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Rent-Price Ratios in Sydney and Melbourne 1985-2014 – The Story So Far

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This research was supported under Australian Research Council's
Linkage Projects funding scheme (LP140101020).

Outline

1. Look at the data – some details on its sources in back slides
 - Figure 1 has rent-price ratios based on rent and price for 43 LGAs in Sydney from 1986. Split by six regions.
 - Figure 2 for 31 LGAs in Melbourne from 1985, split into 4 regions.
2. Rent-price ratio as ‘predictor’ of rents/returns
3. LGA differences in ratios – related to rent or price growth?
4. Equilibrium rent-price ratios? What does this tell us about whether current rent-price ratios are under-/over-valued?

Figure 1: Sydney Region Rent-Price Ratios 1986-2014

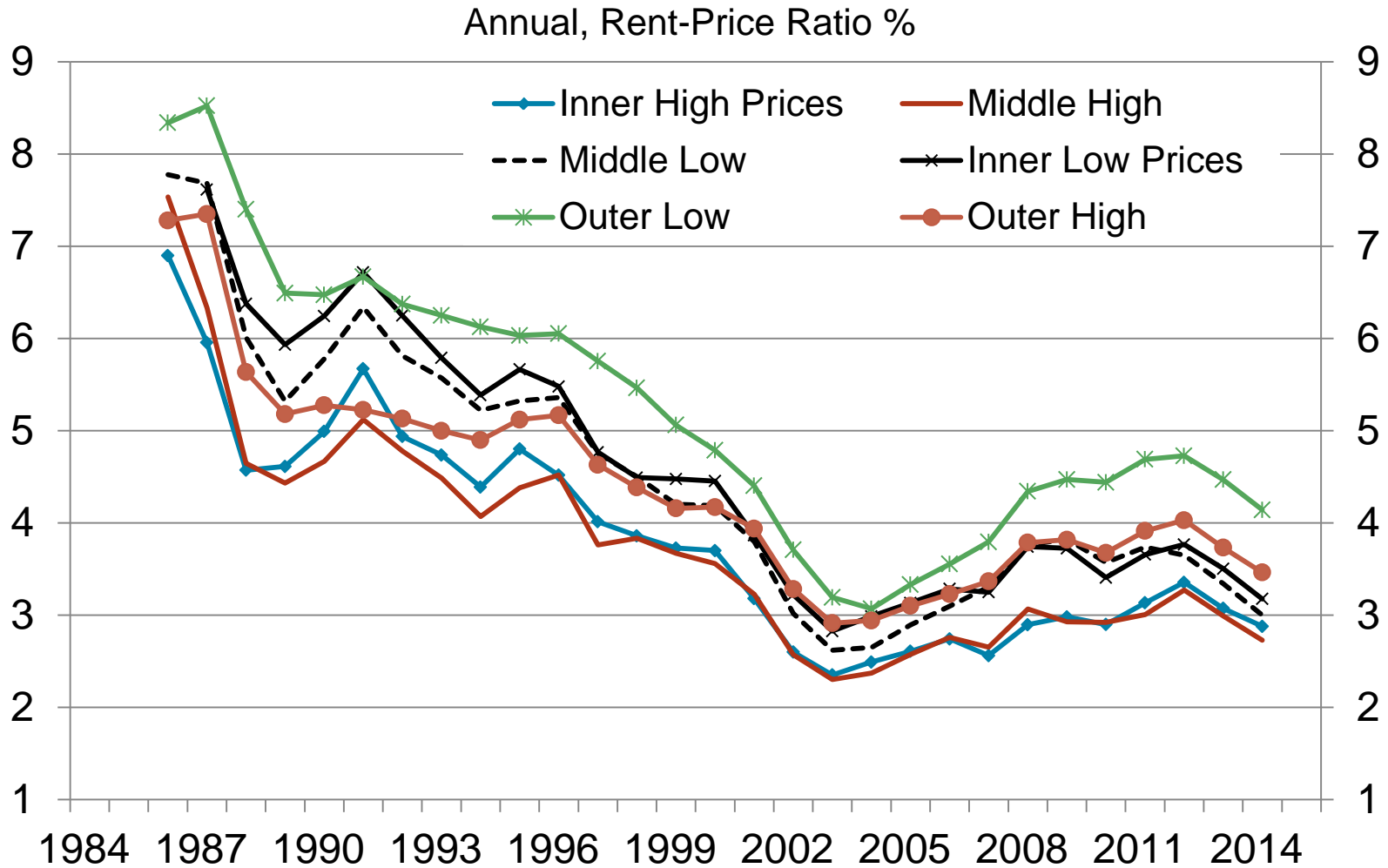


Figure 2: Melbourne Region Rent-Price Ratios 1985-2014

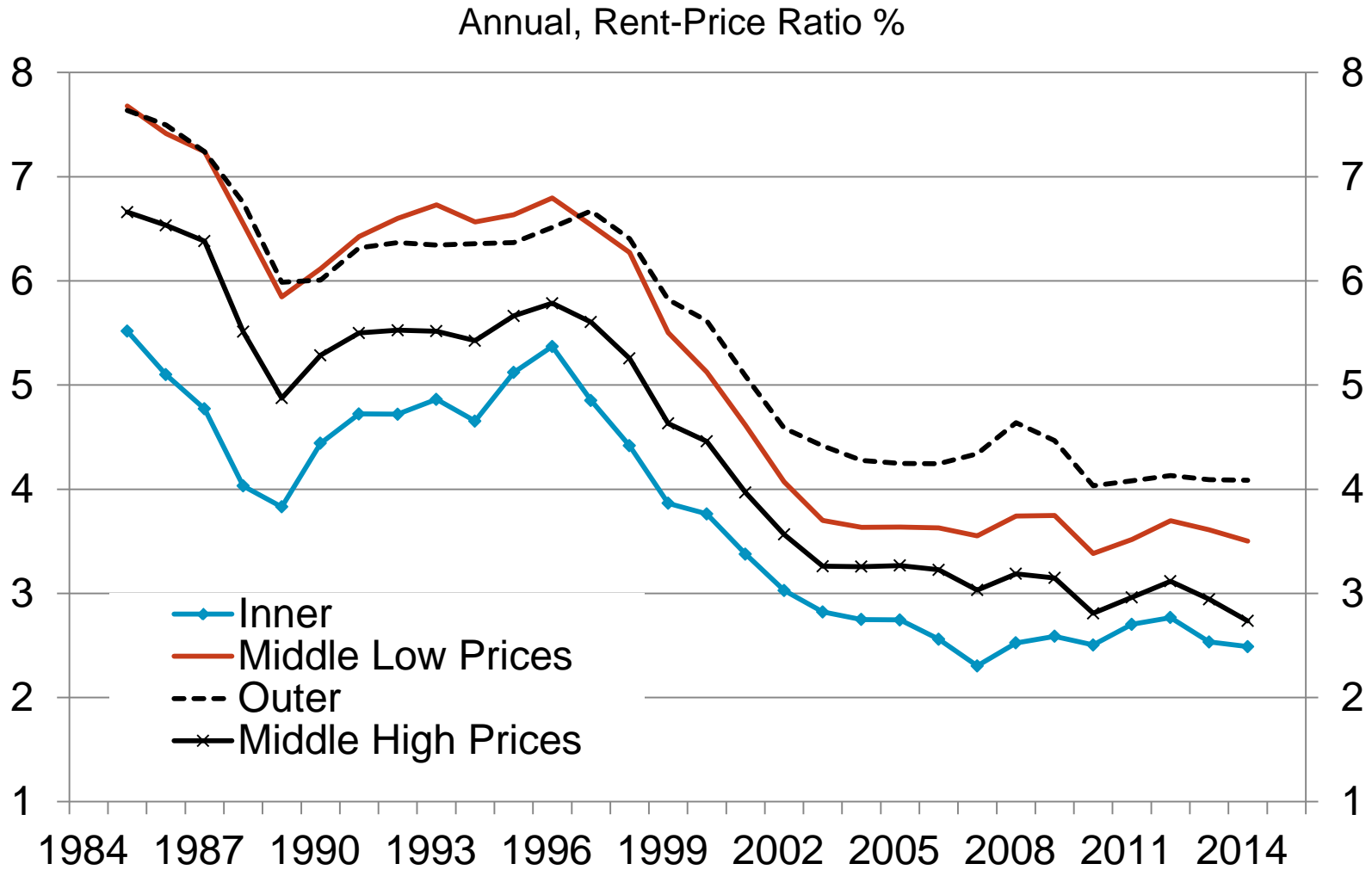
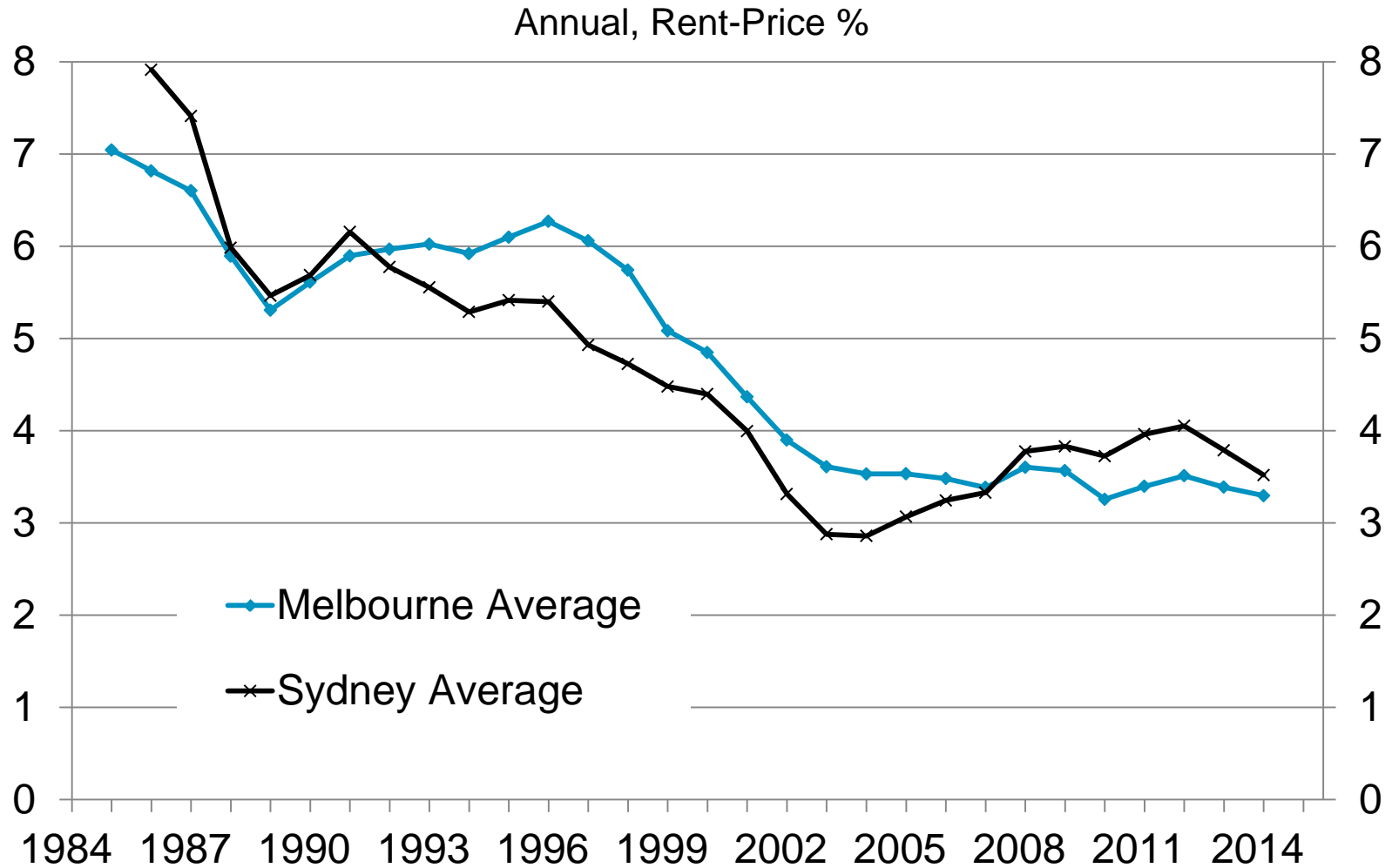


Figure 3: Sydney and Melbourne Average Rent-Price Ratios 1985-2014



Standard Campbell-Shiller time-varying equation for dividend-price ratios, as applied to housing rent-price ratios

$$(v_t - p_t) = \text{const.} + E_t \sum_{j=0}^{\infty} \rho^j (\Delta v_{t+1+j}) + \sum_{j=0}^{\infty} \rho^j (rf_{t+1+j}) + \sum_{j=0}^{\infty} \rho^j (er_{t+1+j}) \quad (1)$$

| | | | |
|-------------------------|-----------------------------|---|---|
| <i>rent-price ratio</i> | <i>expected rent growth</i> | <i>expected risk free return</i> | <i>expected excess returns (risk premium)</i> |
| | | <i>the two components of expected returns(r)</i> | |

Equation (1) says that the rent-to-price ratio is a function of expected growth in rents, expected risk free rate and expected excess returns.

The other possibility is that there is a bubble – that investors expect prices to rise “forever”, giving an adequate return even if there is no growth in rents. This would represent explosive growth in prices and Cochrane (2001) shows that a rational bubble is not plausible or believable (rational buyer ultimately requires an irrational buyer). While a rational bubble can be ruled out, irrational exuberance cannot be.

Notation: v = rents; p = prices; ρ = discount factor; rf = risk free rate; er = excess returns

What does the housing rent-price ratio predict

Models to test equation (1) have the following basic form:

$$x_{t+h} - x_t = \alpha + \beta(v_t - p_t) + u_{t+h} \quad (2)$$

where the regressor is the cumulative growth rate in a variable over increasingly long horizons. The estimate of β and the R-squared from (2) provide a measure of the ability of the rent-to-price ratio to forecast different variables. In this case, future returns, future capital growth and future rent growth.

Results in next three tables.

Rent-price ratio as predictor of returns over long horizons

Results: Returns are predictable. However, R^2 of 37% and t-stat of 2.82 at 5 years is weak result compared with 60% and 5.8 for US equity market 1947-96 (Cochrane (2001) page 390). A low rent-to-price ratio is a signal of likely decreased real returns over the subsequent period of years.

Table 1: Regressions of Housing Returns on Rent-to-Price Ratio – Averages for Sydney LGAs 1986-2014

| h (years) | $\hat{\beta}$ | t-statistic | R^2 | Proportion of LGAs Reject $\hat{\beta} \leq 0$ |
|-----------|---------------|-------------|-------|---|
| 1 | 0.14 | 1.99 | 0.17 | 0.43 |
| 2 | 0.28 | 2.36 | 0.27 | 0.82 |
| 3 | 0.34 | 3.06 | 0.31 | 0.88 |
| 4 | 0.38 | 3.03 | 0.23 | 0.88 |
| 5 | 0.44 | 2.82 | 0.37 | 0.86 |

Notes: Figures in the first three columns are simple averages of estimates obtained for each individual LGA.

Rent-price ratio as predictor of capital growth over long horizons

Results: Capital growth is only weakly predictable. A low rent-to-price ratio is a signal of decreased capital growth over the subsequent period.

Table 2: Regressions of Housing Capital Growth on Rent-to-Price Ratio – Averages for LGAs

| h (years) | $\hat{\beta}$ | t-statistic | R^2 | Proportion of LGAs Reject $\hat{\beta} \leq 0$ |
|-----------|---------------|-------------|-------|---|
| 1 | 0.03 | 1.5 | 0.12 | 0.2 |
| 2 | 0.05 | 2.11 | 0.19 | 0.53 |
| 3 | 0.06 | 2.66 | 0.17 | 0.61 |
| 4 | 0.05 | 2 | 0.15 | 0.35 |
| 5 | 0.06 | 1.76 | 0.15 | 0.25 |

Notes: Figures in the first three columns are simple averages of estimates obtained for each individual LGA.

Rent-price ratio as predictor of rent growth at long horizons

Results: Growth in rents is largely unpredictable at 1-2 year horizons, but predictability increases with longer horizons, and at 5-years close to 40% of the variability (on average) is explained by current rental yields. A low rent-to-price ratio is a signal of increased growth rates in real rents over the subsequent 5 years.

Table 3: Regressions of Housing Rent Growth on Rent-to-Price Ratio – Averages for Sydney LGAs 1986-2014

| h (years) | $\hat{\beta}$ | t-statistic | R^2 | Proportion of LGAs Reject $\hat{\beta} \geq 0$ |
|-----------|---------------|--------------|-------------|---|
| 1 | 0 | -0.74 | 0.07 | 0.12 |
| 2 | -0.01 | -1.11 | 0.1 | 0.14 |
| 3 | -0.02 | -1.87 | 0.19 | 0.39 |
| 4 | -0.04 | -3.01 | 0.29 | 0.75 |
| 5 | -0.05 | -4.45 | 0.38 | 0.90 |

Notes: Figures in the first three columns are simple averages of estimates obtained for each individual LGA.

What does the housing rent-price ratio predict

Whereas the equity literature has ratios not predicting future dividend growth but (more strongly) predicting returns, the key result here is that the rent-price ratio does predict rent growth.

Is this result function of the sample period, ie lucky? The period from 2006-2014 associated with “resources boom” which boosted immigration and incomes – prime drivers of rents. Did low rent-price ratios predict the boom?

Conversely, in absence of the ‘predicted’ rent growth, would not even lower returns have been expected/predicted.

When rent-price ratio is stable, price growth is function of rent growth. Again, in absence of the ‘predicted’ rent growth, would not lower capital growth have been more strongly predicted.



Figure 12: Sydney Region House Rents 1985-2014

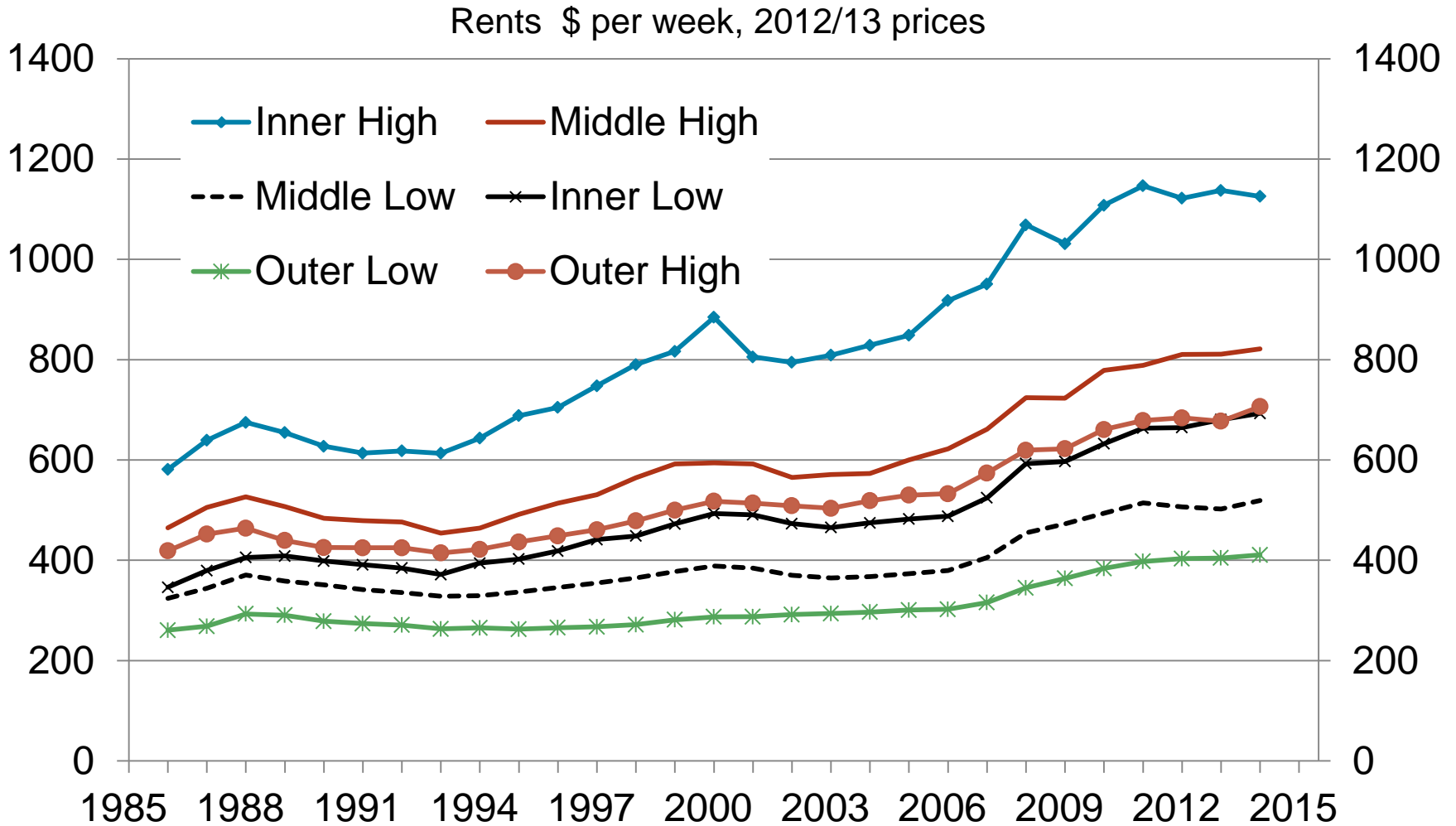
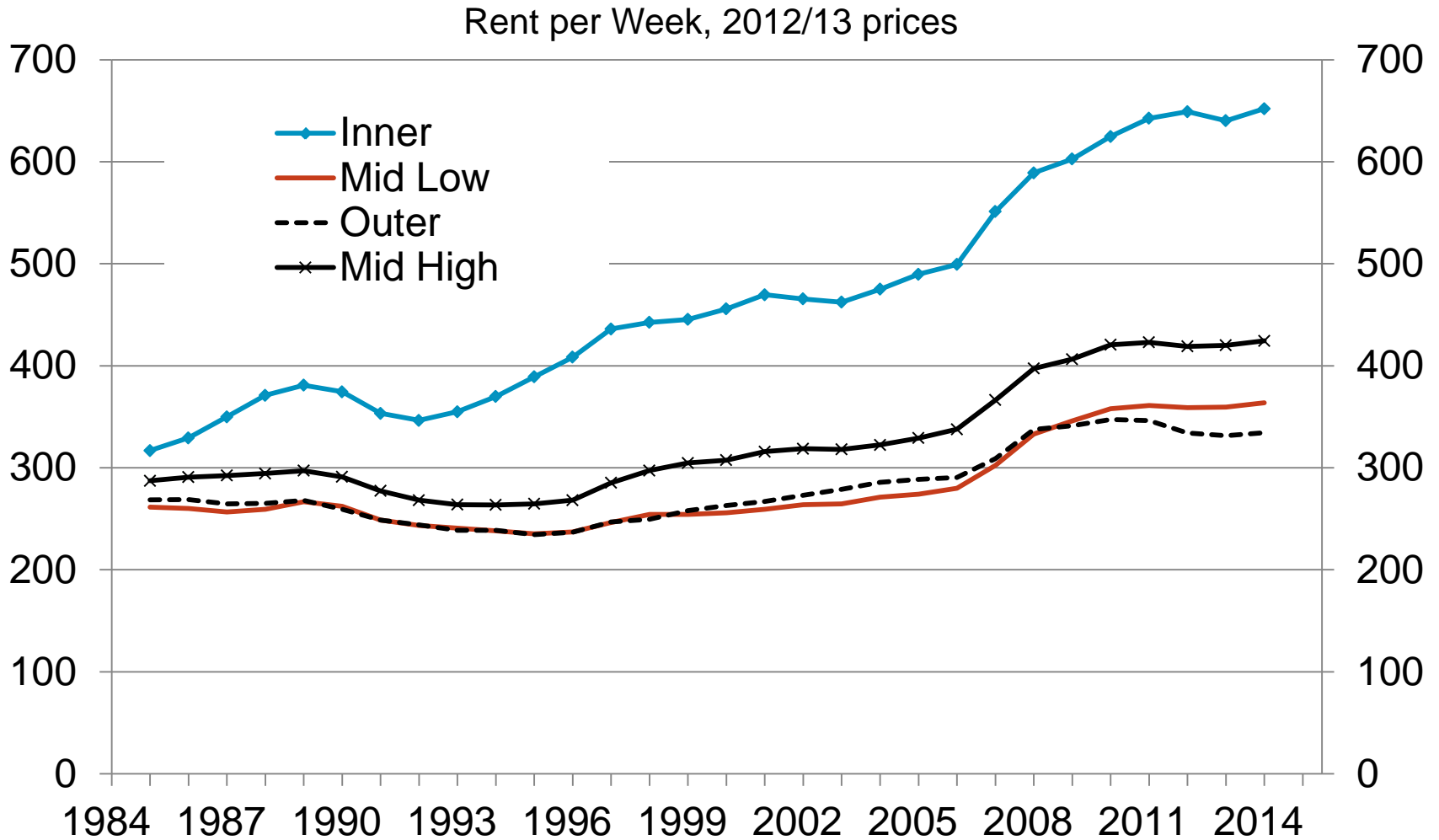


Figure 13: Melbourne Region House Rents 1985-2014



Explaining observed differences in rent-price ratios across LGAs

$$(v_t^k - p_t^k) - (v_t^m - p_t^m) =$$

If rent-price ratio in LGA 'k' is > 'm', this will be a function of:

$$E_t^m \sum_{j=0}^{\infty} \rho^j (\Delta v_{t+1+j}^m) - E_t^k \sum_{j=0}^{\infty} \rho^j (\Delta v_{t+1+j}^k)$$

expected rent growth in 'k' < 'm'

$$+ E_t^k \sum_{j=0}^{\infty} \rho^j (r / (er)_{t+1+j}^k) - E_t^m \sum_{j=0}^{\infty} \rho^j (r / (er)_{t+1+j}^m)$$

expected returns (r) or excess returns (er) in 'k' > 'm'

In the absence of variation in risk across LGAs, the final item should drop out, as equilibrium requires that risk-adjusted returns should equate.

The leaves the difference as a function of differences in rent growth.

As before, when the rent-price ratio is stable, price growth is function of rent growth. And in user cost models, rent-price is as function of required return less capital gain. Investors might be expected to read differences in expected price growth as a good proxy/indicator for variation in expected rent growth.

What do we observe?

Rent-price ratios are positively related to prices. High priced LGAs tend to have low rent-price ratios. (Figure 4)

Variation in rent-price ratios is strongly persistent. (Figure 5)

Do we observe that differences in rent-price ratios are related to differences in rent growth? Yes, but only weakly so. (Figure 6)

Differences in rent-price ratios are more strongly related to differences in capital growth. (Figure 7)

Observe that rent growth is reasonably correlated with capital growth. (Figure 8)

When rent-price ratio is stable, price growth is function of rent growth. But in this period not stable, with significant structural decline in the rent-price ratio a major cause of capital gains. Hence, these relationships (Figures 6-8) arguably not as strong as we might expect.

Very similar results for Melbourne.

Figure 4: Sydney Region LGA Price 2014 vs Rent-Price Ratios 2010-2014

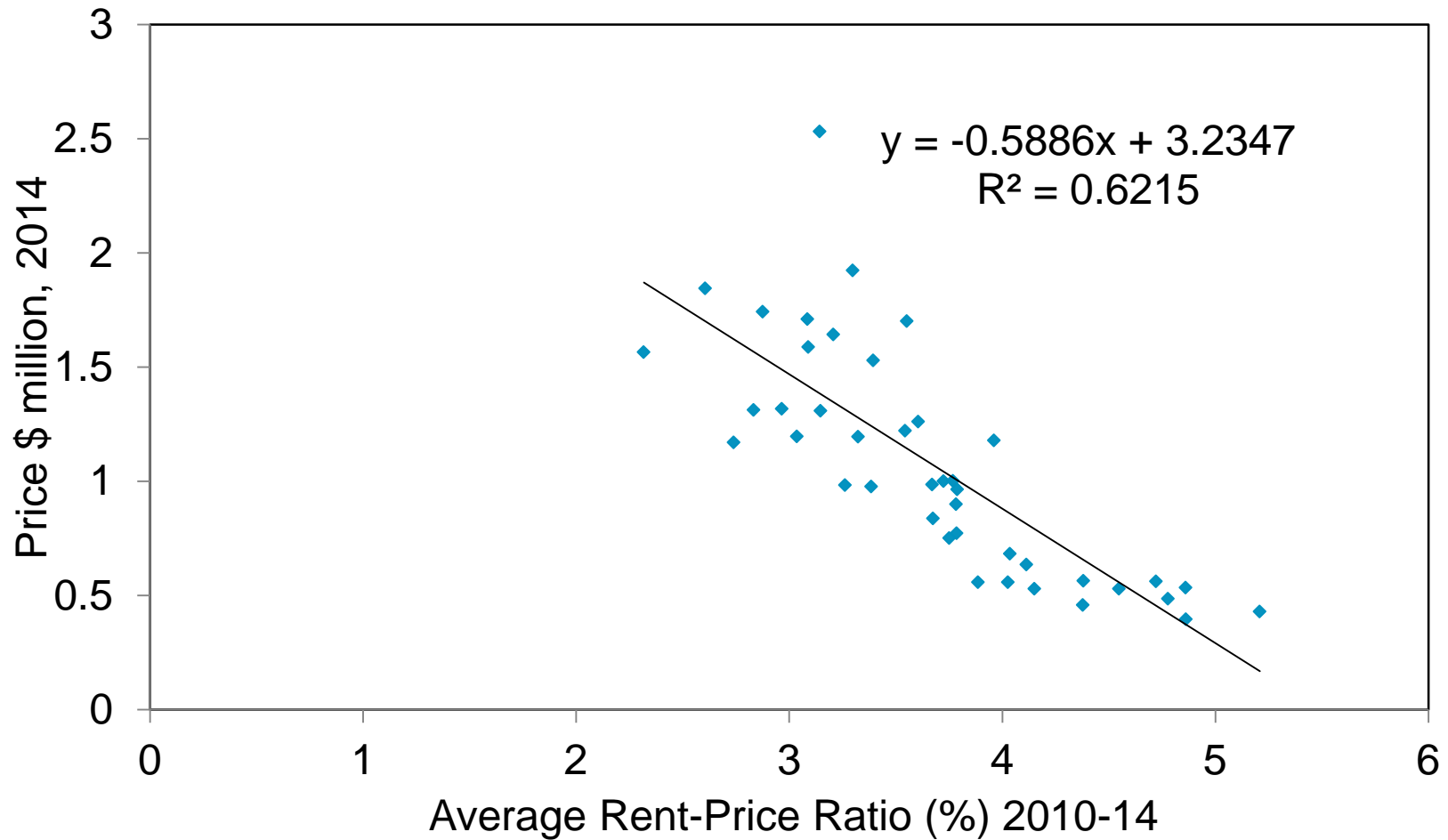


Figure 5: Sydney Region LGA Rent-Price Ratios 1991-96 vs 2010-14

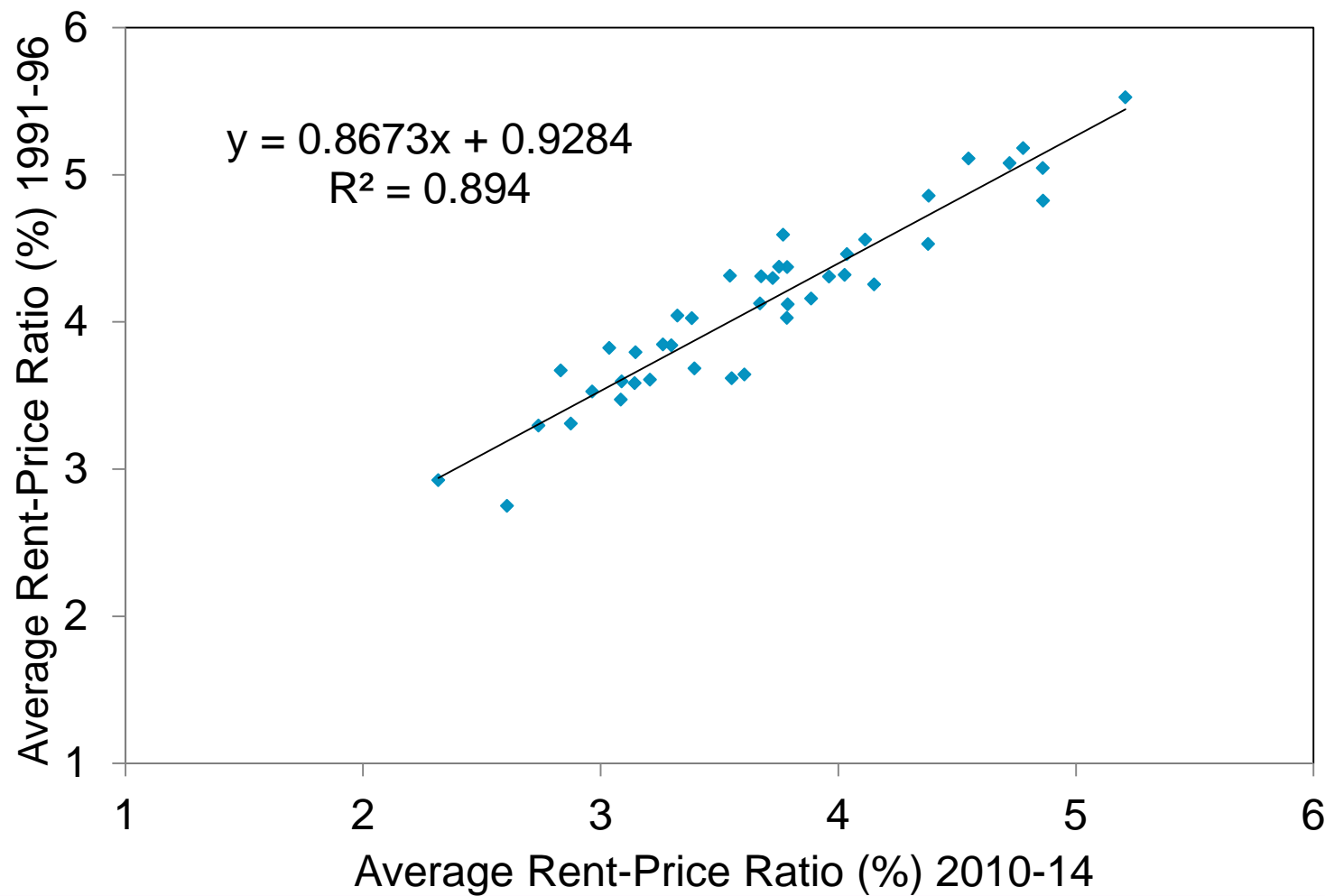


Figure 6: Sydney Region Rent-Price Ratios 2010-14 vs Real Rental Growth 1986-2014

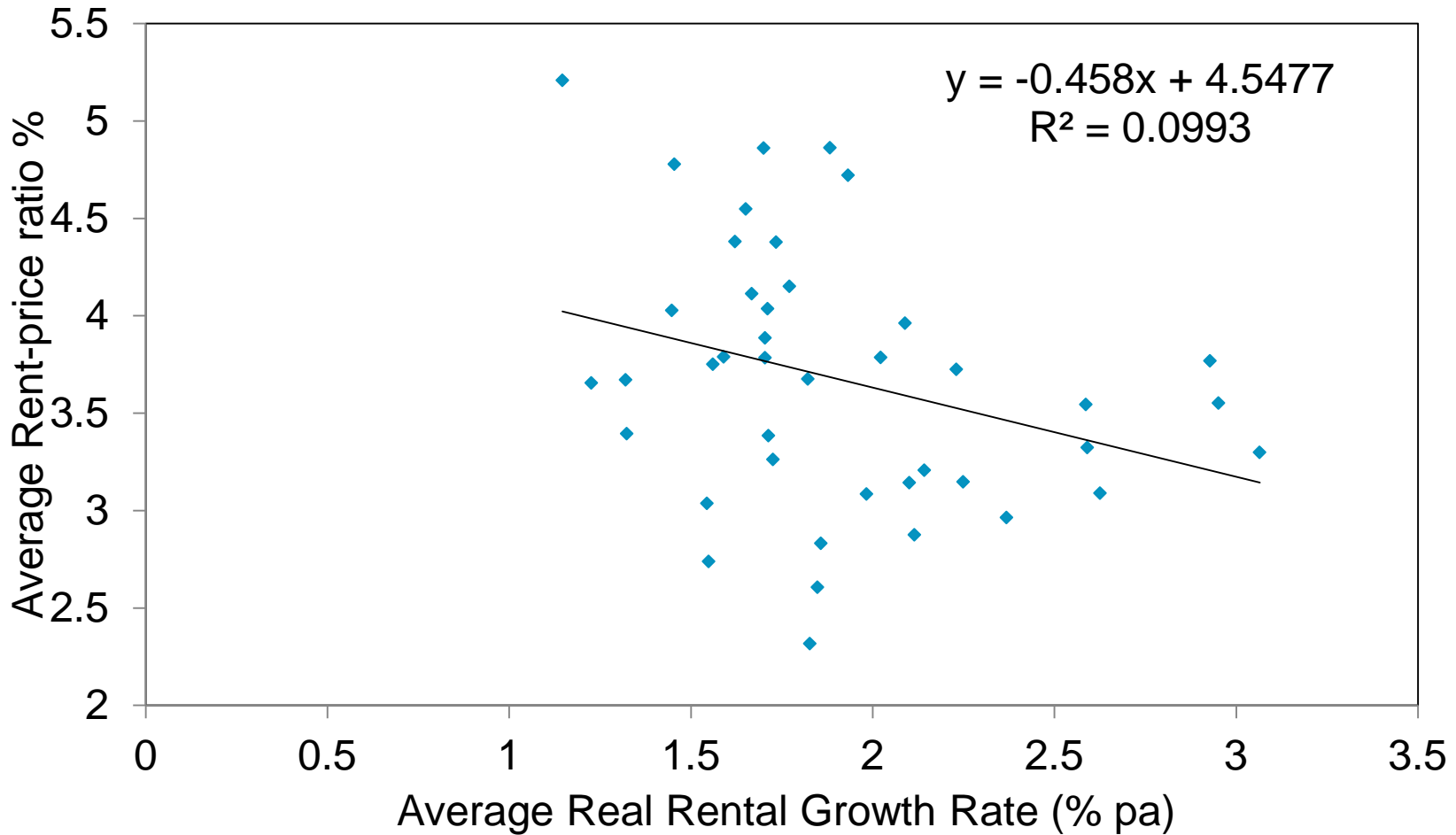


Figure 7: Sydney Region Rent-Price Ratios 2010-14 vs Real Price Growth 1986-2014

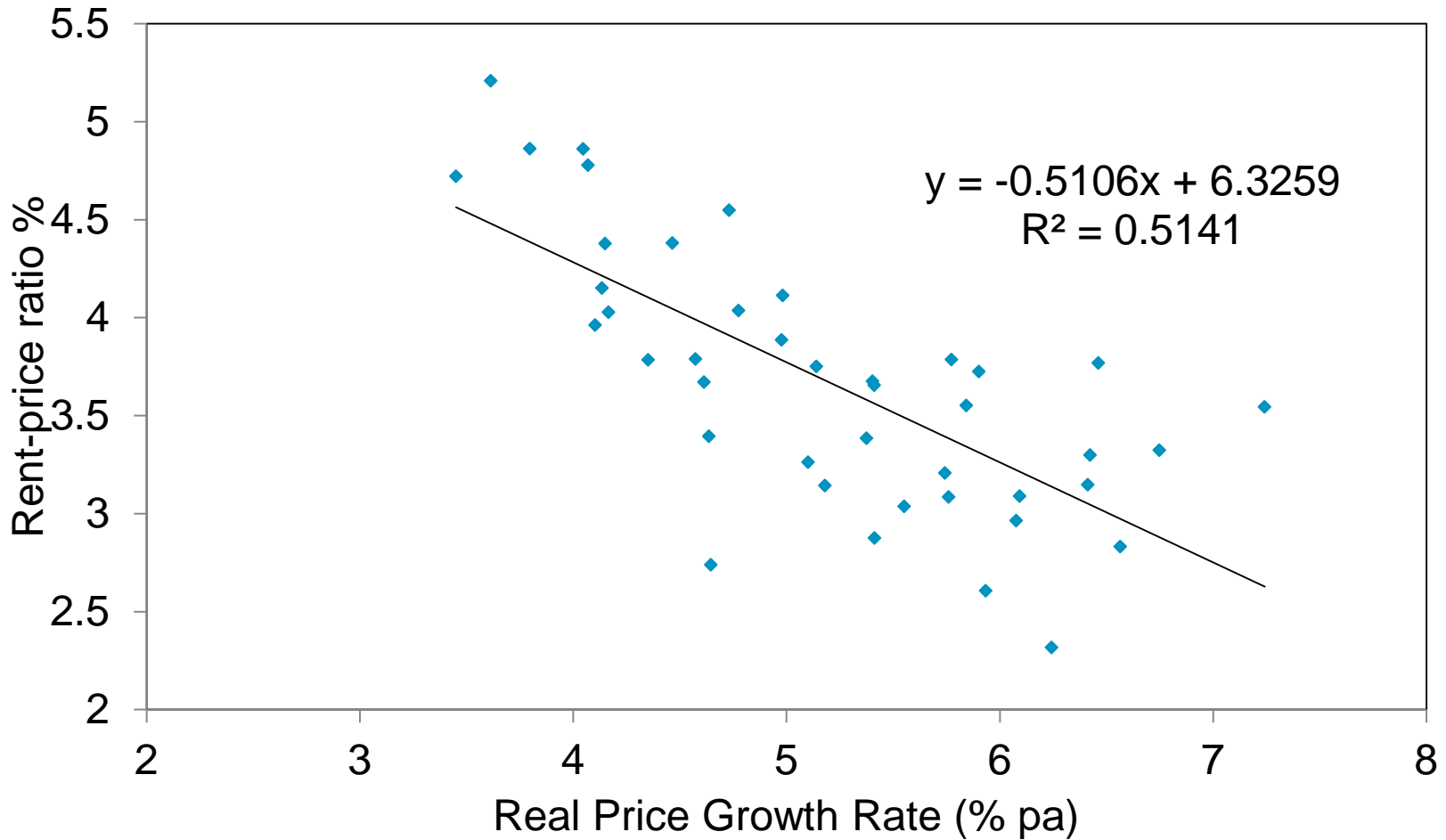
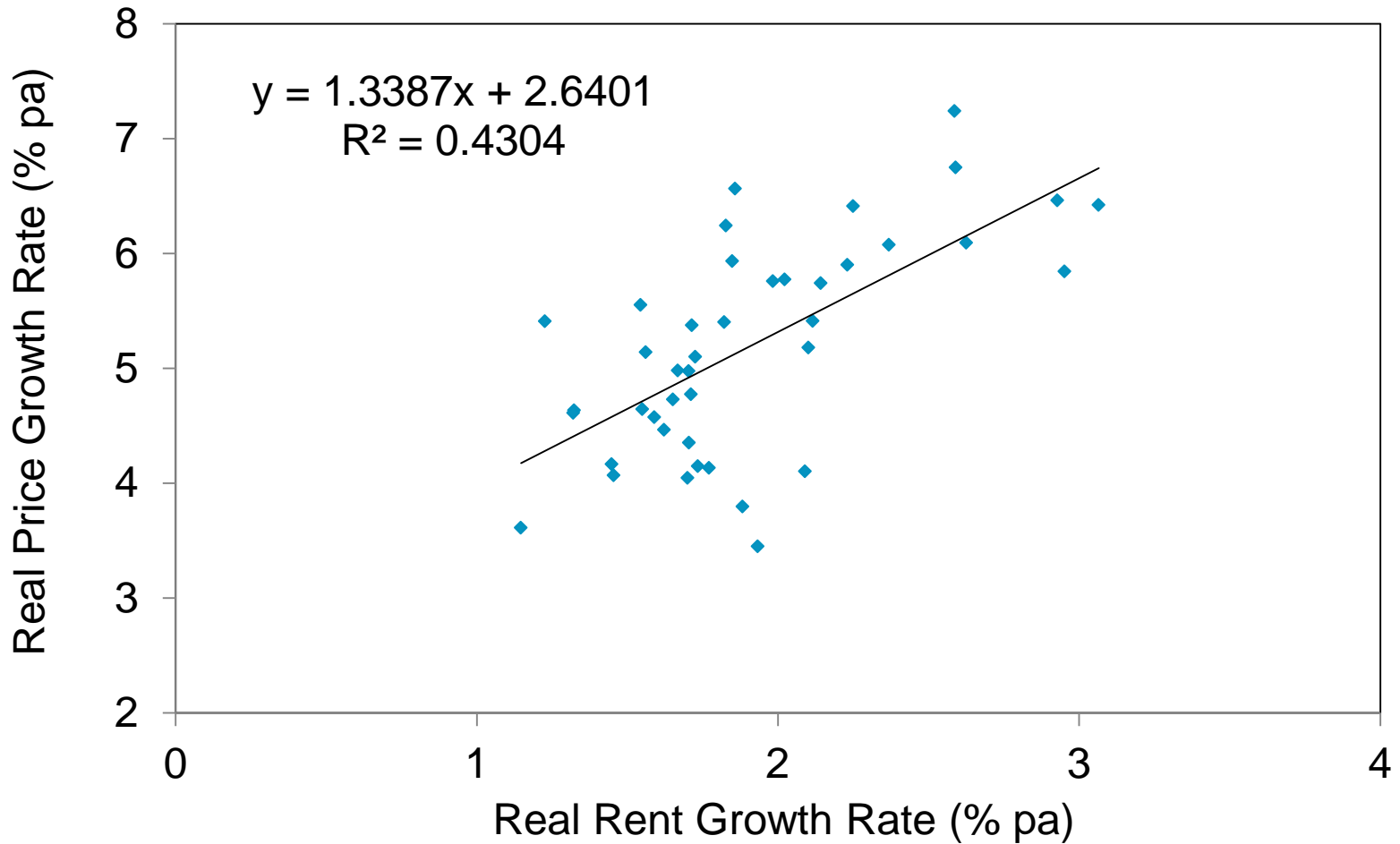


Figure 8: Sydney Region LGA Price vs Rental Growth 1986-2014



Equilibrium in the housing market

$$(v_t - p_t) - \epsilon_t(v - p) = \emptyset$$

$$\epsilon_t(v - p) =$$

$$\epsilon_t \left[\sum_{j=0}^{\infty} \rho^j (-\Delta v_{t+1+j}) \right]$$

$$+ \epsilon_t \left[\sum_{j=0}^{\infty} \rho^j (rf_{t+1+j}) \right]$$

$$+ \epsilon_t \left[\sum_{j=0}^{\infty} \rho^j (er_{t+1+j}) \right]$$

Disequilibrium (\emptyset) is difference between actual rent-price ratio and equilibrium rent-price ratio.

Equilibrium rent-price ratio is conditional on, or a function of:

Equilibrium rent growth - typically taken as some long-term growth rate.

Equilibrium risk free rate - in the equity literature assumed 'constant'!!! But evidence that risk free rate is time varying. Figure 9 shows this for Australia but also applies to world/US.

Equilibrium risk premium/excess return - (un)measured. In equity, taken as the variable that shifts with the business cycle. Might it shift with the property cycle?

We can also think of changes in the equilibrium rent-price ratio being a function of changes in these three variables.

Equilibrium Rent-Price Ratios with Risk Free Rate

Assume that long-term averages of rent growth and excess returns are reasonable starting assumptions.

Then $\epsilon_t (v - p)$ a function of risk free rate.

What risk free rate? Use inflation-indexed long-term bond yield as proxy measure, not short-term rate. Investors/buyers' decisions build in expectations of future path of rates. Long-term bond prices in markets' expectations which we attribute to buyers.

In Figure 10 and 11, we observe that this seems to explain a significant part of the movement in the rent price ratio. It strongly suggests/explains a structural fall in the rent-price ratio.

It also tells us that a simple mean of the rent-price ratio for the period 1985-2015 would not be a good measure of equilibrium, on either theoretical or empirical grounds.

If we take the this measure, one implication is that actual rent-price ratios in 2014 were too high! (Prices too low).

Equilibrium Rent-Price Ratio with Credit Spread Added

The post-GFC decline in the real long-term rate has not been matched by a comparable decline in rates for borrowers.

If we add the housing spread (VHR less bank-bill rate) to the real long-term rate (Figure 9), we are incorporating some of the risk associated with the market.

On this measure, the Equilibrium Rent-Price Ratio is still showing variation in the period 2001-2015 but around a largely sideways trend movement.

And significantly the rent-price ratio in 2014 looks “about right”.

In all this well to note that estimates of equilibrium rate will come with a large confidence interval. Not least because there large confidence intervals around the equilibrium rate for the real risk free rate.

Figure 9: Long-term Interest Rates and Housing Spread 1985-2014

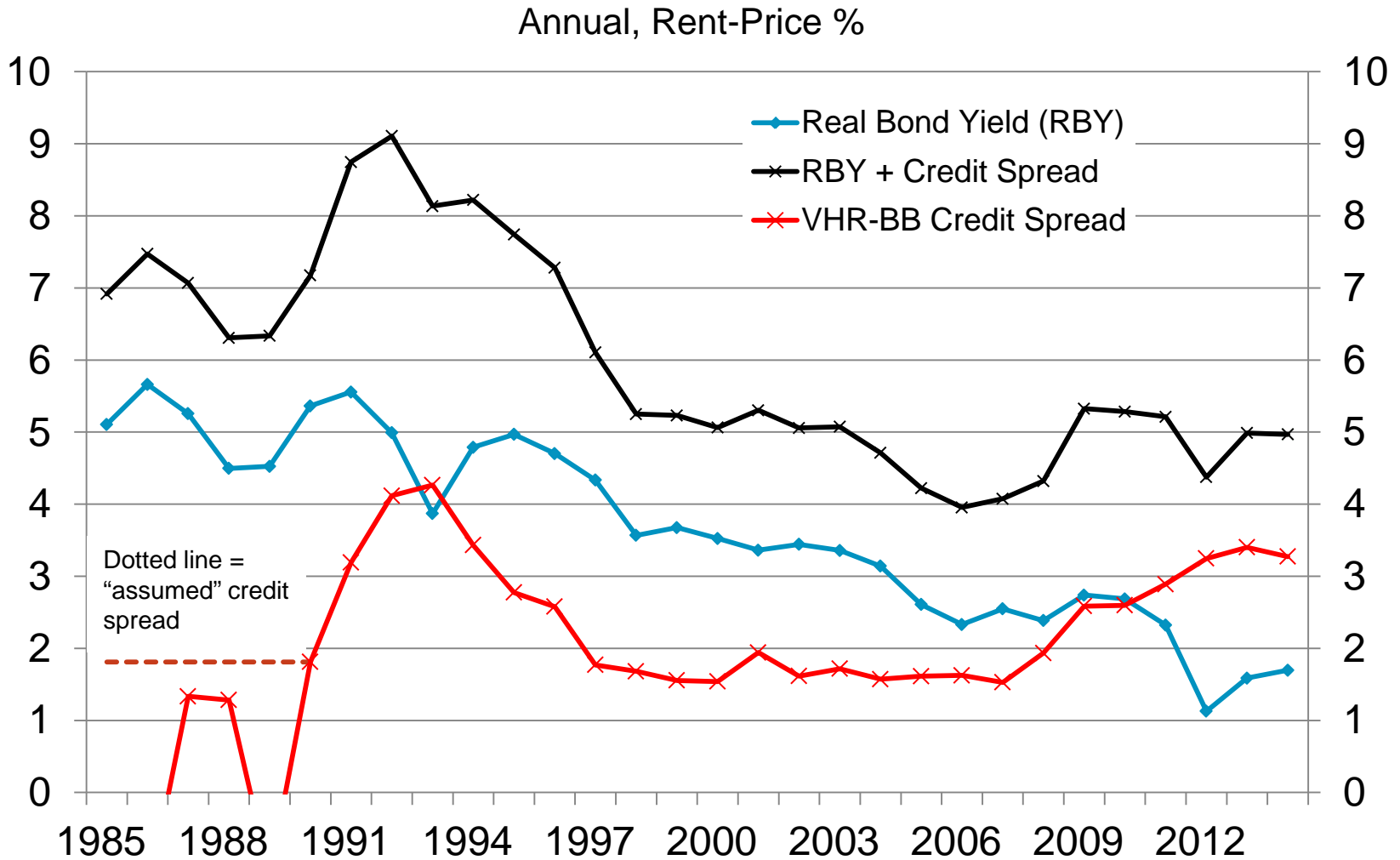
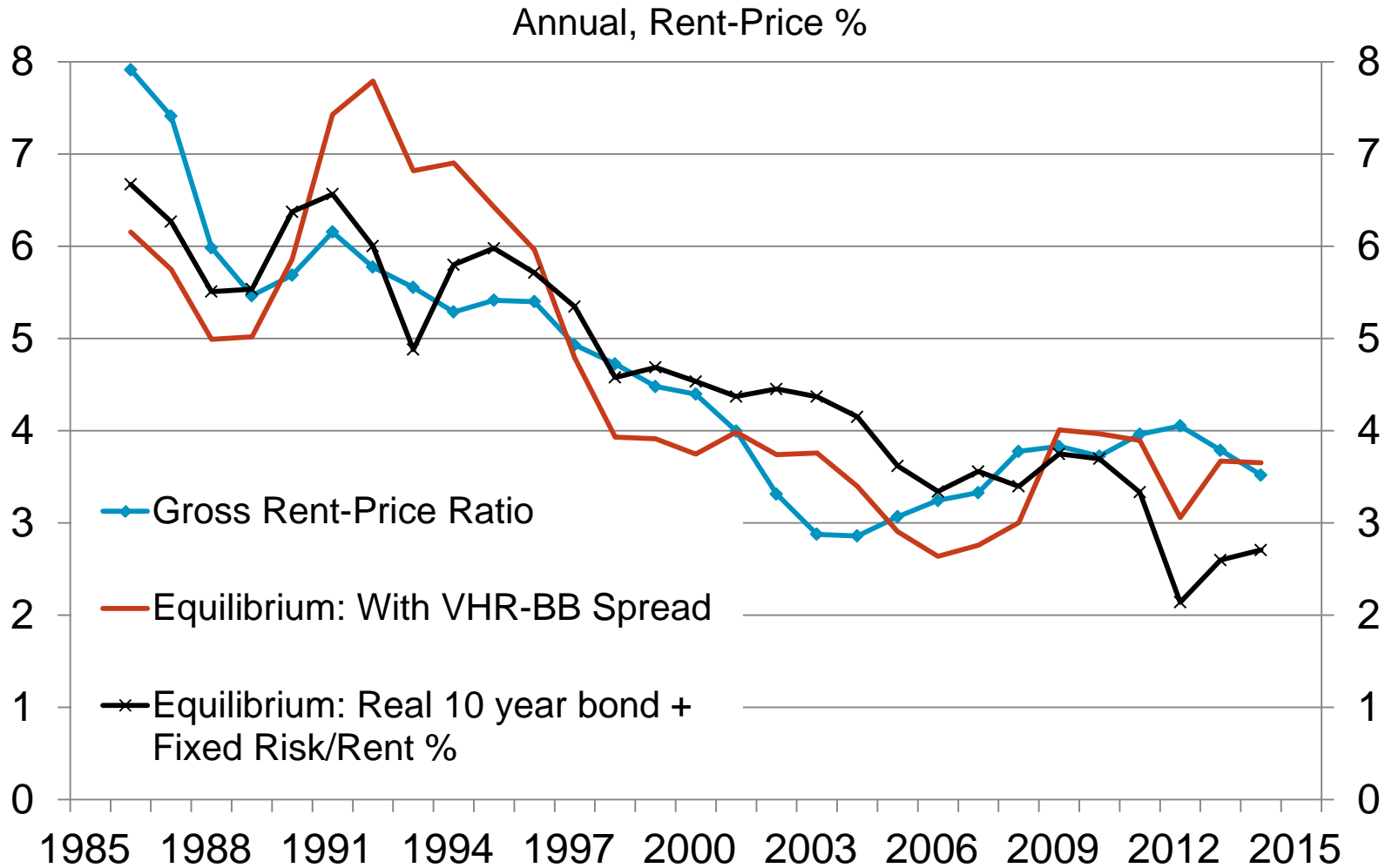


Figure 10: Sydney Region Actual and Equilibrium Rent-Price Ratio 1986-2014



Conclusions or Questions

Significant structural decline in rent-price ratios, chiefly due to decline in equilibrium interest rates. This generated significant 'structural' or one-off rise in house prices. Does the market appreciate that one-off?

Actual rent-price ratios appear in ball park of equilibrium – allowing for a wide confidence interval.

We have observed that the low rent-price ratio 'predicted' higher growth in rents. But was it luck?

After the high rent growth of the resource boom period, are expectations of rent growth built into the rent-price ratio too high?

Or has the high rent growth of the resources boom (Figure 12, 13), in saving the market from a period of lower returns, inflated confidence in the property market?

After 25 years without a serious downturn in the housing market, even allowing for larger credit spread, is the risk premium too low?



Supplementary Slides

Figure 11: Melbourne Region Actual and Equilibrium Rent-Price Ratios 1985-2014

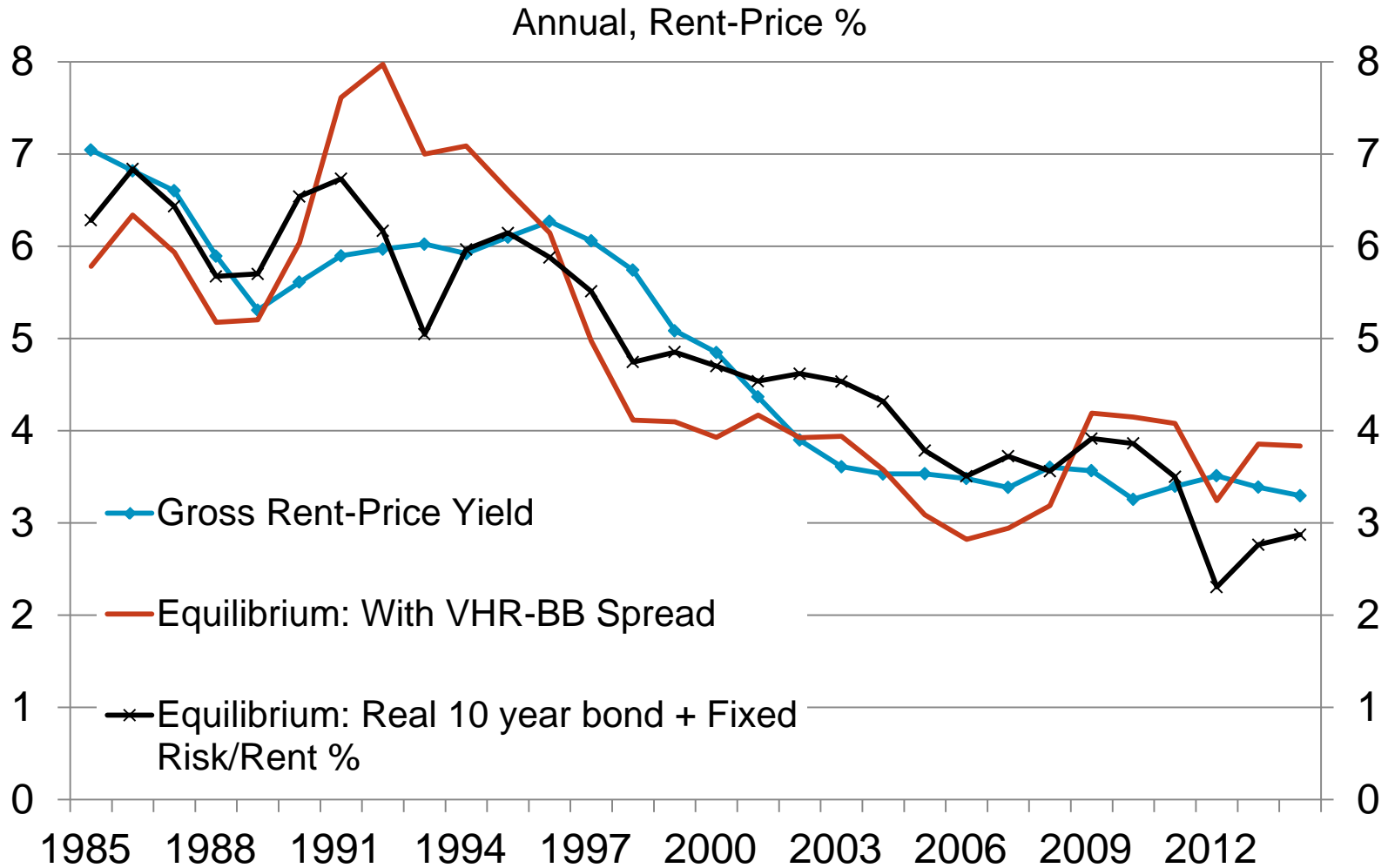


Figure 12: Sydney Region House Rents 1985-2014

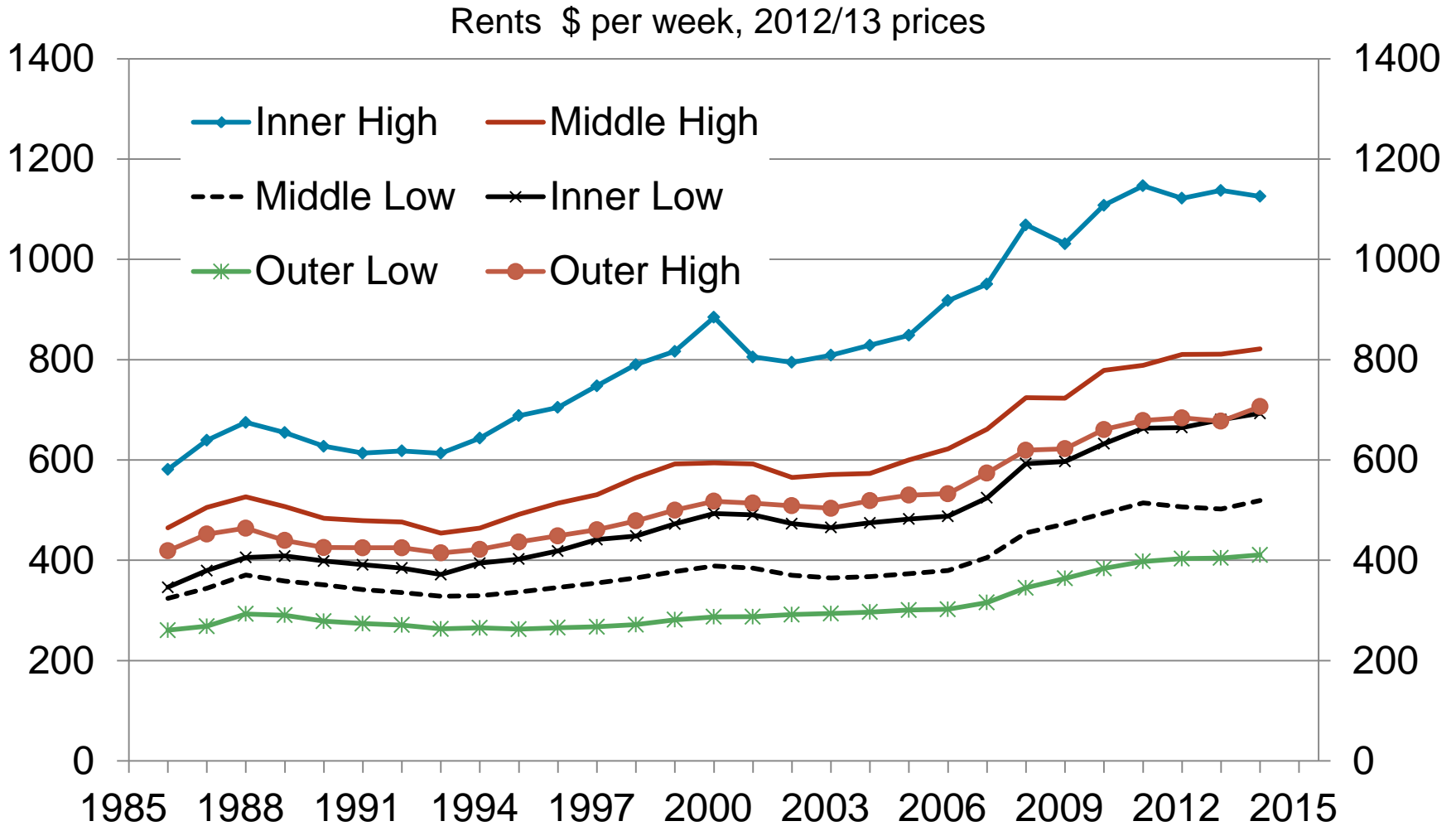


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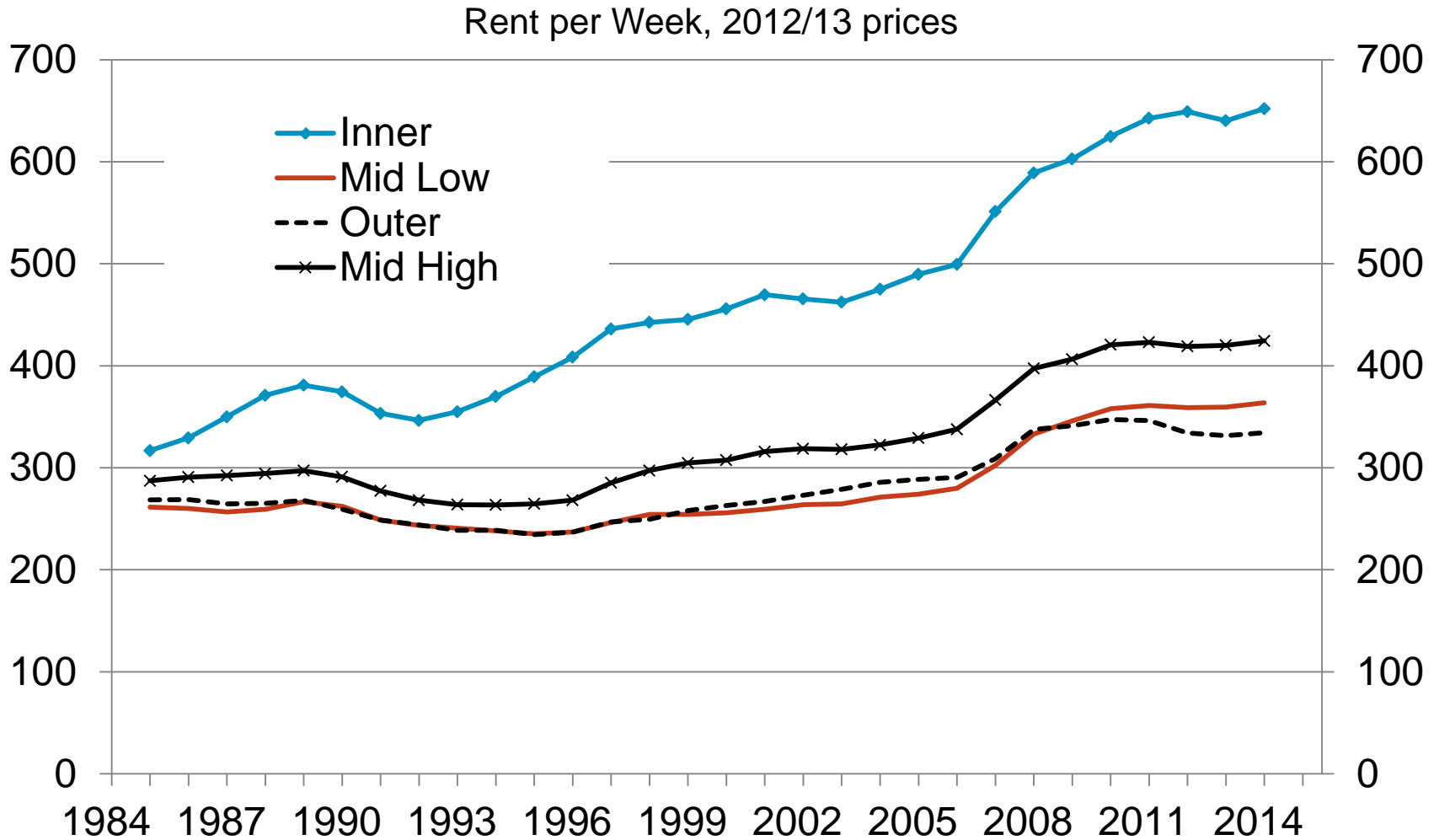


Figure 14: Sydney Region House Prices 1985-2014

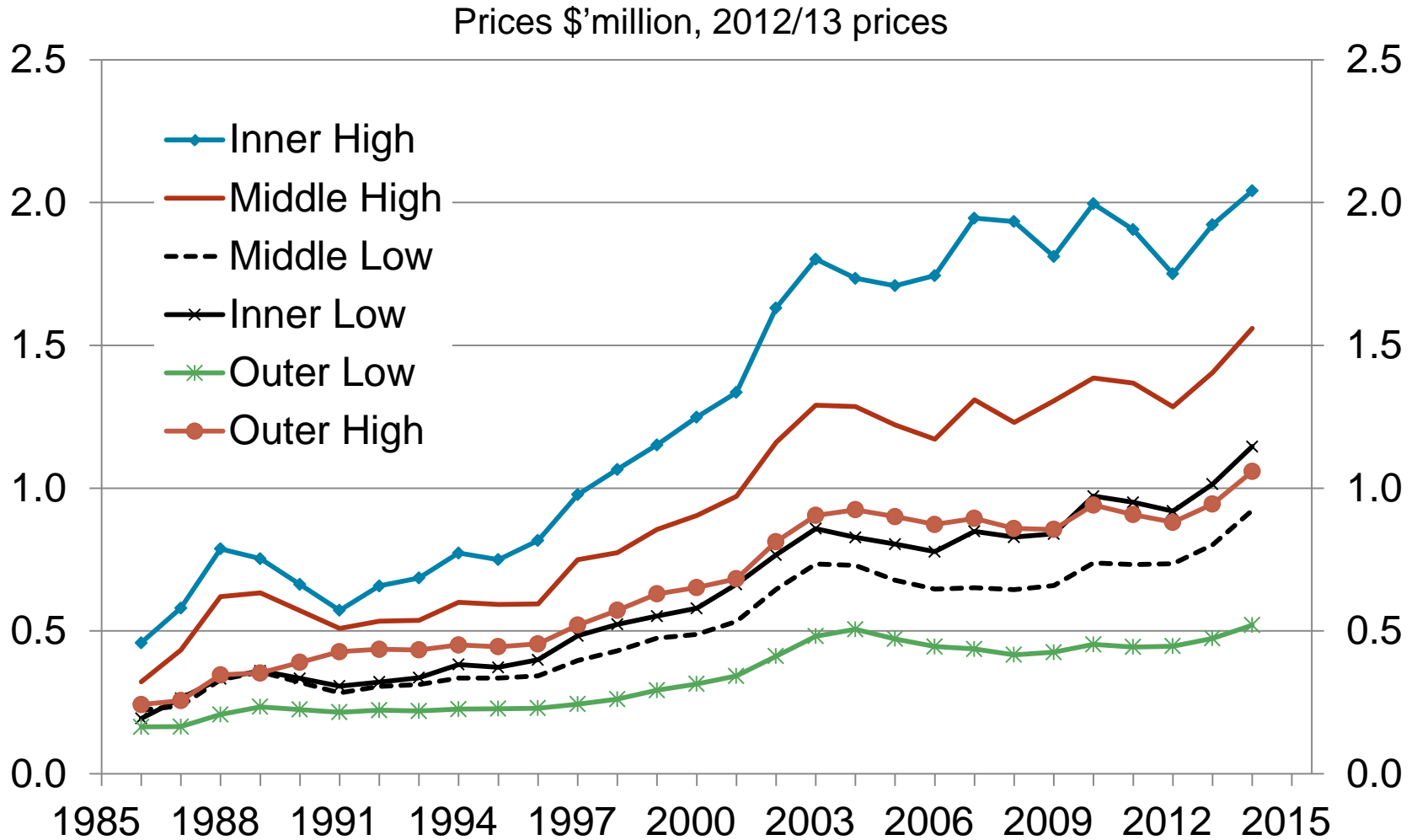
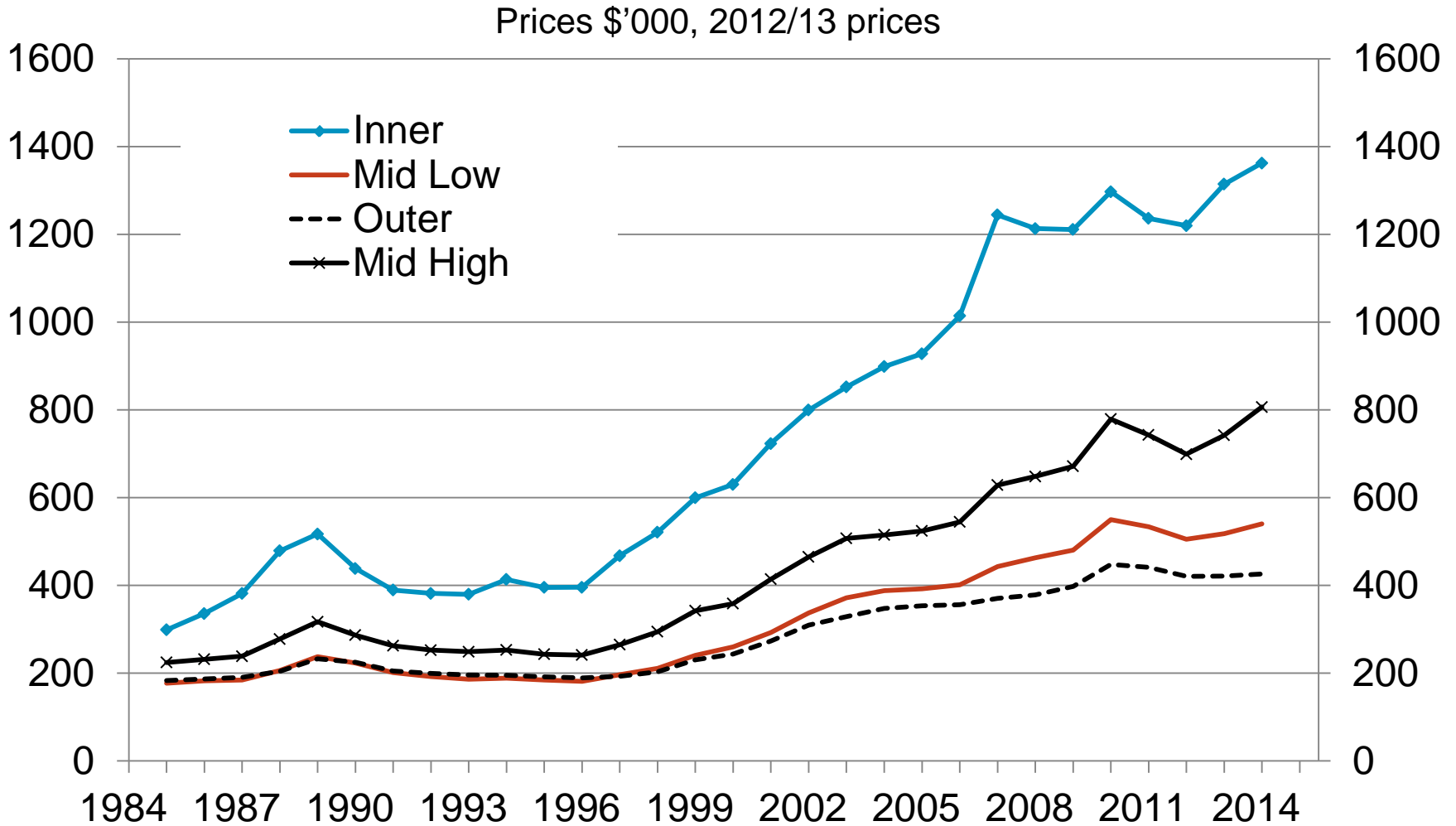


Figure 15: Melbourne Region House Prices 1985-2014



The Data - Melbourne

- 31 LGAs
- Dwelling prices
 - 1970-2014 LGA level house and unit prices (annual) – all Victorian LGAs – electronic from 1985; paper earlier.
 - Mean and median estimates
- Dwelling rents
 - 1999-2014 LGA level actual rents for houses and units from government rental bond regulator – Melbourne and major regional LGAs
 - 1985-1998 asking rents Melbourne LGA – paper records only
 - Asking rents ‘imperfect’ but can benchmark against Census estimates for 1986 (in progress), 1991, 1996 – suggest ‘reasonable’ estimates
 - Census LGA rents – electronic from 1991; paper only 1911-1986
- Gross rents – in ideal world would have net rents (gross rent less depreciation, maintenance, rates, and insurance)



The Data - Sydney

- 43 LGAs in Greater Sydney, and from 1991 8 LGAs in growth corridor south-north (Wollongong to Hunter Valley)
- Dwelling prices
 - 1979-2014 LGA level house and unit prices (annual) – all Sydney LGAs – electronic from 1991; paper earlier.
 - Series 1979-1989: Abelson (1991) – sample provided by NSW Government
- Dwelling rents
 - 1991-2014 LGA level actual rents for houses and units by LGAs, from DoH records
 - 1986-1990 Sydney sub-regions paper records only
 - Paper records are of actual rents as per 1991-2014 series
 - Census LGA rents – as per Melbourne
- As per Melbourne

Rent-Price ratios

- Gross Rents – ideally would like estimates of depreciation, maintenance, rates, insurance etc. expenses to give net rents
 - Standard to assume ‘same’ proportion of gross rent
- But some of the variation could reflect different expense ratios. High land value dwellings expected to have lower expense ratios.
- Ratios compare two series which are not quality adjusted
 - However, the quantum of units of housing should be the same for rent and price.
 -
- Sales are for owner-occupied and rented stock and can be different quality. However, in case of units, high proportion rented. Rent-price ratios for house and units show same movements – so reasonable to use/draw inference from these ratios