

The Effects of Monetary Policy on the Australian Property Market

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ABSTRACT
The use of monetary policy has important implications within an economy as it directly affects the supply and demand of cash itself. One most notable application of monetary policy in Australia is the change in the official cash rate (OCR) and its effects on both domestic as well as at international levels. We attempt to use both effects from foreign investments as well as impacts from domestic sources to measure the influences of the OCR on the Australian housing markets.

This research also draws attention towards the variation in the growth rate of property prices in major Australian cities and how it reacts to the changes in this major economic variable. Our paper also addresses the limitations of the devised models however, at a high level these models gives guidance to general movements in housing prices given monetary policy changes with fixed money supply as determined by the Reserve Bank of Australia (RBA) and with that reinforced by movements in several macroeconomic indicators.

Keywords: official cash rate; monetary policy; Australian property market; housing prices.

1. INTRODUCTION

There has been abundant academic discourse on role of interest rates and its impact on the real housing prices in the Australian market. The focus of this research is to give general insight about decisive factors that drives residential housing prices in Australia. This research examines "The changes in RBA cash rate and its impact on Real Estate market" from the period 2002-2014. Furthermore we analyse the speculative claims of Australian property market bubble by providing some historical research in this area. We examine this phenomenon by analysing the growth in listed and unlisted properties through multiple regressions on real time data series. We have provided quarterly observations of property price index regressed on several key macroeconomic variables over the last decade. Finally, we test their significance level and support our findings in light of various literatures and earlier studies.

2. LITERATURE REVIEW

Home ownership is popularly considered as one of the indicators of high living standards across the globe. Additionally, it provides security, independence and privacy to the masses. It is then imperative that we closely study its determinants, reasons for price fluctuations, and its overall impact on to the whole economy. Since, housing equity forms a major asset for all households in aggregate it represents around 60 per cent of net household wealth in Australia (Otto 2007, p. 226) it also accounts for around 55 percent of total assets of all

Australians. Around 28 percent of Australians live in rented accommodation, and more than three-quarters rent from private landlords (Standard and Poor's; Eslake cited in , p. 577).

If house prices are overvalued, which is of the opinion in Australia, nominal house prices are likely to drop as well as real prices at times of recession. If the housing bubble bursts it will do more harm to the general economy than when the stock market collapses (Rahman 2010, p. 587).

It is also important to note that inflationary shocks and interest rate shocks lower housing prices, while output shocks have an incremental affect on them. Moreover, house prices move with output conditional on all three macroeconomic shocks and their response is larger in magnitude compared to the response of output (Demary 2010, p. 16). This was the case in Global Financial Crises when the house prices plummeted in U.S. and across several other nations leading to a huge disaster for many financial institutions.

Moreover, most of the countries experienced a house price boom after the mid-1990s (Tsatsaronis and Zhu 2004, p. 66). In Australia, the lower interest rates over the past decade have also contributed to increased house prices (Rahman 2010, p. 587). This inferring that declining interest rate markets and OCR environment will typically boost the overall demand for residential real estate market. Economist and Gittins (cited in Otto 2007, p. 225) and a number of commentators have suggested that periods of rapid price rises in parts of the Australian housing market are indicative of speculative bubbles, and this can be related back to past experiences such as the technology bubble and US housing bubble. Some support for this claim is provided by Bodman and Crosby (cited in Otto 2007, p. 225) who estimated that house prices in Sydney and Brisbane exceeded their fundamental values by about 20–25 percent in 2002 and 2003 respectively.

Consequently, housing investment decisions are extremely pivotal for all households. And this category of household expenditure critically depends on the OCR, cost structure and flexibility of debt financing. These factors are likely to drive shifts in housing demand in the short run together with returns in other asset classes, which determine the opportunity cost of real estate investments (Tsatsaronis and Zhu 2004, p. 68).

Many potential drivers on property prices have been proposed by Otto (2007, p. 226) and these include, the role of interest rates; demographic factors such as population growth; output movements in most countries; real income growth; subsidies to housing; the cost of maintenance or depreciation; expected capital gains which is unobservable at times; constraints on the supply of new housing due to government regulations; the performance of the stock market; long-run behavior of inflation; and the overall tax regime.

The most striking result emerging from the analysis of these drivers is the dominance of inflation in determining long run real house prices, despite marked differences in the individual aspects of national markets. However, in the short run, the size of the impact is even larger. Tsatsaronis and Zhu (2004, p. 72) stated that its contribution nears 90% of the total price variation in the one-quarter horizon and drops to about two thirds over the one-year horizon. Finally, the impact of inflation on the cost of mortgage financing suggests that higher inflation would have a negative impact on house prices.

Accordingly, since house financing is a critical aspect on the demand side of the market. Previous study entails, variable mortgage rate have an important influence on growth rates of real house prices in Australia's capital cities across all states. Empirical results show that the nominal mortgage rate also plays an important role in influencing the real growth rate of property prices (Otto 2007, p. 231). In all major cities in Australia, the estimated marginal effect of the mortgage rate on the real growth rate of house prices is negative and it is statistically significant. In Australia, movements in variable mortgage rates are closely tied to changes in the RBA's target cash rate. Subsequently, dynamics of house prices related to mortgage finance are tied with bank credit, short-term interest rates and spreads. They are almost equally important, and together they explain about one third of the observed variance of house prices in the long run. However surprisingly household income has a very small explanatory power over housing price movements (Tsatsaronis and Zhu 2004, p. 73).

Lastly, the historical analysis on house price growth rates suggests that the performance of the Australian stock market appears to have a negative impact on it. Population growth is generally expected to have a positive effect on housing prices. The unemployment rate has a negative effect on the growth rate of house prices as expected, whereas, inflation rates or CPI are found to have a significant positive impact on its prices (Otto 2007, p. 231). The latter is counter intuitive as normally we would expect similar results for nominal and real housing prices thus, we would look to find reasons to support this argument if our results also forms the similar footings.

3. METHODOLOGY AND MODELLING

3.1. METHODOLOGY

Ordinary least squares is a method for estimating the unknown parameters in a linear regression model. We use this methodology in our multiple regression model which minimizes the sum of squares vertical distances between the observed responses predicted by the linear approximation. OLS estimator in our case is Best Linear Unbiased Estimator (BLUE), it is also consistent as the regressors are exogenous and there is no perfect multi-collinearity. Expected value of errors given value of predictors is zero, that assumes strict exogeneity, this proves that data is homoskedastic and serially uncorrelated and under these assumptions OLS method provides minimum variance mean unbiased estimation when the errors has finite variances. However, we test for homoskedastic and no correlation assumption by analysing the estimators through robust OLS standard errors using Matlab to test if housing prices are in fact affected by changes in monetary policy. In this case if heteroskedasticity assumption is considered a more efficient estimator would be weighted least squares as the errors have infinite variances.

Therefore robust estimation techniques for beta valuation is designed to circumvent some limitations of traditional parametric and non parametric methods. Robust regression methods are designed to be not overly affected by violations of $E[uu'|X] = \sigma^2 I$ and no correlation assumptions by the underlying data-generating process. Considering this method of estimation our standard error, t-stats and p-value figures are different to normal OLS estimation figures.

3.2. REGRESSION MODEL

Housing Price Index = β_0 + β_1*Unemployment Rate + β_2* Interest Rates + β_3* Dummy$_1$ (Change in IR) + β_4*Magnitude of IR change + β_5*Exchange Rate (weighted AUD EX index against major currencies)+ β_6*ASX S&P 200

House price index (Australian Bureau of Statistics)

As an indicator of the price effect on property over time the property price index of domestic housing across capital cities in Australia over time has been selected as the dependent variable. This time series data of property prices over the period of 2002-2014 has been sourced from the Australian Bureau of Statistics. A lagged index of 6 months has been assumed in the model due to the slow transition mechanism of monetary policy and economic growth indicators to flow through to house prices and general public sentiment and actions. We tested the strength of lagging the dependent variable across several time periods and found that the optimal effect of changes in the independent variable on the house prices is 6 months.

Unemployment (Australian Bureau of Statistics)

The proportion of the total labour force currently unemployed. This is used as an indicator to housing affordability given credit is provided to the individual when future repayment is foreseeable. The amount an individual is able to borrow for a mortgage is based on the expectation of fulfilling repayment at a later date. As the unemployment rate falls, future income is more apparent leading to a larger proportion of the population able to draw on credit and inflow this into property; being a person's/families' largest physical asset. i.e. larger investments into property if the future expectation of employment and wages is optimistic. It is therefore expected that property prices will rise as the unemployment rate falls.

On a macroeconomic level, unemployment is used as an indicator to judge the health of an economy, leading to lower interest rates on the back of loosening monetary policy as discussed below. A consideration would be given to look at this in conjunction with the participation rate, which looks at the proportion of the labour force currently unemployed and are actively seeking employment.

Interest Rates (Reserve Bank of Australia)

A monetary policy tool used to govern credit and money supply. The main objectives includes controlling inflation, stabilizing economic growth and lowering unemployment. It primarily uses open market operations, which entails the process of transacting financial instruments with major financial institutions. During expansionary monetary policy, the central bank (Reserve Bank Australia) will buy financial assets hence, pumping cash into the market and providing greater fund availability. Banks inherently will impose lower interest rate on both sides of lending and borrowing, resulting from a boost in economic activities, employment rate and inflation rate. Vice versa for contractionary monetary policy.

Monetary Policy controls interest rate, and these rates, in common perception, drives property price because it impacts mortgage rates. As most of residential properties are acquired with mortgage of certain amount, different

mortgage rate will effect on purchaser's repayment amount. It is commonly agreed that people tend to buy a property when they observe low fixed interest rate or low variable interests rates in the upcoming future. Economically speaking, mortgage rates are merely one type of the interest rate that affect housing prices. Interest rates influence demand and supply of funds, capital cash flow and required rate of return.

Dummy variable on change in cash rates RBA (Reserve Bank of Australia)
A qualitative independent variable that explains the effect of a change in OCR has on consumer sentiment and their actions on investments. This is based on a 6 month deferred basis for lagged effect of changes in rates to flow through to the economy and actions of the individuals. The expectation is that when rates move, consumers behaviours on borrowing will change and lead to a consideration of being leveraged to fund physical assets.

Magnitude of the Cash rate change (Reserve Bank of Australia)
The effect of a marginal movement in OCR on the actions of the individual consumer. As rates falls more consumers will be induced into taking on larger debt. This is a direct causation from the central bank policy making process to spur investment and growth in the economy, as the rates fall the individuals behaviour changes, and housing affordability becomes more apparent as the rate continually drops, hence as more people enter the market, house prices will rise from the larger demand and availability of credit. The opposite affect is also true when rates rise, house prices as one of the many factors of the economy would be affected and in this situation it falls as there is less demand due to the higher cost of funding.

Exchange index (Australian Bureau of Statistics)
Based on the Australian Dollar against the greenback as a lead indicator to foreign direct investment. There is an expectation that as the Australian dollar falls, the relative investment in property is cheaper for foreign investors, leading to greater inflow into the Australian housing market. This is one of the key indicators for FDI in addition to interest rates and the international financial market (Wu & Eves 2013)

Globalisation in Australia has lead to greater investments from offshore clients resulting in increasing residential real estate prices and increasing borrowings. This has led to the requirement of screening by the Foreign Investments Review board to avoid foreign investors bidding up house prices for speculative purposes, and to the ease of which from lower exchange rates.

ASX S&P 200
An exchange traded fund which lists the 200 largest companies in Australia. In addition to the rates movement, this is used to determine the health of the corporate sector which will drive consumer behaviour. As the ASX S&P200 rallies on the back of performing equities, it provides an indication to consumers of job security and in turn the ability to take on larger debt. This will lead to investment across all asset classes including property and hence loosely bidding up prices.

4. RESULTS INTERPRETATION

4.1. Model No. 1:

Model on Interest Only		
	intercept	Interest
bOLS	122.5958	-6.5589
Standard Error	4.7367	1.0473
T-statistics	25.8819	-6.2629
p-value	0.0000	0.0000
Lower Limit	113.3118	-8.6116
Upper Limit	131.8798	-4.5063
R sqr	0.4007	
Adjusted R sqr	0.3853	

- *Model 1. Property Price Index = b0 + b1 interest rate + e*

With initial null hypothesis of interest rate change and monetary policy have no impact on property price index, (H0: bOLSinterest = 0 and bOLSdummy = 0, H1: bOLSinterest ≠ 0 and bOLSdummy ≠ 0) two single linear regression models are used on the interest rate variables and dummy variable (whether there is a OCR change implemented by RBA in that quarter or not). As observed in Model 1, interest rate is statistically correlated to the property price index as p-value is approximately zero after adjusting for heteroskedasticity by robust method. With beta of -6.5589, every unit of interest rate change is said to cause 6.5589 units of negative change in

property price index in 6 months time, assuming interest rate is the only determining factor. This inverse relationship economically make sense as lowering interest rate will lower general mortgage rates, frees up capital availability and reduces required rate of return, all of which will consequently boost property prices. This model specifies that interest rate alone explains 40.07% of the variance in property price index by R^2, this result is intuitive as interest rates are significant in driving housing prices as discussed earlier. From the graph in Appendix, we can further conclude that a strong negative correlation exists and it graphically represents the data in an intuitive format.

4.2. Model No. 2:

Model on Dummy Only		
	intercept	Dummy
bOLS	87.2700	6.5348
Standard Error	3.0755	3.9972
T-statistics	28.3759	1.6348
p-value	0.0000	0.1021
Lower Limit	81.2420	-1.2998
Upper Limit	93.2980	14.3693
R sqr	0.0616	
Adjusted R sqr	0.0376	

- *Model 2. Property Price Index = b0 + b1 dummy + e*

Model 2 attempts to draw a relationship between property price and monetary policy implementation, where dummy variable equals to 1, when there is an OCR change implemented by the RBA in the quarter and 0 otherwise. The p-value of the dummy variable is 0.1021 where it can barely draw a statistically significant relationship at 90% confidence level. Alongside with an R^2 of 6.16% which is much lower compared to Model 1, the dummy variable is contributing to the property price index but definitely at a much weaker level compared to interest rate variable. Nevertheless, at approximately 90% confidence interval, it infers that when RBA implement monetary policy to control OCR, the property price index will increase by 6.5348 units in 6 months time. The economical interpretation is that the market views any action taken by the central bank as a positive signal to aid/ improve market condition in the coming period. Though this interpretation can be impaired as the model only contains data within a short time frame across only one financial crisis and few actions had been taken by the RBA.

4.3. Model No. 3:

Model OLS Robust MatLab results							
	constant	interest	unemployment	ASX 200	EX index	cash rate change	dummy
bOLS	252.4947	-14.7548	-23.9516	-18.2970	0.4574	5.7729	2.4817
Standard Error	39.3453	1.7777	3.6922	9.8298	0.2026	1.8543	1.5086
T-statistics	6.4174	-8.2998	-6.4871	-1.8614	2.2579	3.1133	1.6450
P-value	0.0000	0.0000	0.0000	0.0627	0.0240	0.0019	0.1000
Lower Limit	175.3779	-18.2392	-31.1882	-37.5634	0.0603	2.1385	-0.4752
Upper Limit	329.6115	-11.2705	-16.7150	0.9694	0.8545	9.4073	5.4385
R sqr	0.8762						
Adjusted R sqr	0.8543						

- *Model 3. Property Price Index = b0 + b1 interest + b2 unemployment + b3 ASX200 return + b4 EX index + b5 magnitude of cash rate change + b6 dummy +e*

To account for other related variables which is believed to have an impact on Australian Property Index, many of the common economic indicators have been considered to minimise omitted variable problem that will cause OLS estimator to be inconsistent. They includes Australia population, Australia inflation, Australian Household Income, US S&P500, Australia GDP, world GDP etc. However after testing for multi-collinearity and statistically significance, model 3 is believed to be a relative comprehensive model in explaining the change in property price index. With adjusted R^2 being about 2% less than the R^2, it is anticipated there is a rather small shrinkage that would not generalize to the population because the solution is over-fitted to the data set by including too many independent variables. The adjusted R^2 infers a goodness of fit of 85.43% of the dependent variable can be explained by the independent variables.

Interest Rate: Compared to model 1, where only interest rate alone is regressed, the interest rate variable in the complete model remains statistically significant where P-value stays approximately zero. A 1% increase in interest rate will cause negative 14.7548 units, (some unit value lies between negative 11.2705 and negative 18.2392 by 95% confidence interval) of property price index in six months assuming all other variables are constant (ceteris paribus).

Unemployment: Stable job and level of income are key considerations for people in buying a property. But in accordance with the study done by *Tsatsaronis and Zhu* in 2004, this model also found that property prices is not affected by household income surprisingly but unemployment rate does. It is believed that behaviour wise, people tend to buy house when they are 'settled down', that involves a stable job with a family (excluding speculation/investment behaviours). People buy a property when they are certain they will work in one firm in that location for certain length of time rather than caring how much more they will get paid. From another point of view, unemployment generally is one of the most important leading indicators to economic performance where increase of unemployment drives down purchasing power and investment opportunities. In Model 3, it is observed with over 95% confidence that one unit increase of unemployment rate will decrease property price index by 23.9516 units in six months.

ASX 200 return: As commonly perceived as a leading indicator of the general economy, the model displayed identical inverse relationship where 1% increase in ASX 200 quarterly return will decrease property price index by 0.1821(18.297*log(1.01)) units in six months assuming other factors being constant. With a p-value of 0.0603, it is only considered statistically significant at a significant level of 90%. Although not entirely significant, it does demonstrate the substitute nature of the equity and property market.

EX Index: The intention of introducing EX index is to proxy foreign direct investments in the Australian property market, where depreciation of $AUD induces greater attractiveness of Australian properties to overseas buyers. Overseas investment has always played a significant role in the Australian property market where Credit Suisse recently reported that on average in past 10 year, one sixth of buyers of new properties are from overseas, majority from China. With over 95% confidence level, the model concludes that one unit increase in the EX index, will increase the property housing market by 0.4574 units in six months.

Dummy: Compared to Model 2, the complete model provides similar results on the dummy variable on dependent variable. With just 90% confidence level, the property price index will increase by 2.4817 units in six month after RBA implements monetary policy to adjust OCR. The magnitude and direction of OCR change is not considered in this variable, but rather how central bank has taken any action represents a positive signal to the market. The beta in this case is smaller compared to Model 2 because the variable 'Cash Rate Change' is introduced to quantify the magnitude and direction of change.

Cash Rate Change: The magnitude change in OCR by RBA monetary policy has shown a statistically significant effect of influencing property price index, with over 95% confidence level. However the positive beta contradicts the conventional inverse relationship between OCR and property prices. The underlying intuition is that the RBA increases OCR with primary goal of controlling inflation during economic boom, which purports positive conditions in property market. Greater increase of OCR implies greater economic prosperity. Hence with 95% significance level, 1% increase of the OCR by the RBA will not cause but relate to 5.7729 units increase in property price index in six months. The positive beta implies that the RBA policy only embark the property price in timeframe over six months, thus signifies the relative inefficiency of monetary policy in influencing property prices.

4.4. Model No. 4:

- *Model 4. Property Price Index = b0 + b1 interest + b2 unemployment + b3 ASX200 return + b4 EX index + b5 magnitude of cash rate change + b6 dummy +b7 EX index * dummy + e*

Model OLS Robust MatLab results with interaction term								
	constant	interest	unemployment	ASX 200	EX index	cash rate change	dummy	EX index* dummy
bOLS	223.8246	-14.2222	-22.5326	-15.0650	0.7324	5.9558	33.2475	-0.4485
Standard Error	44.3427	1.8357	4.0821	9.7104	0.2550	1.6698	16.0890	0.2305
T-statistics	5.0476	-7.7475	-5.5199	-1.5514	2.8720	3.5668	2.0665	-1.9458
P-value	0.0000	0.0000	0.0000	0.1208	0.0041	0.0004	0.0388	0.0517
Lower Limit	136.9129	-17.8202	-30.5334	-34.0973	0.2326	2.6830	1.7131	-0.9003
Upper Limit	310.7363	-10.6242	-14.5317	3.9672	1.2323	9.2286	64.7819	0.0033
R sqr	0.8862							
Adjusted R sqr	0.8620							

Model 4 adds an interaction term consists of a product of EX index multiplying the dummy variable. Apart from ASX 200 being considered as statistically insignificant even at 90% confidence level, all other independent variables now obtain smaller p-values. The magnitude and direction of OLS estimate of betas are almost identical for all variables except dummy compared to Model 3. The key variable cash rate change remains positive, reinforcing the inefficiency of monetary policy in dealing with the property prices in the timeframe of six months.

The interaction term draws a relationship between b4, b6 and b7. The effect of EX index on property price index is now 0.7324 - 0.4485*dummy. For a period without monetary intervention, dummy = 0, the effect of EX index is 0.7324 - 0.4485 *0 = 0.7324. For a period with monetary policy injection, however, one unit increase in EX index will only increase property price index by 0.7324 - 0.4485 = 0.2839 units. This change of b4 is not significantly different to b4 in model 3. On the other hand, b6 increased more than 10 folds from 2.4817 to 33.2475, indicating 33.2475 units change of property price index in six months time when there is a monetary policy implementation and EX index equals to zero in the period. With EX index being a continuous variable, it is very unlikely for it to become zero at any point realistically, thus b6 itself is virtually meaningless but to help in aiding the effect on b4.

5. LIMITATIONS

As for our limitation our data is sourced from one main information gateway, the Australian Bureau of Statistics (ABS). The limited resources on the website cannot provide a big sample size. For instance, we use residential property price index changes as our dependent variable. But only the quarterly index data from September 2003 to March 2014 is available. The 42 observations (changes) we have in the model cannot appropriately and comprehensively represent the relationship between independent and dependent variables.

In the computation of weighted average of eight capital cities for the residual property price index, a new weighting pattern has been introduced from September quarter 2005. An inconsistency problem may arise with using periods that were not re-weighted, and hence would not be comparing like-for like.

Some critical variables are omitted in our model. According to previous literature, variables like inflation, real income growth and population growth have an important influence on residual property price. In our quantitative test, those variables are significantly correlated as shown by this correlation matrix table below. Because of the time constraint in our data (back to 2002) and Matlab software restrictions on being able to solve the correlation problem, we have omitted those variables for simplicity. In addition, we claim that foreign direct investment (FDI), the existence of financial crisis and changes in tax rate are supposed to affect our independent variable. However, it is not easy to access to those data. For those reasons mentioned above, we kept to only 6 independent variables in our model.

Correlation Coefficient Matrix Table:

	interest rate	unemployment	ASX 200	EX index	cash rate change	dummy
interest	1.0000					
unemployment	-0.8278	1.0000				
sp200	-0.3900	0.4921	1.0000			
exindex	-0.3040	-0.0011	-0.2409	1.0000		
cash rate change	0.3094	-0.0438	-0.0399	0.1912	1.0000	
dummy	-0.0860	-0.0629	-0.0385	0.0076	-0.1371	1.0000

On top of statistical limitation, the reliability of macroeconomic variables are essential to consider regarding the magnitude of each variable's influencing power. The sets of tested economic variables are largely based on the economy conditions whereas the impact of the change will not create an instant translation into the prices based on the notion that change in house prices are typically derived from demand and supply. Even with the adjustment with time lag, sticky wages and sticky prices are still largely arguable with the approximate period they will happen simultaneously. Another point to note, in the case of a booming housing market where foreign direct investment and domestic real estate investment are growing rapidly, change in the adverse direction on a normal notion will not translate as anticipation based on investment expectation that leads to inaccuracy of measuring opportunity cost of investment.

Change in OCR creates a direct impact on housing market to the extent that prices are anticipated to change accordingly. To emphasise the magnitude of the change, economic conditions of foreign countries could affect

Australia's housing prices for example Chinese economy. When heaps funds were flowing out of China, Australia's housing market became an ideal investment option, this constituted part of the rise in housing prices over the recent years. This suggested that the impact on foreign direct investment in overseas countries could also limit the accuracy of the model.

6. DISCUSSION AND CONCLUSION

This paper acknowledges the effects of the change of the OCR on the property market in Australia using quarterly data starting from 2002 to now. We employed the use of OLS regression to estimate the effects of the change in OCR on the weighted property index of all the capital cities of Australia. Due to the multifaceted property of this study, we have also included other factors within the results. The forward economic trend is given by the returns of the Australian S&P200 index; the rate of foreign investment is explained via the information within the trade weighted index; and we attempted to determine the Australian economic strength using the unemployment rate. It is well acknowledged that the effect of monetary policy will be lagged between 6 to 18 months before the flow on effect goes through to the whole economy. Hence, we lagged the OCR by 2 quarters as this minimise the problems of multi-collinearity as well as demonstrates the full lagging effect of monetary policy. While most our variables exhibits small correlation, the interest rate variable correlates to other variables to a certain degree (see Appendix). This is intuitive as interest rates play a vital role in determining economic performance from different perspectives.

The results of this study can be summarized as the following. Firstly, the OCR affects the Australian property markets via both direct and indirect ways. These impacts include that of changing interest rates that causes a fundamental change in supply and demand in the property market. It also includes the availability of cash, and to a lesser extent, opportunity cost of investment. These interactions are all included within the regression of S&P200, Trade weighted Index, and property index. We found that the effects of the change in property index from the change in OCR is amplified once the other factors are included. This leads us to conclude that the OCR cannot be the sole purpose of the fluctuations in the housing prices in Australian capital cities. Overall, we found that the monetary policy of RBA is effective but inefficient in dealing property prices.

In summary, the results derived from this study conclude that property prices are affected not only by the change in OCR, but also shifts due to foreign investments and economic outlook. We have learnt the greater diversity of effects that a change in OCR can offer and their direct and indirect relationships with the property market within an Australian context. Despite the study being done using Australian data, given the similar financial environment and level of development of the Australian finance and property sector, similar methodology can be applied onto other large economies in the world. As housing prices is a major component of the economy, this also serves as an additional decision making tool when changing the OCR when the monetary policy makers are implementing their decisions. This would be most helpful towards the economy as well as allow them to create the intended effects. Lastly, there is no doubt that there is a need for concerted efforts to be made by researchers in this area to evaluate the effects of housing prices by targeting other major economic variables as they are also critical in policy making area for government and therefore, try to find an appropriate mode to minimise the limitations we mentioned above as they undermines the accuracy of the findings.

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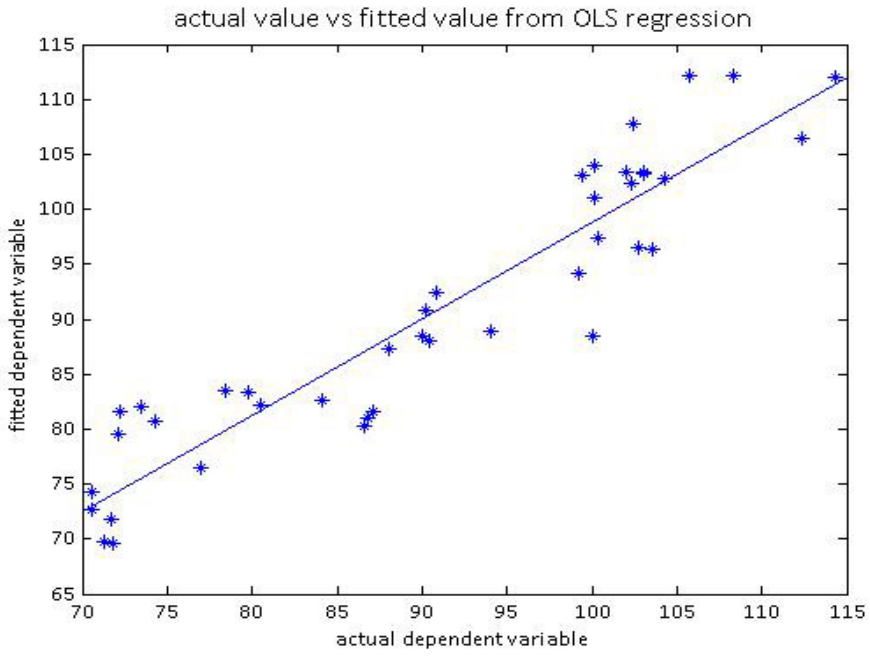
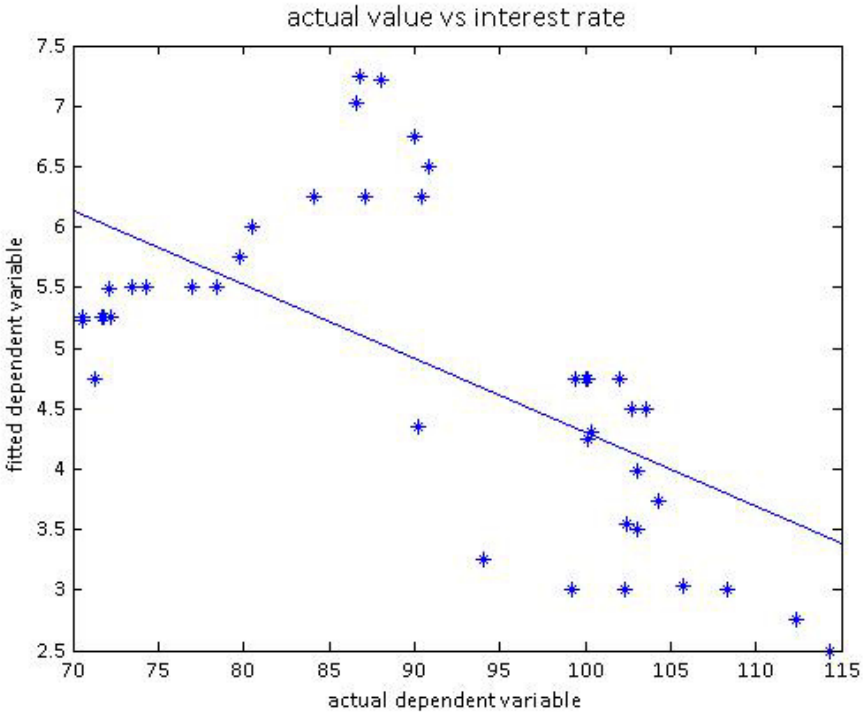
8. APPENDICES

GRAPHICAL REPRESENTATION OF THE OLS REGRESSION MODEL FORMED BY MATLAB.

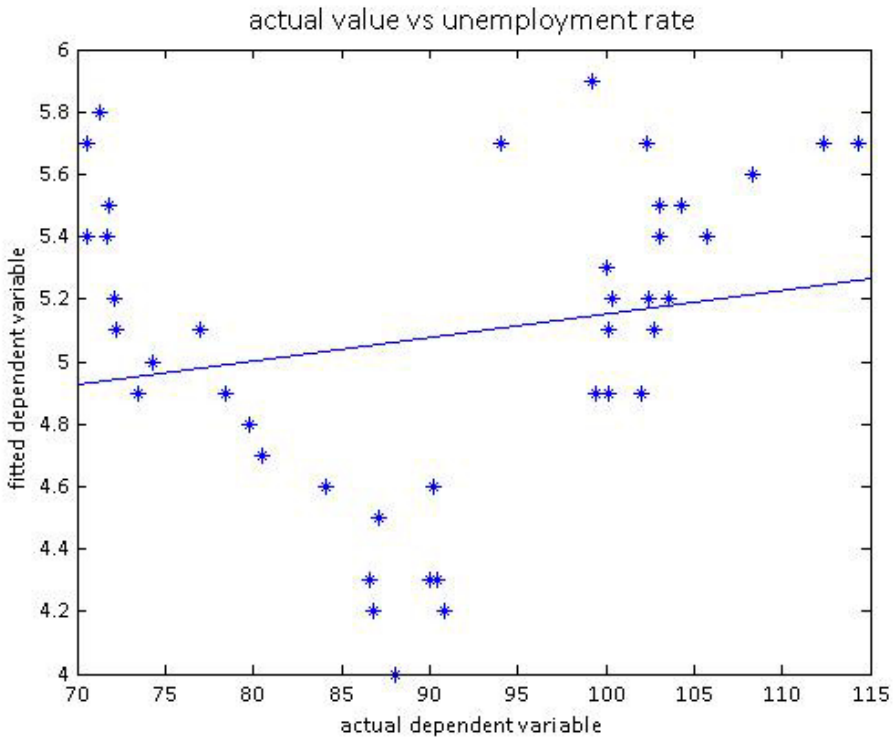
- **Actual value vs Fitted value**



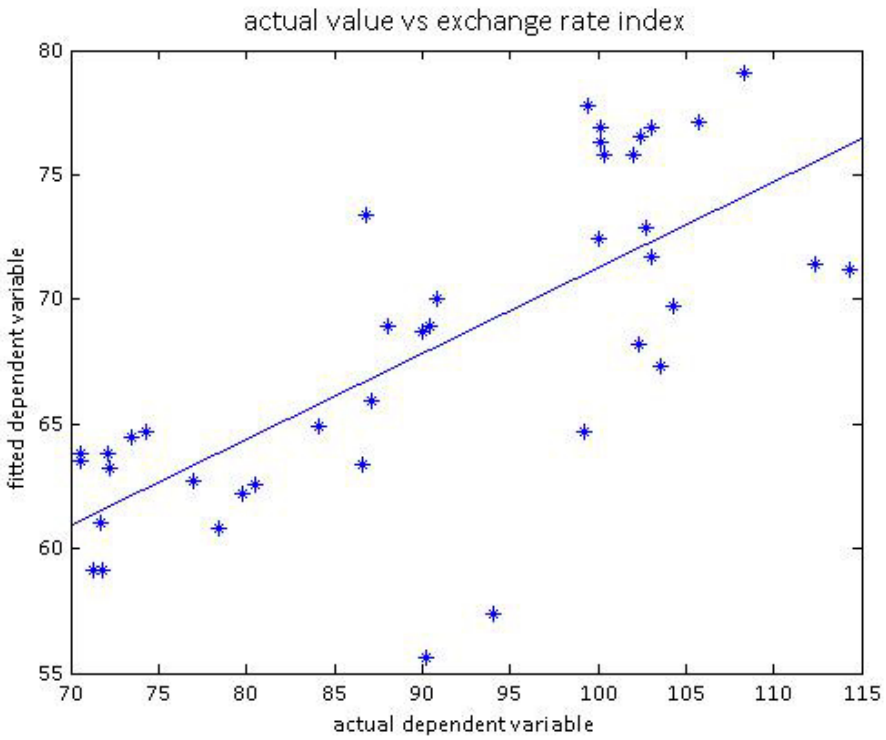
- **Actual value vs Interest rate**



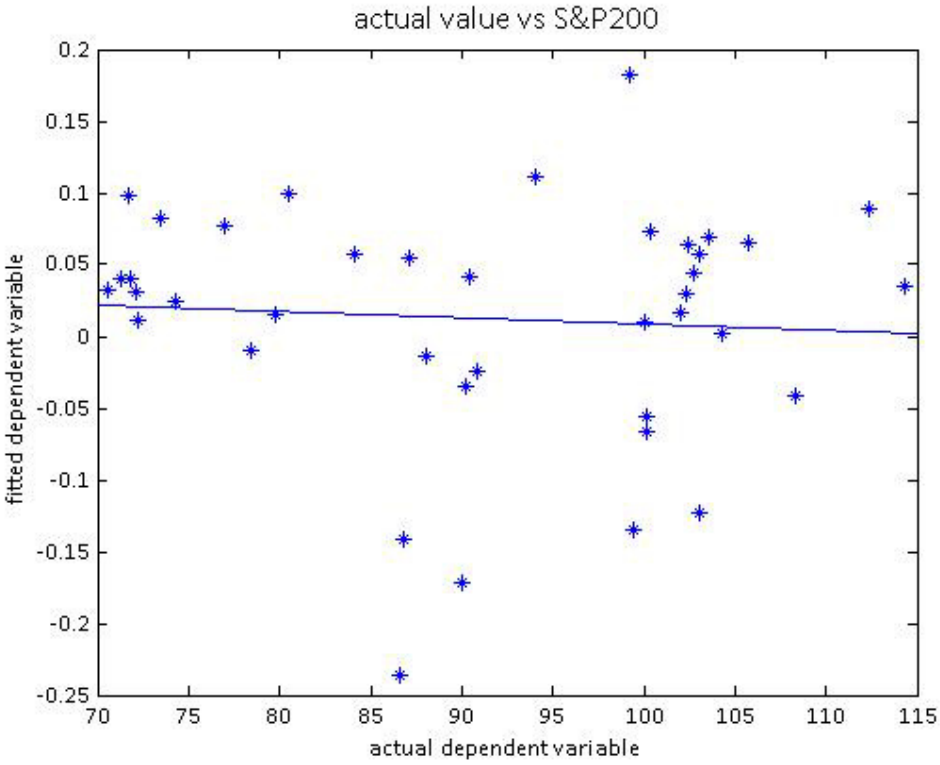
- **Actual value vs Unemployment rate**



- **Actual value vs Exchange rate index**



- **Actual value vs S&P200**



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