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# Do Foreign Investors Perform Better than Domestic Investors? Evidence from Commercial Real Estate Equity Investment in Emerging Market

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Financial globalization has enabled investors to allocate some of their portfolio assets to foreign countries and alternative assets. This environment has also created an increase in investment in international real estate especially in the emerging markets. In this study, we investigate whether foreign real estate investors outperform domestic investors after controlling for property specific characteristics. Using property level transaction data of Korea from 2003 to 2016, we also examine the characteristics of commercial real estate investment associated with the probability of an acquirer being a foreign investor versus a domestic investor. The binary and multinomial probability models are used to test our research hypothesis and the structural equation model is applied to find the determinants of the internal rate of return. The result reveals foreign investors perform better than domestic investors in a holding period analysis. Furthermore, the findings support that foreign direct and indirect real estate investments are statistically significant to the age of the building, corporate bond and exchange rates,

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growth domestic product growth, and the equity market movement in the domestic market.

## **Keywords**

Commercial Real Estate, Foreign Investors, International Finance, Real Estate Investment

## **1. Introduction**

The increase in investment in international real estate can be attributed to financial globalization which has enabled investors to allocate their portfolio assets to foreign countries and alternative assets (Clayton et al., 2015). Much of the increase in asset allocation might be due to the relatively low interest rates which have provided for a steady stream of income and capital returns. Cross-border investment has also increased over the last decade and accounted for a larger percentage of the overall real estate investment in Asian countries including South Korea. We posit as our primary research question whether foreign investors perform better or worse on target property compared to domestic investors after controlling for property specific characteristics. We also examine the characteristics of commercial real estate investment associated with the probability of the acquirer being a foreign investor for the commercial office market in Seoul.

Even after the financial and housing crisis of 2008, institutional investors have continued to find the real estate market very attractive. The average allocation of total assets to real estate increased from 8.4% to 10.2% between 2008 and 2014 (The Pension Real Estate Association 2015, 2018). According to a market report (The Pension Real Estate Association 2015), global institutional investors are expecting an increase in their real estate allocations with the largest increase coming from the Asia-Pacific regions. The upward trends of foreign real estate investments are clearly evident in South Korea. There was approximately \$6 billion U.S. worth of properties transacted in South Korea and cross-border real estate investment accounted for 32% of the total transaction amount for the commercial office market.

However, there have been no academic findings with respect to research on the characteristics of foreign real estate investment in the commercial real estate market. Therefore, we make the following contributions to the existing literature. First, we investigate whether foreign investors outperform domestic investors on target property after controlling for property specific characteristics. Our study is contingent on the considerations of foreign versus domestic investors specifically with a commercial investment purpose. With the expectation that domestic investors have more access to private information in

the commercial market than foreign investors, we examine whether foreign investors tend to focus more on stable core-investments (those with a stable income and moderate capital gain) rather than total overall returns.

Second, we decompose the investment choice of foreign investors by regressing the type of foreign or domestic investor as a binary selection variable on a set of property specific, locational and macro-economic variables. We then identify the characteristics of the target properties which interest foreign investors.

Finally, we investigate the impact of direct and indirect investments via real estate investment trusts (REITs) and private real estate equity (PREE) funds, and also provide information on the relationship between the investment vehicle and target property size (Ling and Petrobva 2012). Since indirect real estate investment via REITs and PREE funds is relatively liquid compared to direct real estate investment, we expect there should be a positive correlation among the degree of liquidity, direct and indirect real estate investments, and size of the target property. Thus, we consider the purpose, nationality, and liquidity level of the investment as a function that assumes the determinants of the target property characteristics. Our findings are consistent with the international commercial investment conjecture that characteristics of target property may possibly explain for the type of investor.

This paper is composed of the following sections: Section 2 is the literature review; Section 3 provides a description of the data; Section 4 explains the methodology adopted to test our hypotheses; Section 5 discusses the empirical results; and finally, Section 6 concludes our findings.

## **2. Literature Review**

Recent research work on the determinants of international investment in commercial real estate markets has generally found that economic growth, rapid urbanization and compelling demographics as favorable determinant factors, while lack of transparency of legal frameworks, administrative burdens of real estate businesses, socio-cultural challenges, and political risk as constraints of international investment (Lieser and Groh 2014). Most of the previous studies in the literature attempt to explain the determinants of international portfolio choice based on transaction of securities and estimating foreign holdings (Erel et al. 2012). Unlike stock transaction data and mutual fund holdings information, the transaction data of real estate investments are less publicly available.

Eichholtz et al. (2011) examine the performance of international real estate investment firms and identify the potential challenges of international real estate investment such as political risks, liquidity problems, informational disadvantages, and legal protection of investors. Lieser and Groh (2014) examine the determinants of international commercial real estate investment

specifically for the relative market attractiveness of 47 countries for the period from 2000 to 2009. Their findings suggest that investors not only take economic growth, degree of urbanization, and demographic growth into consideration, but also the level of information transparency within the legal framework, administrative restrictions for conducting real estate business, socio-cultural differences, and political risk in the host countries.

Studies on international real estate investment have examined direct measures of market premium and predictability of real estate returns in the commercial office market. For instance, Pai and Geltner (2007) extend the capital asset pricing model (CAPM) to the Fama-French model to explain the function of the direct real estate market in association with its size and type. They conclude that different types of real estate have different levels of risk premium, thus suggesting that the office market commands a lower level risk premium. De Wit and Van Dijk (2003) examine the determinants of direct office returns and find that economic growth and supply variables are highly correlated and each country shows a larger disparity in the global context. Therefore, they conclude that economic growth encourages investors to expand their business operations which consequently provides more office space to the existing market. The increased demand for commercial real estate space positively affects growth domestic product (GDP) growth and also increases commercial real estate returns.

Although the diversification effect of real estate is beyond the scope of our research, a large number of previous studies in the literature are available on this topic with positive findings (Kallberg et al., 1996, Glascock and Kelly, 2007). Research on the role of real estate in a mixed asset portfolio reveals that the inclusion of real estate would enhance the performance of an asset mixed portfolio. Earlier work by Hoesli et al. (2004) shows that the results may vary for an optimization of a mixed asset portfolio with the inclusion of real estate as it depends on the invested country in the portfolio. Other researchers have extended this topic to geographical diversification in other regional markets, thus suggesting that developing markets may offer investors a superior investment opportunity in comparison to developed markets (Jin et al., 2007). Worzala and Sirmans (2003) show the benefits of international diversification through real estate equities. They summarize the literature on international investment within a real estate asset class portfolio. They conclude that most of the studies advocate the inclusion of international real estate in a mean-variance analysis. Furthermore, they conclude that both property type and regional diversification are important; however, regional diversification appears to have a greater impact. Most studies apply a mean-variance analysis with the use of the modern portfolio theory based on the work of an economist named Harry Markowitz in 1959. These studies utilize real estate appraisal based data. Therefore, they are limited in showing the true volatility and thus have disadvantages, particularly when comparing real estate to other asset classes. Ho *et al.* (2015) examine the international direct real estate risk premiums for 16 cities in north and south Asia, and the U.S. They apply macroeconomic and

country-specific institutional variables to the risk premiums, which validate the effects of smoothed and de-smoothed appraised values on international direct real estate risk premiums. They adopt autoregressive de-smoothing models to validate the presence of appraisal smoothing in direct real estate market returns. Their findings show that changes in macroeconomic and direct real estate variables explain for office and retail returns more than residential returns, thus suggesting the existence of country-specific market structural factors that cause uncertainty in the direct real estate market.

In addition to the portfolio theory in international real estate investment, it is also known that the asymmetry of local real estate information that foreign investors face is a critical determinant for investment decisions where global diversification and home-bias phenomenon are observed (French and Porerba, 1991, Kang and Stulz 1997, and Karolyi and Stulz, 2003). Home bias is the tendency of investors to favor domestic assets despite the clearly evident benefits of diversifying into foreign assets. This prevalent phenomenon can reduce the possible risks of information asymmetry. Empirical evidence has shown that local investors outperform foreign investors in the equity markets in both advanced and emerging countries (Shukla and Van Inwegen, 1995, Choe et al., 2005, Teo, 2009, and Van Nieuwerburgh and Veldkamp 2009) thus indicating that local investors can better access local real estate information.

On the contrary, there is empirical evidence which indicates that foreign investors have valuable private information because they trade in many countries simultaneously with highly diversified assets. Their cumulative knowledge and sophisticated analytic tools may allow an advantage in foreign markets over local investors. Empirical findings support this hypothesis that foreign investors are actually better informed than local investors in equity markets; see for example, Froot et al. (2001) for the emerging markets; Huang and Shiu (2009) for Taiwan; and Bailey et al. (2007) for Singapore and Thailand.

There have been justifiable discussions that pertain to the benefits of diversification on asset portfolios, particularly the inclusion of real estate in emerging markets. However, absent in the literature is an empirical study that examines the characteristics of target investment property, type and holding period returns between foreign and domestic investors with the use of individual transaction data.

Most previous international real estate investment studies are grounded in portfolio theoretical models that apply macro level statistical economic modeling to explain for international real estate investments. In response, our study poses the following research question. Are there certain property specific characteristics preferred by certain types of investors? Our study examines the systematic differences between foreign and domestic investments which have occurred in the commercial real estate market in Seoul. This allows us to empirically examine whether the causal effect of asymmetric information (home bias) can influence the selection of commercial property in which

foreign investors (who have less accessibility to information) tend to invest<sup>1</sup>. Hence, our null hypothesis suggests that the commercial market is sufficiently transparent for both domestic and international investors; therefore, relevant information is easily accessible to all types of investors in the commercial real estate market in Seoul.

Previous studies in the literature use transaction data but none have incorporated their property characteristics. Our study considers the property characteristics of commercial real estate transactions. If there are any systematic differences driven by the acquisition process, the behavior of the investor may be related to the expected return of the acquired property. The null hypothesis of our research is that there is no difference in property characteristics for both foreign and domestic investors. In fact, investors with a purely investment purpose are likely to search for a target property with higher potential capital gain while investors who are acquiring property to use as a Class A headquarter may place more emphasis on stable income sources (e.g. long-term lease contract, quasi-guaranteed low vacancy rate, etc.). Therefore, our second research question considers the intention of the investor for acquiring the property.

Finally, our study is contingent on the consideration of indirect real estate investment (e.g. REITs, real estate equity funds) as an important type of investment in our analysis on investing in commercial property. With the research expectation that indirect real estate investment is a critical explanatory factor in the commercial real estate market, we investigate whether indirect real estate investment is highly liquid to determine if an investor is inclined to invest in large Class A properties relative to direct real estate investment. Our null hypothesis is that indirect real estate investment is insignificant to the type of investment property for the commercial property market in Seoul, thus suggesting the alternative hypothesis that indirect real estate investment tends to focus on large Class A properties.

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<sup>1</sup> The National Council of Real Estate Investment Fiduciary (NCREIF) has identified three investment styles that apply at the underlying asset level: core, value-added and opportunistic real estate investments. The NCREIF also classifies eight attributes to differentiate among the three types of real estate asset investing. Core properties tend to be held for a long period of time. The majority of their income originates from cash flow instead of value appreciation. Value-added properties tend to produce less income and rely more on property appreciation to generate their total return. Opportunistic real estate moves away from the core/income approach to a capital appreciation approach. Often opportunistic real estate is accessed through real estate opportunity funds, sometimes called PREE. The majority of the return from these properties comes from value appreciation. Leverage is typically included to further enhance total returns.

### 3. Data

#### 3.1 Office Transaction Data

This study uses office transaction data<sup>2</sup> provided by Genstar Co. as a proxy of the commercial real estate market for the period of January 2003 to September 2016. The office transaction data cover the city of Seoul: its central business district (CBD), the Gangnam Business District (GBD), and Yeoido Business District (YBD). The office transaction data include a total of 334 transactions over this period of time and focuses on corporate level transactions since office transactions at the individual level are concentrated on small office properties.

Table 1 contains the descriptive statistics for domestic and foreign investments in the Seoul office market. The annual investment of domestic investors, for the most part, had steadily increased from 2007 through to 2016. Foreign investment is defined as any capital inflow from a foreign country to South Korea which possesses ownership stakes in domestic commercial real estate properties via a subsidiary foreign investment branch, real estate equity fund investor, REIT investor, or foreign hedge fund. Foreign investors represented 48% and 61% of the total market in 2003 and 2004, respectively. However, foreign investment activity decreased to 3.5% in 2012, then rebounded back to 43% in 2016.

Figure 1 shows the cumulative total investment amount from 2003 to 2016 in the Seoul metropolitan statistical area. The United States was the largest foreign investor in 2016 which registered approximately US\$4.2 billion of cumulative investment in the Seoul office market (34% of all foreign investor investments). Singapore was second at US\$3.3 billion while Bermuda, Germany, and Hong Kong rounded out the list of top five largest foreign investors. Bermuda being a popular tax haven, had over a quarter of Fortune 500 company subsidiaries located there in 2014. This arrangement makes it challenging to identify the origin of the country for the funds transferred from the Bahamas to Korea. The United Arab Emirates (UAE) as the sixth-largest investor, provided US\$0.45 billion followed by Azerbaijan. The sovereign national pension fund in Azerbaijan represents investment from Azerbaijan. The U.K., Australia, the Netherlands, China, New Zealand, and Japan made up the remaining list of foreign investors.

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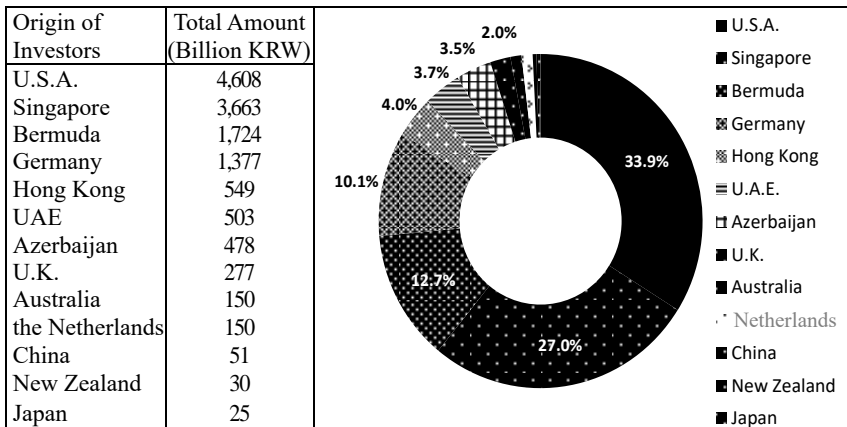
<sup>2</sup> According to the report by COLLIERS in 2018, the real estate investment inbound to Seoul by sector consists of office (71%), retail (12%), development (8%), and hotel and warehouse (10%). We only use the transaction data for office properties to analyze repeat transactions with consistent frequency. Since there is no known tax exemption for foreign investors on capital gain taxes in Korea, they have the equity position of real estate funds to take advantage of a corporate tax exemption.

**Table 1 Total Invested Amount in Seoul Office Market by Foreign Investors**

Year	Domestic Investors (Billion KRW)		Foreign Investors (Billion KRW)		Total Amount (Billion KRW)
	Amount	Percentage	Amount	Percentage	
2003	1,036	52.0%	957	48.0%	1,994
2004	1,125	38.4%	1,801	61.6%	2,925
2005	1,545	66.8%	770	33.2%	2,315
2006	1,228	86.9%	184	13.1%	1,412
2007	2,785	62.1%	1,698	37.9%	4,483
2008	3,391	89.9%	380	10.1%	3,771
2009	4,873	95.3%	240	4.7%	5,113
2010	3,899	88.2%	522	11.8%	4,421
2011	4,331	89.4%	514	10.6%	4,845
2012	4,662	96.5%	169	3.5%	4,831
2013	4,437	94.8%	245	5.2%	4,682
2014	4,598	72.2%	1,769	27.8%	6,367
2015	3,224	82.4%	687	17.6%	3,911
2016	4,810	56.9%	3,647	43.1%	8,457
Total	45,942	77.2%	13,584	22.8%	59,526

*Notes:* Based on March 22, 2018 currency exchange rate, approximately 1 U.S.\$ is 1125 South Korean won (KRW) so that 1 billion KRW is equivalent to U.S.\$ 888,889. A foreign investor is defined with reference to foreign investment to capital inflow from a foreign country to South Korea for ownership stakes in domestic commercial real estate property via a subsidiary foreign investment branch, real estate equity fund and REIT investments, or foreign hedge fund.

**Figure 1 Total Invested Amount in Seoul Office Market by Country of Origin**



*Notes:* The total amount is estimated as the cumulative sum from Jan. 2003 to Sept.2016. Based on March 22, 2018 currency exchange rate, approximately 1 U.S.\$ is 1125 KRW so that 1 billion KRW is equivalent to U.S.\$ 888,889.



### 3.2 Macro-Economic and Property-Specific Variables

Table 2 presents the summary statistics for the research variables in our study. We identify the nationality of the buyer, purpose of the investment, and the vehicle of investment. Each transaction is classified into one of three main types: 1) the nationality of the buyer as a binary variable (foreign or domestic investor); 2) purpose of the investment as a binary variable (investment purposes or headquarter use); and 3) vehicle of investment as a binary variable (processed by indirect real estate investment (e.g. REITs and real estate equity funds)). Thus, we create three binary variables according to our classifications (nationality of the buyer, investment purpose, and investment vehicle). We identify transactions that include 2 and 3 of the above conditions as binary variables to examine any systematic investment characteristics.

**Table 2 Summary Statistics**

Variable	n	M	SD	Min	Max
<b>Binary Variable</b>					
Nationality of the buyer (Foreign=1, Domestic=0)	344	0.192	0.394	0	1
Investment Purpose (Investment=1, Headquarters=0)	334	0.846	0.362	0	1
Investment Vehicle (Indirect Investment=1, Direct Investment=0)	344	0.608	0.489	0	1
Nationality of the buyer and Purpose (Foreign & Investment=1, Other=0)	344	0.186	0.390	0	1
Nationality of the buyer, Purpose & Vehicle (Foreign, Investment & Indirect =1, Other=0)	344	0.169	0.375	0	1
<b>Multinomial Variable</b>					
Domestic & Headquarters	51				
Domestic & Direct Investment	76				
Domestic & Indirect Investment	151				
Foreign & Headquarters	2	N/A	N/A	N/A	N/A
Foreign & Direct Investment	6				
Foreign & Indirect Investment	58				
CDB	344	0.343	0.475	0	1
GBD	344	0.322	0.468	0	1
YBD	344	0.160	0.367	0	1
Other locations	344	0.160	0.367	0	1
Building size (py= 35.58 SF/unit)	344	9,668	8,340	634	64,316
Domestic	278	9,390	7,925	634	53,099
Foreign	66	10,837	9,884	1,404	64,316

(Continued...)

(Table 2 Continued)

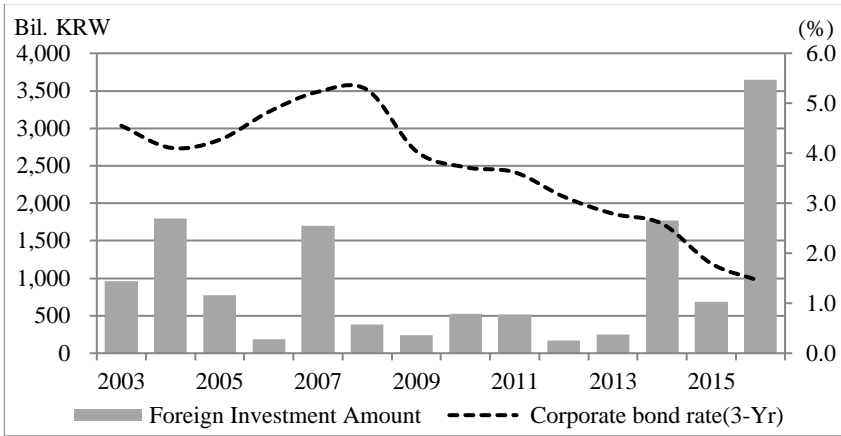
Variable	n	M	SD	Min	Max
Age of building (Yr)	344	5.122	3.600	0	13
Domestic	278	5.090	3.584	-	13
Foreign	66	5.258	3.689	-	12
Net Operating Income (NOI, 10,000 KRW/py)	344	74.10	25.64	8.50	151.60
Domestic	278	73.45	25.56	8.50	146.60
Foreign	66	76.82	26.01	23.00	151.60
Price per unit size (10,000 KRW/py )	344	1,275.78	491.77	444.70	2,607.50
Domestic	278	1,315.91	488.85	444.70	2,607.50
Foreign	66	1,106.76	471.01	465.40	2,489.60
Cap. rate spread	344	0.030	0.017	-0.158	0.082
Exchange rate (KRW/USD)	344	1,105	97	917	1,462
Corporate bond rate (3-Yr, %)	344	0.037	0.012	0.012	0.060
Real GDP growth rate (%)	344	3.55	1.42	0.70	6.50
Stock market index (KOSPI )	344	1,535	462	680	2,012

*Notes:* We adopt the Korean unit of measurement for the size of the building, where 1 Pyung (py) is equivalent to approximately 35.58 square feet. Net operating income is presented as 10,000 KRW/1 py. The price per unit is denoted as 10,000 KRW/1 py (35.35 square feet per 1 Pyung). M denotes mean.

Figure 2 plots the relationship between foreign investment and the 3-yr corporate bond rate. The corporate bond rate hovered around 4% from the early 2000s until 2008, then sharply dropped after the financial crisis, ending below 2% in 2016. The 3-yr bond rate can be a proxy for an alternative asset class compared to real estate assets. Foreign investment was significant in 2003, 2004, and 2007 as it neared or exceeded 1 trillion Korean won (KRW; 1 billion U.S. dollars) in all three of those years. The 3-yr corporate bond rate exhibited growth from 2003 to 2005, thus indicating positive gains in both capital and real estate markets in Seoul during those years. However, the 3-yr corporate bond rate experienced a sharp decline after 2014 while foreign investments were up during that same period with enormous gains in 2014 and 2016.

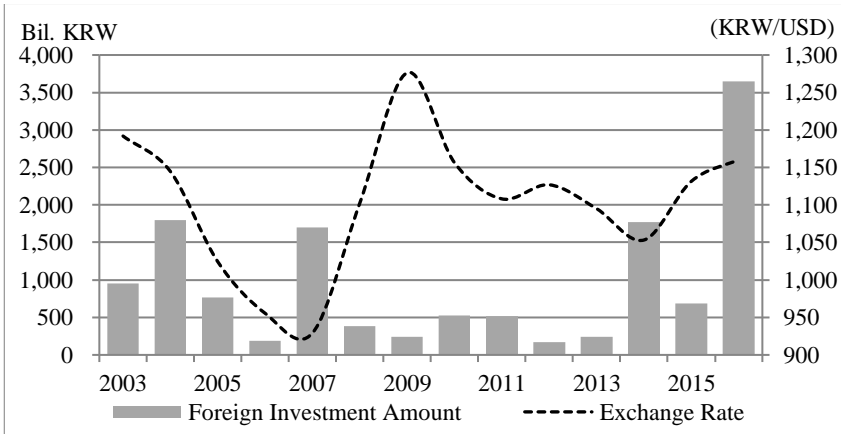
Figure 3 shows the relationship between KRW and the U.S. dollar and foreign investments. The Korean foreign exchange rate had appreciated from 1200 KRW to 950 KRW prior to 2007 but depreciated from 925 KRW to 1250 KRW in 2007. Consequently, there was a huge influx of foreign investment in 2007 compared to 2006. Exchange rates fluctuated greatly from 2007 to 2014, which reveals the impact of the financial crisis on the real estate and capital markets. The KRW exchange rate once again experienced a sharp depreciation after 2014 (over 1050 KRW to 1 U.S. dollar); at the same time, the amount of foreign investment increased sharply around 2014 and 2016. In summary, it appears that the foreign exchange rate has a substantial influence on foreign investment decisions.

**Figure 2 Foreign Investment Amount and 3-yr Corporate Bond Rate**



**Notes:** Based on March 22, 2018 currency exchange rate, approximately 1 U.S.\$ is 1125 South KRW so that 1 billion KRW is equivalent to U.S.\$ 888,889. A foreign investor is defined with reference to foreign investment to capital inflow from a foreign country to South Korea for ownership stakes in domestic commercial real estate property via a subsidiary foreign investment branch, real estate equity fund and REIT investments, or foreign hedge fund.

**Figure 3 Foreign Investment Amount and 3-yr Corporate Bond Rate**



**Notes:** Based on March 22, 2018 currency exchange rate, approximately 1 U.S.\$ is 1125 South KRW so that 1 billion KRW is equivalent to U.S.\$ 888,889. A foreign investor is defined with reference to foreign investment to capital inflow from a foreign country to South Korea for ownership stakes in domestic commercial real estate property via a subsidiary foreign investment branch, real estate equity fund and REIT investments, or foreign hedge fund.

In our analysis, we also include the 3-year corporate bond rate and Korean stock market index (KOSPI) as proxies for capital market conditions. We also calculate the spread between the 5-year government bond and capitalization rate. Both bond rates are obtained from the Bank of Korea database. The capitalization rate spread serves as a proxy measure for the additional risk inherent in real estate assets compared to capital assets, a proxy for risk premium considered to compensate for liquidity and leasing, and tenant risk in real estate assets. We use the real GDP growth rate and KRW to U.S. dollar exchange rate. The property-specific variables include total size of building, age, net operating income (NOI), price per unit size, and the capitalization rate derived from individual properties.

#### 4. Methodology

We adopt an ordinary least squares (OLS) analysis and carry out structural equation modeling (SEM) to test whether foreign investors perform better than domestic investors by using the internal rate of return (IRR). First, we adopt a multi-variable OLS model with the IRR as the dependent variable and nationality as the main dependent variable with other control variables such as holding period, vacancy and purchase, selling and rental prices. The specification of this relation is in Equation (1).

$$\begin{aligned}
 \ln(IRR) \equiv & \beta_0 + \beta_1 Location + \beta_2 \ln(Size) \\
 & + \beta_3 Purchase Year Dummy + \beta_4 Operation Month \\
 & + \beta_5 Operation Month^2 + \beta_6 \ln(Purchase Price) \\
 & + \beta_7 \ln(Selling Price) \\
 & + \beta_8 Mean Vacancy of Operations \\
 & + \beta_9 Mean Rent of Operations \\
 & + \beta_{10} Foreign Investors Dummy + \varepsilon
 \end{aligned} \tag{1}$$

The major concern of the OLS model is that it cannot reveal the causal relation among the variables. Thus, we consider the causal relation among variables through SEM with an indicator variable of foreign investor as a parameter variable in the structural equation model. The structural equation model is a statistical model that expresses the cause and effect relations between variables to be analyzed in order to explain a specific phenomenon by using a series of linear equations called structural formulas. SEM provides a path to show how the control variables affect a parameter variable (e.g. nationality).

Since we need to analyze complex, non-recursive relations among relevant variables in commercial real estate, many of which cannot be directly observed (i.e., latent variables) in the market, we use a structural equation model to overcome these hurdles and help to provide an understanding of the relations between investment performance measured by using the IRR and foreign investment. We follow the methodology in Zhang *et al.* (2016) as follows:

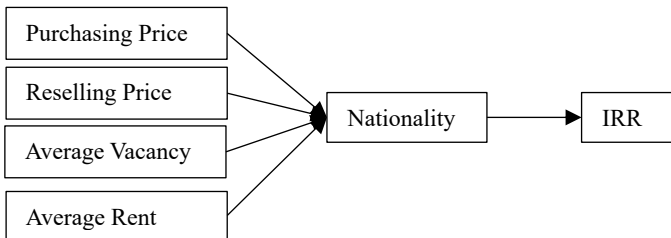
$$\eta \equiv \beta\eta + \Gamma\xi + \zeta \tag{2}$$

$$Y = \Lambda_y\eta + \varepsilon \tag{3}$$

$$X = \Lambda_x\xi + \delta \tag{4}$$

Equation (2) is the first of the structural equations, and established to reflect the relations amongst the effects of the latent variables (IRR as the proxy for investment performance, foreign investment).  $\eta = (\eta_1, \dots, \eta_m)$  is the corresponding endogenous latent variable if applicable and  $\xi = (\xi_1, \dots, \xi_n)$  is the exogenous latent variable (i.e. corresponding IRR investment performance). Both the endogenous and exogenous latent variables are linked by a matrix of  $\beta$  and coefficient  $\Gamma$  and an error term vector  $\zeta$ . While the notion  $\Gamma$  represents the effect from an exogenous latent variable on an endogenous latent variable,  $\beta$  measures the influence from a endogenous latent variable to another endogenous latent variable.  $\zeta$  presents the residual from the equation. Suppose  $E(\zeta) = 0$ , and  $\zeta$  is independent with  $\eta$  and  $\xi$ . Equation (3) measures the effect from the latent variables based on the observed variables if applicable. The equation shows the interrelation among endogenous variables by identifying  $Y$  and the endogenous latent variable  $\eta$ . Equation (4) shows the relations between the exogenous variables (four observed factors: purchase and reselling prices, average vacancy and rent) to identify  $X$  (the observable variable of investment performance) and the exogenous latent variable. Observed variables  $X$  and  $Y$  relate to the corresponding latent variable  $\eta$  and  $\xi$  by factor loading  $\Lambda_y$  and  $\Lambda_x$ . The measurement error  $\varepsilon$ , and  $\delta$  are associated with the observed variables  $X$  and  $Y$ . Suppose  $E(\varepsilon)$  and  $E(\delta) = 0$ , and  $\varepsilon$ , and  $\delta$  are independent from  $\eta$  and  $\xi$ . In our first structural equation model, we consider that foreign investors are selective in their choice of properties. The relationships have two logical directions. First, we include the control variables such as purchase and selling prices, vacancy, and rent which directly affect the nationality of the investor. Secondly, we consider the nationality of the investor to be a factor that directly affects the return premium. This involves the selection process of foreign investors for the property through the control variables. Figure 4 depicts this relationship.

**Figure 4 Logical Test with Structural Equation Model**



We also employ a binary logit regression to our research hypothesis. If foreign investors systematically obtain return premiums, it becomes necessary to test whether the characteristics of the property are more likely to become acquisition targets of foreign buyers.

Our analysis answers the following questions. Is the property acquired by indirect real estate investment vehicles (e.g. REITs and real estate equity funds) or direct investment? Which type of property is more likely to be used as headquarter office space versus investment purposes? Or is it a combination of the elements of these questions such as which factors determine whether the property is acquired by foreign investors with investment purposes via indirect real estate investment vehicles?

We estimate logistic models where the binary dependent variable is classified as 1 if the property is acquired by a foreign investor, 1 if the property is acquired for investment purposes, and 1 if the property is acquired through an indirect real estate investment vehicle, where the probability is determined by:

$$prob(Y) = Prob(Y = 1|x),$$

where  $x$  represents the conditional property specific and economics characteristics associated with each property.

We propose the following logistic model:

$$\begin{aligned} prob(Y_{i,t}) = & \beta_0 + \beta_1 Location_{i,j} + \beta_2 Size_{i,j} + \beta_3 Age_{i,j} \\ & + \beta_4 NOI_{i,j} + \beta_5 PRICE_{i,j} + \beta_6 Cap\_Spread_{i,t} \\ & + \beta_7 Exchange\_rate_t + \beta_8 3yr\_bond_t \\ & + \beta_9 \Delta GDP_t + \beta_{10} KOSPI_t + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Using an approach similar to that in Mauck and Price (2017), we classify our dependent variables ( $Y_{i,t}$ ) into 5 types of binary variables as the dependent variables, respectively; nationality of buyer (1= foreign investment), investment purpose (1=investment purpose), investment vehicle (1=indirect real estate investment), foreign buyer with investment purpose (1=foreign investor & investment purpose), and foreign investor with investment purpose via indirect real estate vehicle (1=foreign investment & investment purpose & indirect real estate vehicle).

$Y$  is proposed as the binary response variable, and it is assumed that there is the probability that  $Y$  may be dependent on a vector of predictor values, and property specific and macro-economic variables where  $\beta_0$  is a constant, and  $\beta_1$  through to  $\beta_{10}$  are the parameters for estimation. The term  $\varepsilon_{it}$  is the random error term for transaction  $i$  at time  $t$ .  $Location_{i,j}$  represents three indicating variables for relative location of the property (GBD, YBD, and CBD). The variable  $Size_{i,j}$  represents the total size of the building in Pyung (py; Korean unit of measurement equivalent to 35.58 square feet). The variable  $Age_{i,j}$  represents the age of the individual property.  $NOI_{i,j}$  indicates the net operating income of

the property.  $Price_{i,j}$  represents the purchase price per py.  $Cap\_Spread_{i,t}$  denotes the spread between 5 year treasury bonds and the capitalization rate of the individual property.  $Exchange\_rate_t$  represents the exchange rate of KRW to the U.S. dollar. The  $3yr\_bond_t$  denotes the 3-year corporate bond rate and  $KOSPI_t$  is the Korea Stock Market Index as a proxy for the capital market.  $\Delta GDP_t$  represents the real GDP growth rate.

An alternative research framework is proposed which allows all investors to simultaneously identify the target property. Therefore, we use a multinomial logistics regression which assumes that all available outcomes are determined concurrently. The estimated multinomial logit model is defined in the following form:

$$\begin{aligned} Multi\_prob(Y_{i,t}) = & \beta_0 + \beta_1 Location_{i,j} + \beta_2 Size_{i,j} \\ & + \beta_3 Age_{i,j} + \beta_4 NOI_{i,j} + \beta_5 PRICE_{i,j} \\ & + \beta_6 Cap\_Spread_{i,t} + \beta_7 Exchange\_rate_t \\ & + \beta_8 3yr\_bond_t + \beta_9 \Delta GDP_t + \beta_{10} KOSPI_t + \varepsilon_{i,t} \end{aligned} \quad (6)$$

where variable ( $Y_{i,t}$ ) is denoted as 1 if the dependent variable is a domestic direct investment, 2 if it is a domestic indirect investment, 3 if it is a foreign investor with headquarter use as the investment purpose, 4 if it is a foreign investment via direct investment, and 5 if it is a foreign investment through indirect investment.

## 5. Empirical Results

An analysis of the IRR is conducted as the first stage to investigate the performance and characteristics of foreign investors. The descriptive analysis is reported in Table 3.

**Table 3** Sample Descriptive Statistics of IRR Calculations

Variable	Mean	Std. Dev.	Min	Max
IRR	0.161	0.067	0.055	0.422
Total size of building	33,795	20,706	11,136	153,125
Average operating period	58.342	27.062	9	147
Purchase price per unit	3145.06	1282.91	1124	6873.53
Selling price per unit	4651.92	1250.35	1446.54	7531.16
Vacancy rate	0.0588	0.072	0	0.371
Rent (KRW)	56,585	19,781.62	6400	11,2735.3
Nationality	0.411	0.495	0	1

**Notes:** To analyze the investment performance with the use of IRR, it is necessary to obtain all transaction information at the time of the initial purchase and resale as well as the operation information. We include a total of 73 transactions for the IRR analysis which contain all initial purchasing information and reselling property information.

We examine the relative performance of foreign investors by using the IRR which assumes that the periodic discount rate for the present value of the investment equals to zero.

The IRR is specified in the following equation:

$$V_{i,t} - \left[ \frac{CF_{it+1}}{(1 + IRR)} + \frac{CF_{it+2}}{(1 + IRR)^2} + \dots + \frac{CF_{it+n}}{(1 + IRR)^n} + \frac{CF_{it+1} + V_{it+n}}{(1 + IRR)^n} \right] = 0 \quad (7)$$

where  $V_{i,t}$ , is the purchase price of property  $i$  at time  $t$ . In order to estimate the IRR, we calculate the property specific NOI,  $CF_{i,t}$ , which consists of the monthly rent, vacancy rate, and operating expenses of property  $i$  at time  $t$ . We also use the resale price  $V_{i,t+n}$ , denoted as the purchase price of property  $i$  at time  $t+n$  respectively.

The IRR results and analysis for domestic and foreign investors are presented in Table 5. The hypothesis tests whether foreign investors perform better than domestic investors. Evidence reveals that there is a higher IRR for transactions of foreign investors (average  $IRR_f = 18.5\%$ ) than domestic investors (average  $IRR_d = 14.6\%$ ). The average holding period between the foreign investors (59.2 months) and domestic investors (57.7 months) is similar.

Among the 334 transactions, 73 repeated sales are observed for comparing the IRR between domestic and foreign investors. As shown in Table 6, the average IRR of foreign investors is 3.9% higher than that of domestic investors. Multiple regression and structural equation modeling are carried out to conduct further analysis of the results.

To decompose the factors that affect foreign investment on IRR, we estimate the regression models by using the binary variables of foreign and domestic investors with other control variables. Since we are not able to obtain all of the cash flow information, modeling the determinants of the IRR can be done to determine the net effect of foreign investors with the most critical variables. We also conduct a variance inflation factor (VIF) test to avoid the potential multicollinearity problems in modeling the determinants of the IRR and the results are shown in Table 6. We confirm that the VIF value is less than the critical threshold of 10, thus indicating no severe multicollinearity problem in the regression model.



**Table 5** Weighted IRR Analysis for Domestic and Foreign Investors

Year	Non-weighted return		Weighted return by the selling price		Weighted return by the GFA	
	Domestic Investors	Foreign Investors	Domestic Investors	Foreign Investors	Domestic Investors	Foreign Investors
2004	-	17.6%	-	17.6%	-	17.6%
2005	-	12.2%	-	12.2%	-	12.2%
2006	24.9%	20.2%	24.9%	20.1%	24.8%	18.7%
2007	11.9%	25.0%	11.9%	25.7%	11.7%	23.1%
2008	20.4%	23.6%	20.7%	23.9%	21.6%	25.7%
2009	18.4%	18.6%	18.2%	18.6%	18.4%	20.0%
2010	18.7%	18.9%	18.3%	18.9%	19.3%	18.9%
2011	12.7%	19.0%	12.7%	18.8%	12.7%	19.4%
2012	13.1%	9.1%	12.8%	9.1%	12.7%	9.1%
2013	10.5%	-	10.5%	-	10.7%	-
2014	12.8%	-	13.6%	-	15.0%	-
2015	15.2%	11.2%	15.1%	11.2%	15.5%	11.2%
2016	10.7%	14.6%	10.1%	14.7%	10.8%	14.9%
2017	7.8%	9.0%	7.8%	8.7%	7.6%	9.4%
Average IRR	14.6%	18.5%	14.0%	18.6%	14.8%	19.2%
N	43	30	43	30	43	30
Average Holding Period	57.7 months	59.2 months	57.7 months	59.2 months	57.7 months	59.2 months

**Notes:** GFA is total size of building based on a 1 unit measure denoted as 1,000 Pyung (35,580 square feet). A foreign investor is defined with reference to foreign investment to capital inflow from a foreign country to South Korea for ownership stakes in domestic commercial real estate property via a subsidiary foreign investment branch, real estate equity fund and REIT investments, or foreign hedge fund. To analyze the investment performance with the use of IRR, it is necessary to obtain all transaction information at the time of the initial purchase and resale as well as the operation information. We include a total of 73 transactions for the IRR analysis which contain all initial purchasing information and reselling property information. There are missing cases in 2004-2005 for domestic investors and 2013-2014 for foreign investors due to the repeat sale requirements and Class A standard with approximate average size of 343,987 SF.

Table 6 shows that nationality itself is not directly related to a high IRR for foreign investors compared to domestic investors. However, it can be interpreted that a higher IRR is dependent on the conditions of the transaction or property conditions, such as purchase and selling prices, rent, and vacancy rate. Although nationality does not have a direct impact on providing a higher IRR for property transactions, the endogenous choice of property

characteristics as described by Mauck and Price (2017) shows that foreign investors prefer larger and higher quality properties (“trophy’ office assets).

**Table 6 Multiple OLS Models of Determinants of IRR**

Log of IRR as Dependent Variable	Variable	Model 1	Model 2	Model 3
Geographic Area	CBD	0.139	0.080	-
Dummy	GBD	0.205	0.108	-
(Base=ETC)	YBD	0.239*	0.399	-
GFA of Building	GFA	0.000	0.000	-
Purchase Year Dummy	2003	-0.188	0.718	-
(Base=2013)	2004	-0.063	0.708	-
	2005	0.076	0.666	-
	2006	0.210	0.503	-
	2007	0.208	0.446	-
	2008	0.290	0.059	-
	2009	0.148	0.239	-
	2010	0.267	0.378	-
	2011	0.307	0.355	-
	2012	0.224	0.023	-
Operation Month	Month	-0.012***	-0.010	-
	Month <sup>2</sup>	0.000	0.000	-
Log of Purchase Price	ln_buy_price	-1.787***	-	-1.152***
Log of Selling Price	ln_sell_price	1.015***	-	0.544***
Operations	Mean vacancy	-1.225**	-	-0.772
	Mean ln_rent	0.277***	-	0.229***
Domestic (If domestic investor = 1, otherwise = 0)		-0.039	0.011	-0.040
Constant		0.498	-2.256	-0.296
F-statistic		8.747	3.525	14.300
Prob>F		0.000	0.000	0.000
R-squared		0.783	0.521	0.516
Adj R-Squared		0.693	0.374	0.480

**Notes:** We adopt a total of 73 repeated transactions to estimate the IRR. Operation Month represents a holding period of property based on month and month2 to control for the U shape effect of a nonlinear relationship. There is also the concern about the potential impacts on the results due to missing observations from two recession years (2003-2004) and two boom years (2013-2014). We therefore conduct modeling that excludes data from 2004, 2005, 2013, and 2014. We expect the alternative coefficients will be able to validate the robustness of the main result. Although we do not report the result for brevity, the result remains similar when the years with missing observations are excluded. The results are available upon request. \*, \*\*, and \*\*\* denote significance of *p*-value at 10%, 5% and 1% levels.

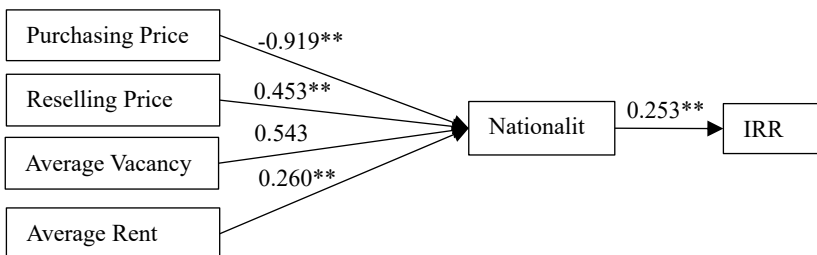
If the commercial real estate market in South Korea is efficient, then most of the return premium (affected by selling and buying prices) should be explained by property specific conditions or different transaction conditions. Thus, it is important to examine the systematic characteristics that foreign investors prefer when making investments with our structural equation model.

After examining the critical variable to determine the IRR in Table 6, we further extended our model to conduct SEM. We assume that SEM implies that the investor can “select” the purchase price, rent, vacancy, and sale price. Our primary concern of the hypothesis is that foreign investors may use their own standards to select a property. While improving the power of the SEM, we also consider all possible variables that are related to the IRR. Thus, we extend the model, including the segmented office market and market timing of property transactions. Using the 73 repeated transactions, we conduct a regression analysis through SEM with the significant variables.

We assume that there should be specific factors in the foreign investment decision process. Foreign investors systematically select a property based on specific standards such as purchase price, vacancy, rent, and selling price through access to valuable private information and based on their operational experiences. Therefore, the use of foreign investors may positively affect investment performance in the end. The structural equation model is an appropriate model to examine this causal relationship. The estimated parameter, nationality, is estimated with a set of variables from the critical variables of the regression analysis: purchase and reselling prices, and average vacancy and rent. Finally, nationality is an essential parameter to differentiate between the IRR of domestic and foreign investors.

For our structural equation model, nationality is relevant in selecting the control variables such as purchase and selling prices, vacancy, and rent; therefore, although nationality does not directly affect the returns of an investor, this parameter does impact the selection process of the property with the aforementioned control variables; see Figure 5.

**Figure 5** Result of Structural Equation Modeling



*Note:* \*, \*\*, and \*\*\* denote significance of  $p$ -value at 10%, 5% and 1% levels

The structural equation model assumes that foreign investors systematically select the purchase and selling prices, vacancy, and rent. Then, these factors will go through the nationality variable as a deterministic factor in the IRR model. The SEM results show that foreign investors select properties with lower purchase prices, higher average rent, and higher resale prices in comparison to domestic investors. Furthermore, nationality can systematically determine the difference in IRR, which is a 25% higher IRR. The result is consistent with our average IRR result in that the IRR of foreign investors is 18.5%, which is close to 25% higher than the IRR of domestic investors of 14.5%. The results strongly show that the purchase and selling prices, and average rent affect foreign investments and that foreign investments yield a higher IRR.

According to the findings in our structural equation model, there is a systematic difference when investing in a target property based on nationality. Using the 344 transactions, we adopt binary and multinomial logistics regression models to examine the possibility of a systematic difference in preferred target properties of foreign investors.

Table 7 shows the result of the binary logistic regression with the three different model classifications. The first model compares the change in nationality of the investor (if yes =1) to other investors. We find a negative coefficient (-0.196) for the age of the property thus indicating that the probability of a real estate asset being a target property of a foreign investor decreases with age. For example, if the age of a property increases by one year, its probability of being a target property of a foreign investor decreases by 4.88%. The spread of the capitalization rate has a significantly positive coefficient of 34.83 thus indicating that a 10 base point increase of the cap rate spread would increase the probability of the real estate asset being a target property of a foreign investor by 0.87%. The bond rate shows a significantly positive coefficient of 0.71 thus suggesting a 10 base point increase of a corporate bond would reduce the probability of a real estate asset being a target property by 1.8%. GDP growth also has a positive effect on the probability of a real estate asset being a target property. A 1% increase in GDP growth leads to a 7% increase of a property being a target property. Interestingly, the KOSPI has a negative and marginally significant coefficient of -0.001 which indicates that a slowdown in the Korean stock market would reduce the probability that a real estate asset would be a target property of foreign investors by 3.7%.

The first model compares change in the nationality of investor (if yes =1) to that of other investors. The second model compares the change in indirect investment (REITs and PREE funds) to direct investment. The third model specifies foreign investment via indirect investments such as REITs and PREE funds.

The second model compares the probability that an investment is indirect (REITs and PREE funds) or direct. The proportion of foreign investors who

invest through REITs and PREE funds is 83.6% and 16.4%, respectively. We find a positive coefficient in total area (square feet) of property, thus indicating that investors who invest through REITs and PREE funds prefer to invest in property with a larger total area. If the property area size increases by 1000 py, then there is a 7.1% probability of the property being a target property by those who invest in REITs or PREE funds. If the age of property increases by one year, the probability would be reduced by 8.9%. The exchange rate shows a significantly positive coefficient when the KRW exchange against the U.S. dollar is low, thus suggesting a lower probability that these investors would invest. The KOSPI has a negative and marginally significant coefficient, thus indicating if the stock market slows down in Korea, then the probability that property is chosen with an investment purpose would fall by 0.3%.

**Table 7 Binary Logistic Regression Results**

Variable	Foreign vs Domestic	Indirect Investment vs Other	Foreign Indirect vs Other
CBD	-0.140	-0.273	-0.671
GBD	-0.349	-0.553	-0.805
YBD	-0.603	-1.025*	-0.690
GFA of Building (1000 py)	0.035	0.288**	0.042
Age of Building	-0.196**	-0.358**	-0.223**
NOI (10,000 KRW/py)	0.038	0.0283	0.032
Purchase Price (10,000KRW/py)	0.001	-0.000	0.003
CAP spread	34.838*	4.1945	33.053
Exchange Rate (KRW/USD)	-0.003	-0.003*	-0.004*
Corporate Bond (3year, %)	0.710**	0.328	0.639*
GDP growth (%)	0.282*	0.091	0.328*
KOSPI	-0.001*	-0.001*	-0.001**
Constant	-0.888	5.306	0.892
LR chi_sq	73.150	90.080	68.640
Prob(chi_sq)	0.000	0.000	0.000
Log likelihood	-131.61	-185.38	-121.74
Pseudo R_sq	0.218	0.196	0.220

*Notes:* \*, \*\*, and \*\*\* denote significance of *p*-value at 10%, 5% and 1% levels

The third model specifies foreign investment via indirect investment such as REITs and PREE funds. We find a negative coefficient for exchange rate and variation in KOSPI but a positive coefficient for the bond rate and the GDP growth rate. Finally, we examine the binary logistic regression and find commonly significant variables such as age, cap rate spread, exchange and corporate bond rates, GDP growth, and KOSPI. However, it is important to note

that the binary logistics regression model can only compare binary conditions. Thus, we expand our study with a multinomial logistic regression model.

Table 8 shows the multinomial logistic regression model outcomes by using the binary variables as in the previous setup. The table reveals some expected stylized facts that validate the results from previous studies on commercial office building investments. The most significant variables are the age of the building and stock market performance or KOSPI. The corporate bond rate is a significant factor with a positive directional relation with all of the other factors except for property as use of Class A headquarter of foreign investors. This implies that foreign investors are more responsive to changes in corporate bond rates. Finally, we find that GDP growth and KOSPI as an alternative market are significant only for foreign indirect investments. In sum, foreign indirect investments are sensitive to the macro economy investment environment.

**Table 8 Multinomial Logistic Regression Results**

Variable	Domestic Direct Investment vs Domestic Headquarter	Domestic Indirect Investment vs Domestic Headquarter	Foreign Headquarter vs Domestic Headquarter	Foreign Direct Investment vs Domestic Headquarter	Foreign Indirect Investment vs Domestic Headquarter
CBD	-0.742	-0.425	17.350	15.038	-0.915
GBD	-0.329	-0.540	1.402	14.854	-1.088
YBD	0.842	-0.425	-2.335	-0.471	-0.646
GFA of Building (1,000py)	-0.118	0.244*	0.472	0.294	0.200
Age of Building	-0.259*	-0.543**	2.452	-0.565**	-0.610**
NOI (10,000KRW/py)	0.008	0.029	1.958	0.152	0.055
Purchase Price (10,000 KRW/py)	0.0071	0.002	-0.131	-0.020	0.006
CAP spread	18.937	9.455	-952.03	52.731	44.041
Exchange Rate (KRW/USD)	-0.001	-0.004	-0.055	-0.001	-0.007*
Corporate Bond (3 year, %)	0.745*	0.787*	-15.424	7.154*	1.328**
GDP growth (%)	0.294	0.207	0.749	0.813	0.533**
KOSPI	-0.001	-0.002	0.049	-0.004	-0.003**
Constant	-1.022	5.068	13.548	-44.063	4.394
LR chi_sq	208.410				
Prob(chi_sq)	0.000				
Log likelihood	-370.066				
Pseudo R_square	0.220				

*Note:* \*, \*\*, and \*\*\* denote significance of p-value at 10%, 5% and 1% levels

## 6. Conclusion

This study builds on the existing international real estate investment literature by systematically measuring investment based on valuable private information through the nationality of the investor. Specifically, we investigate whether foreign investors perform better than domestic investors during the period of 2003 to 2016. Our study reveals that foreign investors on average outperform domestic investors (average  $IRR_f = 18.5\%$  versus average  $IRR_d = 14.6\%$ ). However, nationality itself is not directly related to a high IRR for foreign investors compared to domestic investors. The higher IRR is dependent on the transaction or property conditions, such as purchasing and selling prices, rent, and vacancy rate. The SEM result shows that the selection of properties with a lower purchase price, higher average rent, and higher resale price by foreign investors is more statistically significant than that of domestic investors. Furthermore, the properties chosen by foreign investors will systematically yield a significantly higher IRR than those selected by domestic investors, or a 25% higher IRR.

We further examine factors that influence the performance of foreign investors through structural equation modeling, and binary and multinomial logistic regression modeling. Foreign investors focus on factors such as purchase and selling prices, vacancy, size of property, and average rent when identifying a target property. This study offers a novel approach to empirically investigate performance measurement by using the nationality of investors within the international real estate context.

The findings of our study suggest that the response of foreign indirect and direct real estate investors to the age of the building, corporate bond and exchange rates, GDP growth, and equity market movement is statistically significant. The results empirically support the argument that foreign investors have valuable private information as they trade in many countries at the same time. Their cumulative knowledge and sophisticated analytic tools may give them the advantage in foreign markets over local investors. Also, this can also be interpreted that foreign investors are more risk averse towards non-domestic investments by selecting higher quality properties. Thus, we recommend future studies on the different behavior of foreign and domestic investors.

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## Appendix

### Variable Definition

Abbreviation	Description
CBD	Central Business District
GBD	Gangnam Business District
YBD	Yeouido Business District
GFA	Total size of building based on 1 unit measure denoted as 1000 Pyung (35,580 square feet)
Age	Relative age of an individual property.
NOI	Net operating income of property measured by 10,000 KRW.
Purchase price	Purchase price per Pyung
Cap. Spread	Spread between 5 year treasury bond and capitalization rate of individual property
Exchange rate	Exchange rate of KRW to U.S. dollar (approximately 1 U.S. \$ value is 1125 KRW in March 22, 2018)
Corporate bond	3-year corporate bond rate
KOSPI	Korea Stock Market Index as proxy for capital market.
GDP growth	real GDP growth rate