

# Effect of Energy Efficiency Rating (EER) of Dwellings on Sale Prices in the ACT 1999-2020

**DRAFT**

Trevor Lee<sup>1</sup>, Yoke Yeong Fung, Chun Yin Wu

<sup>1</sup>*Exemplary Energy Partners, Wakool House, 32 Fihelly Street, Fadden ACT 2904, Australia*

*trevor.lee@exemplary.com.au*

## **Abstract**

This paper seeks to elucidate whether the mandatory disclosure of Energy Efficiency Rating (EER) influences the sale prices of properties in the Australian Capital Territory's market. The correlation between dwelling price and EER has been monitored continuously by the author since mandatory disclosure of the EER was introduced in the ACT in April 1999. Early positive correlation, however, waned a few years later as the blocks holding the poor performing (low EER) stock in the inner suburbs grew in value relative to the outer, newer, higher EER suburbs. More recently, the rise in apartment construction as a fraction of total housing added another confounding factor. Apartments average a higher EER than houses but also sell for a lower average price. It was evident that disaggregation by housing type was a necessary refinement for this historical data set to retain purpose and meaning. A revised methodology, by means of further disaggregating properties by dwelling type (i.e. house, townhouse and apartment) and median prices, in lieu of mean prices, was implemented to achieve better representation. The author's observation into the refined dataset is that the segregation by dwelling types does corroborate the intent of the legislation by revealing (and perhaps generating) a significant price margin of high EER dwellings over their low EER competition – confirming the conventional wisdom of “higher EER, higher prices”.

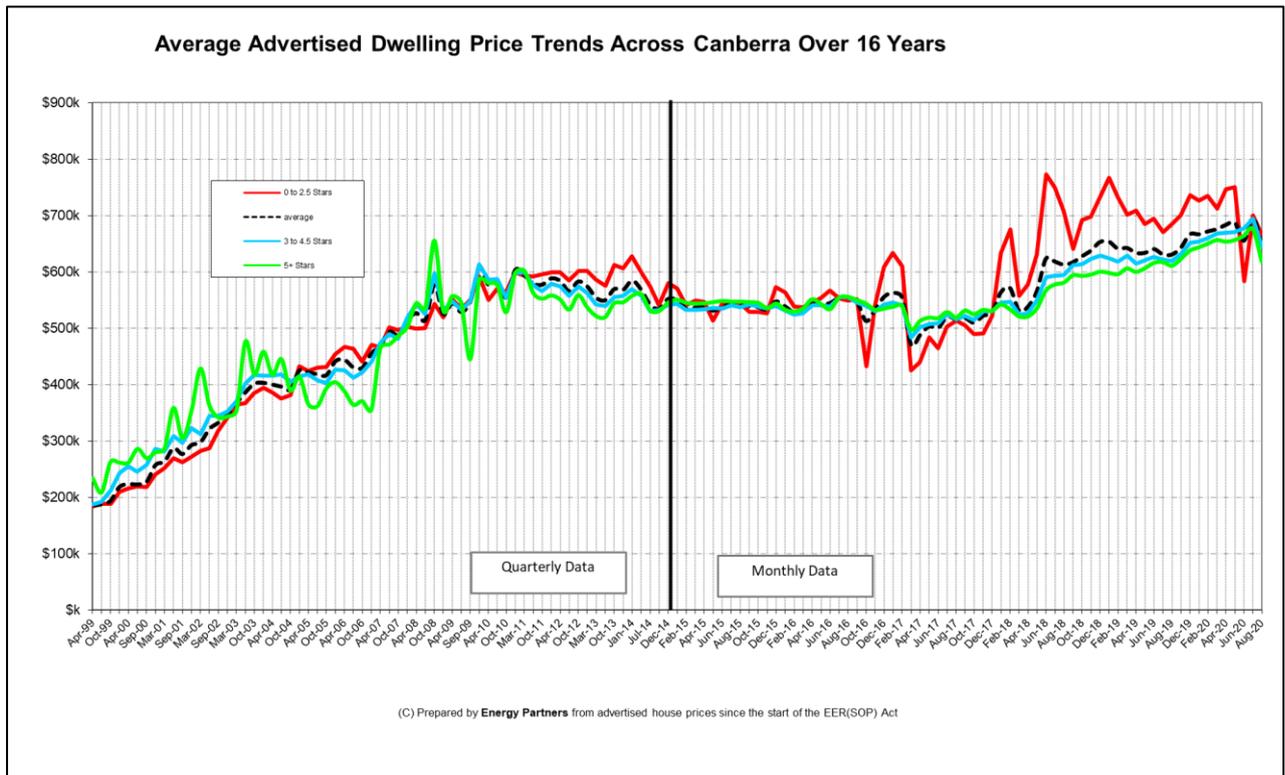
## 1. Introduction

Since April 1999 in the ACT, it has been mandatory for sellers of residential properties to disclose and provide information about their property's Energy Efficiency Rating (EER) to potential buyers, including in any advertisements for that sale (EER(SOP) Act 1997 and CL(SRP) Act 2003). As a result, not only possible energy performance improvements specific to the building can be set out but also market value of the property can be better justified. The overall benefit of this scheme lies in the expectation that it acts as an incentive for all parties, be they property owners, real estate agents or building industry participants, to improve the energy efficiency of their properties for higher sale prices.

Despite well documented successes in demonstrating a robust relationship between EER and selling prices (ABS, 2008) and (DECC, 2013), there remains ongoing media analyses and critiques, be it constructive or destructive, on this scheme; for example (Trobe, 2014, 2016) and (Hull, 2013). More academic commentary on this scheme is also listed in the public domain (Lee *et.al*, 2007, 2008 and 2010), (Lee, 2009) and (Energy Partners, 2002, 2003, 2004, 2007 and 2008).

Since the advent of this mandatory disclosure scheme, Energy Partners has been evaluating the relationship of EER and dwelling advertised/asking prices through the "*Canberra Times*" weekly hard copy "*Property Guide*", now called "*Domain*", and more recently through its web-based equivalents. The data of that ongoing study, however, had been collected and presented in a way that was not differentiated by dwelling type (i.e. house, townhouse and apartment; see Dwelling Type Classifications below for definitions).

With each passing month, our ongoing study showed that the positive correlation between EER and property prices was weak at best. As early as October 2004, these two factors can even be observed to occasionally have an inverse correlation and this has remained counterintuitively so from 2011 to mid-2015. This is indicated by the red line (advertised price of properties with 0-2.5 star ratings) being greater than the green line (properties with 5+ star ratings).



**Figure 1: Average advertised dwelling price trends across Canberra over 16 years**

Key reasons for this apparent anomaly are posited to be:

1. The proximity of the worst performing property to the city centre (old houses on valuable and rapidly appreciating blocks),
2. Data analysis and representation (i.e. mean instead of median property prices have been used in the early years – in the case of means, a small number of high value properties can skew the aggregated value upwards on some occasions); and
3. The fact that apartments, being the intrinsically best performing dwelling type (highest EERs due to low surface area exposed to the elements), are priced relatively low in the market and persistently so over recent years. Additionally, apartments (flats and units) have rapidly grown as a fraction of the total housing market in the last decade in particular.

As such, by utilising the completeness of our pertinent historical resources Energy Partners, this paper seeks to re-evaluate whether the notion of “higher EER, higher property prices” can be corroborated.

## 2. Methodology

This section explains how Energy Partners collates and presents the data in this paper.

Property prices in the preceding month for all 112 suburbs in Canberra are collected around the first day of every following month from *Domain* ([www.news.domain.com.au](http://www.news.domain.com.au)). Firstly, all suburbs are categorised into six regions (i.e. Gungahlin, Belconnen, Inner North, Inner South, Woden Valley/Weston Creek and Tuggeranong; see **Error! Reference source not found.**). In each suburb, a sking prices of dwellings are grouped according to their respective advertised EERs and further differentiated by dwelling types within each star. This allows the median prices for each dwelling type in a star band to be recorded for every suburb. These steps are repeated for all suburbs.

Once the process is completed, the median prices corresponding to their region, EER and dwelling type are then compiled and segregated into a larger EER group (i.e. 0-2.5, 3-4.5 or 5+ stars)<sup>1</sup>. Finally, within each EER group, the median prices for each dwelling type are averaged for an “average median price”. This “average median price” is an indicative measure of the cost needed by potential property buyers to purchase a property of a given EER range.

## 3. Revised Data - Rationale

Given the above background, Energy Partners has been collating data on median property prices based on their star rating and disaggregating by dwelling type for the past 83 months. This has been done to achieve better data representation. There are three factors which will contribute to this:

Firstly, property prices generally do not lie on a normal distribution. To account for occasional outstandingly high advertised prices which can consequently skew the mean, the median rather than mean prices plotted over time is more reliable and hence desirable.

Secondly, it was observed from previous data that the price of one dwelling type differs quite significantly and consistently to the price of another dwelling type. As such, prices of different dwelling type can be better represented by segregating them.

Lastly, trends may differ according to the region within Canberra being considered, with the inner regions being more prone to obscuration of \$/EER trends by virtue of old, inefficient housing

---

<sup>1</sup> While the EER software is capable of differentiating to a single decimal place (e.g. 5.3 stars) the reports generated are rounded down to the nearest half star: so a published rating of 3.5 stars could describe an underlying rating of between 3.5 and 3.9 stars.

standing on valuable sites (often because they are ripe for redevelopment, often as townhouses or apartments with new, higher EER stock). As a generalisation, it can be observed that block prices (and hence dwelling prices) decline with distance from Lake Burley Griffin. See Figure **Error! Reference source not found.** for the location of regions within Canberra.

#### 4. Dwelling Type Classifications and Suburban Regions

The Building Code of Australia (BCA) defines 10 building classifications, with the bulk of all dwellings lying in Classes 1 and 2, as below.

BCA Classification 1(a)i:

- Detached houses (not attached to any other dwelling)

BCA Classification 1(a)ii:

- Townhouses, row houses, semi-detached houses (attached by one or more walls to another dwelling)

BCA Classification 2:

- Apartments, units and flats (attached by one or more walls and by floor and/or ceiling to another dwelling)

The BCA is a part of Australia's National Construction Code (NCC) available from the Australian Building Codes Board (ABCB) at [www.abcb.gov.au](http://www.abcb.gov.au).

There are six suburban areas in Canberra (Woden and Weston Creek are usually treated as a single district), generally separated from each other by extensive park lands as shown in Figure 2: Generic Canberra map characterised by suburban areas denoted by their respective town centres. Quasi suburbs outside the ACT to the north and south-east are not subject to mandatory publication of EER values and can be ignored for the purposes of this article.



**Figure 2: Generic Canberra map characterised by suburban areas denoted by their respective town centres**

## 5. Results

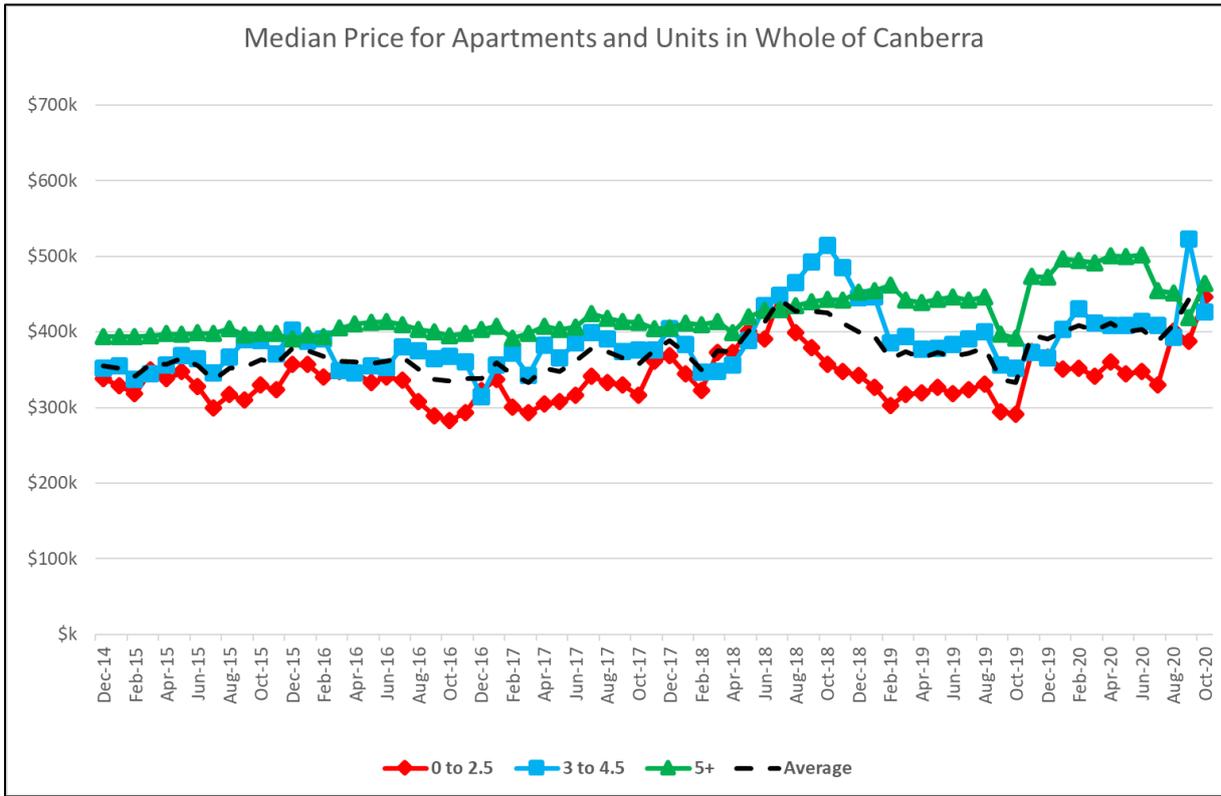
### 5.1 Apartments

Figure 3 to figure 7 shows the median prices for apartments across Canberra as a whole and selected suburb regions. 5+ star Apartments generally attract a sale premium when compared against the lower star band groups. The average sale premium in the past 12 months is between 16% (3-4.5 star to 5+ star) to 30% (0-2.5 star to 5+ star) in Canberra as a whole.

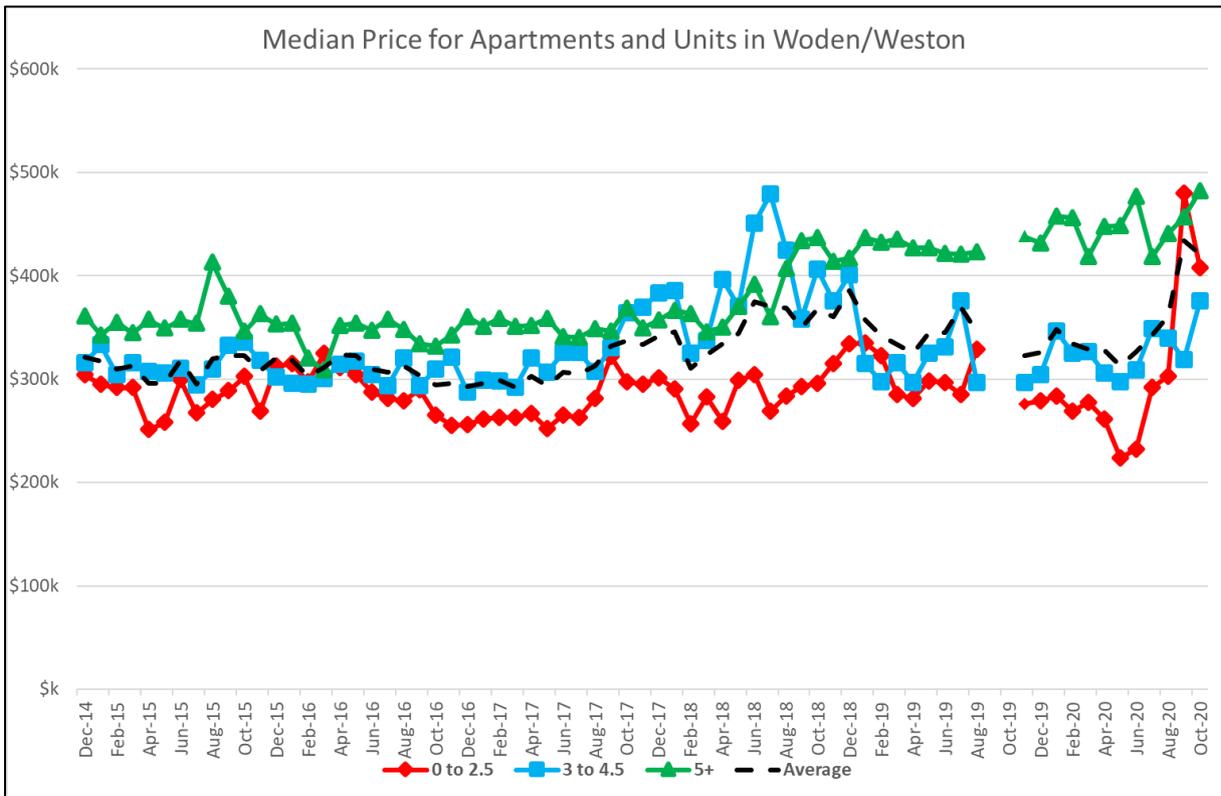
Woden/Weston area (south-west of Civic) and Inner North are suburb regions which had 5+ star apartments listed with above average sale premiums, going as high as 30% (3-4.5 star to 5+ star) to 56% (0-2.5 star to 5+ star), in the past 12 months. On the contrary, Inner South and Gungahlin had 5+ star apartments listed with below average sale premiums, between -20% (3-4.5 star to 5+star) to 22% (0-2.5 star to 5+ star), in the past 12 months.

Property type	Suburb Region	Description	Average sale premium in the past 12 months
Apartment/Units	Belconnen	3 to 4.5 star - 5+ star	8.86%
		0 to 2.5 star - 5+ star	-3.31%
		0 to 2.5 star - 3 to 4.5 star	-10.71%
	Gungahlin	3 to 4.5 star - 5+ star	-13.05%
		0 to 2.5 star - 5+ star	-6.36%
		0 to 2.5 star - 3 to 4.5 star	13.48%
	Inner North	3 to 4.5 star - 5+ star	30.61%
		0 to 2.5 star - 5+ star	42.12%
		0 to 2.5 star - 3 to 4.5 star	9.59%
	Inner south	3 to 4.5 star - 5+ star	-19.87%
		0 to 2.5 star - 5+ star	22.56%
		0 to 2.5 star - 3 to 4.5 star	61.28%
	Tuggeranong	3 to 4.5 star - 5+ star	10.93%
		0 to 2.5 star - 5+ star	-18.43%
		0 to 2.5 star - 3 to 4.5 star	-25.61%
	Woden/Weston Creek	3 to 4.5 star - 5+ star	38.56%
		0 to 2.5 star - 5+ star	56.15%
		0 to 2.5 star - 3 to 4.5 star	12.50%
	Canberra	3 to 4.5 star - 5+ star	16.24%
		0 to 2.5 star - 5+ star	31.04%
		0 to 2.5 star - 3 to 4.5 star	13.39%

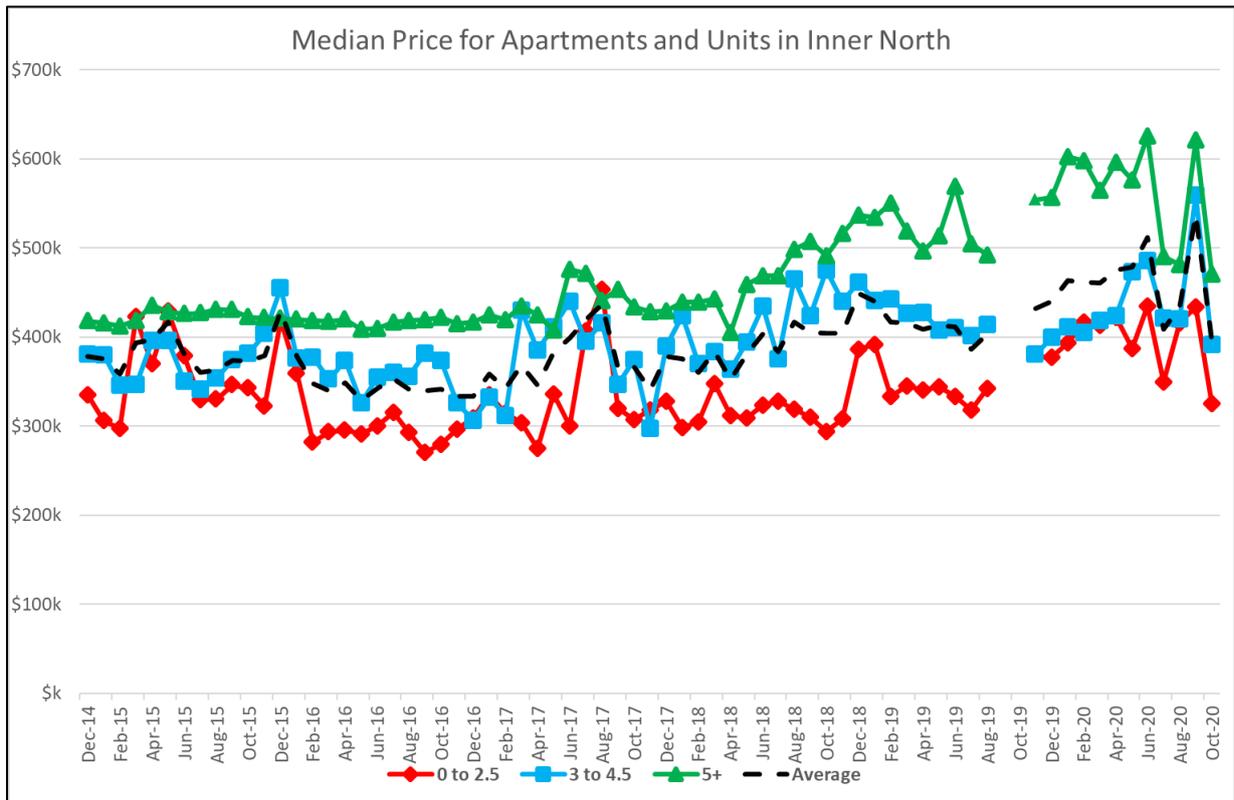
**Table 1 – Average sale premiums for apartments/units in the past 12 months**



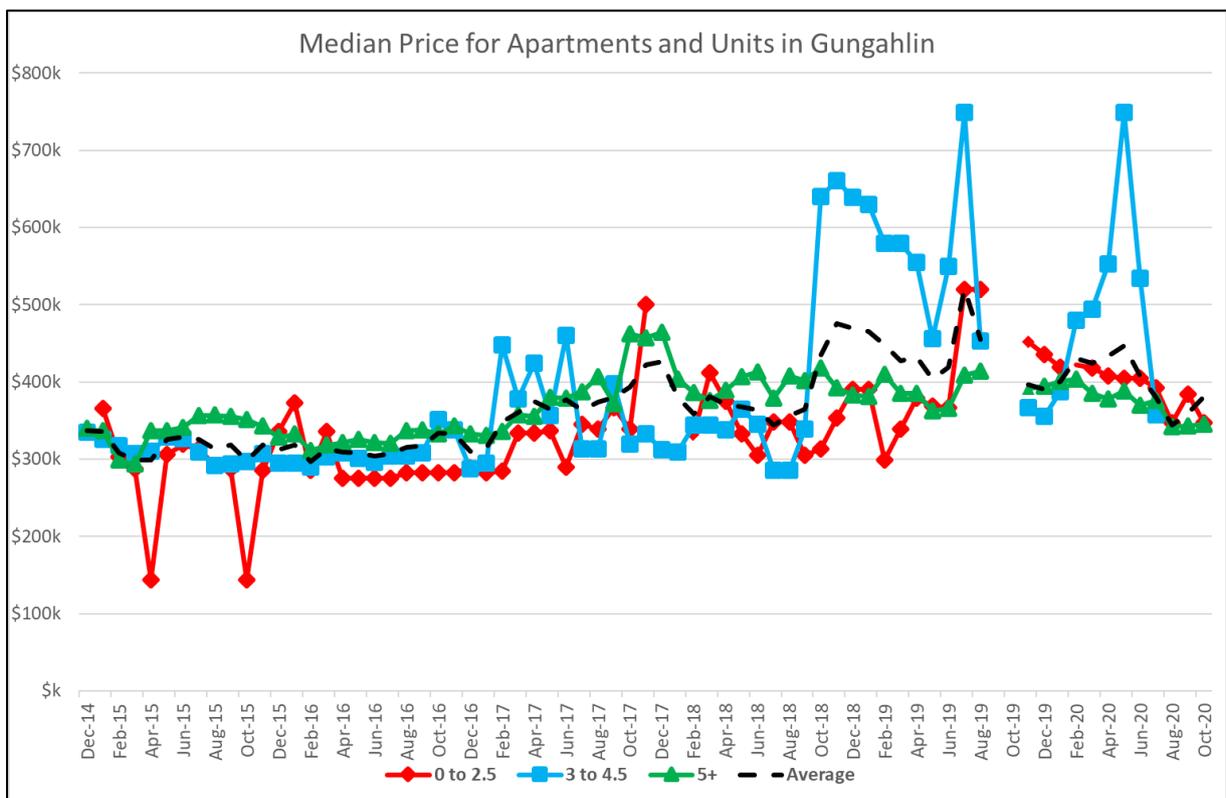
**Figure 3 – Median price for apartments/units in the whole of Canberra**



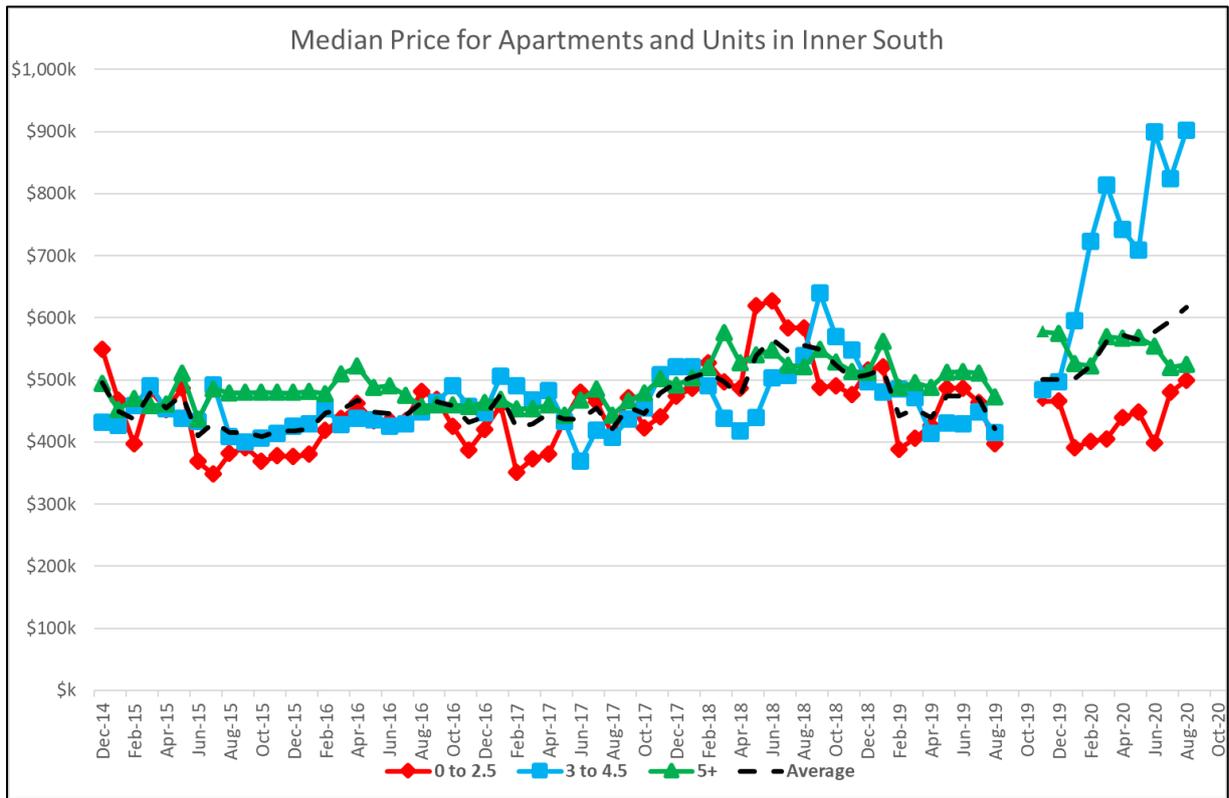
**Figure 4 – Median price for apartments/units in Woden/Weston**



**Figure 5 – Median price for apartments/units in Inner North**



**Figure 6 – Median price for apartments/units in Gungahlin**



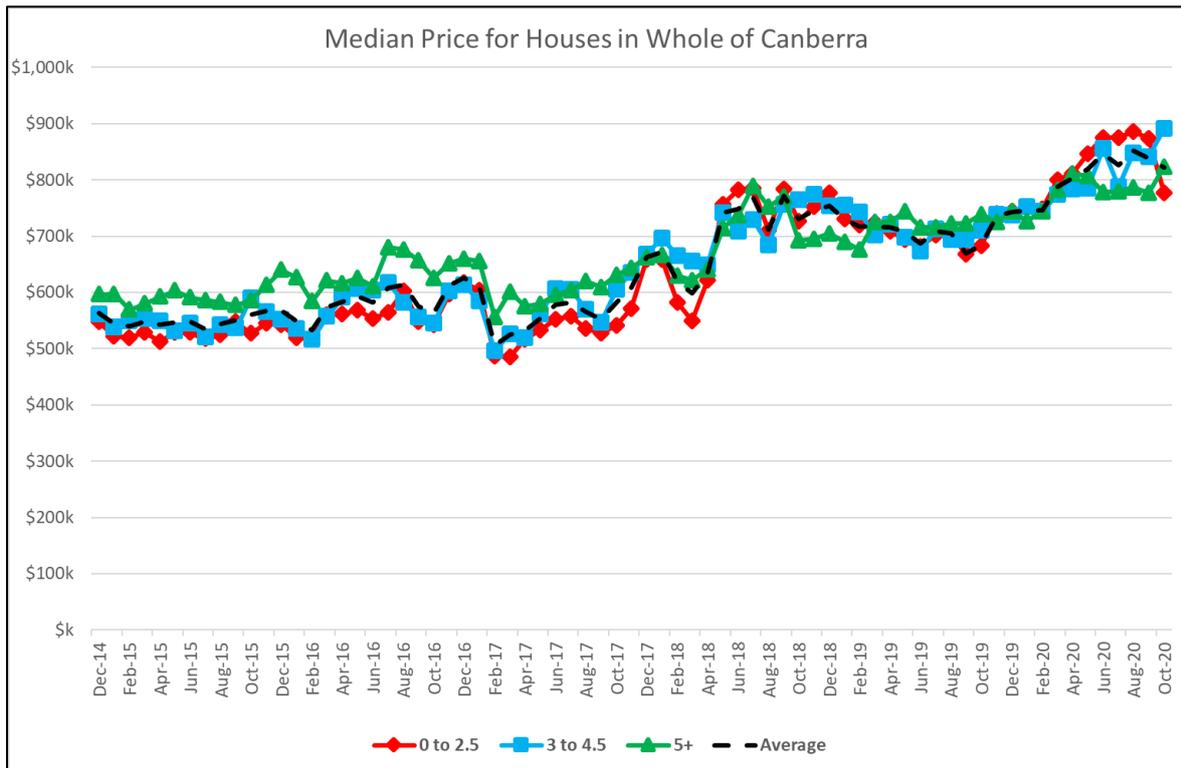
**Figure 7 – Median price for apartments/units in Inner South**

## 5.2 Houses

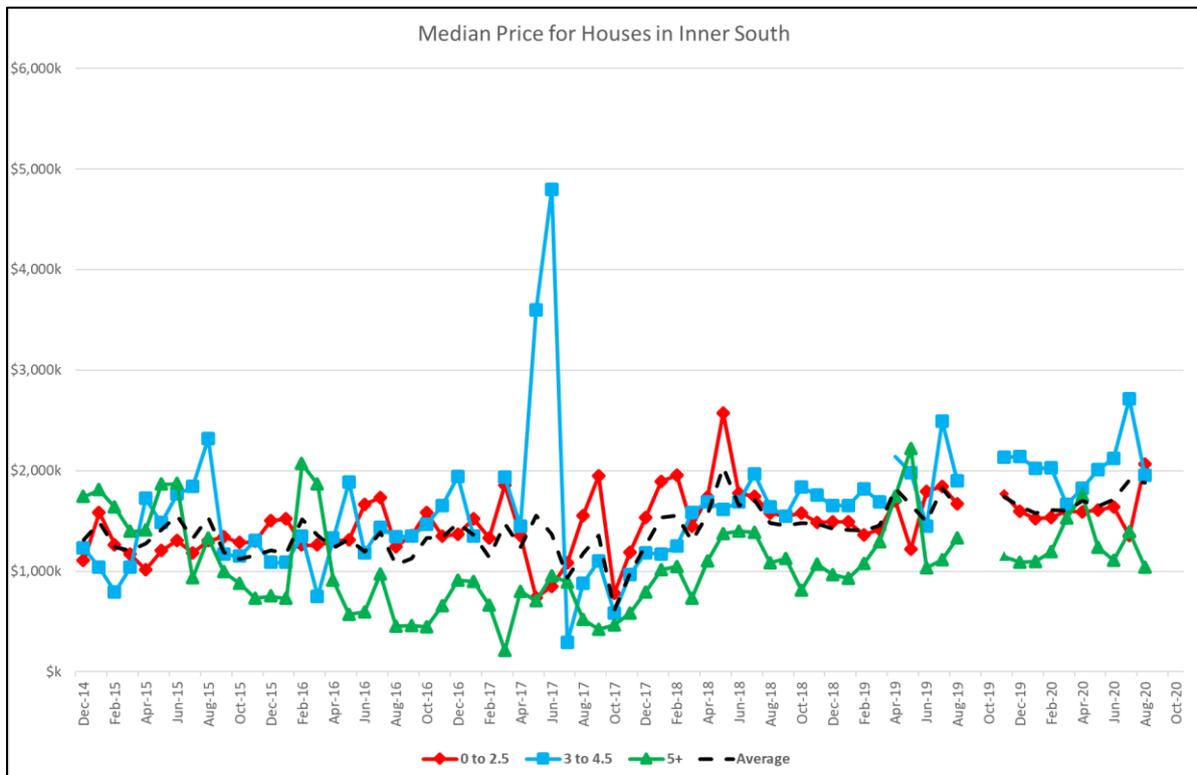
While house prices generally had a positive relationship with EER in the earlier years between 2014 to 2017, this relationship waned especially in the past 12 months. Houses at 3 – 4.5 star appear to be more appealing and listing at a higher price as compared to other star band groups regardless of location. In Belconnen, Inner South and Woden/Weston Creek in particular, the 12 month average sale premium attracted for 0 – 2.5 star to 3 – 4.5 star is at least 20% (Woden/Weston Creek at 48%) as compared to -1.73% in Canberra as a whole.

Property type	Suburb Region	Description	Average sale premium in the past 12 months
House	Belconnen	3 to 4.5 star - 5+ star	-20.37%
		0 to 2.5 star - 5+ star	-3.68%
		0 to 2.5 star - 3 to 4.5 star	21.99%
	Gungahlin	3 to 4.5 star - 5+ star	-10.48%
		0 to 2.5 star - 5+ star	-21.65%
		0 to 2.5 star - 3 to 4.5 star	-12.55%
	Inner North	3 to 4.5 star - 5+ star	56.73%
		0 to 2.5 star - 5+ star	-17.82%
		0 to 2.5 star - 3 to 4.5 star	-29.28%
	Inner south	3 to 4.5 star - 5+ star	-39.83%
		0 to 2.5 star - 5+ star	-23.94%
		0 to 2.5 star - 3 to 4.5 star	29.30%
	Tuggeranong	3 to 4.5 star - 5+ star	-1.01%
		0 to 2.5 star - 5+ star	3.32%
		0 to 2.5 star - 3 to 4.5 star	5.18%
Woden/Weston Creek	3 to 4.5 star - 5+ star	-10.81%	
	0 to 2.5 star - 5+ star	20.52%	
	0 to 2.5 star - 3 to 4.5 star	48.49%	
Canberra	3 to 4.5 star - 5+ star	-2.47%	
	0 to 2.5 star - 5+ star	-4.25%	
	0 to 2.5 star - 3 to 4.5 star	-1.73%	

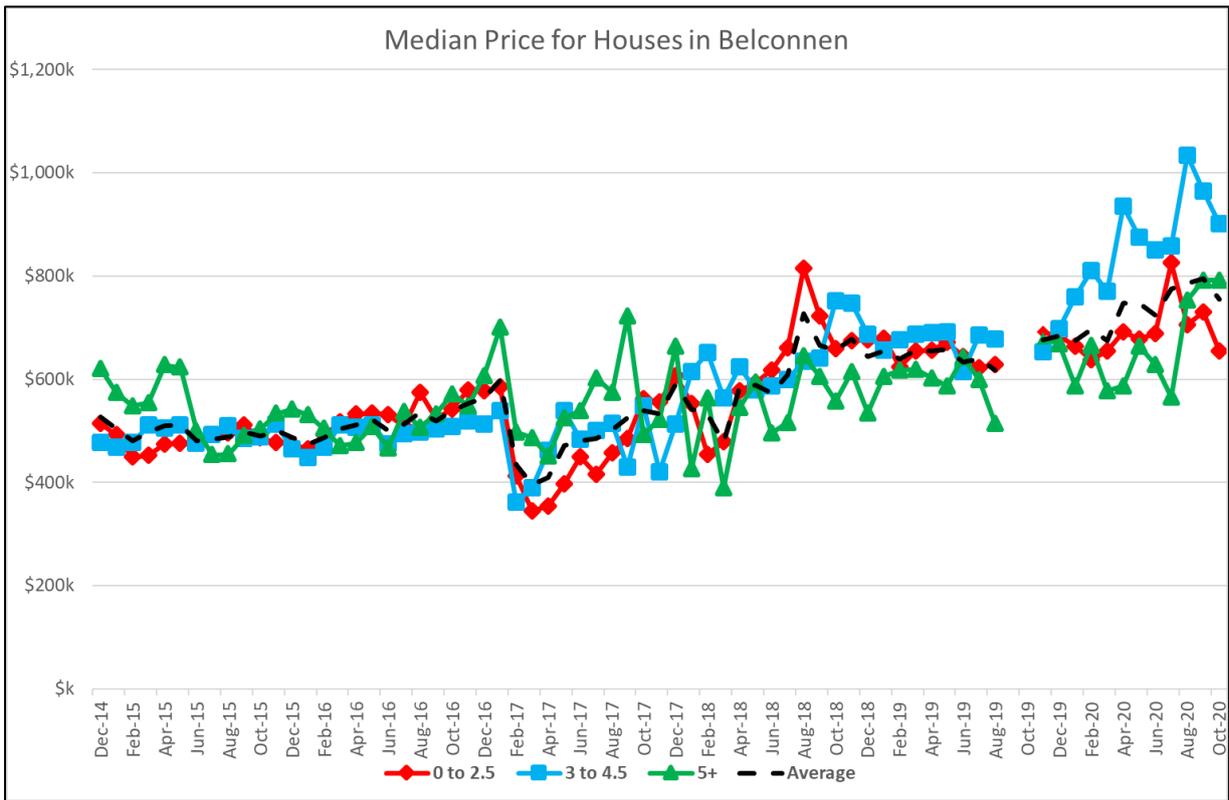
**Table 2 – Average sale premiums for Houses in the past 12 months**



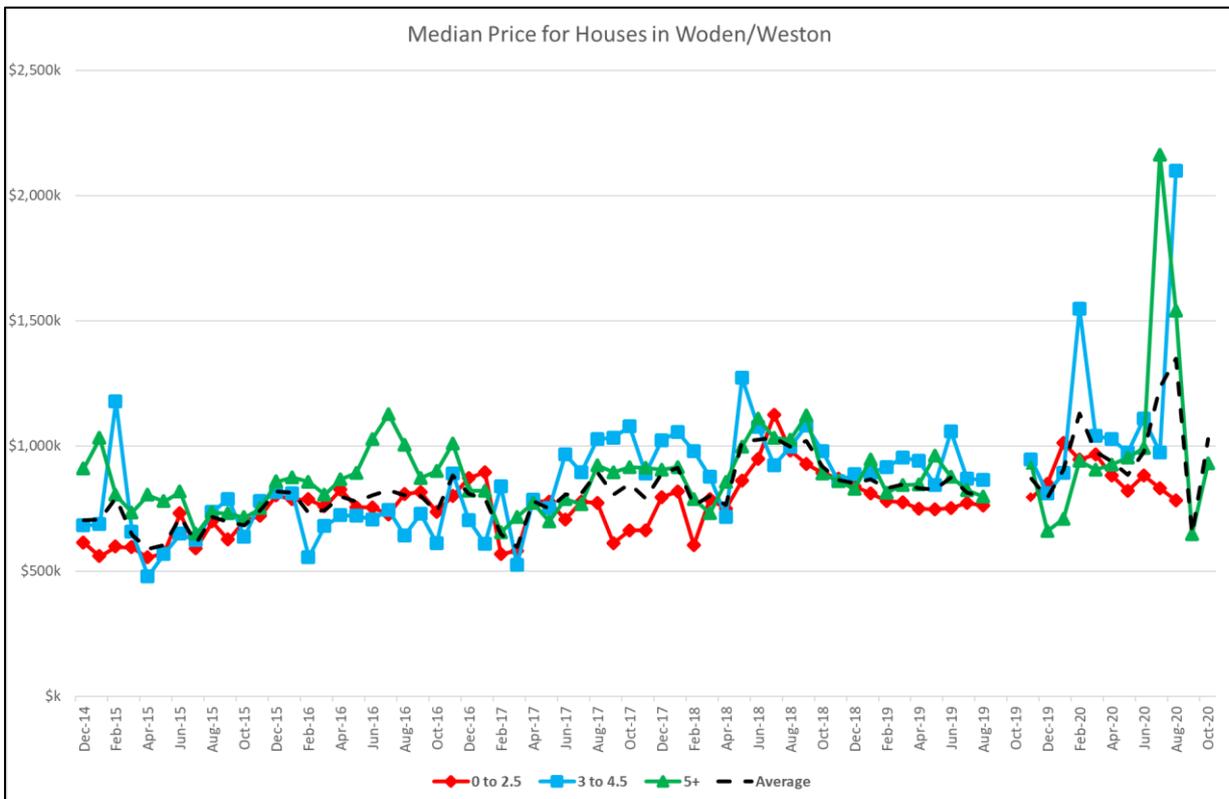
**Figure 8 – Median price for houses in the whole of Canberra**



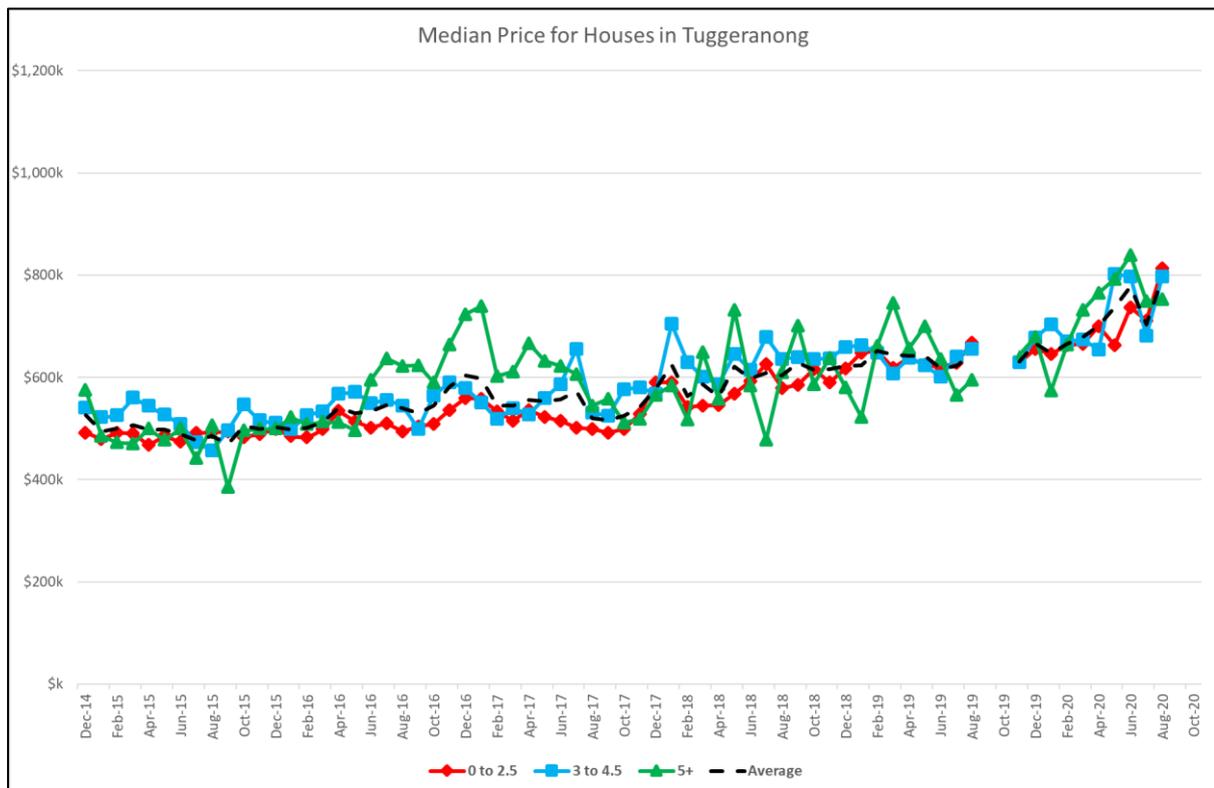
**Figure 9 – Median price for houses in Inner South**



**Figure 10 – Median price for houses in Belconnen**



**Figure 11 – Median prices for houses in Woden/Weston**



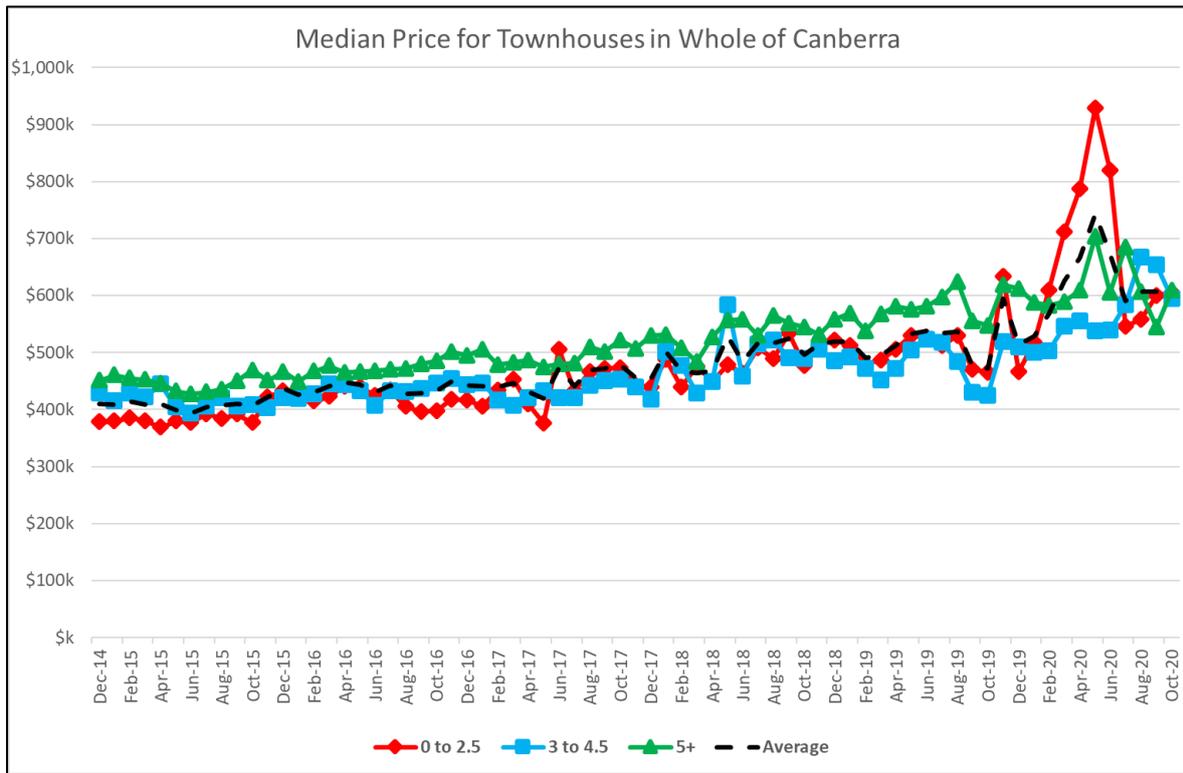
**Figure 12 – Median prices for houses in Tuggeranong**

### 5.3 Townhouses

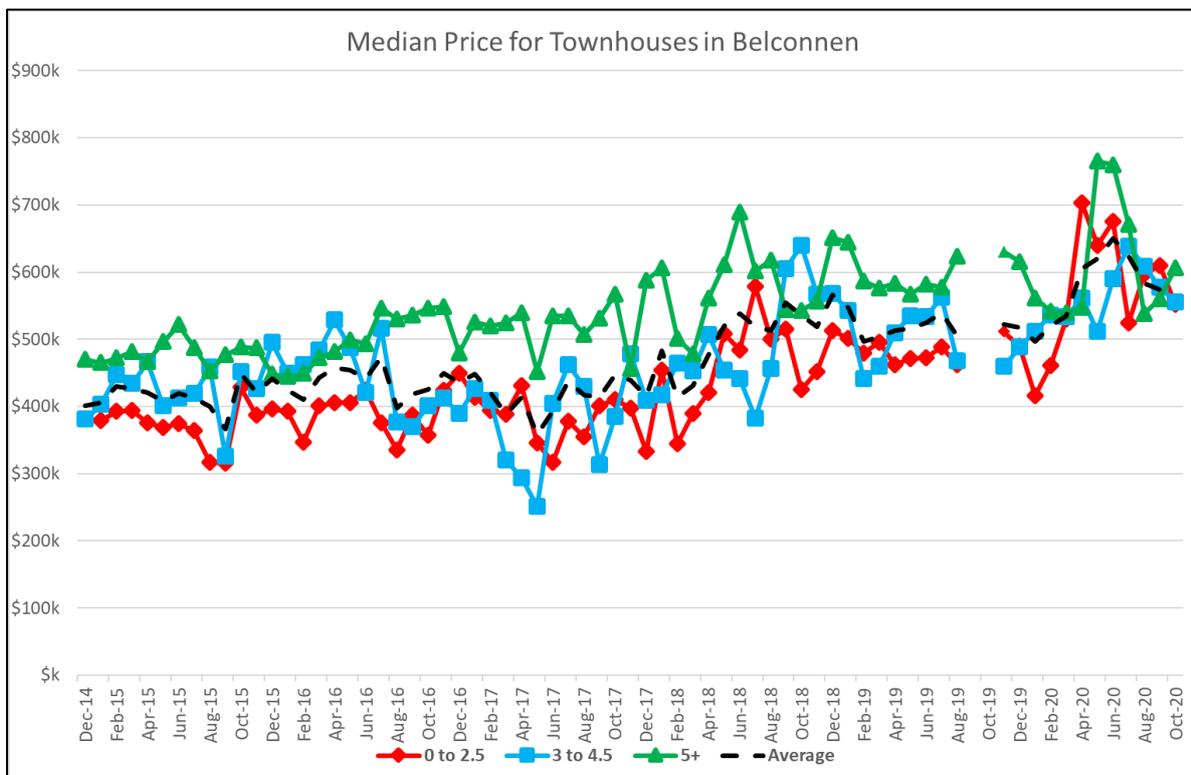
Townhouses in Canberra, with the exception of Inner South, generally demonstrate a positive relationship between price and EER. 5+ star townhouses in Tuggeranong in particular had been listed with an above average sale premium of 26% for 3-4.5 star to 5+star and 24% for 0-2.5 star to 5+star. Townhouses in Inner South on the have large fluctuations in listing price and generally records price discounts when compared against the lower star band group.

Property type	Suburb Region	Description	Average sale premium in the past 12 months
Townhouse	Belconnen	3 to 4.5 star - 5+ star	12.54%
		0 to 2.5 star - 5+ star	11.05%
		0 to 2.5 star - 3 to 4.5 star	-0.37%
	Gungahlin	3 to 4.5 star - 5+ star	-5.10%
		0 to 2.5 star - 5+ star	5.92%
		0 to 2.5 star - 3 to 4.5 star	12.45%
	Inner North	3 to 4.5 star - 5+ star	22.39%
		0 to 2.5 star - 5+ star	-13.39%
		0 to 2.5 star - 3 to 4.5 star	-25.50%
	Inner south	3 to 4.5 star - 5+ star	-22.14%
		0 to 2.5 star - 5+ star	-13.53%
		0 to 2.5 star - 3 to 4.5 star	14.13%
	Tuggeranong	3 to 4.5 star - 5+ star	26.68%
		0 to 2.5 star - 5+ star	24.14%
		0 to 2.5 star - 3 to 4.5 star	-1.11%
	Woden/Weston Creek	3 to 4.5 star - 5+ star	-5.91%
		0 to 2.5 star - 5+ star	3.61%
		0 to 2.5 star - 3 to 4.5 star	14.98%
Canberra	3 to 4.5 star - 5+ star	10.59%	
	0 to 2.5 star - 5+ star	-2.23%	
	0 to 2.5 star - 3 to 4.5 star	-10.41%	

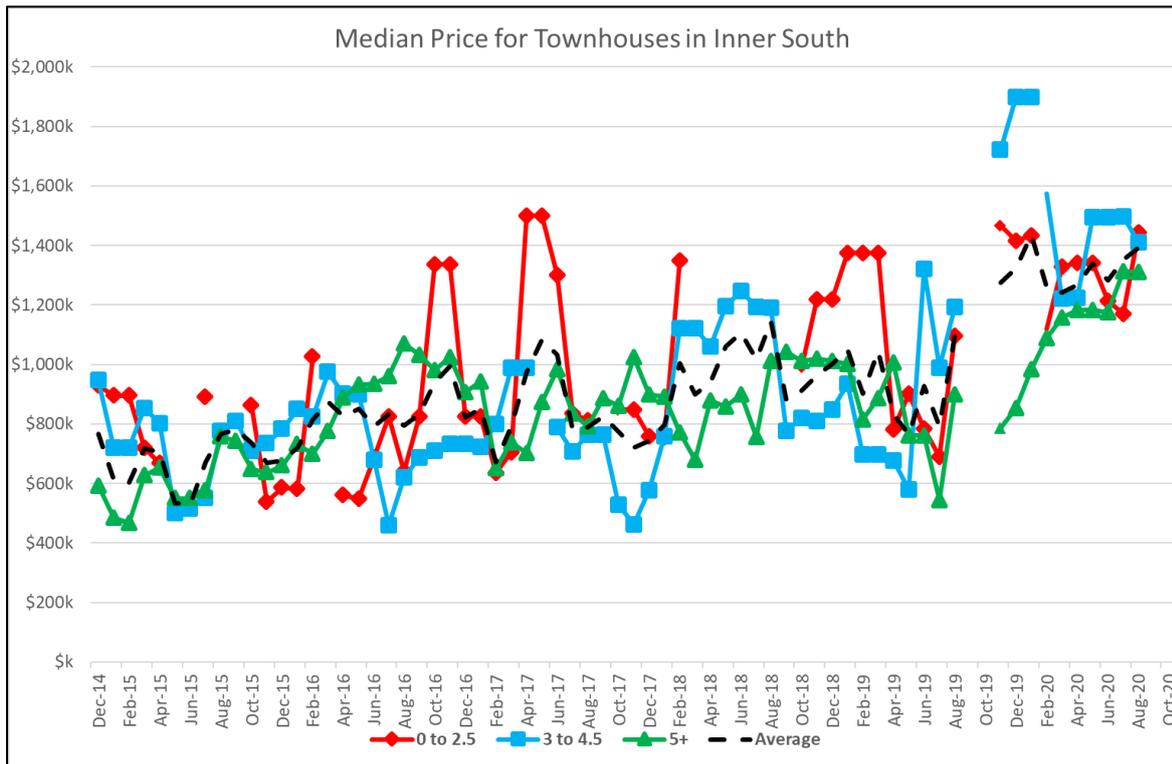
**Table 3 – Average sale premiums for Townhouses in the past 12 months**



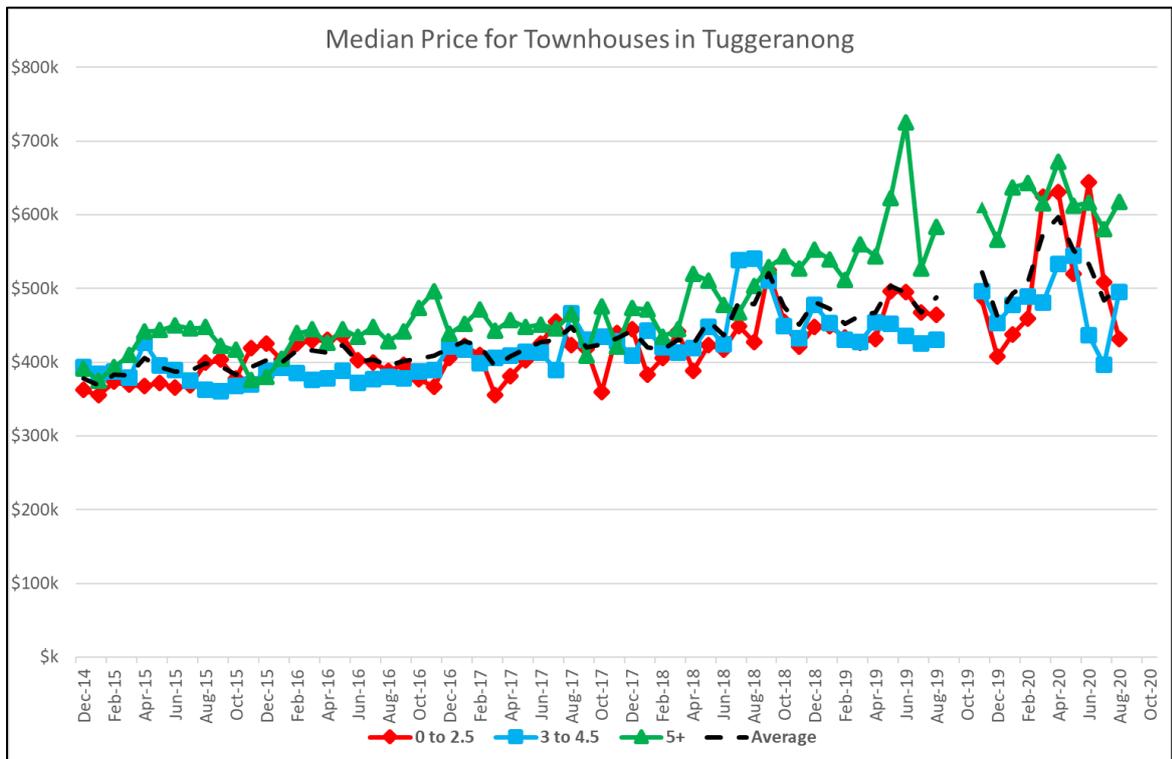
**Figure 13 - Median price for townhouses in the whole of Canberra**



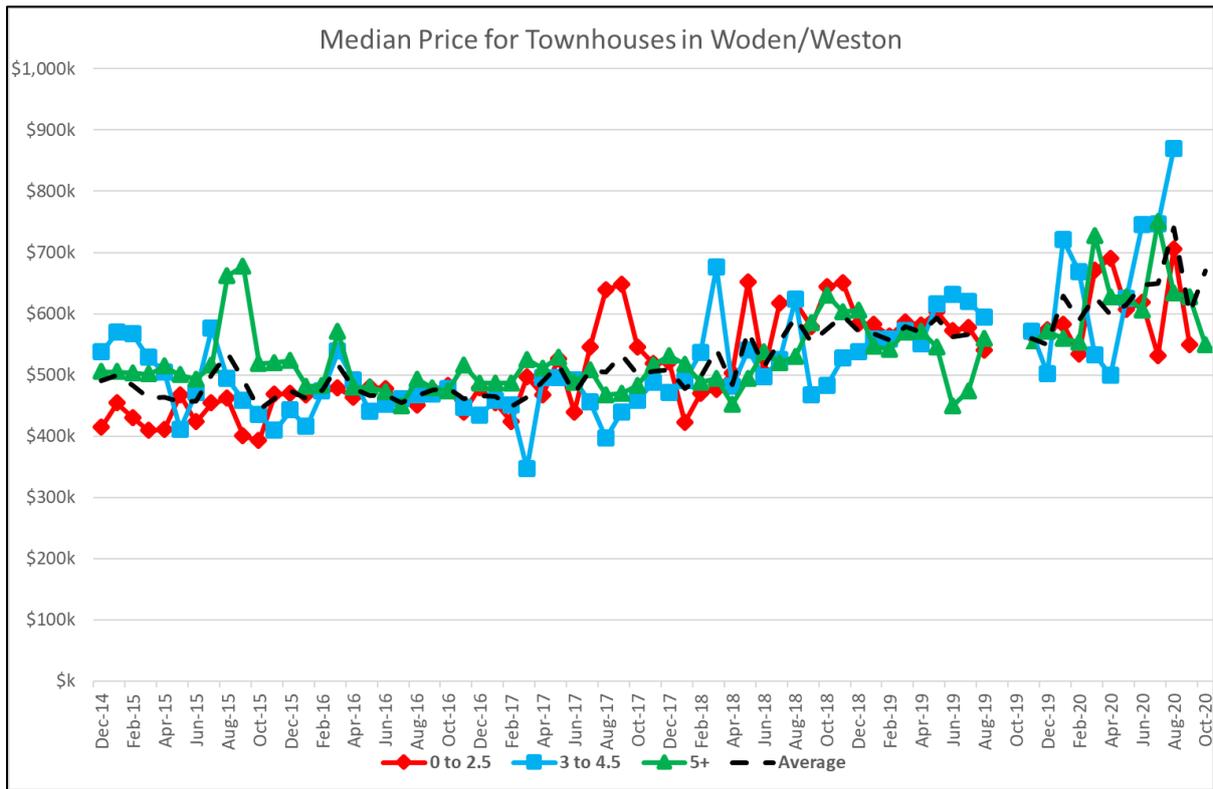
**Figure 14 – Median price for townhouses in Belconnen**



**Figure 15 - Median prices for townhouses in Inner South**



**Figure 16 – Median prices for townhouses in Tuggeranong**



**Figure 17 – Median prices for townhouses in Woden/Weston Creek**

## 6. Discussions

The results of our ongoing historical study support the existence of positive effects of energy efficiency and property prices, albeit to a lesser extent for houses. This observation is most stark in Apartments/Units. In most suburb regions in Canberra, an apartment with a higher EER would almost attract a price premium. Townhouses and houses also demonstrate a similar trend in most suburb regions except Inner North and Inner South.

On this note, the results suggest that the price discounts and premiums progression may not be linear, especially when listing prices are above \$800,000 which is reflective of the property prices in Inner North and South. This observation also appears to be in agreement with the findings of Hyland and Lyons (2013) and Fuerst and Warren-Myers (2018), whereby the second-highest rated property attracted a higher premium than the highest rated one. Fuerst and Warren-Myers (2018) posited that this trend may be due to satisficing, (Simon, 1972) as the difficulties of pursuing higher ratings is bounded by uncertainty, lack of information and details of proven benefits and outcomes. Other key considerations such as location and size of property, in lieu of energy efficiency ratings, could also assume greater weightage in a purchasing decision as prices reaches a certain point.

## 7. Conclusion

This paper sets out to test whether there is a correlation between EER and sale prices of properties in the ACT. Using the completeness of our pertinent historical resources, median prices, in lieu of mean prices and segregation of property type (houses, townhouses and apartments/units) were applied to explain observed prices. The overall conclusion from this study is that EER do have an effect and therefore reflect in property prices up to a certain price point after which other market variables appear to take effect.

## Acknowledgements

Many people have assisted in the gathering and interpreting of this data over the years: Niki Burnside, Julia Collin, Ashlin Flanagan, Megan Griffin, David Hodgkin, Lini Lee and Jessica McDonald.

The occasional feedback and positive response from the REIACT, Independent Property Group and staff of the Office of Regulatory Services (ORS) is also gratefully acknowledged.

## References

- ABS, 2008. "Energy Efficiency Rating and House Price in the ACT", Australian Bureau of Statistics report to DEWHA, Canberra
- ACT Legislative Assembly, Energy Efficiency Rating (Sale of Premises) Act 1997, (EER(SOP) Act
- ACT Legislative Assembly, Civil Law (Sale of Residential Property) Act 2003, Civil Law (SRP) Act
- BCA 2016, Building Code of Australia, Volumes 1 and 2 (part of the National Construction Code NCC))
- DECC, 2013. "An Investigation of the Effect of EPC Ratings on House Prices", Department of Energy and Climate Change Final Report, UK
- Energy Partners, 2007. "Energy Efficiency Star Ratings Compliance - Analysis of eight years of EER compliance data for the Canberra real estate industry shows that even though more and more rental homes have EER ratings, real estate agents aren't going to pass the information on to the tenants", media release, Canberra
- Energy Partners, 2004. "Energy Efficiency Star Ratings Compliance Collapse", media release, Canberra
- Energy Partners, 2003. "Energy efficient houses attract higher prices", media release, Canberra, April 2002
- Energy Partners, "Five Star Advantage Returns: indicator of the 'heat' leaving the residential sales market", media release, Canberra
- Energy Partners, 2008. "Gas Guzzling Houses Lead ACT's Price Decline", media release, Canberra
- Energy Partners, 2008. "Home Energy Efficiency pays off at sale time", media release, Canberra
- Fuerst, F., and Warren-Myers, G., 2018. "Does voluntary disclosure create a green lemon problem? Energy-efficiency ratings and house prices", Energy Economics
- Hull, C., 2013. "Time to Consign Energy Audits to the Wastebasket", <http://www.smh.com.au/comment/time-to-consign-energy-audits-to-the-wastebasket-20130802-2r58h.html> [Accessed 26th April 2016]
- Hyland, M., Lyons, R.C.Lyons., 2013. "The value of domestic building energy efficiency -evidence from Ireland." Energy Economics. 40, 943-952
- Lee, T. and McMahon, J., 2007. "EER Disclosure Non-Compliance in the ACT Rental Market", Solar 07 Conference Proceedings, ANZSES, Alice Springs NT
- Lee, T. And Wang, Y., 2010. "Mandatory Disclosure of Energy Efficiency for Residences – History and Compliance in the A.C.T. Sales and Rental Markets", Solar 2010, the 48<sup>th</sup> AuSES Annual Conference, Canberra

Lee, T., 2009. "Energy efficiency Mandatory disclosure at sale or lease", BEDP Environment Design Guide News, Australian Institute of Architects, Melbourne

Lee, T., McMahon, J. and Stewart, J., 2008. "EER Disclosure Non-Compliance in the ACT Rental Market", Solar 08 Conference Proceedings, ANZSES, Sydney

Trobe, T., 2014. "Beware of Unintended and Costly Consequences when Upgrading Houses", <http://www.canberratimes.com.au/comment/beware-of-unintended-and-costly-consequences-when-upgrading-houses-20141008-10rogv> [Accessed 26th April 2016]

Trobe, T., 2016 "Building Code is a Blunt Instrument", <http://www.smh.com.au/comment/building-code-is-a-blunt-instrument-20160211-gmrrpw.html> [Accessed 26th April 2016]