	2.833495	0.0100
SG01	1.102674	0.368501	2.992319	0.0069
SG04	-0.787457	0.318778	-2.470235	0.0222
RESID01_SG	-0.880458	0.612623	-1.437194	0.1654

R-squared	0.444140	Mean dependent var	0.067013
Adjusted R-squared	0.364731	S.D. dependent var	0.079698
S.E. of regression	0.063522	Akaike info criterion	-2.529199
Sum squared resid	0.084737	Schwarz criterion	-2.334179
Log likelihood	35.61499	Hannan-Quinn criter.	-2.475109
F-statistic	5.593099	Durbin-Watson stat	1.374043
Prob(F-statistic)	0.005572		

Dependent Variable: SH
Method: Least Squares
Date: 02/26/13 Time: 00:09
Sample (adjusted): 2005Q3 2009Q3
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.076573	0.023329	3.282313	0.0059
SH01	0.267589	0.284387	0.940932	0.3639
SH04	-0.281072	0.193485	-1.452683	0.1700
RESID01_SH	0.173500	0.357831	0.484866	0.6358

R-squared	0.355580	Mean dependent var	0.068552
Adjusted R-squared	0.206867	S.D. dependent var	0.037610
S.E. of regression	0.033495	Akaike info criterion	-3.752513
Sum squared resid	0.014585	Schwarz criterion	-3.556463
Log likelihood	35.89636	Hannan-Quinn criter.	-3.733025
F-statistic	2.391057	Durbin-Watson stat	1.661793
Prob(F-statistic)	0.115710		

Source: EViews version 7.

Appendix 3. Retail Sector Regression Estimation Outputs

Dependent Variable: BJT
Method: Least Squares
Date: 02/26/13 Time: 19:30
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.092043	0.051099	1.801259	0.0860
BJT01	0.713964	0.331000	2.156993	0.0427
BJT04	-0.231595	0.224807	-1.030198	0.3146
RESID01_BJT	-0.638554	0.301212	-2.119949	0.0461

R-squared	0.193992	Mean dependent var	0.171826
Adjusted R-squared	0.078849	S.D. dependent var	0.044894
S.E. of regression	0.043087	Akaike info criterion	-3.305526
Sum squared resid	0.038987	Schwarz criterion	-3.110506
Log likelihood	45.31908	Hannan-Quinn criter.	-3.251436
F-statistic	1.684782	Durbin-Watson stat	2.002633
Prob(F-statistic)	0.200754		

Dependent Variable: BKT
Method: Least Squares
Date: 02/26/13 Time: 19:30
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.116854	0.045844	2.548945	0.0187
BKT01	0.431464	0.272077	1.585817	0.1277
BKT04	-0.235797	0.233152	-1.011349	0.3234
RESID01_BKT	0.093693	0.275925	0.339561	0.7376

R-squared	0.236099	Mean dependent var	0.142506
Adjusted R-squared	0.126971	S.D. dependent var	0.052764
S.E. of regression	0.049301	Akaike info criterion	-3.036114
Sum squared resid	0.051042	Schwarz criterion	-2.841094
Log likelihood	41.95142	Hannan-Quinn criter.	-2.982023
F-statistic	2.163495	Durbin-Watson stat	1.999392
Prob(F-statistic)	0.122568		

Dependent Variable: HKT
Method: Least Squares
Date: 02/26/13 Time: 19:31
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.070406	0.033592	2.095897	0.0484
HKT01	0.098842	0.285245	0.346517	0.7324
HKT04	0.121161	0.220109	0.550460	0.5878
RESID01_HKT	0.509671	0.312867	1.629033	0.1182

R-squared	0.302095	Mean dependent var	0.095654
Adjusted R-squared	0.202394	S.D. dependent var	0.073415
S.E. of regression	0.065566	Akaike info criterion	-2.465862
Sum squared resid	0.090278	Schwarz criterion	-2.270842
Log likelihood	34.82327	Hannan-Quinn criter.	-2.411771
F-statistic	3.030020	Durbin-Watson stat	1.907666
Prob(F-statistic)	0.052072		

Dependent Variable: JKT
Method: Least Squares
Date: 02/26/13 Time: 19:31
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.179895	0.101644	1.769845	0.0913
JKT01	-0.183612	0.511878	-0.358703	0.7234
JKT04	0.000614	0.343546	0.001787	0.9986
RESID01_JKT	0.181723	0.470320	0.386381	0.7031

R-squared	0.007357	Mean dependent var	0.152647
Adjusted R-squared	-0.134449	S.D. dependent var	0.058498
S.E. of regression	0.062307	Akaike info criterion	-2.567850
Sum squared resid	0.081525	Schwarz criterion	-2.372830
Log likelihood	36.09813	Hannan-Quinn criter.	-2.513760
F-statistic	0.051881	Durbin-Watson stat	1.762189
Prob(F-statistic)	0.983966		

Dependent Variable: KLT
Method: Least Squares
Date: 02/26/13 Time: 19:32
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.097139	0.052085	1.865018	0.0762
KLT01	0.274548	0.361362	0.759759	0.4558
KLT04	-0.078470	0.265924	-0.295083	0.7708
RESID01_KLT	-0.008764	0.345960	-0.025332	0.9800

R-squared	0.076921	Mean dependent var	0.119986
Adjusted R-squared	-0.054947	S.D. dependent var	0.040722
S.E. of regression	0.041826	Akaike info criterion	-3.364936
Sum squared resid	0.036738	Schwarz criterion	-3.169916
Log likelihood	46.06171	Hannan-Quinn criter.	-3.310846
F-statistic	0.583317	Durbin-Watson stat	1.939766
Prob(F-statistic)	0.632534		

Dependent Variable: MNT
Method: Least Squares
Date: 02/26/13 Time: 19:32
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.067860	0.035413	1.916223	0.0690
MNT01	0.776536	0.313371	2.478008	0.0218
MNT04	-0.293442	0.244614	-1.199610	0.2437
RESID01_MNT	-0.422535	0.269703	-1.566670	0.1321

R-squared	0.231756	Mean dependent var	0.123245
Adjusted R-squared	0.122007	S.D. dependent var	0.050742
S.E. of regression	0.047546	Akaike info criterion	-3.108577
Sum squared resid	0.047474	Schwarz criterion	-2.913557
Log likelihood	42.85721	Hannan-Quinn criter.	-3.054487
F-statistic	2.111687	Durbin-Watson stat	2.132179
Prob(F-statistic)	0.129209		

Dependent Variable: SGT
Method: Least Squares
Date: 02/26/13 Time: 19:33
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.049003	0.039593	1.237683	0.2295
SGT01	0.632463	0.317312	1.993190	0.0594
SGT04	-0.165728	0.293703	-0.564271	0.5785
RESID01_SGT	-0.056952	0.401751	-0.141759	0.8886

R-squared	0.364870	Mean dependent var	0.088033
Adjusted R-squared	0.274138	S.D. dependent var	0.048100
S.E. of regression	0.040980	Akaike info criterion	-3.405830
Sum squared resid	0.035266	Schwarz criterion	-3.210810
Log likelihood	46.57288	Hannan-Quinn criter.	-3.351740
F-statistic	4.021372	Durbin-Watson stat	1.898654
Prob(F-statistic)	0.020849		

Dependent Variable: SHT
Method: Least Squares
Date: 02/26/13 Time: 19:36
Sample (adjusted): 2003Q3 2009Q3
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.174225	0.069733	2.498478	0.0208
SHT01	0.126695	0.308739	0.410362	0.6857
SHT04	-0.162922	0.218877	-0.744352	0.4649
RESID01_SHT	0.354354	0.299560	1.182917	0.2501

R-squared	0.255131	Mean dependent var	0.168312
Adjusted R-squared	0.148721	S.D. dependent var	0.047574
S.E. of regression	0.043894	Akaike info criterion	-3.268415
Sum squared resid	0.040461	Schwarz criterion	-3.073395
Log likelihood	44.85519	Hannan-Quinn criter.	-3.214325
F-statistic	2.397624	Durbin-Watson stat	2.070980
Prob(F-statistic)	0.096771		

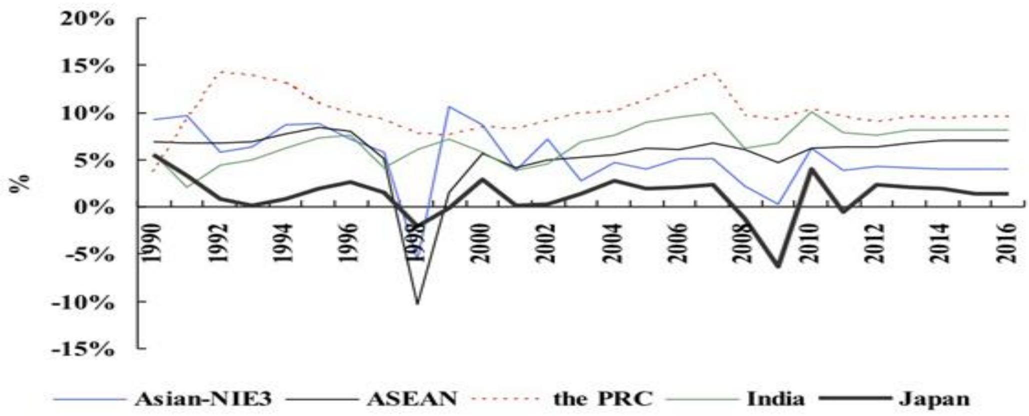
Appendix 4. The Multi Factor APT Model

Dependent Variable: ATR				
Method: Least Squares				
Date: 06/23/16 Time: 02:13				
Sample: 1 29				
Included observations: 27				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Constant, C	0.082035	0.020529	3.996048	0.0006
GDP	0.006394	0.005941	1.076262	0.2935
IR	-0.000254	0.002019	-0.125704	0.9011

VR	0.027067	0.008601	3.146842	0.0047
DUM_FC	0.041436	0.024084	1.720474	0.0994
R-squared	0.375489	**Mean dependent var**		0.134156
Adjusted R-squared	0.261942	**S.D. dependent var**		0.067535
S.E. of regression	0.05802	**Akaike info criterion**		-2.690495
Sum squared resid	0.074058	**Schwarz criterion**		-2.450525
F-statistic	3.30689	**Durbin-Watson stat**		2.096053
Prob(F-statistic)	0.028913			

Source: EViews Version 7 and author, 2016.

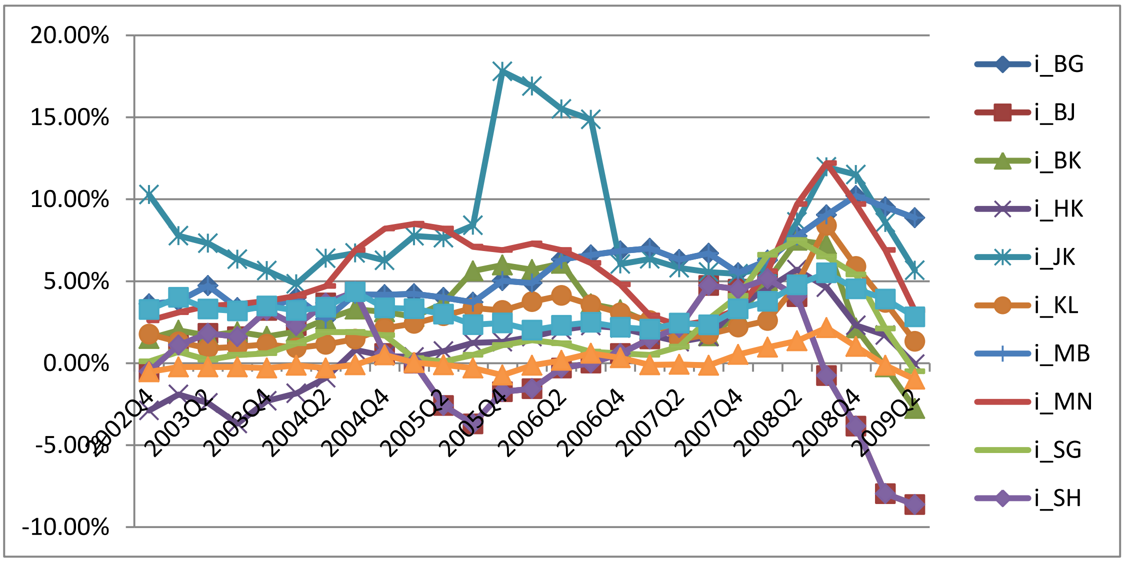
Appendix 5. GDP Growth Rate



Source: Asian Development Bank Institute

(http://www.asiapathways-adbi.org/2012/01/introduction-to-asia-pathways/) and Author, 2016.

Appendix 6. Interest Rate Movements for 13 Cities



Source: Author, 2016.