

# **AN ANALYSIS OF NEW SUPPLY OF RESIDENTIAL DWELLINGS IN AUSTRALIA**

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## **ABSTRACT**

The level of new residential dwellings has not kept pace with the demand for new supply due to the sustained population increase from both natural growth and the increasing numbers of migrants. In addition the falling 'average household size' has further compounded the need the shortage of new dwellings. The increase in population needs additional dwellings to accommodate the new demand. As new supply has not kept pace with this sustained increase in demand, prices across the board in Australia have been rising. This paper will investigate the reasons for new residential supply not being forthcoming and in particular focus on government compliances, policy, taxation and other associated costs.

Keywords: building activity, building cycles, housing starts, taxes and charges, government policy.

## **INTRODUCTION**

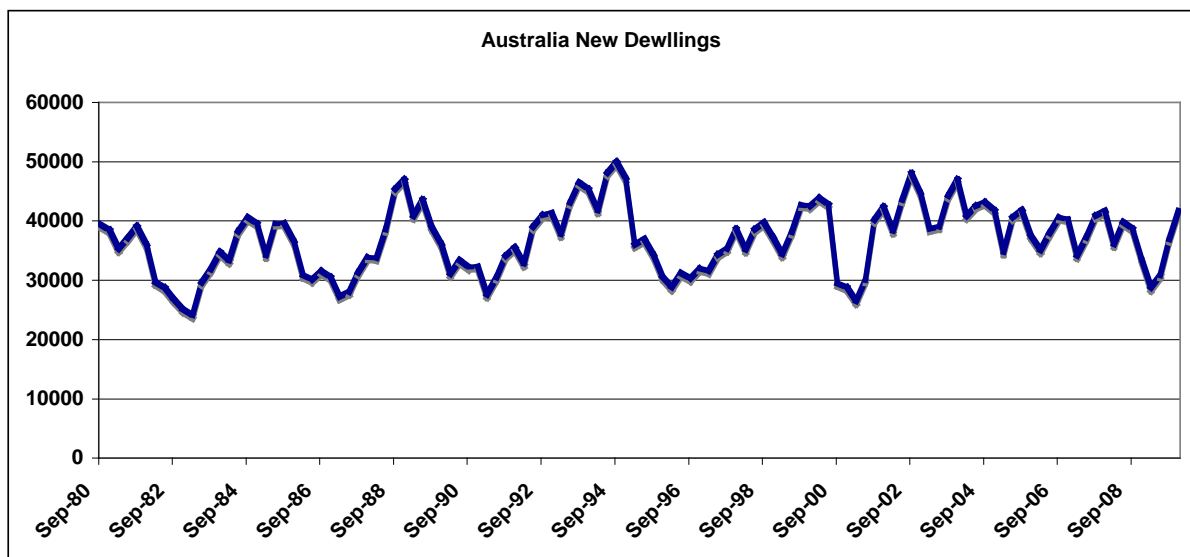
Over the past 35 years Australia's population has increased by around 6.3 million and at the same time there have been around 3.67 million new dwellings constructed, which equates to one new dwelling per 1.71 population increase. However up to the introduction of GST (July 2000), there was one new dwelling per 1.52 increase in population whilst after 2000 there is one new dwelling being built per 2.06 increase in population. This position is further eroded with the introduction of 'sustainability' (known as BASIX in NSW) from July 2005, with a new dwelling per 2.65 increase in population.

This means that in relative terms, there has been reduction of new dwellings been built to accommodate the population growth. In addition to this, the ABS (Cat. 4102.0) has predicted that 'average household size' has been declining from 2.7 (1991) to 2.6 (2006) and is

forecasted to decline to between 2.2 and 2.3 people per household in 2026. Thus the increase in population and the fall in household rate are compounding the demand for residential dwellings in Australia.

Figure 1 shows the level of new residential dwellings in Australia has fluctuated between 20,000 to 50,000 new dwellings with an average of around 37,500. The average for the pre GST, post GST and Post BASIX has been stable around the 37,000 mark, however, population growth averaged 64,715 p.a. for the entire period of the study but increased substantially to over 98,000 p.a. since 2005.

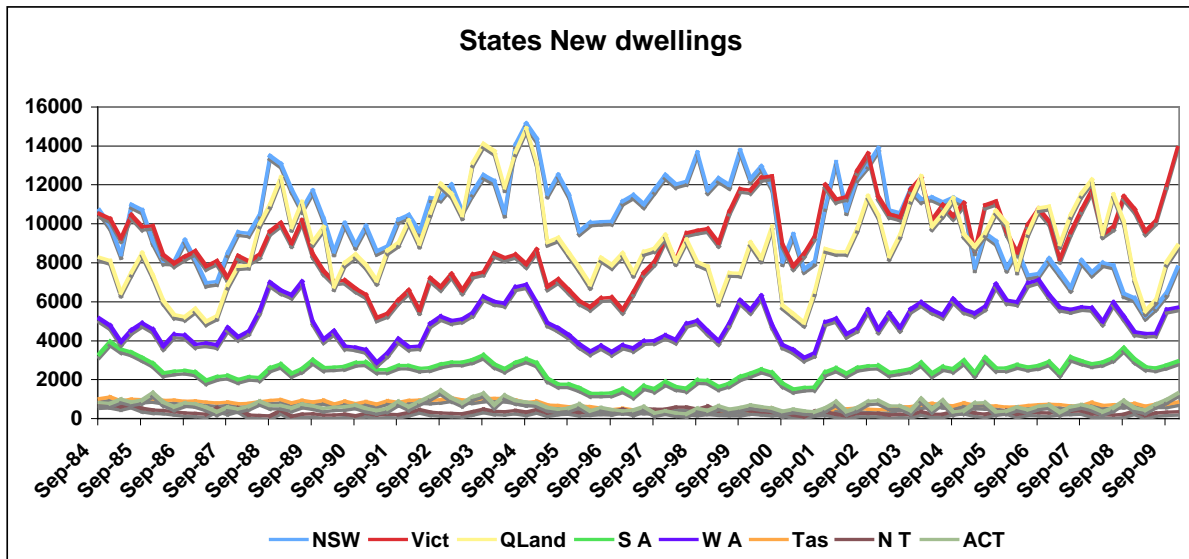
Figure 1: Level of new dwelling supply in Australia



Source: ABS (8752.0)

The position is similar across Australia. Figure 2 shows all states and territories and as can be noted, new dwellings per year towards the end of the period is similar to that of the start. Yet in all states territories there has been an increase in population.

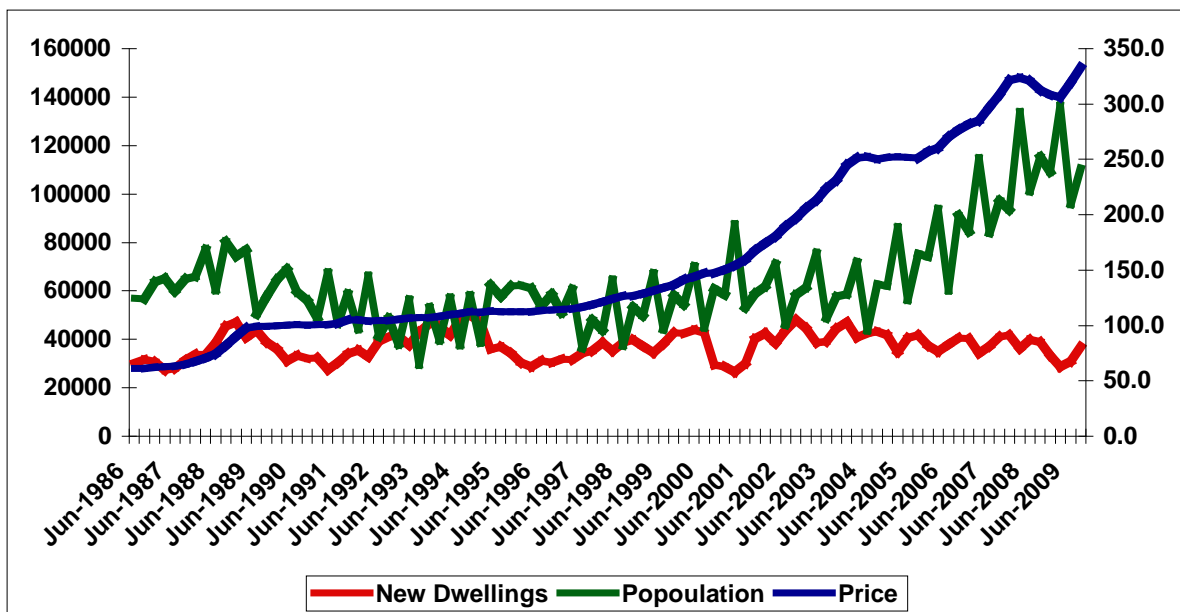
Figure 2: Level of new dwelling supply in all states & territories of Australia



Source: ABS (8752.0)

Not surprising, this has led to increase in prices across the board in Australia. Figure 3 shows the new dwelling supply with the growth of population and the increasing price level. As can be noted both population and prices are on an upward trend, whilst new dwelling construction has been relatively stable over the period.

Figure 3: Levels of new dwelling, prices and population change - Australia



Thus with a growing population, this would imply that there should be an increase in new dwelling activity, but instead, new dwellings have not kept pace with the growth of population in Sydney.

This leads to the question, “what is impeding the new supply of dwellings?”

## **LITERATURE REVIEW**

The study of new dwellings is the study of ‘the supply side of the property market’ and as DiPasquale (1999) notes there has been far less literature on the supply side of housing than the demand side and provides a Table that ‘virtually all the supply studies analysed aggregate data’. Some studies have more structured approaches, where supply ‘estimated directly with construction as a function of price and cost shifters’ that is the costs of supplying new housing.

Price elasticity of supply is the main focus of built environment textbooks. Harvey (1987) and Warren (1994) have started on the premise of an inelastic supply.

On the theme of price elasticity in USA, Green et al (2005) found that the price elasticity varied substantially from ‘heavy regulated’ cities to ‘low regulated’ cities. The former has a low price elasticity and the latter a higher elasticity. In essence, their research implicitly identified government as a factor.

In Australia the role of government in the building and property development industry is significant. Waxman (2004) pointed out that all levels of government may directly or indirectly influence the decision in the property market. Developer’s ‘infrastructure’ contributions (such as Section 94 Contributions in NSW) were introduced by all states by the 1980s, the GST, introduced from 1 July 2000 and the sustainability compliance (such as BASIX in NSW) introduced from July 2005 by all state authorities have had a major impact on new dwelling. UrbisJHD (2006) and 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. Berger-Thomson and Ellis (2004) found that whilst interest rates attributed to the construction movements in the 1980s, the levels in construction in Australia from around 2000 were “more (as) a result of the introduction of the

GST” and Karantonis (2007) showed that the three tiers of government between them receive around 60 percent of total income of a development. In other words, the developer with all the risk receives 40 percent of the total income and this study did not include the cost of any sustainability compliance.

The shortage of new dwellings in Australia is not unique. Internationally, in a review of housing supply in the UK, known as the Barker Report, identified that the long-term upward trend in real house prices has been 2.4 per cent per annum over the last 30 years is the result of shortage of supply (Meen, 2005). To bring the UK real price trend in line with the EU, an extra 120,000 houses each year would be required. In their submission to the review, the Home Builders Federation (HBF) also stressed that land supply is the key to sustainable housing (Anonymous, 2007).

Finally, UDIA (2003) noted that providing affordable housing is determined by three interacting factors; namely, demand side factors, supply side factors and government. It noted that the government included its intervention in planning regulatory mechanism and provision of infrastructure, both of which are predominantly on the supply side.

## **METHODOLOGY & DATA**

The aim of this paper is to analyse new dwelling supply and the relationship between new residential dwellings and the impact of government taxes, fees and policy. A series of correlations, graphs and tables have been undertaken using variables identified in previous studies.

The statistics are quarterly statistics and have been gathered from various Australian Bureau of Statistics (ABS) publications and ‘time series’ downloads. It should be noted from the outset that the figures for new dwellings are gross figures, that is, demolitions of existing dwellings are not accounted for, as there are no formal (ABS) statistics which show the number of demolitions.

## NEW SUPPLY

Figure 4 shows that the number of person increase in population per new dwelling has been on an upward trend over the past decade, which implies a fall in new dwellings in relative terms. The average for the period 1985 -2009 was 1.73 person increase per new dwelling and this has risen to 2.06 post GST to 2.65 post Sustainability compliances.

Figure 4: Number of increase in population per new dwellings (Australia)

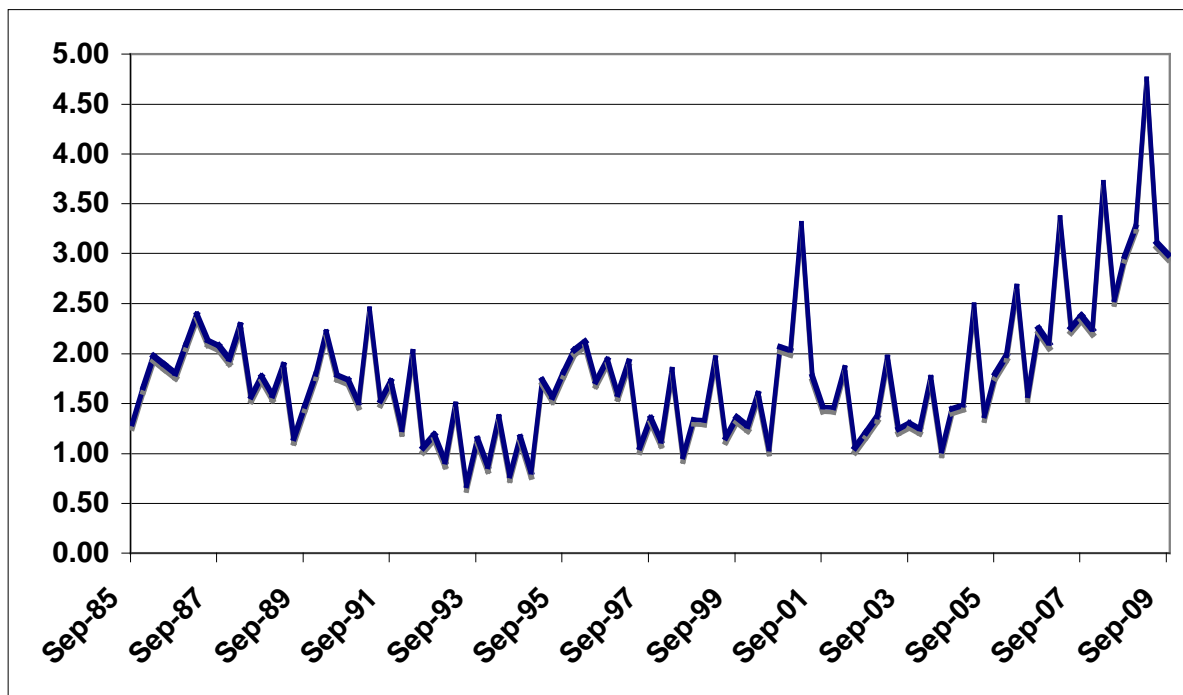


Table 1 shows this ratio of new dwellings per person increase in population for all states and territories of Australia. In all cases, the position becomes worse after GST in 2000 and even further eroded after the introduction of sustainability compliances in 2005. When one considers the average household size of 2.6, NSW, Queensland and Northern Territory are shown to be producing less than the required rate from 2005 and if we examine the past year we see that all but South Australia and Tasmania having under supply, with NSW producing the worst result.

Table 1: Ratio new dwellings per number of increase in population

	<b>AUS</b>	<b>NSW</b>	<b>Vic</b>	<b>Q'L</b>	<b>SA</b>	<b>WA</b>	<b>Tas</b>	<b>NT</b>	<b>ACT</b>
<b>Total</b>	1.73	1.71	1.55	2.13	1.09	1.75	0.91	2.42	1.60
<b>Pre GST</b>	1.52	1.56	1.29	1.84	0.96	1.61	0.63	2.17	1.55
<b>Post GST</b>	2.06	2.01	1.89	2.60	1.29	1.96	1.45	2.94	1.70
<b>Post Sustain</b>	2.65	3.29	2.45	2.83	1.59	2.49	1.51	3.92	2.34
<b>Average Prev Yr</b>	<b>3.53</b>	<b>4.98</b>	<b>2.80</b>	<b>4.42</b>	<b>1.90</b>	<b>3.47</b>	<b>1.74</b>	<b>4.72</b>	<b>2.79</b>

Although there has been a growing population and a resultant increase in price, there has not been a growing supply of new dwellings. This can be explained with Table 2, which shows the correlation between new dwellings, population change for Australia and the mainland states and the price index for their relevant capital cities.

The correlations for each are also ‘broken down’ into three periods, namely, the full period, the post GST period (post 2000) and the post Sustainability index period (post 2005).

Analysing Australia, it can be noted that there are no strong relationships between the variables and in fact population has a negative sign in each period. NSW produces all negative correlations whilst Victoria produces positive correlations for the factors over the full period, and has a 0.634 correlation with price, but it wanes away for the other periods and population becomes negative.

In all cases, there is, as expected a positive relationship between price and population, with NSW producing the least strongest.

Table 2: Correlation new dwelling, population and prices – Mainland States

Australia				Queensland			
<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.19	1.00		<b>Pop</b>	0.28	1.00	
<b>Price</b>	0.19	0.66	1.00	<b>Price</b>	0.18	0.78	1.00
<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.40	1.00		<b>Pop</b>	0.23	1.00	
<b>Price</b>	0.07	0.70	1.00	<b>Price</b>	0.29	0.78	1.00
<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.51	1.00		<b>Pop</b>	-0.41	1.00	
<b>Price</b>	-0.19	0.63	1.00	<b>Price</b>	-0.17	0.58	1.00
NSW				S A			
<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.52	1.00		<b>Pop</b>	0.34	1.00	
<b>Price</b>	-0.33	0.10	1.00	<b>Price</b>	0.44	0.62	1.00
<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.74	1.00		<b>Pop</b>	0.44	1.00	
<b>Price</b>	-0.31	0.13	1.00	<b>Price</b>	0.70	0.79	1.00
<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.43	1.00		<b>Pop</b>	-0.17	1.00	
<b>Price</b>	-0.30	0.53	1.00	<b>Price</b>	0.43	0.40	1.00
Victoria				W A			
<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>Full</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	0.40	1.00		<b>Pop</b>	0.23	1.00	
<b>Price</b>	0.63	0.76	1.00	<b>Price</b>	0.38	0.68	1.00
<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.32	1.00		<b>Pop</b>	0.18	1.00	
<b>Price</b>	0.10	0.69	1.00	<b>Price</b>	0.46	0.86	1.00
<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>	<i>GST+Sus</i>	<b>New</b>	<b>Pop</b>	<b>Price</b>
<b>New</b>	1.00			<b>New</b>	1.00		
<b>Pop</b>	-0.16	1.00		<b>Pop</b>	-0.69	1.00	
<b>Price</b>	0.40	0.56	1.00	<b>Price</b>	-0.36	0.51	1.00

Since population and price are not influencing new dwelling, what about the macro factors, GDP, interest rates, income and the cost of construction. In a recent study, Karantonis (2009) produced Table 3 which shows the correlation between new dwellings and macro economic



factors plus costs and as can be noted the correlations between new dwellings and these factors are not very strong. As well, the sign for cost is positive, whereas one would expect it to be negative.

**Table 3: Correlation new dwellings & macro factors**

	<b>New</b>	<b>GDP</b>	<b>Int Rate</b>	<b>Income</b>	<b>Cost</b>
<b>New</b>	1.00				
<b>GDP</b>	0.260	1.00			
<b>Interest rate</b>	-0.337	-0.793	1.00		
<b>Income</b>	0.236	0.981	-0.724	1.00	
<b>Cost</b>	0.208	0.916	-0.528	0.958	1.00

Source: Table 5 in Karantonis (2009)

All the analysis above, the correlation (Tables 2 and 3) and the ratios produced in Table 1, indicate that there are other drivers for dwelling supply.

## **SHORT SUPPLY**

Besides an increase in population, through increases in both the natural rate and immigration, there has been a trend over the past few decades of a population movement to the city. As well, there has been a trend for fewer people per household, that is the average household size has been reducing. Together, this means that there is a need for a growing supply of new dwellings.

In Sydney, the Metro Strategy identified that with a predicted population growing to 5.3 million and average household sizes anticipated to fall to 2.36 persons<sup>1</sup> per private dwelling by 2031, a total of 2.2 million homes will be required in Sydney alone. Accounting for current stock it estimates that there will be a need for an additional 640,000 dwellings. The average number of new dwellings for NSW for this decade is around 37,000 per year, far short of the target needed for the future.

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<sup>1</sup> Currently, 22 per cent of all households in Sydney are occupied by one person and by 2031, there are likely to be an additional 300,000 single person households in Sydney-representing 30 per cent of all households (Metro Strategy).

To accommodate this growth, urban consolidation and/or greenfield development, that is, the sub-division of outlying broad hectares is needed. One major effect of this is the cost of infrastructure required, as either new infrastructure has to be put in place or upgrading and extending the existing infrastructure. Either way, in Australia, there has been a rapid increase in the cost of infrastructure.

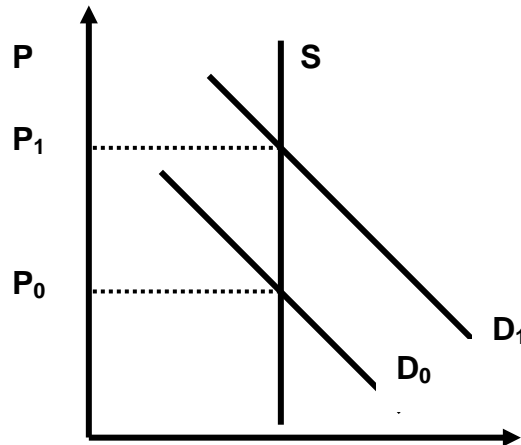
Due to the increases in infrastructure costs that are required to service new sub-divisions over the past two decades, the cost of supplying new land for residential development in Sydney has risen at a far greater rate than the cost of construction of new dwellings. This was highlighted with the UDIA (2007) noted in the literature review, whereby even if a developer was given the land for free in the nominated regions, it still would not be feasible to develop.

## **POLICY OPTIONS**

Maintaining new dwelling supply is crucial to housing affordability. Like all markets the property market is determined by demand and supply factors and one could argue in the typical classical economists way that in the long run the market will sort itself out. However unlike other markets, property is both shelter and a wealth asset and therefore there are consequences to society.

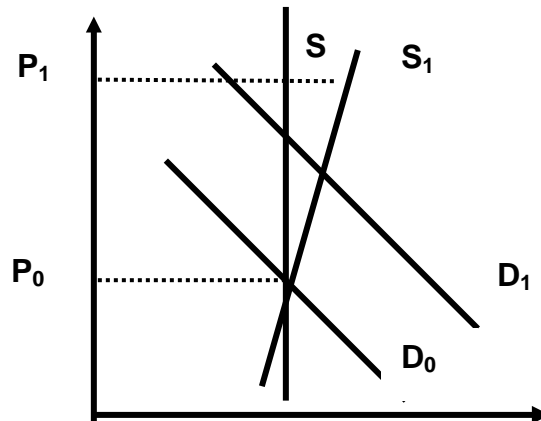
Government plays a significant role in both the demand and supply side of property markets. Fundamentally the increase in demand is coming from the population growth and to a lesser extent the falling household formation rates. At the same time, as Warren (1994) and other property economist point out that “supply is primarily inelastic, at least in the short run”. In simple terms, it could be argued that any policy option that gives benefit to the buyer will be passed onto the seller as shown in Figure 5a, where an increase in demand basically has the effect of pushing price up.

Figure 5a: The demand and supply of housing in the short run



Even in the long run, due to supply being relatively inelastic to demand, price will rise when demand increases unless there is a larger proportional increase in supply as depicted in Figure 5b where price rises to  $P_0$ .

Figure 5b: The demand and supply of housing in the long run



From the foregoing discussion, it is obvious that supply needs to increase, but for a developer to increase supply, the cost of supplying the new development needs to decrease and/or the gross realisation increase. Much of the discussion regarding affordability has focused on the demand side and although recognising that there is a shortage of new supply but no new policies have been introduced to alleviate the problem.

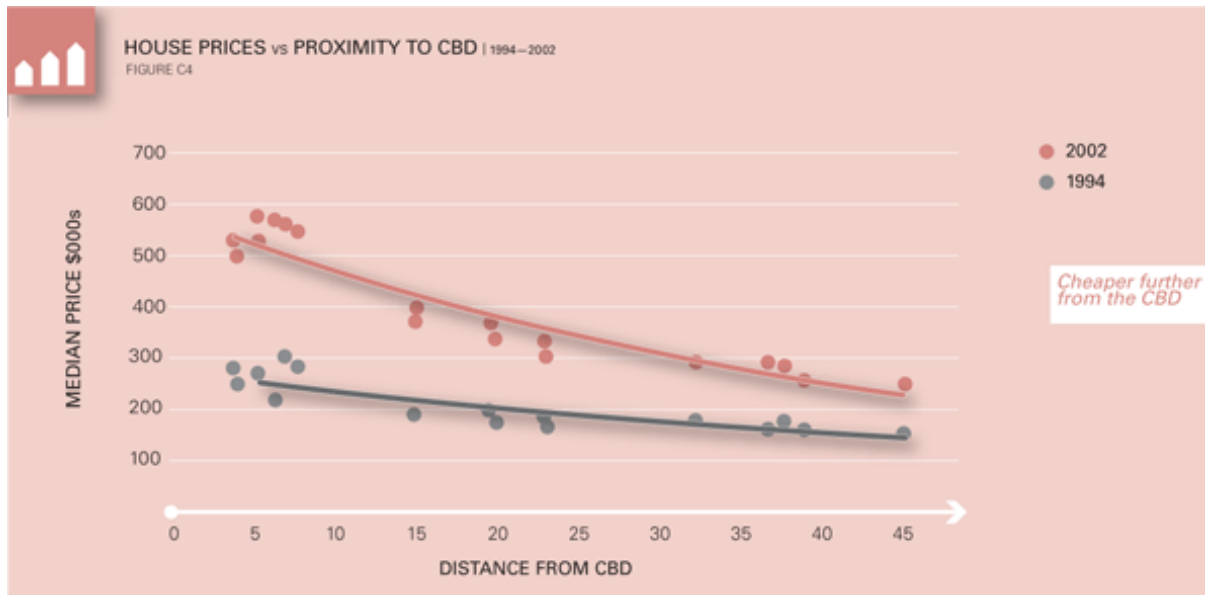
Not surprising, the industry bodies (UDIA, 2007, PCA, 2007) have identified many options, which can mainly be summarised by the following:

*“There is a need to increase the supply of new dwellings and for this to be achieved government needs to recognise that there is a need to improve the transport infrastructure and living conditions in urban sprawl areas. The former can be achieved through government expenditure on infrastructure and latter through economic decentralised programs to create work in the outlying areas.”*

A problem for growing cities particularly relying on urban sprawl is that regional areas outside the Greater Metropolitan Region lack the employment base or infrastructure investment to sustain or attract large increases in population. People need employment and if employment is not nearby, then transport needs to be cheap and efficient. The cost and efficiency of transportation is also a major issue for the fringe regional areas, as commuters need to travel to work. Metro (p30) estimated “the average household spent 31% more on petrol in 2003-4 compared to 1998-9 and traffic congestion in Sydney was estimated at \$5 billion in 1995 and is estimated to increase to \$8.8 billion by 2015.”

The new supply in fringe city areas is often not feasible, as the developers are faced with lower gross realisations as they move further from the CBD. Figure 6 shows how values typically fall as property is further from the Sydney’s CBD for 1994 and 2002. Thus, the one major stumbling block is the gross realisation of the developed dwelling may not exceed the total cost of supply it, as invariably the total cost is so great that there is absolutely no benefit (even a loss) to a developer to undertake a development, be it a new greenfield release or a medium to high density development.

Figure 6: House price vs. proximity to CBD



Source: Metro Strategy, (Figure C4, p125, 2006)

The problem for supply is further compounded with the need for an upgrade of existing infrastructure in brownfield developments, whilst the greenfield development require new infrastructure. These costs are generally passed onto the developer though infrastructure levies and Section 94 contributions as discussed above.

This becomes a self perpetuating problem, because whilst developers cannot get a *reasonable return* on development, they will not provide the new supply needed and thereby have existing dwelling prices driven higher.

There also needs to be a review of the number and incidence of taxes fees and charges on property development. Karantonis (2007) showed that there is at least ten ways of taxing property (these include fees and charges) in Australia and many of these apply to property development in one way or another. As pointed out in the literature review URBIS JHD (2006) also found that government charges are a major contributing factor for the cost of providing new supply, especially for the cost of providing new supply of land for housing and found that infrastructure cost for Sydney to be \$68,223, an increase of 21.1 percent since 2000.

The UDIA (2003) identified that new and rising taxes and charges on a new dwelling in Sydney was about \$167,000:

- GST introduced in 2000, adding between an average of \$50,000
- Land tax and stamp, up by \$30,000
- Infrastructure charges, \$75,000, made up of:
  - \$50,000 Section 94 levies
  - \$15,000 transport levy,
  - \$10,000 Water and sewerage headworks and charges
- Land dedicated for regional conservation, \$10,000
- Additional application and incidental fees, \$2,000.

Clearly, the government has an important role to play in lowering the cost of supply. But once again, any policy initiative must clearly lead to a reduction or at least stabilising the cost of providing new supply and not passing the benefits of policy onto the developer or land owner.

## **CONCLUSION**

This paper identified that new dwelling supply in Australia has been relatively stable whilst population growth has been increasing and compounding this has been the falling average household size. This as resulted in dwelling prices rising across all of Australia.

The paper has also demonstrated that new supply has not been responding to the increase in price and showed that in there is a negative relationship between new dwelling supply and population growth. In addition, new dwellings did not have a relationship with the economic macro factors interest rates, GDP and income.

Over the period of this study, it was shown that in relative terms, dwelling supply has drifted downwards after the introduction of the GST and drifted further downwards with the introduction of the sustainability index in 2005. This has left one with the conclusion that government factors are impeding new dwelling supply.

This paper also addressed policy options however many of these options are dependant upon government action. All three tiers of government need to be pro-active in addressing the problem.

Finally, it needs to be recognised that whilst developers cannot get a *reasonable return* on supplying new housing in many regional areas, they will not provide the new supply needed to keep pace with the expected growth of numbers of household demanding dwellings.

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- 08:30** Registration desk open, Atrium, First floor, Architecture Building
- 08:30 – 09:00** Tea and coffee, Atrium, First floor, Architecture Building
- 09:00 – 09:20** Sisalkraft Theatre, Ground floor, Architecture Building  
Opening– Rick Best, AUBEA Chair, Paolo Tombesi, Conference Convenor
- 09:20 – 09:40** *A new context for built environment research in Australia* – Tom Kvan, Dean, Faculty of Architecture Building and Planning, The University of Melbourne
- 09:40 – 10:00** *Your journal: the new AJCEB* – Goran Runeson, Editor, Australasian Journal of Construction Economics and Building
- 10:00 – 10:20** Tea break, Atrium, First floor, Architecture Building
- 10:20 – 11:20** Sisalkraft Theatre, Ground floor, Architecture Building  
Professional Bodies' Panel: *New policy regimes, professional standards and higher education.*  
With representatives from the AIB, AIBS, AIQS, CIOB and RICS.  
Chair: Rick Best
- 11:20 – 11:40** *The College of Building: an update*– Robert Hunt, Executive Director of the College of Building
- 11:40 – 12:40** Room 308, Third floor, Architecture Building  
ALTC Workshop – William Sher, Catherine Simmons, Anthony Williams  
*Understanding the nexus between theory and practice: Workshopping views on work-based learning in the CM curriculum and the use of e-learning technologies.*
- 12:40 – 01:40** Lunch, Atrium, First floor, Architecture Building
- 01:00 – 01:30** Wunderlich Space, Ground floor, Architecture Building  
Expository talk by Professor Miles Lewis

Exhibition: *Rare French books on architecture and building from the collections of the Osbert Lancaster Memorial Bibliographic Institute.*

**01:40 – 03:20** Paper sessions:

e-Zone, First floor, Architecture Building  
Management of Construction Education (1)  
Chair: Perry Forsythe

James Hardie, Second floor, Architecture Building  
Management of Construction Demand (1)  
Chair: Angelo Karantonis

**01:40 – 02:00** A021. Sidney Newton:  
A new framework for accreditation  
standards in the built environment.

**01:40 – 02:00** A076. Harry M. Karamujic, Chris  
Torr:  
The underlying elements of the  
pricing calculation for lending  
products.

**02:00 – 02:20** A029. Hemanta Doloi, Anil Sawhney,  
K.C. Iyer: Benchmarking the  
versatility of construction  
management education with a global  
perspective.

**02:00 – 02:20** A042. Yan Huang, Chunlu Liu: A-  
REIT price responses to cash rate  
changes.

**02:20 – 02:40** A020. Kerry London, Gayle Morris:  
Judgement, reflexivity and  
interdisciplinarity: reframing  
construction management education.

**02:20 – 02:40** A040. Junxiao Liu, Chunlu Liu:  
Impacts of monetary policies on  
housing affordability in Australia.

**02:40 – 03:00** A005. Bassam Sam Baroudi:  
Teaching professionally based  
construction courses: A reflective  
overview.

**02:40 – 03:00** A017. Jian Zuo; Xiao-Hua Jin; Mark  
McDonald: Challenges to the  
infrastructure delivery during the  
economic downturn – a qualitative  
analysis.

**03:00 – 03:20** Discussion

**03:00 – 03:20** Discussion

**03:20 – 03:50** Tea break, Atrium, First floor, Architecture Building

**03:50 – 05:10** Paper sessions:

e-Zone, First floor, Architecture Building  
Management of Construction Education (2)  
Chair: TBC

James Hardie, Second floor, Architecture Building  
Management of Construction Demand (2)  
Chair: Chris Heywood

**03:50 – 04:10** A006. Hilary Davies: The future of  
facilities management – Educators  
and professional bodies working  
together.

**03:50 – 04:10** A031. Angelo Karantonis: An  
analysis of new supply of residential  
dwellings in Australia.

**04:10 – 04:30** A014. Shane West, Ron McLaren:  
The rationale for the development of  
construction procurement and  
sustainable procurement courses at  
the University of Canberra.

**04:10 – 04:30** A094. Andrew Martel: Economy and  
ecology: How demand affects form  
in the production of high-density  
student housing in Melbourne.

**04:30 – 04:50** A078. Julie Jupp, Perry Forsythe,  
Shankar Sankaran: Towards a  
value-centric approach to education:  
Implications of changing practices in  
construction project management.

**04:30 – 04:50** A037. Stephen Pullen, George  
Zillante, Michael Arman, Dr Lou  
Wilson, Dr Jian Zuo, and Nicholas  
Chileshe: A case study analysis of  
sustainable and affordable housing.

**04:50 – 05:10** A097. Paolo Tombesi: DIPS in

**04:50 – 05:10**

construction education.

05:10 – 05:30 Discussion 05:10 – 05:30 Discussion

06:30 – 09:00 Ian Potter Museum of Art at Melbourne University, First floor, Swanston Street AUBEA  
Opening reception,  
Exhibition: *Sites of Construction*, Marco Luccio

07:00 – 07:20 Artist's presentation of the work

**JULY 15, 2010 – DAY TWO**

08:30 Registration desk open, Atrium, First floor, Architecture Building

08:30 – 09:00 Tea and coffee, Atrium, First floor, Architecture Building

09:00 – 10:40 Paper sessions:

e-Zone, First floor, Architecture Building  
Management of Construction Education (3)  
Chair: Victor Chen

James Hardie, Second floor, Architecture Building  
Management of Construction Demand (3)  
Chair: Stephen Pullen

09:00 – 09:20 A081. Jenny Robins, Peter Ashford: Combining work and study: Preliminary findings from built environment students under the Melbourne Model. 09:00 – 09:20 A023. Hugh Zochling: Addressing Australia's housing shortage through improved housing utilization.

09:20 – 09:40 A032. David Baccarini: The implementation of capstone projects: A case study. 09:20 – 09:40 A088. Jia You, Hao Wu, Sun Sheng Han: The role Chinese municipal government played within the affordable housing development: Evidence from Nanjing, China.

09:40 – 10:00 A079. John Smallwood: The role of integrative projects in tertiary construction management education. 09:40 – 10:00 A011. R.J. Fuller; P. Taylor: Better definitions, better buildings?

10:00 – 10:20 A036. Imriyas Kamardeen: Lessons learnt from the application of problem-based learning strategy in Construction Economics course. 10:00 – 10:20 A075. Dominique Hes, Philippa Howard: Using construction of school buildings as a novel approach to teach about sustainability.

10:20 – 10:40 Discussion 10:20 – 10:40 Discussion

10:40 – 11:00 Tea break, Atrium, First floor, Architecture Building

11:00 – 12:20 Paper sessions

e-Zone, First floor, Architecture Building  
Management of Construction Education (4)  
Chair: Sid Newton

James Hardie, Second floor, Architecture Building  
Management of Construction Demand (4)  
Chair: TBC

11:00 – 11:20 A010. Patricia McLaughlin, Anthony Mills: Parallel TAFE and higher education studies in construction management: From collaboration to dual qualifications. 11:00 – 11:20 A003. Stefan Hornlund: Using timber in construction can help reduce greenhouse gas emissions

11:20 – 11:40	A012. Mary Hardie, Swapan Saha: Some significant issues concerning the articulation of construction programs between TAFE and university: A discussion of the experience at a NSW university.	11:20 – 11:40	A026. Malik M A Khalfan, Tayyab Maqsood, Atif Ali, and Faisal Arain: Trends of sustainable development and construction in Australia.
11:40 – 12:00	A090. Jim Georgiou: Construction management education, quality and housing.	11:40 – 12:00	A035. George Zillante, Ashley Konitzka, Jian Zuo: Benefits of Green Star rated commercial buildings and the potential translation to industrial buildings.
12:00 – 12:20	Discussion	12:00 – 12:20	Discussion
12:20 – 01:00	Sisalkraft Theatre, Ground floor, Architecture Building <i>The road to change: Achievements, challenges and ambitions of the Built Environment Industry Innovation Council two years into the Strategic Plan.</i> Sue Holliday, Chair, Built Environment Industry Innovation Council		
01:00 – 02:00	Lunch, Atrium, First floor, Architecture Building		
01:15 – 01:45	Wunderlich Space, Ground floor, Architecture Building Expository talk by Professor Miles Lewis Exhibition: <i>Rare French books on architecture and building from the collections of the Osbert Lancaster Memorial Bibliographic Institute.</i>		
02:00 – 03:40	Paper sessions:		
	e-Zone, First floor, Architecture Building <u>Management of Construction Education</u> (5) Chair: David Baccarini		James Hardie, Second floor, Architecture Building <u>Management of Construction Processes</u> (1) Chair: Toong-Khuan Chan
02:00 – 02:20	A096. Ning Gu, Anthony Williams, Willy Sher: Supporting design education in 3D virtual worlds: A case study.	02:00 – 02:20	A019. Perry Forsythe, Warwick Davidson, Florence Phua: Predictors of construction time in detached housing projects.
02:20 – 02:40	A024. Tony Williams, William Sher and Catharine Simmons: Do e-learning technologies facilitate work based learning for Construction Management students? Researching the nexus between theory and practice.	02:20 – 02:40	A028. Alireza Fallahi: Bam earthquake construction management in cultural heritage sites.
02:40 – 03:00	A016. Jennifer Macdonald, Julie E. Mills: Can BIM be used to improve building design education?	02:40 – 03:00	A070. Peter E.D. Love; Peter Davis: Rework in the design, construction and operation of a floating production storage offloading hydrocarbon projects.
03:00 – 03:20	A082. Valerie Francis, Scott Drake, Joan Greig: Building pedagogy: The case study of a new Faculty building.	03:00 – 03:20	A013. Van Dai Tran, John E. Tookey: Productivity in the NZ construction industry: Albatross around the neck of growth or victim of circumstances?
03:20 – 03:40	Discussion	03:20 – 03:40	Discussion
03:40 – 04:00	Tea break, Atrium, First floor, Architecture Building		

02:00 – 03:40 Paper sessions:

e-Zone, First floor, Architecture Building  
Management of Construction Supply  
Chair: TBC

James Hardie, Second floor, Architecture Building  
Management of Construction Processes (2)  
Chair: Valerie Francis

04:00 – 04:20 A091. Milinda Pathiraja: Building as capacity building: An industry-wide labour training approach for urbanizing South.

04:00 – 04:20 A030. Tony Ma, Ashley Olifent, Jian Zuo: Towards the minimization of variations in Design and Build projects.

04:20 – 04:40 A098. Blair Gardiner, Heather Mitcheltree: 'Not in my backyard': The difficulty in examining OHS processes.

04:20 – 04:40 A027. Malik M A Khalfan, Tayyab Maqsood: Relationships between parties involved in different methods of project procurement.

04:40 – 05:00 A095. Suet Stephanie Chan and Ajibade Ayodeji Aibinu: Barriers to the implementation of value management in the Malaysian construction industry.

04:40 – 05:00 A069. Tony Ma: The two-envelope tendering for contractor selection – South Australian experiences.

05:00 – 05:20 A080. Roberto Padovani, Christopher Jensen and Dominique Hes: Approach to thermal modeling innovative green building elements: Green roof and phase change plaster board.

05:00 – 05:20 A073. Gang Chen, Guomin Zhang, Yimin Xie: Overview of the Australia-based project alliancing research.

05:20 – 05:40 Discussion

05:20 – 05:40 Discussion

06:00 – 06:40 Prince Philip Theatre, Ground Floor, Architecture Building  
Plenary address: *Managing construction vs construction management* – Murray Coleman, Global Head of Project Management, Design and Construction, Bovis Lend Lease, and Professorial Fellow, The University of Melbourne

07:00 – 07:30 Guided tour and pre-dinner drinks, Newman College Cloister

07:30 – 10:00 Newman College, Melbourne University, Swanston Street  
Gala Dinner, Newman College Dining Hall  
Dinner presentation: *The construction and restoration of Newman College*.  
Arthur Andronas, Building restoration architect of Newman College

### JULY 16, 2010 – DAY THREE

08:30 Registration desk open, Atrium, First floor, Architecture Building

08:30 – 09:00 Tea and coffee, Atrium, First floor, Architecture Building

09:00 – 11:00 Room 308, Third floor, Architecture Building  
ALTC Workshop – Pam Roberts, Julie Mills, Judith Gill  
*What's gender got to do with it? A guide to gender inclusive curriculum for building educators and construction professionals.*

10:00 – 11:00 Paper sessions:

e-Zone, First floor, Architecture Building  
Management of Construction Research (1)  
Chair: Victor Chen

James Hardie, Second floor, Architecture Building  
Management of Construction Processes (3)  
Chair: Ajibade Aibinu

09:40 – 10:00	A001. Emad Elbeltagi and Mahmoud Dawood: Construction performance monitoring based on fuzzy control chart.	09:40 – 10:00	A072. Gang Chen, Guomin Zhang, Yimin Xie: A proposed research area in project alliancing: cost management based on interorganizational settings.
10:00 – 10:20	A008. Alexander Soo, Bee Lan Oo: The effect of information feedback in construction bidding.	10:00 – 10:20	A008. Alexander Soo, Bee Lan Oo: The effect of information feedback in construction bidding.
10:20 – 10:40	A041. Heng Jiang, Cuijia Fu, Chunlu Liu: Investigating relationships of construction prices in Australia using cointegration analysis.	10:20 – 10:40	A022. M.E. Che Munaaim: Key features of an effective adjudication regime.
10:40 – 11:00	Discussion	10:40 – 11:00	Discussion
11:00 – 11:20	Tea break, Atrium, First floor, Architecture Building		
11:20 – 01:00	Paper sessions:		
	e-Zone, First floor, Architecture Building <u>Management of Construction Research (2)</u> Chair: Kerry London		James Hardie, Second floor, Architecture Building <u>Management of Construction Projects</u> Chair: Dominique Hes
11:20 – 11:40	A071 .Timothy O'Leary, George Zillante: Codes and conferences – a new ERA for building researchers and educators.	11:20 – 11:40	A009. Bee Lan Oo and Alexander Soo: Using bidding experiment to test the effects of learning and information feedback on construction bidding.
11:40 – 12:00	A025. Tayyab Maqsood, Salman Azhar, Malik M A Khalfan: Soft research approaches for construction research.	11:40 – 12:00	A099. Marianna Nigra: Inductive reasoning in support of building research.
12:00 – 12:20	A089. Paolo Tombesi, Andrew Hutson, Marianna Nigra, Martin Fowler, Verity Ducos, David Teoh, and Surabhi Chaturvedi: The formation of building industry samples through the analysis of individual projects: Two Australian examples.	12:00 – 12:20	A093. Giorgio Marfella: Five speculative points for a building type.
12:20 – 12:40	A004. Marcel Frei, Jasper Mbachu: SWOT analysis of the construction cost management profession - the Australasian case study.	12:20 – 12:40	A007. Morteza Shokri-Ghasabeh, George Zillante: Construction contractors' attitudes towards a new research study: four case studies in South Australia.
12:40 – 01:00	Discussion	12:40 – 01:00	Discussion
01:00 – 02:00	Lunch, Atrium, First floor, Architecture Building		
02:00 – 03:40	Prince Philip Theatre, Ground Floor, Architecture Building QANDA at AUBEA – Plenary panel on research: <i>Is construction research needed/possible/for real?</i> Chair: Paolo Tombesi		

**Panel participants:**

» Randell Fuller, Employee Relations Manager, Brookfield Multiplex Limited;

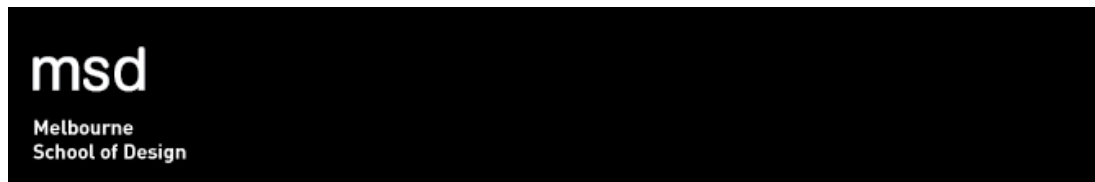
- » Dennis Hogan, Director of Regulatory Development, Building Commission;
- » Richard Hutchings, Legal Counsel, VicUrban;
- » Craig Langston, Professor and Associate Dean for Research, Bond University;
- » Tim Roberts, Director, WT Partnership;
- » Sean Sweeney, Executive Director, Major Projects Victoria.

03:40 – 04:00 Conference closing remarks

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## AUSTRALASIAN UNIVERSITIES BUILDING EDUCATION ASSOCIATION

AUSTRALASIAN UNIVERSITIES BUILDING EDUCATION ASSOCIATION (AUBEA),  
35TH ANNUAL MEETING



### ABOUT THE CONFERENCE

The focus of this year's conference is the management of construction. Rather than automatically associating the meaning of these two words to the area of expertise labelled as 'construction management', we intentionally set out to interpret their connection in the broadest possible way, to incorporate any discipline that improves our ability to manage the industrial structure, the planning and production process, the distribution process, or the output of building.

What should the sophisticated pairing of 'construction' and 'management' designate or include today — particularly from an intellectual perspective? Predetermined or new academic disciplines, specific training or work issues, micro or macro problems, cultural dispositions towards problem definition and problem solving?

Irrespective of the possible answers, can we presuppose curricular bases? If so, to what extent? Similarly, can we identify — normatively or historically — the kinds of research we should engage with, or the kinds of teachers/scholars who should be involved?

These questions are critical for tertiary educators in building programs across the entire Australasian region, but particularly in Australia, where the dynamics of the industry, combined with the ongoing restructuring of building courses and the faltering support for research in construction, raise issues with regard to the nature and use of the education on offer in the various areas, the market for it, and the role that educational providers should play in advancing or maintaining the state of knowledge.

In light of the changes recently undergone in its overall structure, the Faculty of Architecture Building and Planning at the University of Melbourne is keen to provide a platform for AUBEA to reflect on such issues, by implicitly subjecting its own choices to criticism and debate vis-à-vis alternative strategies and/or agendas.

Contributions are therefore sought from individuals as well as institutions that, on the basis of the questions suggested above, can help map an inclusive territory for managing construction, define or reinforce its environmental connections and boundaries, or steer the travel in specific directions — essentially by clarifying their own intellectual and operative position against issues that are specifically deemed or relevance.

This can be done by describing epistemological stances, work carried out by the presenters, curricular choices, teaching strategies, problems to address, gaps to fill, areas to bridge, tools to develop, knowledge streams to pursue, research undertaken or to undertake, issues to consider, or constituencies to respond to, in every area covered by the programs of building schools.

As in the best tradition of AUBEA conferences, the range of possible topics is wide, with the small proviso that each paper should contribute to stimulate a 'reflective' and possibly organic discussion on the overarching theme.

#### Student stream

Since higher research degree students are the linchpin connecting academic present and future, a section of the AUBEA meeting will be devoted to the presentation of their work on related matters.

#### Research funding discussion

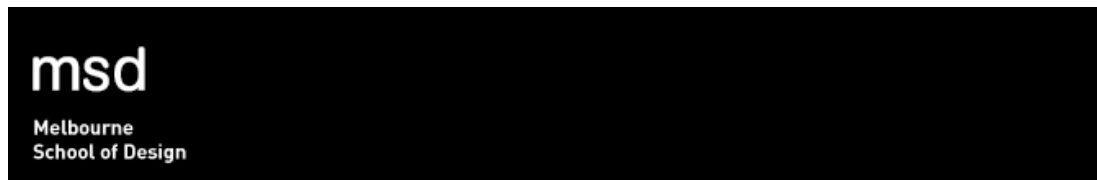
In light of the Federal Government's current Excellence in Research for Australia (ERA) initiative, another section of the meeting will be used to discuss the funded research environment in Australia, and the space this leaves to building-related studies.



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## AUSTRALASIAN UNIVERSITIES BUILDING EDUCATION ASSOCIATION

AUSTRALASIAN UNIVERSITIES BUILDING EDUCATION ASSOCIATION (AUBEA),  
35TH ANNUAL MEETING



### SUBMISSION DETAILS

#### Abstracts

Abstracts will be used as expressions of interest and for conference structuring purposes. We would like to receive short, clear abstracts, not exceeding 300 words. They should include the name(s) and affiliation(s) of the author(s), title, and summary of content of the intended paper. Abstracts should be e-mailed to [aubea-2010 \(@unimelb.edu.au\)](mailto:aubea-2010@unimelb.edu.au).

Referees will review papers only.

#### Initial paper submissions

Submitted papers should not be longer than 3,000 words and be formatted in PDF, with a file size not to exceed 5mb. Name(s) and affiliation(s) of the author(s) should only appear in the first page, as shown in the paper template below. Papers should be sent to [aubea-2010 \(@unimelb.edu.au\)](mailto:aubea-2010@unimelb.edu.au) with 'AUTHOR(S)SURNAME\_aubea2010\_initialpaper' in the Subject field. If the author is a student, the Subject field should read: 'Student\_AUTHOR(S)SURNAME\_aubea2010\_initialpaper'.

» [Paper template](#) (Word, 55 kb)

Format guidelines for the paper are as follows:

Length: 2000 - 3000 words.

Paper size: A4, 1.5 lines spacing.

Margin: 2.5cm top/bottom and 3.5cm left/right.

Title: Times New Roman, upper case bold, 14 point, 24 pt before and 18 pt after.

Text: Times New Roman, 12 point, 6 pt before and 12 pt after.

Main Headings: Bold and all in capitals, 24 pt before and 12 pt after.

Sub-Headings: Bold and lower case, 12 pt before and 6 pt after.

No underlining.

Images, charts and tables should be titled, numbered, and embedded in the text.

Captions: Times New Roman, lower case, 10 point, 0 pt before 24 pt after.

Harvard referencing.

In principle, the structure of the paper should contain an abstract outlining purpose, scope, methods and conclusions, plus selected keywords. The text should be organized in separate sections consisting of introduction, main body, conclusions, and references.

All submissions will be double blind peer-reviewed.

#### Final paper submissions

All accepted papers must be submitted electronically in their final form as a Word document, to the same address and by 26 June. The Subject should be 'AUTHOR(S)SURNAME\_aubea2010\_finalpaper', or 'Student\_AUTHOR(S)SURNAME\_aubea2010\_finalpaper'.

All final manuscripts will be included in the electronic conference proceedings subject to peer review acceptance.

### CONFERENCE PROCEEDINGS

Conference proceedings will be available as part of the conference package. The technical committee will select the best papers and invite its authors to extend them into chapters for a book on education and research on the management of construction or articles for the *Australasian Journal of Construction Economics and Building*.

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