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Cross Border Real Estate Investments and Commercial Office Property Market Performance: Evidence from Australia

Kwabena Mintah*
School of Property, Construction and Project Management, RMIT University, Melbourne, Australia. Email: Kwabena.Mintah@rmit.edu.au

Woon-Weng Wong
School of Property, Construction and Project Management, RMIT University, Melbourne, Australia. Email: woon-weng.wong@rmit.edu.au

Peng Yew Wong
School of Property, Construction and Project Management, RMIT University, Melbourne, Australia. Email: peng.wong@rmit.edu.au

The purpose of this study is to evaluate the impact of cross border real estate investments on the performance of the direct commercial property market in Australia. Using an autoregressive distributed lag (ARDL) model, factors including volume of cross border real estate investments, real gross domestic product (RGDP), office stock, and vacancy and net absorption rates are examined for their impact on total returns. The results indicate that traditionally established long-term drivers, including RGDP, office stock, and vacancy and net absorption rates, are still relevant. It is found that cross border real estate investments have impact on the performance of the direct commercial office property market in Australia. The results and findings would help property investors, developers, policymakers, and stakeholders in decision making around property investments. This research is an initial study that focuses on the impact that cross border real estate investments have on the performance of the direct commercial/office property market in Australia.

Keywords

Commercial Property, Office, Cross Border Real Estate Investments, ARDL, Total Returns.

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* Corresponding author

1. Introduction and Motivation for Current Research

The globalisation and deregulation of financial markets have spurred substantial growth in global capital flow to countries that are politically stable and economically attractive for cross border real estate investments. The growth of cross border real estate investments has generated substantial interest from scholars and professionals due to its possible impact on local real estate markets. Empirical reviews have noted that cross border foreign real estate investments have been on the rise in this global liberalization era (D'Arcy, 2009, Topintzi et al., 2008). However, there is scant empirical evidence that thoroughly shows how cross border real estate investments impact the performance of the total returns of the office market except for a handful of research papers that focus on the United States (US), United Kingdom (UK), and Finland. Apart from traditional institutional investors such as large superannuation funds, life insurance companies, and other real estate investment groups, other syndicated funds, private equity funds, and open and closed-ended funds have emerged as significant investors in commercial office real estate. Many of these investors have networks abroad that help them to participate in international commercial real estate markets to capture opportunities. This paper contributes to the debate on the impact of cross border real estate investments on the direct commercial/office market in Australia.

The Australian office market has been an important investment sector for superannuation (pension) funds, asset managers, and other property stakeholders, serving as an important asset class in property portfolios. In 2018, the total investments in the Australian office market were AUD 288 billion (USD212 billion c.a[1]). Lane et al. (2014) indicate that since 2008, cross border real estate investments have accounted for around one-quarter of the value of major commercial property purchases, and this is up from one-tenth in the previous 15 years. Within the direct commercial real estate sector in Australia, cross border real estate investments have primarily focused on the office property market (Lane et al., 2014). Furthermore, Letts (2018) reported that The Foreign Investment Review Board (FIRB) of Australia estimated that the value of cross border real estate investment approvals for commercial property was AUD 44 billion (USD14.3 billion c.a) in the 2016/2017 financial year. Current data indicate that out of a total of AUD 19.53 billion (USD14.3 billion c.a) office transactions, cross border real estate investments accounted for AUD 9.46 billion (USD6.95 billion c.a) which represent about 48% of the total transactions by value in 2018, and this is an increase of AUD 1.9 billion (USD1.4 billion c.a) from the previous year (Knight Frank, 2019). This demonstrates a substantial growth in cross border real estate investments in the commercial office market of Australia.

[1] Exchange rate is from Reserve Bank of Australia as of 31st August 2020, retrieved from https://www.rba.gov.au/statistics/frequency/exchange-rates.html.

Several studies have empirically provided reasons for cross border real estate investments. For example, exposition on international real estate securities and their income determinants, returns and diversification benefits (Eichholtz et al., 2011, Ling and Naranjo, 2002, Worzala and Sirmans, 2003, Bond et al., 2003), impact of cross border real estate investments on stock markets (see Henry (2000), Reis et al. (2010)), diversification benefits of international real estate (Falkenbach, 2009, Lizieri, 2009, Worzala and Sirmans, 2003), and the internationalisation of local host real estate markets due to cross border real estate investments (D'Arcy and Keogh (1998), Falkenbach and Toivonen (2010), Adair et al. (2006)). As for the impact of cross border real estate investments on the performance of local real estate markets, Dunse et al. (2007) suggest that exogenous investment funds are a significant influence on office market performance in the short term but not in the long run. They use the level of investment activity within a specific city without a thorough examination of cross border real estate funds invested within a particular property sub-sector. Keogh (1996), Falkenbach and Toivonen (2010), McAllister and Nanda (2015), and Oikarinen and Falkenbach (2017) have argued that cross border real estate investments have a negative relationship with capitalisation rates.

Apart from anecdotal evidence and suggestions by professionals (Knight Frank, 2019), there is no empirical evidence on the direction and magnitude of the impact of cross border real estate investments on the performance of the Australian direct office market. This paper contributes to filling this gap in the existing literature by examining the impact of cross border real estate funds on direct office real estate returns (total returns) in Australia. The study focuses on the Melbourne and Sydney office markets for the modelling for two reasons. First, the office market in Australia is highly concentrated, with Sydney and Melbourne constituting the most significant geographical markets in Australia with a combined total value of AUD 226 billion (USD166 c.a), which represents about 78% of the Australian office market (JLL, 2019). Second, there is limited data on the office market for the other six capital cities. As a result, findings based on quantitative modelling of data from these two markets could be used to generalise the performance of Australia, though with caution. The rest of the paper is structured as follows: literature review, methodology, results and discussion, and conclusions in Sections 2, 3, 4, and 5, respectively.

2. Literature Review

2.1 Theoretical Overview

Based on the mechanism that determines demand, supply and price in the direct commercial property market, Archer and Ling (1997) argue that commercial property (office) market is a composition of three interlinked submarkets: space, property and capital markets that drive economic relationships, which are relevant to determining the performance of office market. They group the determinants into factors that trigger demand in the property market, reactions in the space market, and actions from the capital market. Some studies have leveraged on this theory to examine the impact of certain factors on commercial property market performance; for example, Liow (2000) and De Wit and Van Dijk (2003). This paper also leverages on this theory to adopt and control for some factors, and include volume of cross border real estate funds as a new driver of Australian office market performance with the use of total returns.

2.2 Empirical Evidence

McAllister and Nanda (2015) have led investigations on cross-border capital and commercial real estate investment prices. They examine the relationship between cross-border investment and office cap rates in thirty-eight different metropolitan statistical areas (MSAs) across the US. They use an orthogonalisation process and find that an increase of 100 basis points in the cross-border share of total office investment volume in a given market typically leads to a decrease of 8 basis points in the office cap rate for that market. They conclude that all other things equal, there is a decrease in capitalisation rates with the resultant effect of increases in office real estate prices as cross border real estate funds that are invested in a specific real estate market increase. Subsequently, McAllister and Nanda (2016) examine the relationship between cross-border investment funds in major European cities and office capitalisation rates. Like their previous study, they obtain results that suggest a negative relationship between the volume of cross-border office investment and office cap rates throughout Europe. Thus, there is a positive relationship between the volume of cross-border funds and price because a reduction in the capitalisation rate invariably increases prices.

Recently, Oikarinen and Falkenbach (2017) focus on the office market in Helsinki, Finland, and find a statistically significant result which suggests that the office capitalisation rates in Helsinki have decreased by approximately 30 basis points for every 10% point increase in the proportion of volume of cross-border investments compared to the total volume transacted. With a focus exclusively on the New York City commercial office market, Devaney and Scofield (2017) explore the connection between cross-border investment and transaction prices. Their study finds that foreign buyers are more likely to pay a premium of about 9-18% more than their domestic counterparts for newer and larger properties in Manhattan (compared to other parts of the metropolitan area). So far, these are the studies that have focused on the volume of cross-border real estate funds and direct commercial office property prices.

Despite the paucity of directly related studies, there are other indirectly related studies that are relevant. For example, in the US housing market, Akkoyun et al. (2013) carry out Granger causality testing to demonstrate the multiple directional flow of causality- from transaction volume to price, price to volume, and both concurrently. De Wit et al. (2013) study the price-volume relationship in the Dutch housing market and find results similar to studies that focus on the

US. Sá (2016) argues that a 1% increase in the proportion of all housing transaction volumes (cross-border) creates a 2.1% increase in housing prices. Focusing on the London housing market, Badarinza and Ramadorai (2018) find highly significant evidence between cross-border investment volume and housing prices. Li, Shen and Zhang (2020) focus on funds that specifically originate from China and conclude that increases in the volume of cross-border funds from 2001-2013 were highly linked to increases in housing prices, especially in areas with high concentrations of ethnic Chinese. Wong et al. (2019) evaluate the impact of cross border real estate investments on the performance of house prices in Australia. They perform three models which include Sydney, Melbourne, and all cities and find that, cross border investments appear to exert upward pressure on house prices in all three models. This paper evaluates the impact of cross border investments on the performance of the Australian office market. The study leverages a different model and uses total returns as a measure of performance, which is a new contribution to the current literature. Within the Australian commercial real estate office market, this is the first study that examines the impact of cross border real estate investments on the total returns of office real estate.

3. Data and Methodology

3.1 Data

This study examines office market performance by using the total returns of office real estate from two major commercial property markets of Australia, i.e., Sydney and Melbourne, between 2007 and 2018. As the industrial and commercial centers of the nation, these two markets account for approximately 78% of the total office investment volume of around AUD$226 billion (USD166 billion c.a). Thus, data for Sydney and Melbourne could be used to represent the entire Australian office market and vice versa. Due to data constraints and the significance of both the Sydney and Melbourne office markets in Australia, the authors adopt national figures for vacancy rate, office stock, and foreign real estate investment in the modelling for both markets. The sample period spans several vital phases of the economic cycle from the crisis episode of 2007-2009 to the post-crisis recovery era, thus providing a rich source of financial information.

Apart from cross border funds, all macroeconomic indicators are widely available from official sources such as the Australian Bureau of Statistics (ABS) and the Reserve Bank of Australia (RBA), while property market indicators are available from the Property Council of Australia (PCA). Data related to cross border funds are generously provided by Real Capital Analytics (RCA). Office market performance is measured by using a total returns index, which is derived from the total returns. The total returns are a combination of income received by property investors and growth in the capital value of office properties. As a result, total returns are a measure of the yearly return on property investments and account for capital growth due to property market dynamics. This is an important measure of property market performance as investors base their investment decisions on total returns compared to other asset classes. Usually, total returns are a direct measure of the overall performance of office property as an investment asset class. Therefore, the total return variable is the sum of the change in the capital appraisal value and rent for each period. It is similar to the total return used in De Wit and Van Dijk (2003). Explanatory variables include the real gross domestic product (RGDP) per capita, office stock, vacancy and net absorption rates, and cross border real estate investments in the office sector. These variables are summarised in Table 1. Table 1 shows the independent variables used in the modelling, their respective codes, and explanation. Below the table are notes that explain that these explanatory variables are modelled against office real estate total returns as captured by the index. Total returns have been adopted as an independent variable in previous studies, including De Wit and Van Dijk (2003) and McGough et al. (2000).

Table 1 Variables and Their Description in the Study

Variable	Code	Description
Office total returns	TOT RET	Measured as quarterly total returns (income and capital growth) of office investments in Melbourne and Sydney.
Total Returns Index	TRI	An index of total returns normalised to 100 at the beginning of the time series is generated from total returns. The TRI variable captures the rate of growth by taking the ratio of index values in consecutive periods.
Real GDP per capita	RGDP	Real GDP per capita is used as an indicator of economic growth and activity. The GDP is divided by the consumer price index (CPI) to calculate the real GDP which is then divided by population to derive per capita measures at national level.
Office stock	STOCK	Semi-annual data on office stock available in Australia at national level.
Vacancy rate	VACANCY	Semi-annual vacancy rate for office market in Australia at national level.
Net absorption rate	NAR	Quarterly net absorption rate for Sydney and Melbourne measured as uptake of office space per period.
Foreign Real Estate Investment	CBREI	Quarterly data on total foreign investments (office transactions) in the Australian office sector measured at national level.

Note: Office total returns are modelled against real GDP per capita, office stock, vacancy rate, net absorption and foreign real estate investment.

As mentioned earlier, there are several drivers of office property market performance. As a result, other factors are also explored, including population growth, the number of persons employed in professional, scientific and technical services, building approvals, and unemployment rates. However, these are not included in the final model due to the lack of statistical significance after controlling for the variables. It is important to note that during modelling, several dependent variables were tested against the independent variables to achieve the optimal results based on the available data. Therefore, the results presented in this paper represents the best results achieved after several modelling attempts with the use of capital value and returns, and total returns as the dependent variables.

As part of the data description, descriptive statistics have been calculated from part of the data and shown in Table 2.

Table 2 Annualised Summary Statistics for Growth Rates of Selected Variables

In Table 2, annualised summary statistics for growth rates of selected variables are presented as description of the data used in the study.

	Total Returns: SYD	Total Returns: MEL	RGDP	STOCK	VACANCY
Mean	8.88%	9.34%	0.69%	1.80%	8.70%
Median	8.42%	8.42%	0.49%	1.11%	9.31%
Std Dev	4.8%	3.5%	2.12%	1.58%	2.14%
Min	-2.84%	-0.06%	-2.87%	-0.41%	3.88%
Max	22.89%	18.57%	5.57%	4.54%	10.90%

Note: Annualised office total returns and office vacancy rates; and annualised growth rates for real GDP per capita and office stock.

In Table 2, the average annual office total returns in the Sydney and Melbourne markets are 8.8% and 9.34%, respectively, while the average yearly vacancy rates are 8.70%. Office stock has increased at a rate of 1.80% per year, while RGDP per capita is increased by 0.69% per year on average over the modelling period.

3.2 Methodology

In theory, total returns vary in accordance with demand and supply conditions. Periods of high demand (and relatively limited supply) will place upward pressure on total returns while additions to the supply stock (to the extent that surpluses are created) will place downward pressure on rents, and hence on yields, which ultimately affects total returns, and consequentially affect the performance of the entire office market. Accordingly, demand side factors should correlate positively with total returns, while supply side factors are expected to vary inversely. As RGDP is a measure of economic activity, increases of this factor should result in higher demand for office space and, therefore, higher rents (higher yields), which lead to higher total returns (if capital growth also experiences growth). Conversely, as office stock represents the amount of available space, its growth results in a larger supply and lower rents (lower yields), thus leading to lower total returns. Vacancy rates, on the other hand, are derived from a combination of demand and supply. If a given increase in demand is met with a proportionate increase in supply, vacancy rates will remain unchanged. Therefore, an increase in vacancy rates represents a growth in supply in excess of demand, i.e. a surplus. Conversely, a decrease in vacancy rates represents the opposite. A related concept is that of the net absorption rate. An increase (decrease) in net absorption represents a net increase (decrease) in demand above supply. Consider a tenant who currently occupies 1000 square metres of space. If, in a given period, the tenant relocates from one site to another of an equivalent size, then the net absorption is zero. There is an additional demand of 1000 square metres as the tenant relocates. However, this is met with an additional supply of 1000 square metres as the previous site becomes available. If the tenant relocates to a site of 1500 square metres, then the net absorption is 500 as there is an additional demand of 1500 square metres while only 1000 square metres become available from the previous site.

Estimation wise, the long run relationships and short run dynamic interactions among the variables of interest are estimated via the autoregressive distributed lag (ARDL) cointegration approach developed by Pesaran and Shin (1999) and Pesaran et al. (2001). This method is one of the least 'restrictive' among the class of equivalent time series estimation techniques. Traditional approaches, such as ordinary least squares (OLS), require all of the variables to be stationary. In the case where all of the variables are non-stationary and integrated of the same order (e.g. I(1)) *but* not cointegrated, then differencing may be applied until stationarity is achieved. Even if all of the variables are integrated of the same order *and* cointegrated, then an error correction model (ECM) may be specified to estimate a long-run model that considers short-run dynamics. However, while theoretically valid, these conditions are rarely met in applied work. In cases where variables contain a mixed order of integration (some may be stationary while others are not) and there is the possibility of cointegration among *some* of the I(1) variables, the ECM approach is no longer valid. Instead, the ARDL model becomes valid.

The ARDL model involves the following steps: first, an unrestricted ECM is specified. Next, an appropriate lag structure is determined. Common lag order selection criteria include the Akaike information criterion (AIC), Schwarz/Bayes criteria (SC) and Hannan-Quinn (HQ) information criteria. Following this, a separate long-run model in 'levels' is estimated with the (lagged) residuals included as an error correction term in the 'restricted' ECM. Long run coefficients may also be recovered from the unrestricted ECM while the coefficient of the error correction term is commonly interpreted as the speed of adjustment – that is, the speed with which the system returns to its long-run equilibrium following a short-term shock. Accordingly, the unrestricted ECM may be expressed as follows:

$$\begin{aligned}\Delta\big(ln(TRI_t)\big) = \beta_0 &+ \sum_{i=1}^{p} \beta_{1i}\Delta\big(ln(TRI_{t-i})\big) + \sum_{i=0}^{q} \beta_{2i}\Delta\big(ln(RGDP_{t-i})\big) \\ &+ \sum_{i=0}^{q} \beta_{3i}\Delta\big(ln(STOCK_{t-i})\big) + \sum_{i=0}^{q} \beta_{4i}\Delta\big(ln(VACANCY_{t-i})\big) \\ &+ \sum_{i=0}^{q} \beta_{5i}\Delta\big(ln(NAR_{t-i})\big) + \sum_{i=0}^{q} \beta_{6i}\Delta\big(ln(CBREI_{t-i})\big) \\ &+\theta_{11}ln(TRI_{t-1}) + \theta_{21}ln(RGDP_{t-1}) + \theta_{31}ln(STOCK_{t-1}) \\ &+\theta_{41}ln(VACANCY_{t-1}) + \theta_{51}ln(NAR_{t-1}) \\ &+\theta_{61}ln(CBREI_{t-1}) + \varepsilon_t\end{aligned}$$

The restricted ECM may be expressed as:

$$\begin{aligned}\Delta\big(ln(TRI_t)\big) = \beta_0 &+ \sum_{i=1}^{p} \beta_{1i}\Delta\big(ln(TRI_{t-i})\big) + \sum_{i=0}^{q} \beta_{2i}\Delta\big(ln(RGDP_{t-i})\big) \\ &+ \sum_{i=0}^{q} \beta_{3i}\Delta\big(ln(STOCK_{t-i})\big) + \sum_{i=0}^{q} \beta_{4i}\Delta\big(ln(VACANCY_{t-i})\big) \\ &+ \sum_{i=0}^{q} \beta_{5i}\Delta\big(ln(NAR_{t-i})\big) + \sum_{i=0}^{q} \beta_{6i}\Delta\big(ln(CBREI_{t-i})\big) + \emptyset z_{t-1}\end{aligned}$$

where:

$$\begin{aligned}ln(TRI_t) &= \alpha_0 + \alpha_1 ln(RGDP_t) + \alpha_2 ln(STOCK_t) + \alpha_3 ln(VACANCY_t) \\ &\quad +\alpha_4 ln(NAR_t) + \alpha_5 ln(CBREI_t) + v_t \\ z_{t-1} &= ln\big(TRI_{t-1}\big) - \alpha_0 - \alpha_1 ln\big(RGDP_{t-1}\big) - \alpha_2 ln\big(STOCK_{t-1}\big) \\ &\quad -\alpha_3 ln(VACANCY_{t-1}) - \alpha_4 ln(NAR_{t-1}) - \alpha_5 ln(CBREI_t)\end{aligned}$$

The parameter ϕ may be interpreted as the 'speed of adjustment'. This estimation procedure is applied to the Sydney and Melbourne markets.

4. Results and Discussion

The ARDL bounds testing approach requires no variables to be integrated of the order 2 or greater to avoid spurious results. The unit root (breakpoint) test results are summarised in Table 3, which indicate the presence of a unit root in some of the variables but not others, thus suggesting a mixed order of integration. Note that all of the variables are stationary after the first differencing.

Table 3 Unit Root Breakpoint Non-Stationarity Tests for Presence of Unit Roots

Sydney Model			Melbourne Model		
Variable	ADF	p-value	Variable	ADF	p-value
LN-TRI	0.3158	0.9981	LN-TRI	-0.2251	0.9278
LN_RGDP	-2.62855	0.8592	LN_RGDP_CAPITA	-2.32398	0.9423
VACANT	-5.05185	< 0.01	VACANT	-5.05185	< 0.01
LN-STOCK	-6.09298	< 0.01	LN-STOCK	-6.09298	< 0.01
LN-NAR	-3.96843	0.1665	LN-NAR	-4.91493	0.0118
LN-UNEMP	-4.1619	0.1083	LN-UNEMP	-4.1619	0.1083
LN-CBREI	-3.58851	0.3377	LN-CBREI	-3.58851	0.3377

Note: the null hypothesis is that a unit root exists. Therefore, failure to reject the null hypothesis indicates the presence of a unit root.

For brevity, full estimation output, including the unrestricted and restricted ECMs, are reproduced in Appendixes 1 and 2, respectively. Long run parameter estimates, F-statistics for the 'bounds' testing, and the coefficient of the error correction term (the so-called 'speed of adjustment') are reproduced in Table 4.

Table 4 Long Run Coefficients via the ARDL Estimation Procedure

Variable	Sydney	Melbourne
Constant	58.0767*	17.3397***
LN(RGDP)	4.9483*	0.4236***
LN(STOCK)	-6.6914*	-1.2141***
LN(VACANCY)	-6.9277*	-2.6502***
LN(NAR)	0.3208**	-0.1276***
LN(CBREI[1])	-0.1826**	0.02888***
ARDL bounds test: F-stat	7.0772	13.50331
Critical value bounds	I(0)	I(1)
10%	2.12	3.35
5%	2.45	3.79
1%	3.15	4.68
Speed of adjustment	-0.6515	-0.3517

Note: Long run coefficients via the ARDL estimation procedure. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels of significance respectively.
[1] The original series was exponentially smoothed (smoothing constant = 0.3) to reduce noise.

The testing of residuals indicates that the error terms are free from serial correlation. The null hypothesis for the ARDL bounds test is rejected at the 1% level for both models which shows long-run cointegrating relationships between the variables. Furthermore, all of the variables are at least statistically significant at the 10% level. Cross border real estate investment is found to be statistically significant in both the Sydney and Melbourne models, but the results are contrary to expectations in the Sydney model. Similarly, while the results on net absorption rates are statistically significant in both the Sydney and Melbourne models, the direction of movement in the latter contradicts expectations.

As shown in Table 4, the study primarily investigates the impact of cross border real estate investments on the total returns of office property. The results indicate that an increase of 1% in cross border real estate investment leads to an estimated increase of 0.03% in office total returns in the Melbourne market. It is argued that cross border real estate investment represents the demand for property in the Melbourne office market because the approach of foreign investors is to buy and hold property assets over an investment horizon. This has the impact of increasing demand for office property with an attendant effect of a rise in property prices and hence, total returns. On the contrary, the Sydney model indicates that an increase of 1% in cross border real estate investment leads to an estimated decrease of 0.18% in office total returns. Like the finding for net absorption in the Melbourne model, cross border real estate investment has a negative relationship with total returns in the Sydney office market. The results indicate that for every 1% increase in cross border real estate investment in the Sydney office market, there is a corresponding 0.18% decrease in total returns. This negative relationship depicts cross border real estate investment as a supply side variable although inconclusive. Cross border real estate funds, in some cases, provide funding for commercial property development projects. As a result, their transactions may be reflected in the market as increasing supply, which ultimately impacts total returns negatively. Therefore, cross border real estate investments should be viewed as increasing supply instead, and not demand in the Sydney office market because the capital flow is not for office uptake to increase occupancy but for investment. This is supported by Finsia (2014), which suggested that cross border investors do not have established businesses to take up existing space, as such cross border investments serve as capital for financing development projects rather than renting to increase occupancy. Another reason may stem from the divestment of commercial properties held by cross border investors in the Australian office property market, which adds to the supply of properties on the market. Cross border investments have also involved divestment of property assets in recent times. Thus, the results indicate those cross border investments have a significant impact on the performance of the direct commercial office market in Australia.

The study reports on other factors that are included in the model. In terms of RGDP per capita, an increase of 1% leads to an estimated increase of 4.95% in total returns in the Sydney market and an increase of 0.42% in the Melbourne market. The RGDP is a fundamental driver of property market performance. As a result, changes in the RGDP impact property performance. The positive relationship between RGDP per capita and total returns confirms the hypothesis of this paper because variation in the level of economic activity (RGDP) affects demand for office space, which leads to changes in rents and property values, and hence total returns. As economic activity increases (which is denoted by positive changes in the RGDP), this translates into expansion of the Australian economy. Firms usually expand business operations in response to RGDP growth, which leads to increased demand for office space in Australia. Thus, the RGDP per capita has a long-run positive correlation with office real estate total returns. This is consistent with the theory that economic growth positively impacts office property market performance and is further consistent with the results of similar studies including De Wit and Van Dijk (2003), who study the determinants of office market performance at the global level, Karakozova (2004) who uses data from Finland, and West and Worthington (2006) who adopt data from Australia. This finding indicates that the Australian office market responds to the same drivers and in the same direction as the markets in the UK, Finland, the US, and Singapore, albeit at different magnitudes. On the contrary, the finding contradicts results from two other studies on the same subject, i.e., Hin and Addae-Dapaah (2014) and Akinsomi et al. (2018), who find a negative relationship between GDP and total returns from office real estate. The result is unsurprising and attributed to the fact that a larger part of the office real estate returns data for the modelling period correlate positively with the Australian RGDP, which also experienced positive growth year on year for a greater part of the modelling period.

An increase of 1% in the vacancy rates lead to an estimated decrease of 6.93% in the total returns in the Sydney market, and a decrease of 2.65% in the Melbourne market. This finding is consistent with theory and practice because there is a negative relationship between change in the vacancy rate and total returns. Since vacancy is a supply variable, this negative relationship is expected. Higher vacancy rates depict oversupply. As a result, landlords usually decrease rents to clear vacancies in the market, thereby lowering rental yields and ultimately impacting negatively on total returns. Consistent with neoclassical economic assumptions, as office space supply increases disproportionately over demand and becomes less scarce, market performance and confidence decrease with an adverse attendant effect on total returns. This finding is supported by the results of earlier studies, including D'Arcy et al. (1999), who find that change in vacancy rates is a key determinant of property market performance in Dublin. Similarly, this study confirms that there is a negative relationship between office total returns and vacancy rates which is consistent with De Wit and Van Dijk (2003) and de Wit (2007) at the global level and Hin and Addae-Dapaah (2014) who use data from Hong Kong. Similar to the impact of changes in the stock of existing office space on total returns, a 1% increase in the stock of office space has an estimated impact of 6.93% decrease in office real estate total returns. Since changes in the stock of office space represent supply, this negatively impacts office total returns. The finding is consistent with theory and confirmed by De Wit and Van Dijk (2003), who find a negative relationship between the supply of office buildings and total returns from office real estate.

A 1% increase in the net absorption rate leads to an estimated increase of 0.32% in total returns in the Sydney market. Net absorption is a demand-side variable that measures the uptake of total office space for each period. As such, as the net absorption rate increases, it represents an increase in demand for office space. With existing supply unchanged, property values are expected to rise to cause a corresponding change in total returns. As a result, this finding is consistent with theory and practice, which validates the argument of this paper. An important observation is that changes in net absorption rates have a contemporaneous effect on property market performance which causes a corresponding change in total returns. In this case, the impact of lower vacancy or increasing demand (net absorption) is priced into assets almost immediately. The result is consistent with theory and practice because net absorption is a demand-side variable and hence, positively correlated with total returns. Surprisingly, the net absorption rate, although significant in the Melbourne model, has a negative relationship with the total returns with a 0.13% decrease for every 1% increase. It is argued that this could be due to the use of long-term leases in the office market, which tends to bind tenants to their spaces, thereby slowing down adjustment of space consumption (DiPasquale and Wheaton, 1995). This has impacts on the rental rates payable by tenants at any point in time, hence, affecting the total returns in the Melbourne office market.

Another reason that could explain for the surprising results is the nature of lease incentive packages available to tenants. Lizieri (1998) and Hendershott et al. (2010) suggest that incentive packages are a function of supply and demand in the marketplace and vary according to the letting cycle. Thus, during a market downturn, landlords are inclined to offer higher rent-free periods/lease incentives to persuade tenants to rent office space and vice versa. If asking rents are adjusted for rent-free periods (which in some cases could be 12 months rent-free depending on the lease lengths), effective rents received by landlords would be lower than market rents. The effect is lowering of rental yields, which leads to lower total returns. Historically, the Sydney office market has outperformed the Melbourne office market due to the stature of Sydney as the financial capital of Australia, which houses the headquarters of several businesses. As a result, it is argued that the incentives of tenants may be high in Melbourne compared to Sydney, which is essential to drive the uptake of office space. Since such tenant incentives have the impact of reducing rents payable, which affects rental yield and hence total returns, a negative relationship between total returns and net absorption rates is plausible. Therefore, the surprising results could be due to higher lease incentive packages such as rent-free periods prevalent in the Melbourne office market. This is supported by Saviils (2019) in that incentive packages in Melbourne have remained high and are attributed to the strong competition between institutional landlords and high levels of upcoming supply. The supply in the pipeline could cause pre-leasing difficulties. Hence, landlords have to offer high incentive packages to achieve maximum levels of pre-leasing to minimise risks of rental voids in large portfolios.

The modelling strategy employed in this study integrates both short-run dynamics with long-run equilibrium relationships without losing long run information. As Appendix 1 indicates, the macroeconomic factors explored, such as the RGDP, vacancy rate, office stock, net absorption, unemployment, and foreign real estate investment, can continue to exert influence on the total returns for up to three quarters. This finding is not unexpected, given that changes in the macroeconomic environment can take time to filter through to the individual sectors.

Lastly, the 'speed of adjustment' is relatively swift, with up to 65.15% of deviations from the long-run equilibrium adjusted within one quarter in the Sydney office market and 35.17% in the Melbourne market, thus indicating relatively efficient markets and associated transmission mechanisms. Therefore, deviations from long-run equilibrium do not persist. The market can correct itself to reach an acceptable equilibrium after every distortion. To examine the potential of the developed model in predicting the future performance of the office market in Melbourne and Sydney, a graph of the actual/observed values is plotted against forecasted values derived from using the model. The results of the plots for Sydney and Melbourne are shown in Figures 1 and 2 respectively. Note that these values are generated by using the unrestricted version of the model. Distributed lag models such as the one presented in this study essentially seek to explain changes in the dependent variable as functions of the independent variable(s). However, an issue with time series data of this nature is the effect of short run dynamics on the variable of interest which can make estimation of the long run effects difficult. The autoregressive distributed lag model consists of two parts: the autoregressive and the distributed lag. The former (denoted by the β-coefficients in the unrestricted model) capture the 'short run' dynamics while the latter (denoted by the θ-coefficients) capture the 'long run' effects. In fact, the long run coefficients presented in Table 4 are derived from the coefficient estimates of the distributed lag components (the θ-coefficients). This process is discussed in Pesaran and Shin (1999). The long run coefficients which are generally of greater interest are derived from the unrestricted model. The purpose of the restricted model is mainly to estimate the 'speed of adjustment' which is depicted by the ϕ-coefficient in the restricted model. This provides useful information on how quickly the dependent variable returns to its long run equilibrium following a shock.

As Figure 1 indicates, the forecasted values for office total returns in Sydney closely follow the actual/observed values. The correlation coefficient between the series is 0.9780. This is an indication that the variables used in the model have a strong relationship with the observed values. Therefore, changes in these variables could lead to variations in office total returns in the Sydney market.

Figure 1 Actual vs. Forecasted Values for Office Total Returns in Sydney

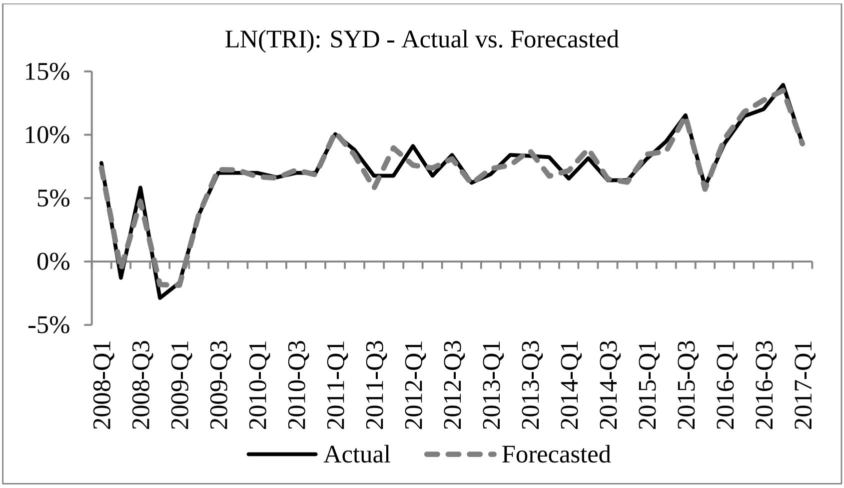
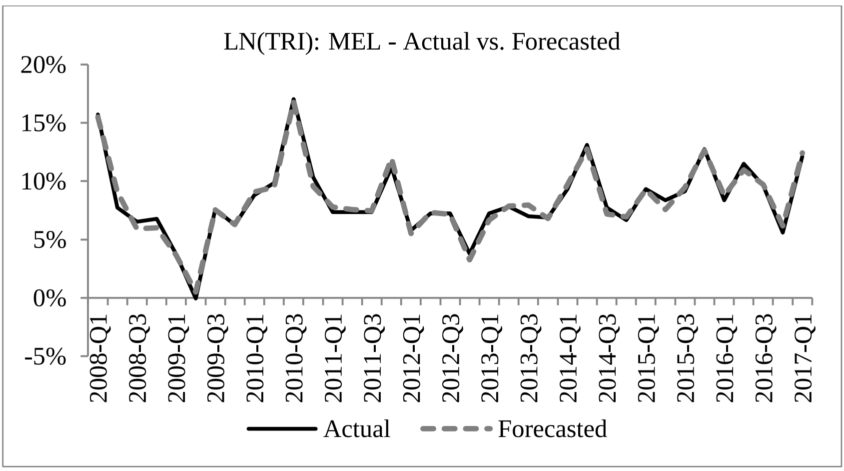


Figure 2 shows that the forecasted values for office total returns in Melbourne closely follow the actual/observed values. The correlation coefficient between the series is 0.9879. Like the Sydney market model, this confirms that the variables in the model have a strong relationship with the observed values. Therefore, changes in these variables or determinants would lead to variations in office total returns in the Melbourne office property market.

Figure 2 Actual vs. Forecasted Values for Office Total Returns in Melbourne



Essentially, this study has unravelled several factors that determine the performance of the office market in Australia with emphasis on Sydney and Melbourne. The work confirms the existence of long-run relationships between office total returns and traditional determinants, including the RGDP, stock of office space at a time, and vacancy and net absorption rates. Thus, the relationship between demand and supply-side variables in the model is confirmed, albeit with some surprising relationships. Therefore, practitioners and various stakeholders in the office market in Australia should focus on these determinants when evaluating their investment decisions.

Furthermore, the emergence of cross border real estate investments as a determinant of market performance in the Melbourne model is interesting. Their appearance confirms several media reports that cross border investments in the property market is a driver of office property market performance. Surprisingly, cross border real estate investments have a negative relationship with total returns in the Sydney model, which suggests that increases in cross border real estate investments in the Sydney office property market may reduce the total returns for investors. On the contrary, total returns in the Melbourne office property market is positively correlated with cross border real estate investments. As a result, property investors in Melbourne and Sydney should evaluate these two markets as separate and distinct based on the drivers of office property market performance because the determinants of property market performance are different for the two markets with respect to the impact of cross border real estate investments.

Other stakeholders, including public sector agencies mandated to regulate cross border investments such as the FIRB of Australia, can rely on the findings of this study to determine and formulate policies that would mitigate the impact of cross border investments on the office property market in Australia. Based on the findings of this study, some discriminatory policy approaches whereby different policy interventions are developed for the two different markets would be appropriate due to divergent results. The findings of this study also provide empirical evidence required to support or refute the argument that cross border investments are responsible for driving office property market performance in Australia. The results contribute to enhancing the existing limited studies on this vital subject of cross border real estate investments for various countries. Whereas the academia could leverage the findings of this research work to conduct further studies with data from different countries, the industry can rely on the findings to gauge and possibly prepare for potential changes in the performance of the Australian office market driven by the factors determined in this study.

Since this is an initial study, it is acceptable that there may be limitations with the quantity of observations and data used for the modelling. However, it is argued that with a large sample size, the possibility of a sub-period analysis could have been explored to determine which specific periods that the data cointegrate negatively with the total returns and compare the results from different sub-periods for an in-depth analysis. It is also acknowledged that probably, a different measure of cross border real estate investment could be explored to examine whether the relationship would be different. For example, the FIRB of Australia collects data on foreign investments and could be a useful source of data for further research, but it is only available as an annual data which does not permit a more in-depth analysis of this nature. Due to data constraints, the authors have adopted national figures for vacancy rate, office stock, and foreign real estate investment in the modelling for both markets. Despite the use of national figures for vacancy rates, office stock per period, and foreign real estate investment rather than values of the Sydney and Melbourne markets, it is argued that the result is still generalisable because the two markets form about 78% of the entire Australian market. Besides, anecdotal evidence suggests that these two markets are the most attractive markets for foreign investments and receive the bulk of investments in direct commercial office property. As a result, these two markets are likely to drive movements in the entire commercial property market in Australia. However, such a generalisation must be made with caution because it may be possible to derive varied results if data at the local level for Sydney and Melbourne are adopted for the modelling. Furthermore, there may be other specific local factors that are partly responsible for movements in the market.

Overall, it is essential to recognise that this emerging factor is a determinant of office market performance for both the Sydney and Melbourne office markets. The current study serves as a platform for further research, which may include other variables such as changes in the currency exchange rate (Australian dollar vs Chinese renminbi (RMB) or US dollar (USD). Furthermore, China has become a significant source of global capital flow to Australia, and quite recently, there have been capital controls in China, thereby limiting the ability of Chinese investors to move capital offshore. It will be interesting to understand the impact of cross border real estate investments from China on the Australian office market performance if data are available.

5. Conclusion

The thesis of this paper is to examine the determinants of Australian office market performance with the inclusion and determination of the impact of cross border real estate investments in Australia with the total return variable as the measure of performance. Two major cities, Sydney and Melbourne, with a combined value of over AUD$220 billion (USD166 billion c.a), represent approximately 78% of the market, are used as a proxy for the Australian property market. Independent variables examined include both demand and supply-side variables with a blend of economic variables. The variables include the RGDP per capita, net absorption rate, stock of office space, vacancy rate, and cross border real estate investments that span 12 years. Using the ARDL model as presented in Section 3 and the evidence obtained after modelling, the paper suggests the following conclusions.

With regards to the thesis of this paper, it is concluded that changes in the total returns in Sydney and Melbourne are influenced by the RGDP, net absorption rate, stock of office space, vacancy rate and cross border real estate investments, albeit with some surprises and differences in the magnitude of impact of the different variables. Apart from the net absorption rates and cross border real estate investments in the Melbourne and Sydney models showing unexpected relationships with total returns, respectively, all of the examined determinants show the expected relationships with total returns and confirm the findings in the existing literature. More importantly, the evidence indicates that the Melbourne office property market is more positively influenced by cross border real estate investments whereas it is more negatively influenced for the Sydney office market. It is concluded that changes in vacancy, RGDP, stock of office space, net absorption rate, and cross border real estate investments impact total returns. As a result, the reaction of the market to changes in these determinants is more quick than anticipated because the effect of the information flow through the property market is usually slow.

The findings of this study would benefit practitioners and stakeholders in the property industry because they provide new findings on certain traditionally established determinants and newly emerging factors (cross border real estate investments) of the office property market performance in Australia, which provides the opportunity for further investigation into other sub-classes of properties and from other geographical markets. Despite several media publications about the perceived impact of cross border real estate investments on the performance of the Australian office market, this study has found evidence that the cross border real estate investments are partly responsible for changes in total returns. As part of future research, other sophisticated econometric techniques suitable for incorporating other variables such as interest rates, building approvals, and unemployment rates, which are equally important determinants of direct office property market performance, could be explored.

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Appendices

Appendix 1 Unrestricted ECM Parameter Estimates

Variable	SYD	Variable	MEL
C	109.2927	C	107.4091
D(LN_RGDP)	8.2520	D(LN_TRI (-1))	3.2116
D(LN_RGDP(-1))	0.8119	D(LN_TRI (-2))	1.5521
D(LN_RGDP(-2))	-4.7963	D(LN_TRI (-3))	0.2980
D(LN_RGDP(-3))	-2.9859	D(LN_RGDP_CAPITA)	-1.6797
D(VACANT)	-10.3279	D(LN_RGDP_CAPITA(-1))	-1.3490
D(VACANT(-1))	-2.2326	D(LN_RGDP_CAPITA(-2))	4.7018
D(VACANT(-2))	27.3238	D(LN_RGDP_CAPITA(-3))	2.4655
D(LN_STOCK)	2.9998	D(VACANT)	2.8558
D(LN_STOCK(-1))	-4.4555	D(VACANT(-1))	-24.2517
D(LN_STOCK(-2))	5.1089	D(VACANT(-2))	1.6813
D(LN_STOCK(-3))	6.1148	D(VACANT(-3))	-24.2135
D(LN_NAR)	0.0206	D(LN_STOCK)	17.0399
D(LN_NAR(-1))	-0.3962	D(LN_STOCK(-1))	-19.9475
D(LN_NAR(-2))	-0.1600	D(LN_STOCK(-2))	33.5154
D(LN_NAR(-3))	-0.0481	D(LN_STOCK(-3))	-2.6754
D(LN_UNEMP)	0.3335	D(LN_NAR)	-0.1939
D(LN_UNEMP(-1))	-2.8118	D(LN_NAR(-1))	0.3451
D(LN_UNEMP(-2))	-1.0879	D(LN_NAR(-2))	0.2353
D(LN_UNEMP(-3))	-0.2939	D(LN_NAR(-3))	0.2265
D(LN_CBREI_ES)	-0.0346	D(LN_CBREI_ES)	-0.0235
D(LN_CBREI_ES(-1))	0.3287	D(LN_CBREI_ES(-1))	-0.1400
D(LN_CBREI_ES(-2))	0.2944	D(LN_CBREI_ES(-2))	-0.0567
D(LN_CBREI_ES(-3))	0.1450	LN_TRI (-1)	-6.1944
LN_TRI (-1)	-1.8819	LN_RGDP_CAPITA(-1)	2.6238
LN_RGDP(-1)	9.3120	VACANT(-1)	16.4164
VACANT(-1)	-13.0370	LN_STOCK(-1)	-7.5205
LN_STOCK(-1)	-12.5924	LN_NAR(-1)	-0.7903
LN_NAR(-1)	0.6038	LN_CBREI_ES(-1)	0.1786
LN_UNEMP(-1)	4.7274		
LN_CBREI_ES(-1)	-0.3436		

Appendix 2 Restricted ECM Parameter Estimates

Variable	SYD	Variable	MEL
D(LN_RGDP)	1.1634	D(LN_TRI (-1))	-0.5999
D(LN_RGDP(-1))	-1.2043	D(LN_TRI (-2))	-0.5626
D(LN_RGDP(-2))	-0.5530	D(LN_TRI (-3))	-0.5023
D(LN_RGDP(-3))	-1.1045	D(LN_RGDP_CAPITA)	2.7897
D(VACANT)	-1.3947	D(LN_RGDP_CAPITA(-1))	0.2868
D(VACANT(-1))	1.7693	D(LN_RGDP_CAPITA(-2))	4.5241
D(VACANT(-2))	-0.4561	D(LN_RGDP_CAPITA(-3))	-11.2949
D(LN_STOCK)	-5.6290	D(VACANT)	-13.0015
D(LN_STOCK(-1))	8.8984	D(VACANT(-1))	1.0840
D(LN_STOCK(-2))	-3.8789	D(VACANT(-2))	0.6195
D(LN_STOCK(-3))	1.1575	D(VACANT(-3))	-3.5837
D(LN_NAR)	-0.0343	D(LN_STOCK)	-5.3396
D(LN_NAR(-1))	0.0006	D(LN_STOCK(-1))	0.1452
D(LN_NAR(-2))	0.0040	D(LN_STOCK(-2))	-0.0336
D(LN_NAR(-3))	-0.0111	D(LN_STOCK(-3))	0.0869
D(LN_UNEMP)	-0.0403	D(LN_NAR)	0.0179
D(LN_UNEMP(-1))	-0.0164	D(LN_NAR(-1))	-0.0045
D(LN_UNEMP(-2))	0.0446	D(LN_NAR(-2))	1.2371
D(LN_UNEMP(-3))	-0.1753	D(LN_NAR(-3))	0.9425
D(LN_CBREI_ES)	0.0515	D(LN_CBREI_ES)	0.2436
D(LN_CBREI_ES(-1))	0.0206	D(LN_CBREI_ES(-1))	-0.0661
D(LN_CBREI_ES(-2))	0.0158	D(LN_CBREI_ES(-2))	-0.0466
D(LN_CBREI_ES(-3))	-0.0438	Z(-1)	-0.3517
Z(-1)	-0.6515		