

# Is there a relationship between price and new construction in the residential markets of Australia? A preliminary finding.

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## ABSTRACT

Keywords: Building activity, building cycle, housing approvals, housing starts, housing price, housing affordability.

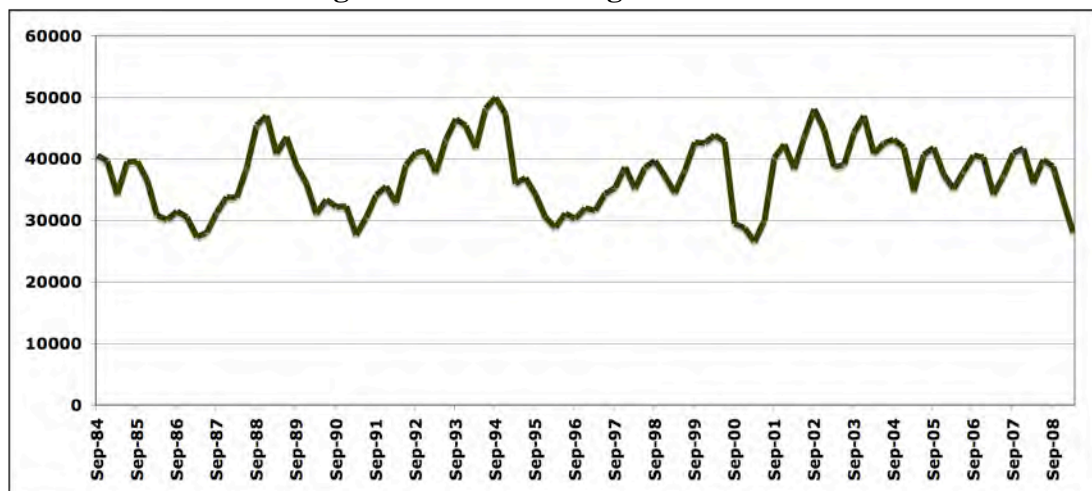
*The price of residential property across the capital cities of Australia has had an upward trend from the early 1980s, yet at the same there has been a fluctuating construction cycle and in more recent years, there has been a downward trend.*

*This paper undertakes a study using a series of correlation analysis to investigate the relationship between new residential construction and prices. It also investigates to see whether there are any common factors that influence the residential prices and new residential dwellings over the past 25 years.*

## INTRODUCTION

The current level of new dwelling construction in Australia is much the same as the level 25 years ago. Figure 1 shows the level of new dwelling construction in Australia from 1984 and as can be noted, the level has been fluctuating between about 27,500 and 50,000 new dwelling per quarter and is currently around the same low level of March 1987. In addition from September 2003, there has been a downward trend.

Figure 1: New dwellings in Australia

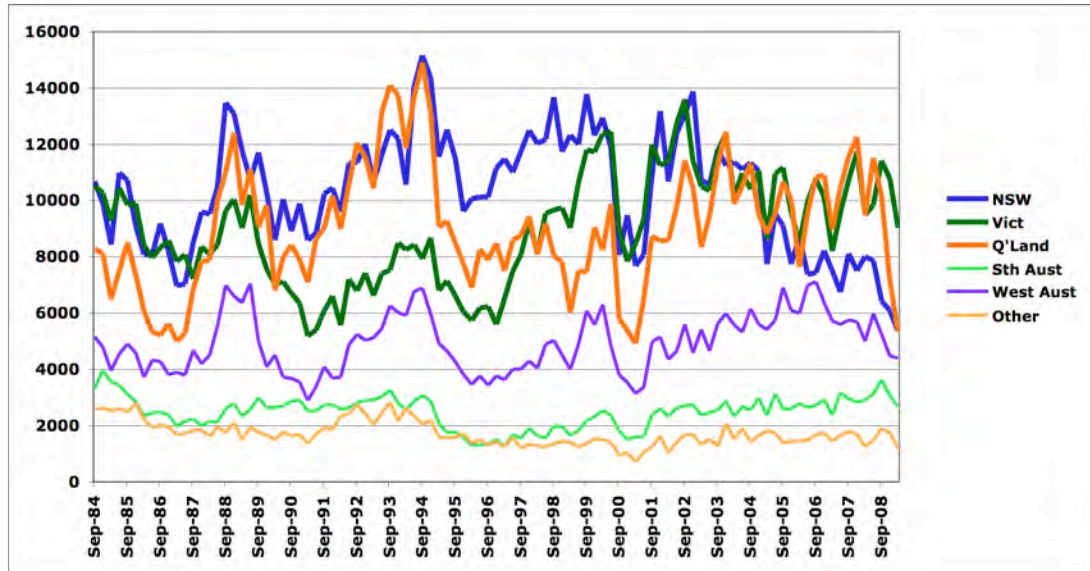


Source: ABS (2009)

This decline and fluctuation in new dwelling construction appears to be the same across all states as shown in Figure 2. In fact, in Sydney, new dwelling construction

fell so low that BIS Shrapnel (2008) reported, “new dwelling construction in Sydney *has fallen* to levels not seen since the 1950s”.

**Figure 2: New residential construction by Australian state and territory**

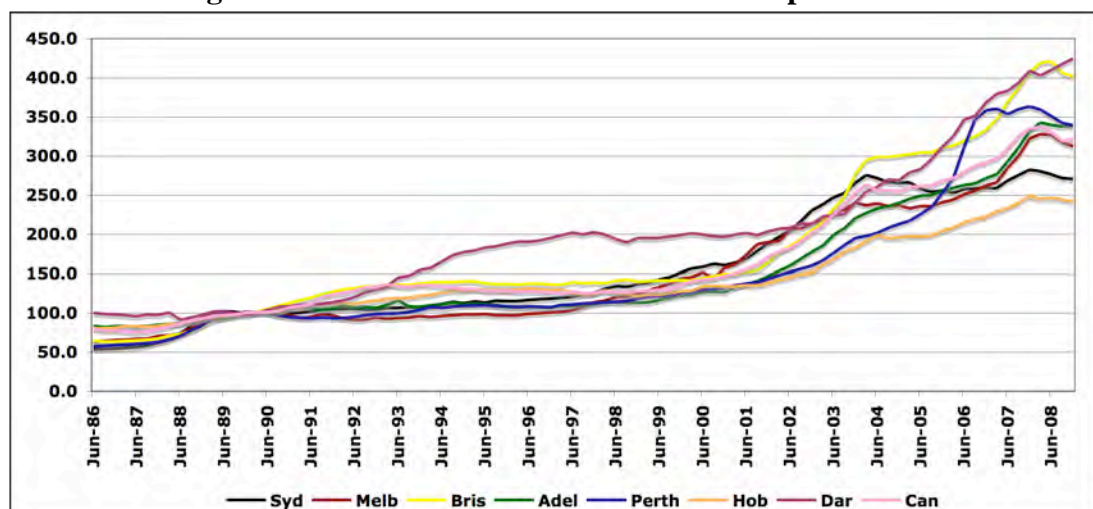


Source: ABS (2009)

At the same time, Australia’s population has grown from 16 million to over 21.6 million over the past 23 years and has a declining average household size (Metro Strategy, 2005). Thus the increase in population and the fall in household rate has, compounded the demand for residential dwellings in Australia.

Not surprising, this has led to increase in prices across the board in Australia. Figure 3 shows all capital cities ‘house price index’ from June 1986 and as can be noted, the index has risen in all cities.

**Figure 3: House Price Index – Australian Capital Cities**



Source: ABS (2009a)

The above figures and analysis raise the question, with increasing residential prices, “why isn’t there an increase in construction?” or as this paper addresses, “is there a

relationship between dwelling price and new construction in the residential markets of Australia?”

## **LITERATURE REVIEW**

The question being addressed in this paper is more or less the same as examining the ‘demand and supply’ of residential dwellings in Australia.

DiPasquale (1999) undertook a study on housing market literature and found that there has been far less literature on the supply side of housing than the demand side and notwithstanding, the empirical evidence on the supply side is less convincing than the demand side. DiPasquale also provided a Table in her paper showing literature on ‘housing supply’ and noted that ‘virtually all the studies analyse aggregate data’. The author found that most studies also focused on reduced form equations, which generally take the form of price as a function of supply and demand factors and are mainly interested in estimating the price elasticity of both demand and supply. Some studies have more structured approaches, where demand or supply is estimated directly with variables that are likely to have an impact on them respectively.

On the supply side, much of the empirical evidence has focused on the ‘price elasticity’ of supply. Built environment economic textbooks (such as Harvey (1987) and Warren (1994)) have started on the premise of an inelastic supply. Whilst Green et al (2005) note that this presupposition is supported by many researchers, they found that in the USA, the price elasticity varied substantially from ‘heavy regulated’ cities to ‘low regulated’ cities. The former has low price elasticity and the latter a higher elasticity. In essence, their research implicitly identified government as a factor.

Taxes and government charges, like developer’s levies for infrastructure are also a major contributing factor for the increasing cost of providing new dwelling supply. UrbisJHD (2006) and industry bodies HIA (2003), UDIA (2007) have argued that state and local government charges and the funding of infrastructure associated with residential development have impacted negatively on new housing supply. These infrastructure costs were introduced by state governments and are generally levied at the local government level. In NSW, the legislation was enacted in 1979, however McNeill and Dollery(1999) point out that due to various legislative complications associated it, these levies, known colloquially as "developer contributions" or "section 94 contributions", have only been fully utilised since 1989. Overall, Karantonis (2007) found that in residential developments, the three tiers of government receive around 60 percent of total income, whilst the developer with all the risk, receives 40 percent.

Barras (2005) determined that cyclical movements of building activity was determined by factors such as current and expected economic growth rate, real rental levels, vacancy rates and property yields. Whilst Hargreaves (2007) in a New Zealand study, found that one major driver for development was the increase in population, particularly migration. He noted that one problem for developers is the time it takes to complete a project and that developers tend to “see the same demand signals ... and compete for first mover advantage”. In his study, he showed how new approvals were still rising two years after immigration growth slowed. In a ‘Special

Article’ on the relationship between interest rates and building approvals in Australia, the ABS (2001) found a correlation coefficient of 0.50 and concluded that it was not possible to say that fluctuations in building approvals are a result of changes in interest rates. However, Berger-Thomson and Ellis (2004) found that interest rates attributed to the construction movements in the 1980s, but the movements in construction from around 2000 were “more (as) a result of the introduction of the GST”.

Finally, Warren (1994) points out that there is a considerable ‘time lag’ in the supply of process of getting new dwellings. He also makes the point that existing housing stock is so large that new dwellings are unlikely to be significant in the overall numbers, adding that it is the second hand market that dominates the market. In other words price movements.

## **METHODOLOGY**

As the aim of this paper is to analyse the relationship between residential prices and new residential construction, a series of correlations were undertaken using Eviews. In addition, variables used in previous studies relating to the demand and supply of dwellings referred to in the literature above were also added to the analysis.

Unit root tests using the ADF (Augmented Dickey-Fuller) test were also conducted to identify non stationary variables and accordingly first difference and in some instances second differences were used to eliminate non stationarity from the data.

## **DATA**

Time-series data was collected from Australian Bureau of Statistics (ABS), the Reserve Bank of Australia (RBA) and the AIQS (Australian Institute of Quantity Surveyors). The ABS provided data for house prices (an index for all capital cities), new residential construction (commencements for Australia and for each state and territory), GDP, and wages, whilst the RBA provided the data for interest rates and for the cost of construction, the AIQS Index was used. As the time series data for house prices was from June 1986 to Dec 2008, the tests undertaken were for this period.

The description of variables employed in the final analysis, their source and their transformed nature are summarised in Table 1. As can be noted, new construction will be based on state or territory, whilst prices are based on capital cities. Accordingly, the test undertaken will be between the state or territory and the relevant capital city.

**Table 1: Description of Variables**

<b>Name</b>	<b>Definition</b>	<b>Data</b>	<b>Measure</b>	<b>Source</b>
New	New Residential Construction	State	#s	ABS
Price	House Price Index	Capital City	Index No	ABS
GDP	Real GDP	Australia	% change	ABS
Cost	AIQS Index	Australia	Index No	AIQS
Interest	Rate of Interest	Australia	%	RBA

## RESULTS

The first test on the data is to see if there is a correlation between prices and new construction for Australia and for each state or territory with their respective capital city. Table 2 show the results of theses correlations in the first column. However if price was to impact on construction starts, logically, the price of the previous quarters would be more appropriate, as before commencement there is the concept stage followed by the approval process. Indeed the approval process would take a minimum of 40 days from the time of lodgement of the proposal with the local authority and depending on the development could take several months. Accordingly, the data in columns two and three are the lagged prices of 1 and 2 quarters of the relative capital city respectively. In the Table the last three columns are differences in price, and lagged by 1 and 2 quarters respectively.

The unit root tests showed all prices to be non-stationary and the data was transformed by taking differences to make the price variables stationary. In the case of “all capital cities” (CC2) and Darwin (CD2) 2<sup>nd</sup> differences were required to be used to transform the data into stationary.

Examining Table 2, Melbourne/Victoria is the only combination to have a correlation greater than 0.5 and that was with the price and its two lags. Adelaide/SA was next with around 0.45 for price and its two lags. In theory, these are not normally regarded as strong correlations and the rest of the ‘price’ correlations are much less and even close to zero (see Darwin). Looking at the ‘change of price’ variables, here the correlations are relatively lower, with Perth/WA having the highest correlation of 0.494 in the 1<sup>st</sup> quarter price change.

**Table 2: Correlations between new dwelling (State) & prices (Cap City)**

	<b>CAP</b>	<b>C-1</b>	<b>C-2</b>	<b>CC2</b>	<b>CC2-1</b>	<b>CC2-2</b>
<b>AUST</b>	0.206	0.193	0.177	-0.060	-0.016	0.122
	<b>SYD</b>	<b>S-1</b>	<b>S-2</b>	<b>SC</b>	<b>SC-1</b>	<b>SC-2</b>
<b>NSW</b>	-0.325	-0.341	-0.365	0.264	0.370	0.311
	<b>MELB</b>	<b>M-1</b>	<b>M-2</b>	<b>MC1</b>	<b>MC -1</b>	<b>MC -2</b>
<b>VICT</b>	<b>0.636</b>	<b>0.620</b>	<b>0.605</b>	0.395	0.417	0.462
	<b>BRIS</b>	<b>B-1</b>	<b>B-2</b>	<b>BC</b>	<b>BC-1</b>	<b>BC-2</b>
<b>QL</b>	0.2429	0.2326	0.2203	0.2378	0.2748	0.3379
	<b>ADEL</b>	<b>A-1</b>	<b>A-2</b>	<b>AC</b>	<b>AC-1</b>	<b>AC-2</b>
<b>SA</b>	0.456	0.455	0.453	0.247	0.271	0.400
	<b>PERTH</b>	<b>P-1</b>	<b>P-2</b>	<b>PC</b>	<b>PC-1</b>	<b>PC-2</b>
<b>WA</b>	0.402	0.372	0.340	0.478	<b>0.494</b>	0.429
	<b>HOB</b>	<b>H-1</b>	<b>H-2</b>	<b>HC</b>	<b>HC-1</b>	<b>HC-2</b>
<b>TAS</b>	-0.132	-0.143	-0.152	0.126	0.088	0.158
	<b>CAN</b>	<b>C-1</b>	<b>C-2</b>	<b>CC</b>	<b>CC-1</b>	<b>CC-2</b>
<b>ACT</b>	-0.056	-0.059	-0.063	0.036	0.045	0.075
	<b>DAR</b>	<b>D-1</b>	<b>D-2</b>	<b>DC2</b>	<b>DC2-1</b>	<b>DC2-2</b>
<b>NT</b>	0.024	0.030	0.033	-0.044	0.068	-0.104

Capital city indicated by its initial letter & -1 and -2 indicate lag one and two quarters respectively  
‘C’ after city initial is the 1st difference = ‘change of price’,  
‘C2’ after city initial = 2<sup>nd</sup> difference.

The next correlation undertaken was to see the relationship for new dwellings between the states and territories. The results in Table 3, shows there is little evidence of any *strong* correlation between the states and territories. Western Australia and South Australia have the strongest correlations with other states, with the highest between Western Australia and Queensland (0.6954). On the other hand, the two main states of Australia, NSW and Victoria have very little cross correlation and appear to be independent as does Northern Territory as well.

**Table 3 Correlation of new commencements between states**

	NSW	Vict	QL	SA	WA	Tas	NT	ACT
NSW	1							
Vict	0.137	1						
QL	0.411	0.228	1					
SA	-0.085	0.301	0.586	1				
WA	0.232	0.538	0.695	0.542	1			
Tas	-0.082	-0.327	0.445	0.599	0.265	1		
NT	0.226	-0.029	0.025	-0.29	-0.018	-0.22	1	
ACT	0.228	-0.037	0.500	0.509	0.294	0.540	-0.159	1

Turning to prices, Table 4 shows the relationship between Australia's capital cities. This time, there is a very strong correlation across all capital cities, implying that prices are moving together across the board.

**Table 4 Correlation of price between capital cities**

	Syd	Melb	Bris	Adel	Perth	Hob	Dar	Can
Syd	1							
Melb	0.976	1						
Bris	0.942	0.963	1					
Adel	0.934	0.971	0.991	1				
Perth	0.893	0.941	0.968	0.971	1			
Hob	0.947	0.958	0.993	0.979	0.969	1		
Dar	0.899	0.929	0.958	0.945	0.959	0.974	1	
Can	0.963	0.974	0.994	0.988	0.963	0.990	0.948	1

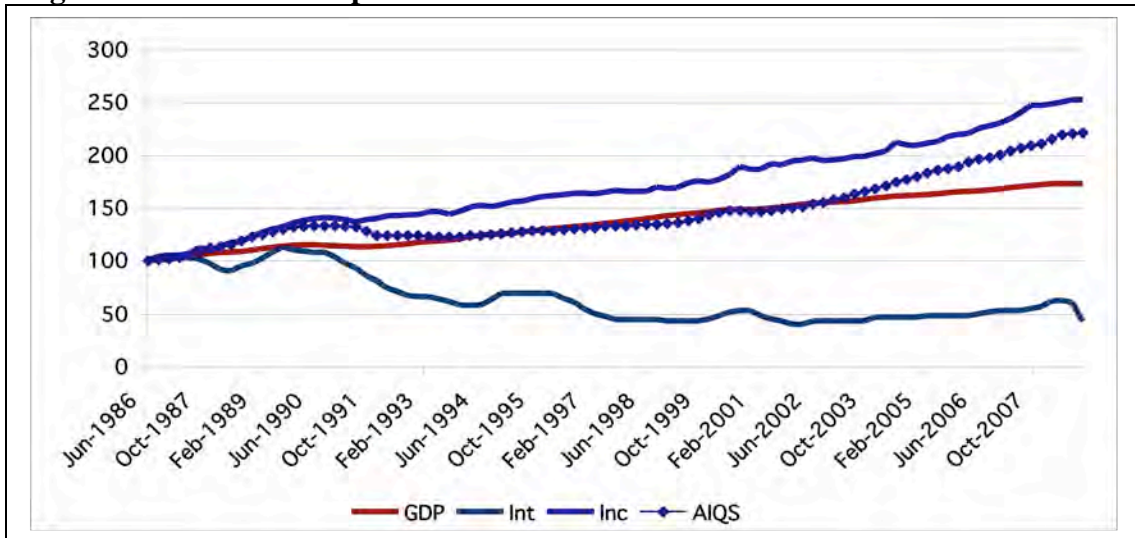
**So, whilst increasing prices are not driving new construction, what is?**

The literature has shown that construction cost and macro factors, such as GDP, interest rates, household income impact on new building activity. Using June 1986 as the base year, Figure 4 shows the change of the base year for new construction in Australia and the variables, cost, GDP, income and interest rate. As can be noted, the cost, GDP and income are continually increasing, whilst the latter one is on a downward slope. In addressing the literature, the variables GDP, income and interest rates are working favourably for an increase in new construction; GDP and income are both increasing and the cost of finance, namely interest rates are decreasing.

The one variable working unfavourably is the cost of construction. As can be seen, the cost curve is continually increasing over the period.

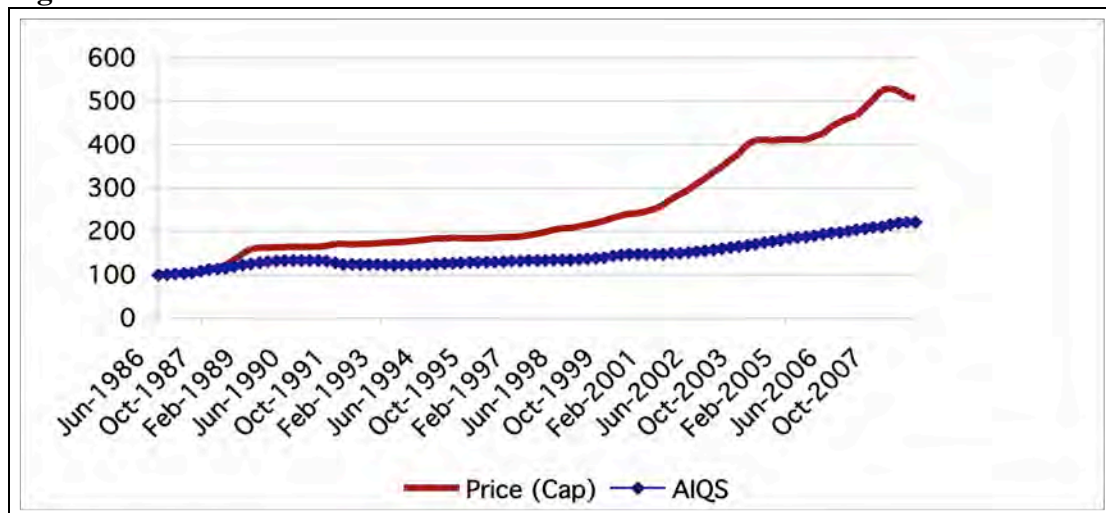


**Figure 4: Construction price & Macro factors**



But, whilst rising costs are detrimental for new dwelling commencements, Figure 5 shows the price is increasing at a much greater rate than cost and therefore more or less offsetting the increase cost.

**Figure 5: Indexed Cost vs Price**



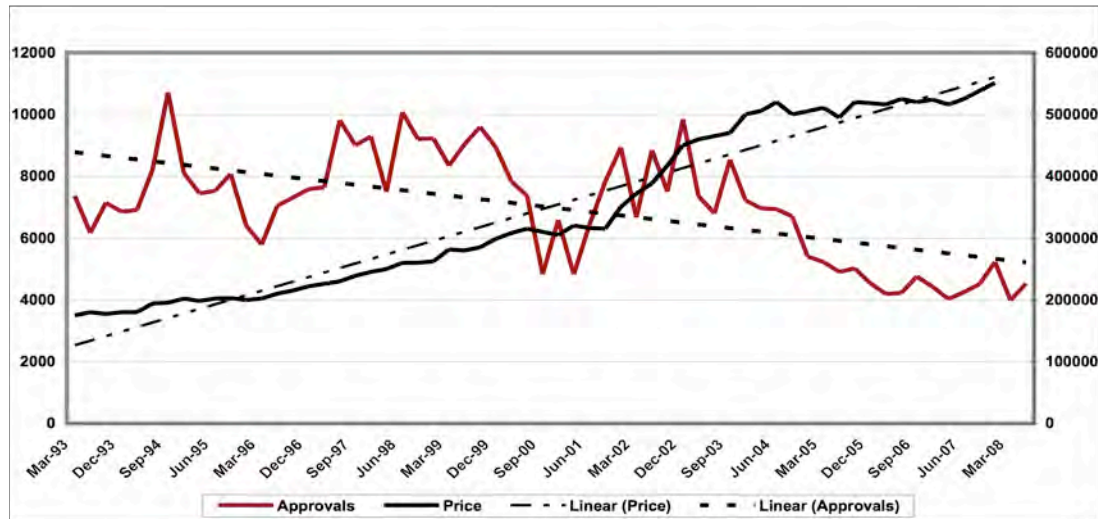
Examining the relationship between these factors in Figure 4 and new dwellings there is no strong relationship. Table 5 shows the correlation between new dwellings and these factors and as can be noted the correlation between new dwellings and the macro factors is not very strong. As well, the sign for cost is positive, whereas one would expect it to be negative.

**Table 5: Correlation new dwellings & macro factors**

	New	GDP	Int Rate	Income	Cost
New	1				
GDP	0.260	1			
Interest rate	-0.337	-0.793	1		
Income	0.236	0.981	-0.724	1	
Cost	0.208	0.916	-0.528	0.958	1

The results above are not surprising, as in a paper on Sydney new dwelling approvals, Karantonis (2009) showed that from March 1993, the ‘trendline’ for prices and new dwelling approvals were moving in the opposite direction (see Figure 6). The paper identified that GST, introduced from 1 July 2000 and BASIX (Building Sustainability Index) introduced from July 2005 by the NSW Government both had an impact on new dwellings in Sydney. However, the study for that paper was from 1986, well before both GST and BASIX.

**Figure 6: Sydney dwelling approvals vs. Sydney price**



Source: Karantonis (2009)

Using case studies, UrbisJHD (2006) showed that that government infrastructure levies and compliances make up for 35 percent of the total cost of homes in Sydney’s northwest and 28 percent of the cost of new units. In NSW, this was introduced in 1979, but as noted in the literature, the section 94 contributions have only been fully utilised since 1989. Unfortunately, there is no quantitative time series data available to use for an empirical study.

Finally, examining the relationship between price (all capital cities) and the macro factors in Table 6, we find that price has a strong correlation with GDP (0.934), income (0.962) and cost (0.985). It also has a mild negative relationship (-0.586) with interest rates. This does not imply that is we could derive an equation from these variables for determining price, as there is high level of cross correlation between the variables: GDP and the other variables; interest rate and income; and cost and income. However, whilst this sort of analysis is outside the scope of this paper, this suggests that the macro factors and construction costs do have some influence. On price

**Table 6: Correlation price & macro factors**

	<i>Price (Cap)</i>	<i>GDP</i>	<i>Int rate</i>	<i>Income</i>	<i>AIQS</i>
<b>Price (Cap)</b>	1				
<b>GDP</b>	0.934	1			
<b>Interest rate</b>	-0.586	-0.793	1		
<b>Income</b>	0.962	0.981	-0.724	1	
<b>Cost</b>	0.985	0.916	-0.528	0.958	1



## **Conclusion**

This paper has shown that there is little evidence to suggest that residential prices influence new residential commencements. In fact the paper has shown that there is only a small relationship between the two variables for Melbourne and Perth with the other cities having a negligible correlation.

As prices are determined by demand and supply, if supply does not respond to rising prices, then this would suggest that housing affordability will be further eroded in a growing population environment which ultimately will lead to demand for more dwellings.

The paper has also shown that whilst many of the variables from the literature moved favourably over the period in the paper, their impact on new dwellings was not very strong. This suggests that the variables may need to be transformed, such as using logs or reciprocal and/or there may be other factors that influencing new dwelling construction. Alternatively, as noted in the paper, government taxes, fees and contributions also have an impact.

Further research and data information is required to see the impact of these costs, particularly the infrastructure contributions. One disappointing aspect of this paper was the lack of quantitative information regarding developer contributions. Although industry groups continue to argue about these contributions which intuitively have a major impact on developer's supply of new dwellings, unfortunately no quantitative data is available. Further studies need to take this into account as governments continue to seek additional contributions from new developments.

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