

Colonial First State Global Asset Management

# The changing risk profile of the AUS-REIT sector

Presented at PRRES 2008 in Kuala  
Lumpur, Malaysia

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23rd January 2008

# Outline

- ➔ Motivation
- ➔ The changing Australian REIT market
- ➔ Methodology and data set
- ➔ Empirical results
- ➔ Summary remarks and implications
- ➔ Appendix

# Motivation

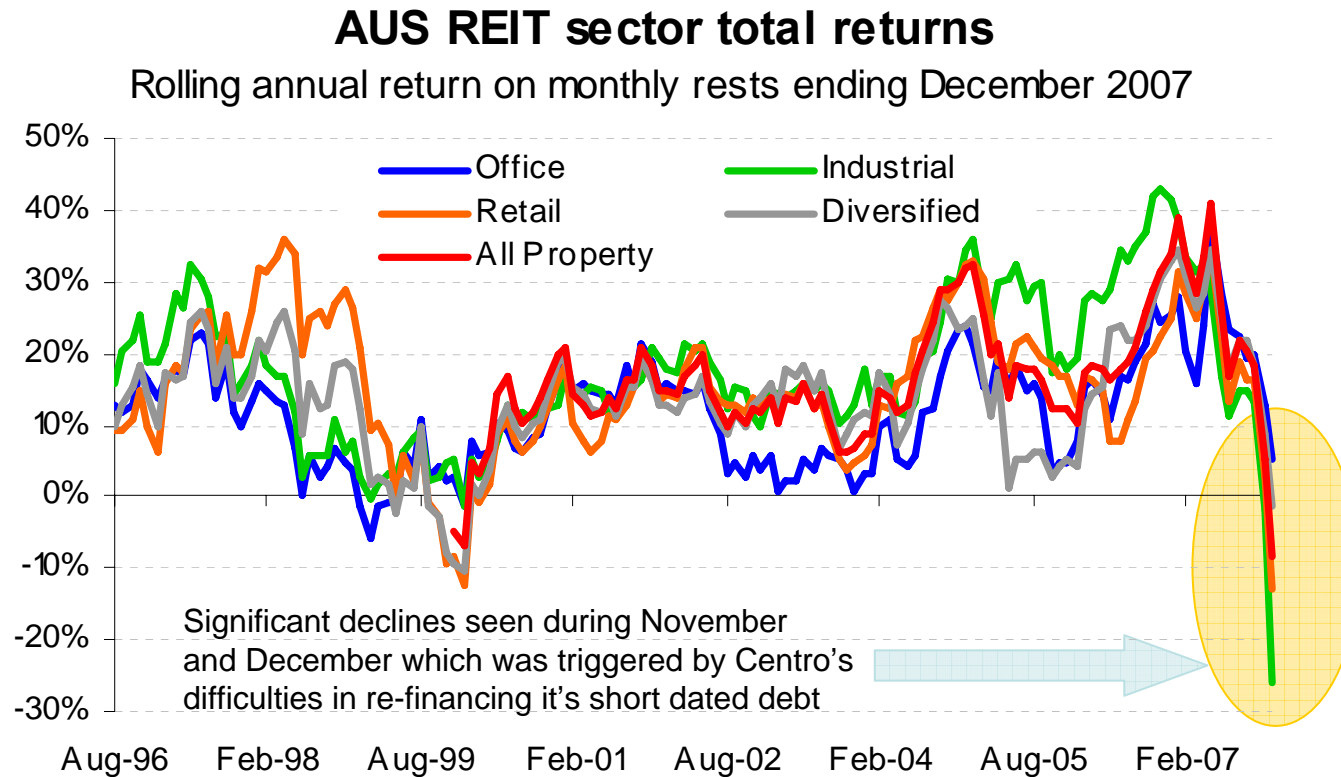
- To give a brief overview of the main changes in the Australian REIT (AUS-REIT) market.
  - Highlighting the way AUS-REITs have evolved since their inception in relation to the movement from a relatively passive strategy to more a active one.
  
- Undertake a formal analyse of what this change has done to the nature of the risk profile of the AUS-REIT sector:
  - We use a simple multivariate GARCH model to model the variance-covariance matrix as a time varying process.
  - We then construct time varying measures of Beta and correlation for the various AUS-REIT indices.
  - We finish by plotting 'News impact curves' for the various AUS-REIT sectors.



# The Changing AUS-REIT Market

# AUS-REIT market turmoil

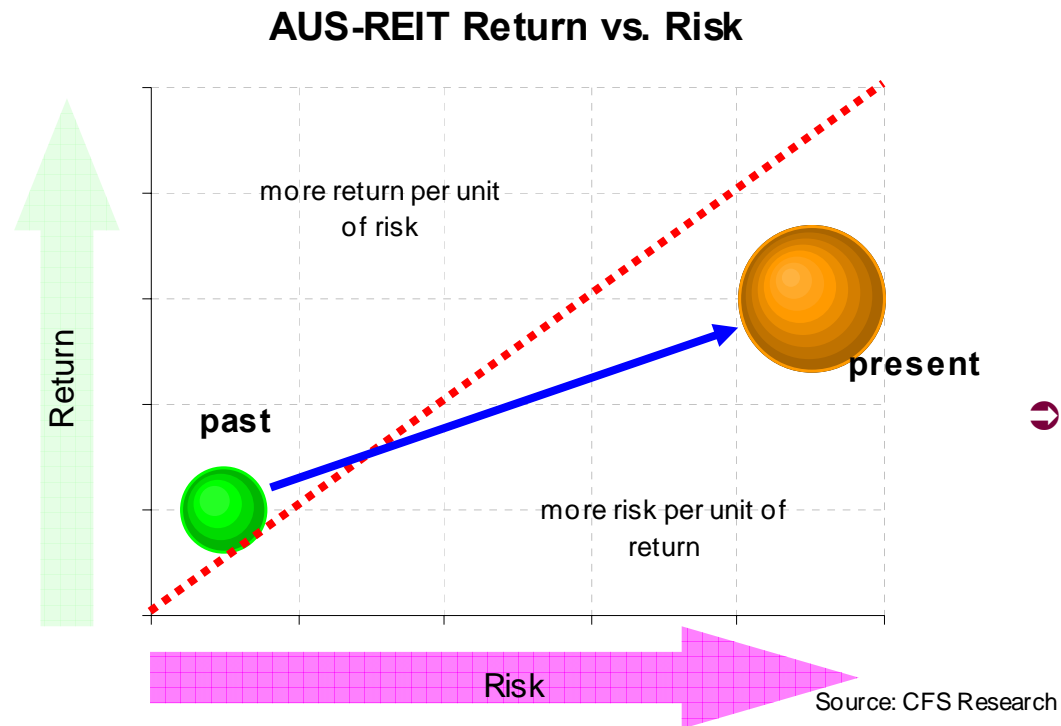
## - Returns across sectors have fallen dramatically



Source: UBS and CFS Research.

- Many REITs have been impacted by the credit crunch and its effect on liquidity in global debt markets, which saw Centro (a retail REIT) lose 70% of it's market value in a single day.

# Why has risk increased? - changing risk profile



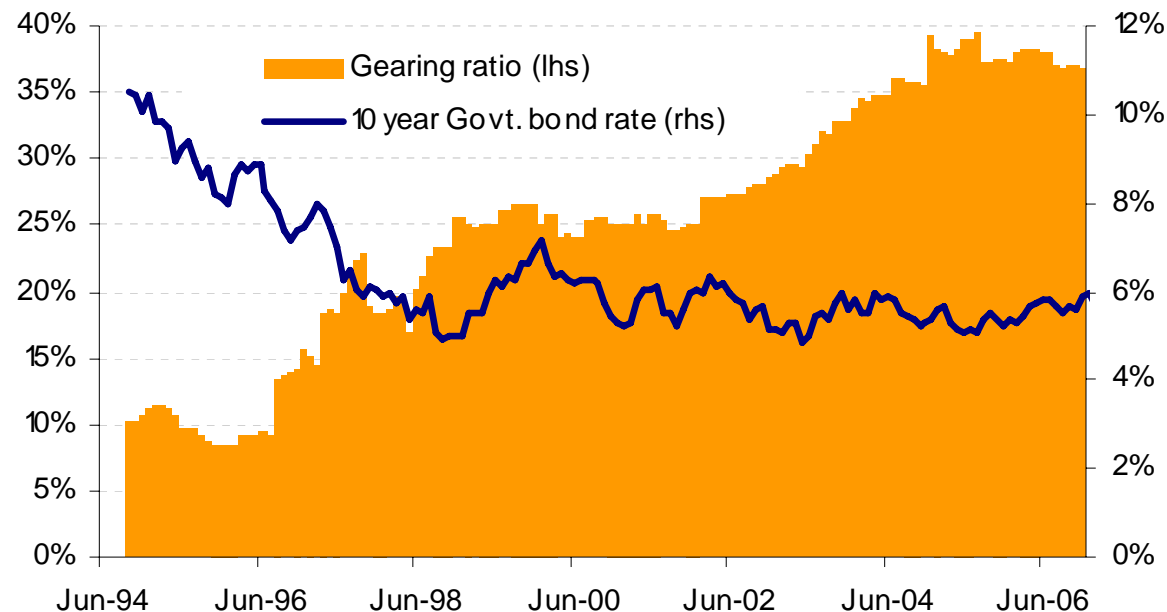
- The quest for growth has seen the AUS-REIT sector take on more risk:
  - Increased gearing levels
  - Growing offshore exposure
  - Rise of stapled trusts
  - Increased market concentration
- While these strategies aim to enhance return to the unit holder via increasing the capital component of total return; they would also be expected to increase the risk profile of AUS-REITs. Specifically, we propose that the sector is now more riskier

# Why has risk increased?

## - Increased gearing levels

### AUS-REIT gearing ratio & interest rates

Monthly observations ending December 2007

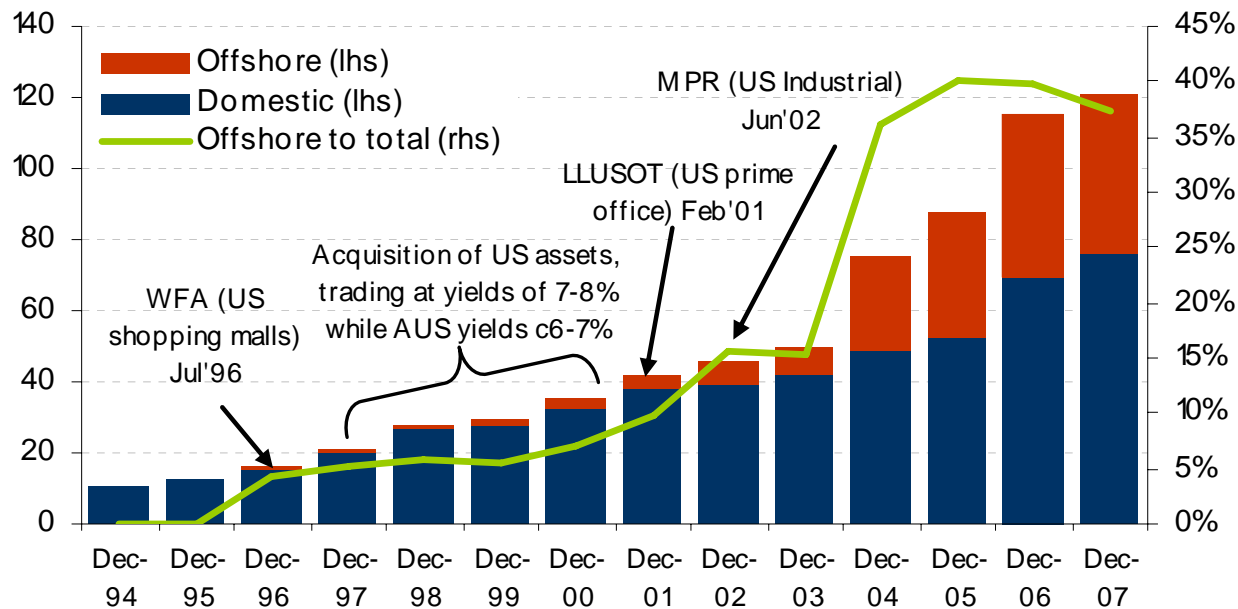


Source: UBS, RBA and CFS Research.

- Reasons for increased gearing:
  - Low interest Rate environment
  - Allows for a greater yield return than would otherwise be the case
  - Historical low levels of (perceived) risk in property investment
- 7
- However, greater gearing makes LPTs more sensitive to interest rate movements

# Why has risk increased? - growing offshore exposure

**Domestic versus international AUS REITs**  
Market cap (A\$Bn)



Note: includes the following trusts; WDC, MCW, MDT, MPR, GSA, TSO & BJT. Source: UBS & CFS Research.

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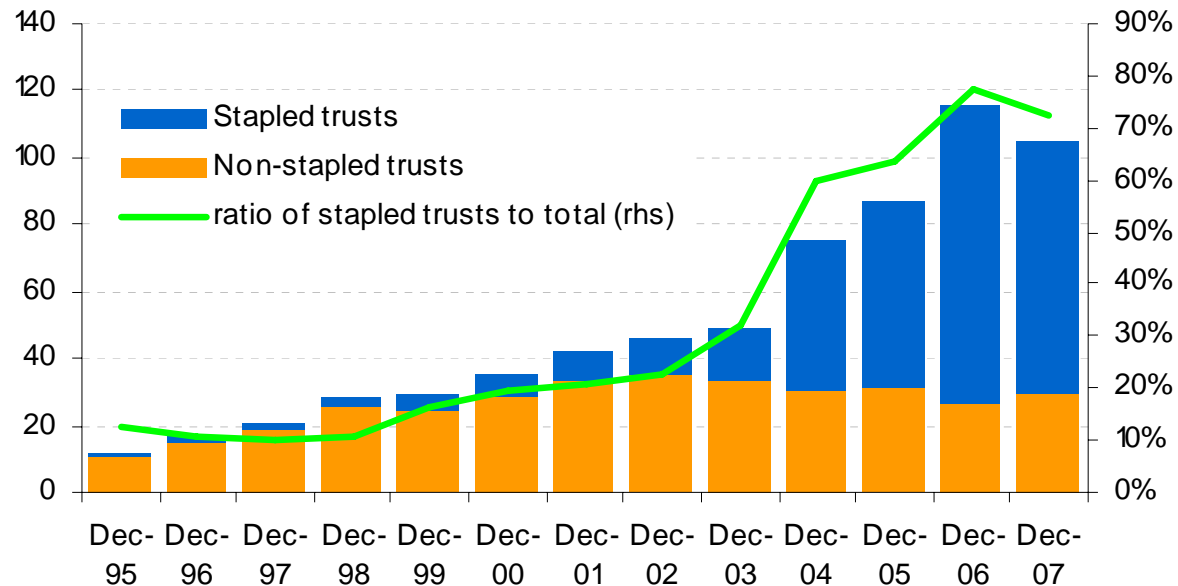
- AUS-REIT exposure to offshore property markets became relatively significant around 2004
- Increases risk via: i) FX risk; ii) country / sovereign risk; and iii) operational / management risk.

# Why has risk increased?

## - changing management structure

### Stapled versus non-stapled AUS REITs

Market cap (A\$Bn)



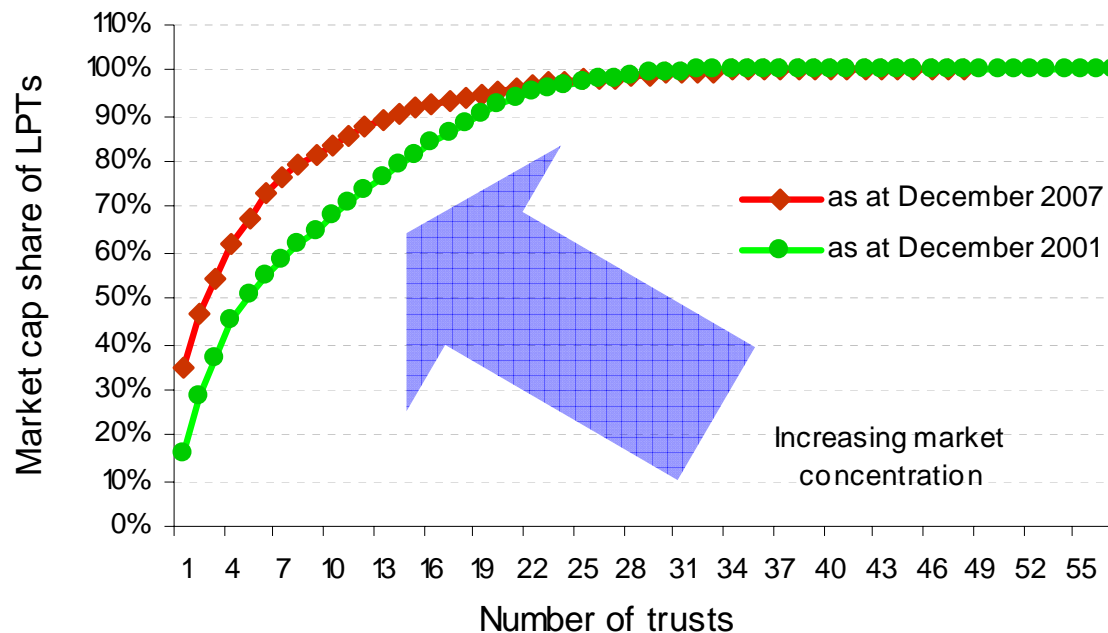
Source: UBS and CFS Research.

- REIT units and shares in a corporation are stapled together.
- Engages in a range of property service, management, development and construction activities.
- Risk from this comes through exposure to non-conventional property activities

# Why has risk increased?

## - increased market concentration

Ranking of LPTs by Market Cap



Source: UBS and CFS Research.

- As at December 2007, ten trusts comprised approximately 82% of the total market capitalisation. One trust (Westfield) comprises 37% of the total market capitalisation on its own.
- 10 ➤ This increases risk due to the potential lack of diversity within the AUS-REIT sector and may lead to inefficient pricing.



# Methodology and data set

# Methodology

## - a simple model for time varying V-C matrices

➔ Conditional mean model - diagonal VAR:

$$y_t = \Phi_0 + \Phi_1 y_{t-1} + \Phi_2 y_{t-2} + \varepsilon_t$$

$$\varepsilon_t | \Omega_{t-1} \sim N(0, H_t)$$

Where  $y_t$  is a 2x1 vector of continuously compounding growth rates of each series.

The coefficient matrices,  $\Phi_1$  and  $\Phi_2$  are diagonal such that the off-diagonal elements are zero.

Lag length was determined via the SBC and AIC statistical measures.

$\Omega_{t-1}$  is the information set up to and including  $t-1$ .

# Methodology

## - a simple model for time varying V-C matrices

- ➔ Following Ding & Engle (2001) and allowing for asymmetry, we can parameterise the variance –covariance matrix as follows:

$$H_t = CC' + \underbrace{AA' \circ (\varepsilon_{t-1} \varepsilon'_{t-1})}_{\text{Squared innovations (govern slope of NIC)}} + \underbrace{BB' \circ (H_{t-1})}_{\text{Lagged variances}} + \underbrace{DD' \circ (\eta_{t-1} \eta'_{t-1})}_{\text{Asymmetric term for impact of innovations}}$$

Current Variance    Constant term    Squared innovations (govern slope of NIC)    Lagged variances    Asymmetric term for impact of innovations

$$\eta_t = \min\{\varepsilon_t, 0\}$$

- All coefficient matrices are lower triangular such that  $LL'$  is Positive Semi-Definite
- Asymmetric term is similar to the Glosten, Jagannathan, & Runkle (1993) method for modelling asymmetry in the univariate GARCH setting.
- The 'o' is the Hadamard product (element by element multiplication)

# Methodology

## - measuring a sector's systematic risk

- ➔ In CAPM systematic risk is known as 'Beta'
  - Beta is the slope coefficient in the following equation:

$$R_{s,t} = \alpha + \beta_s \times (R_{m,t}) + \varepsilon_t$$

- In a one factor model, Beta can be calculated as:

$$\beta_s = \frac{\sum (R_{m,t} - \bar{R}_m) \times (R_{s,t} - \bar{R}_s)}{\sum (R_{m,t} - \bar{R}_m)^2} = \frac{\text{cov}(R_{m,t}, R_{s,t})}{\text{var}(R_{m,t})}$$

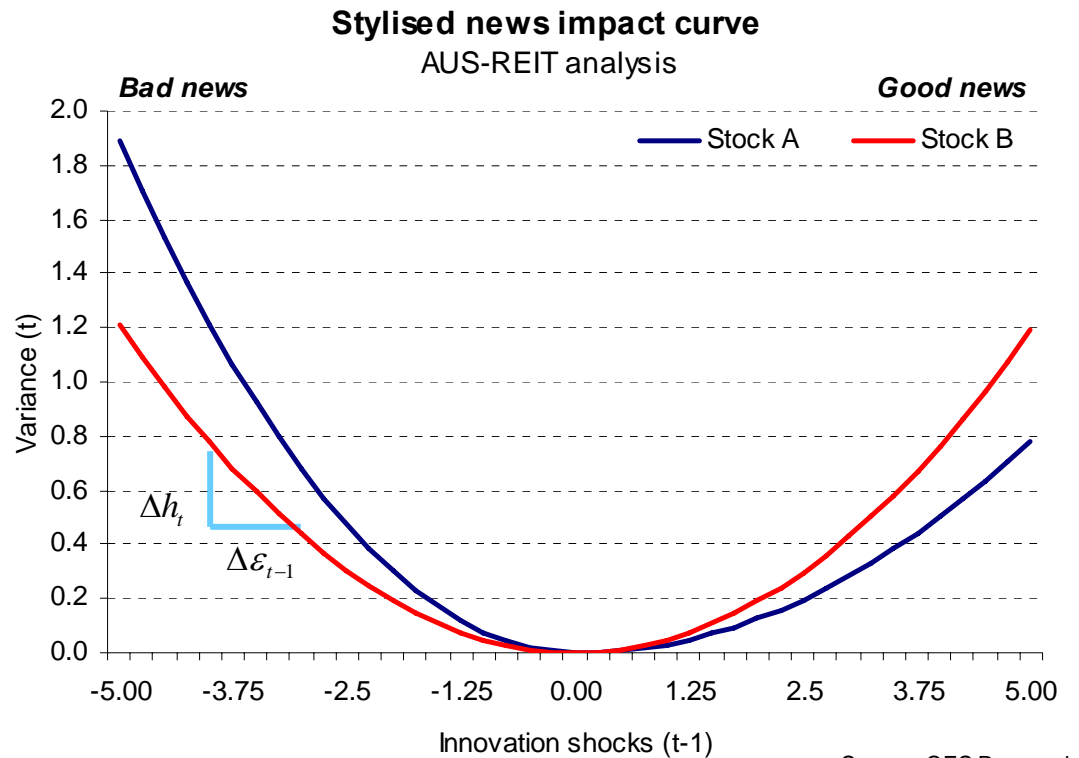
- The time varying measure of Beta can be specified as follows:

$$\beta_{s,t} = \frac{h_{ij,t}}{h_{ii,t}}$$

14 Where:  $i$  = Market,  $j$  = Stock

# Methodology

## - introducing News Impact Curves (NICs)



- The NIC of Engle and Ng (1993) is a graphical tool which plots the variance at  $t$  that would arise from various positive and negative innovations in a set range at time  $t-1$ , given an estimated model.
- It is useful to highlight the degree of asymmetry in the response of variance to 'good' or 'bad' news (defined as positive or negative returns) .
- Asymmetry shows that variance is dependant on the sign as well as the magnitude of an innovation shock.
- Degree of curvature highlights how responsive variance is to an innovation shock holding everything else constant.

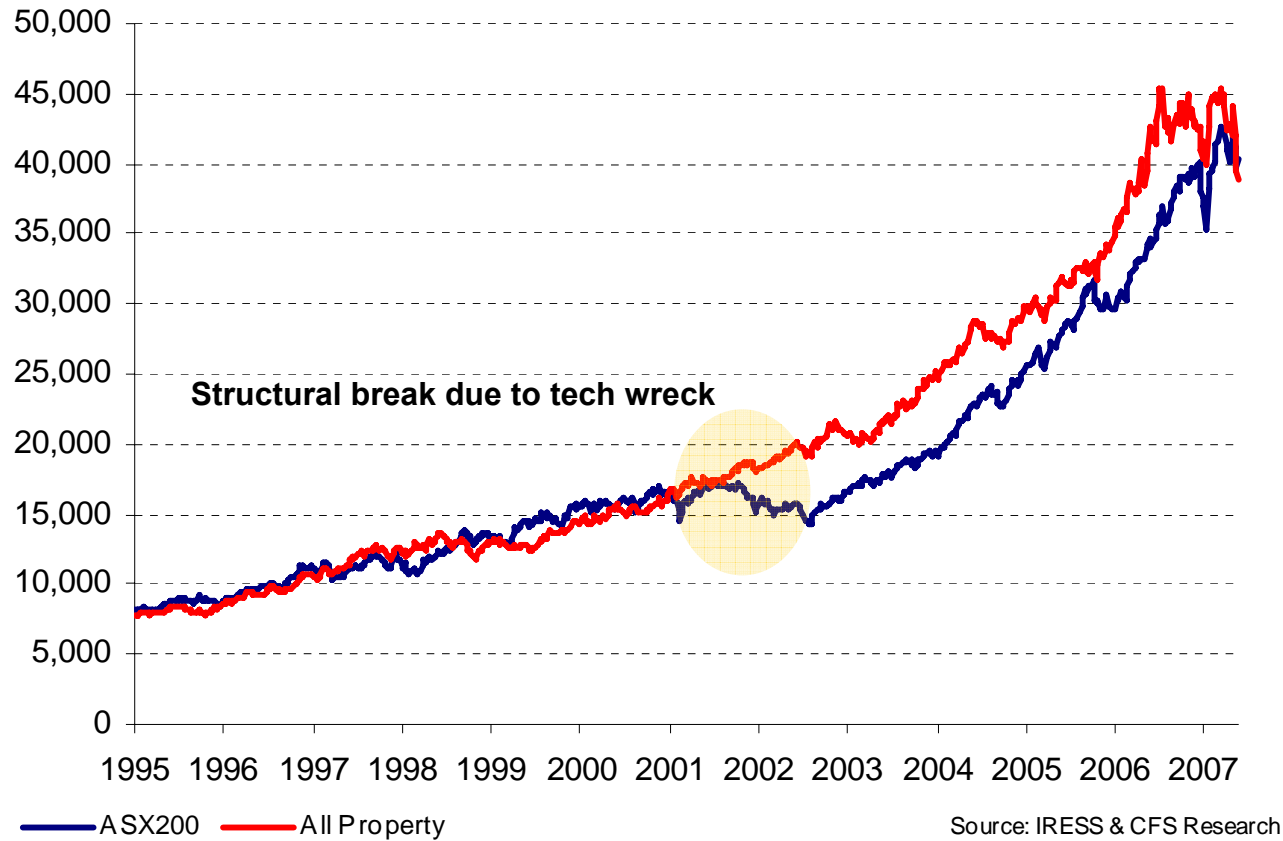
# Data set

- Data type: nominal accumulated index based returns
- Sources: IRESS and ASX
- Sector coverage:
  - S&P ASX200
  - S&P All Property ASX200
  - Office, Retail, Industrial, and 'Diversified' sub sectors
- Time span: 18th August 1995 – 28th December 2007
- Frequency: weekly observations (646 data points).
  - Weekly data has relatively less noise (vs. daily data) while still having the necessary volatility clustering needed in GARCH modelling (vs. monthly data).

# Data set

## Accumulated indices for the ASX200 & AUS-REIT

AUS-REIT analysis, weekly rests



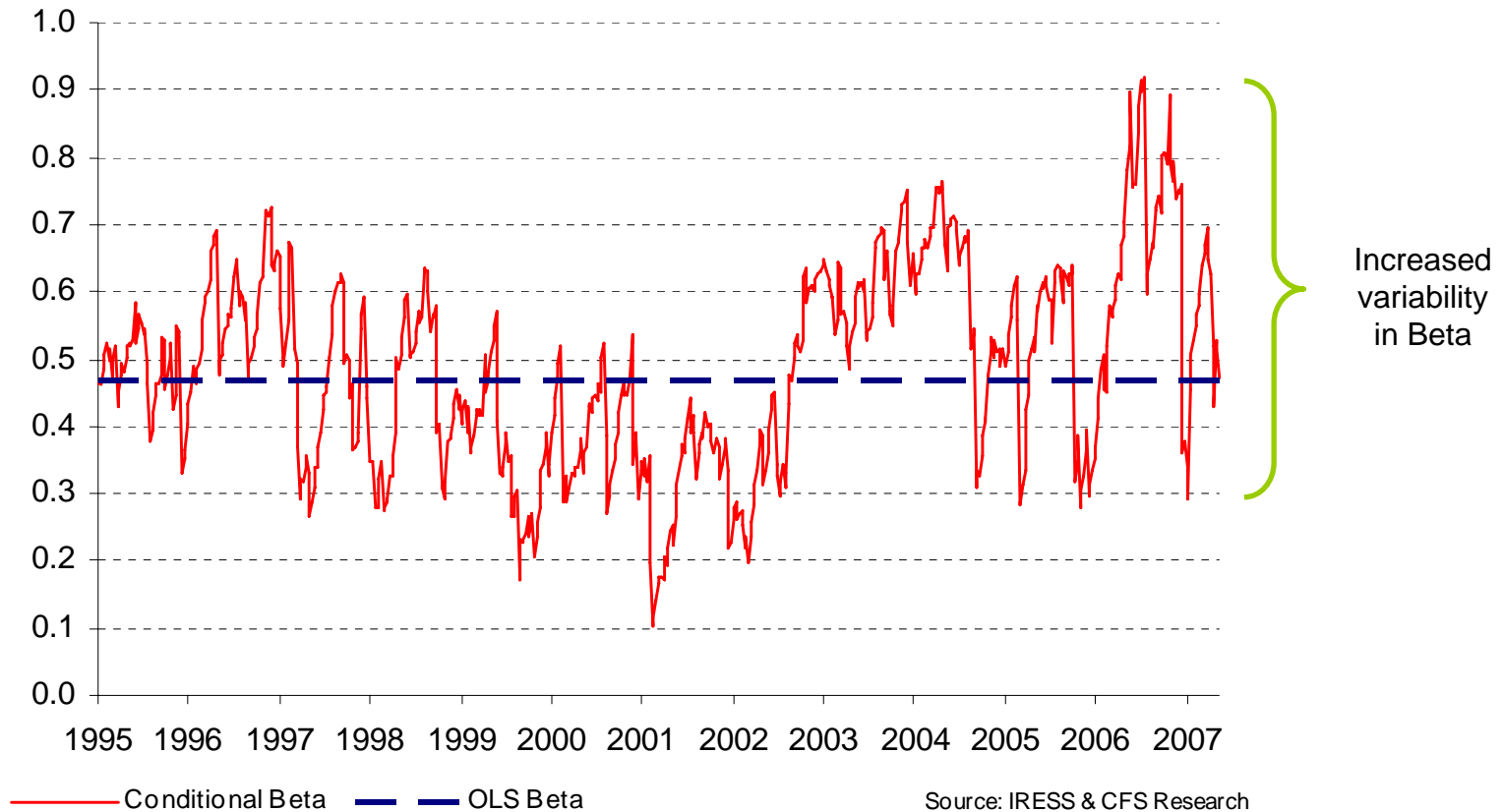


# Empirical results

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## - conditional Beta – all property

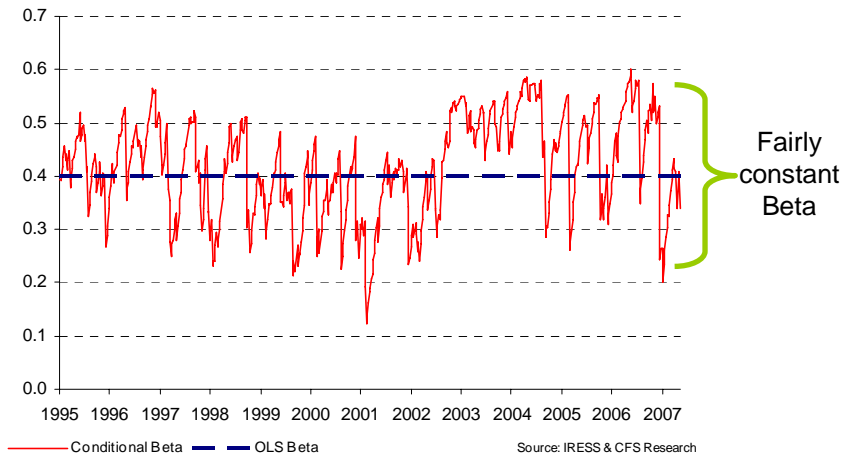
**Conditional Beta - All Property AUS-REITs**  
AUS-REIT analysis, weekly rests



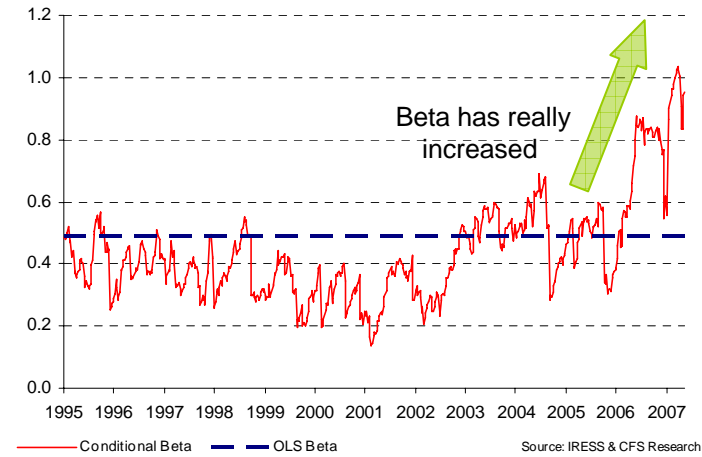
# Empirical results

## - conditional Beta AUS-REIT sub sectors

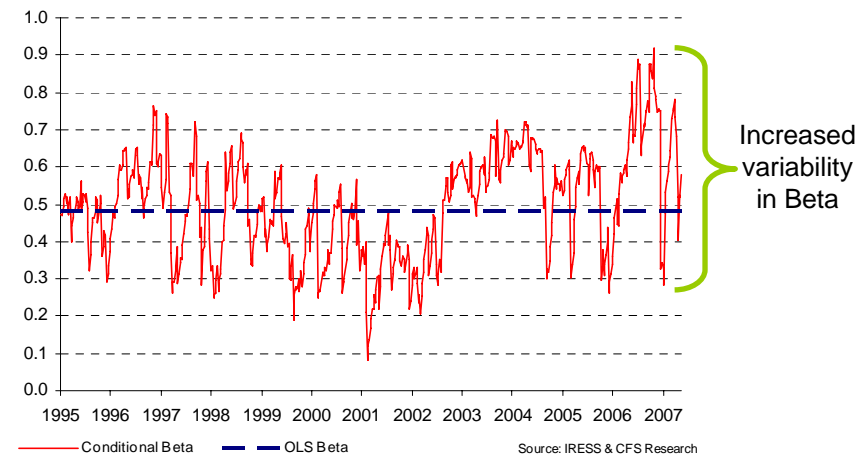
**Conditional Beta - Commercial AUS-REITs**  
AUS-REIT analysis, weekly rests



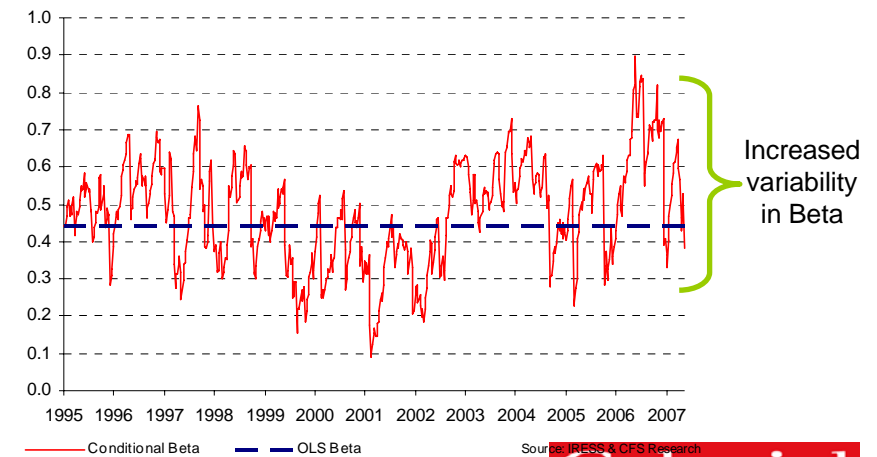
**Conditional Beta - Industrial AUS-REITs**  
AUS-REIT analysis, weekly rests



**Conditional Beta - Retail AUS-REITs**  
AUS-REIT analysis, weekly rests

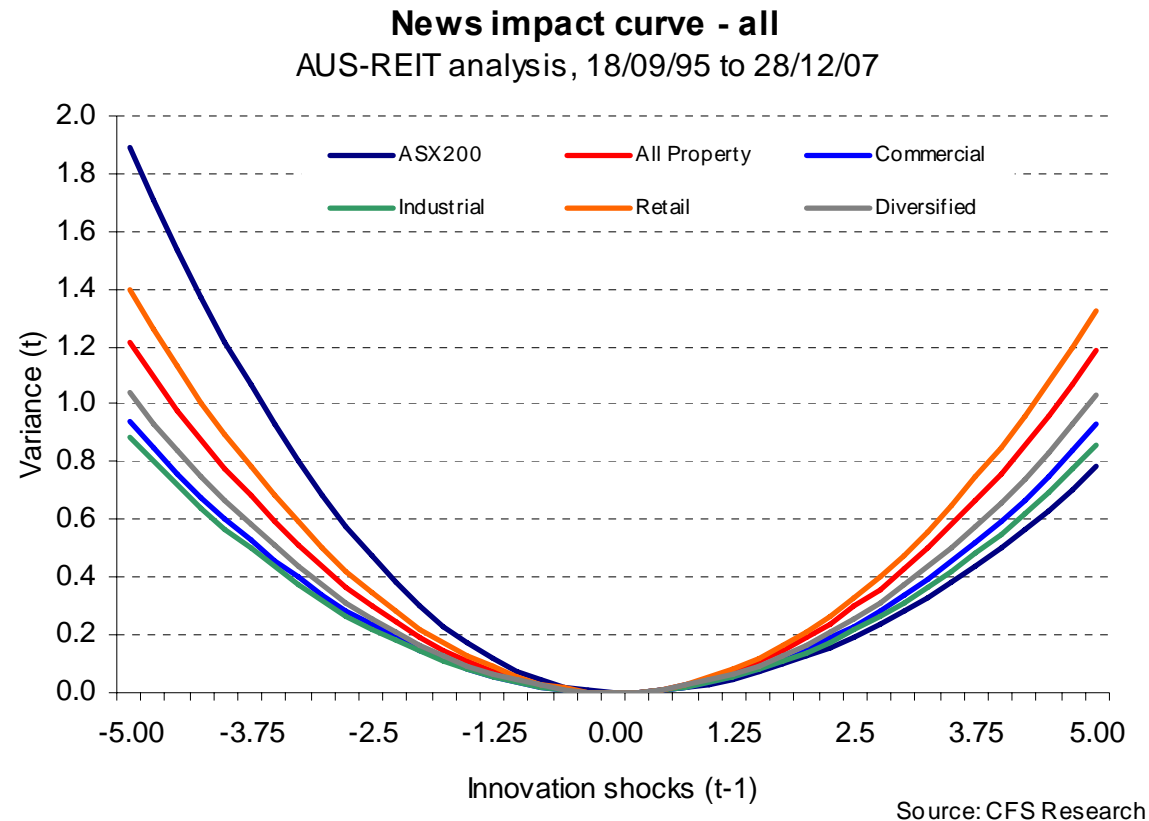


**Conditional Beta - Diversified AUS-REITs**  
AUS-REIT analysis, weekly rests



# Empirical results

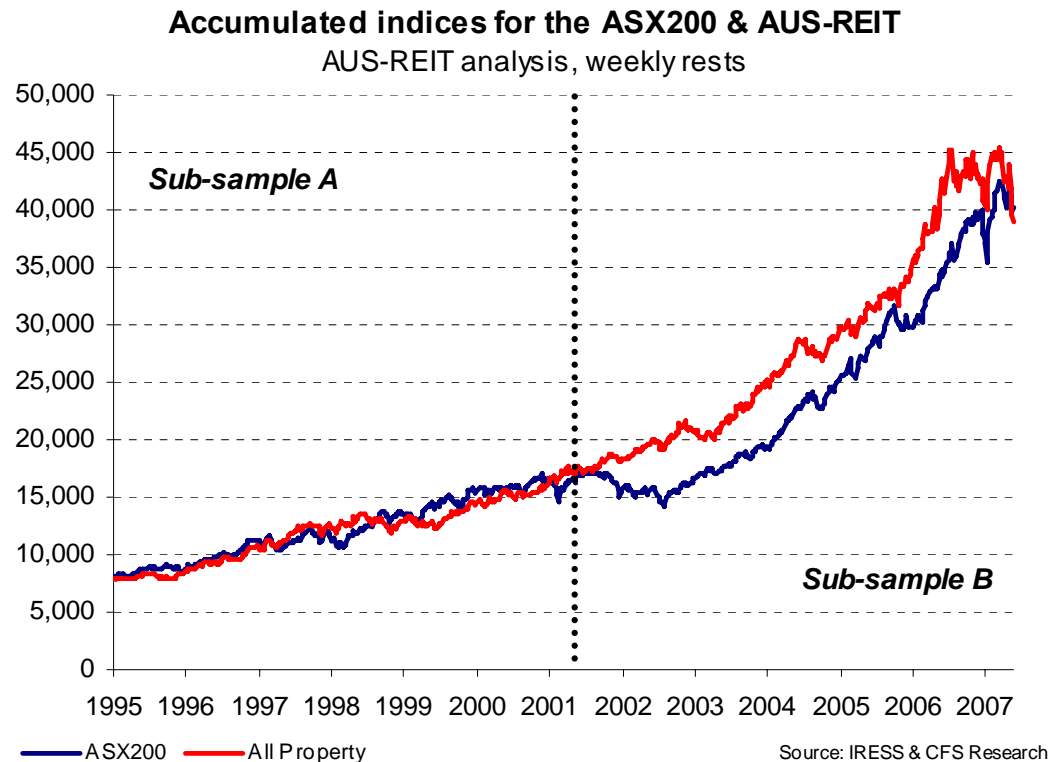
## - NICs for the whole sample period



- The curve plots variance at time  $t$  for innovations at  $t-1$  in the range  $[-5,5]$  using the model estimated over whole data sample.
- There is significantly more asymmetry in the general stock market, while asymmetry for AUS-REITS does not seem to be as pronounced.

# Empirical results

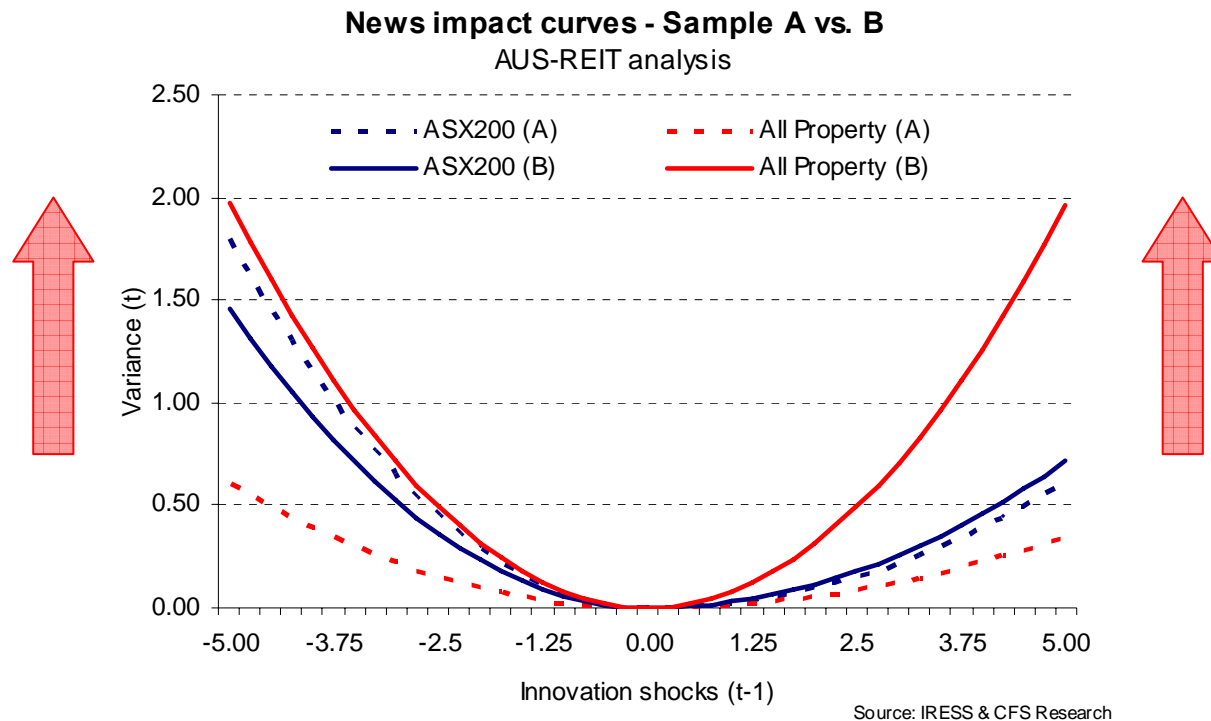
## - NICs for sub sets of the sample period



- We break the whole sample up into the following two sub sample periods:
  - Sample A: 18<sup>th</sup> August 1995 to 28<sup>th</sup> December 2001 (333 observations)
  - Sample B: 4<sup>th</sup> January 2002 to 28<sup>th</sup> December 2007 (313 observations)
- We then construct NICs based on models estimated over the two sub-samples. The time period chosen corresponds with many of the structural changes we have highlighted.

# Empirical results

## - NICs for sub sets of the sample period

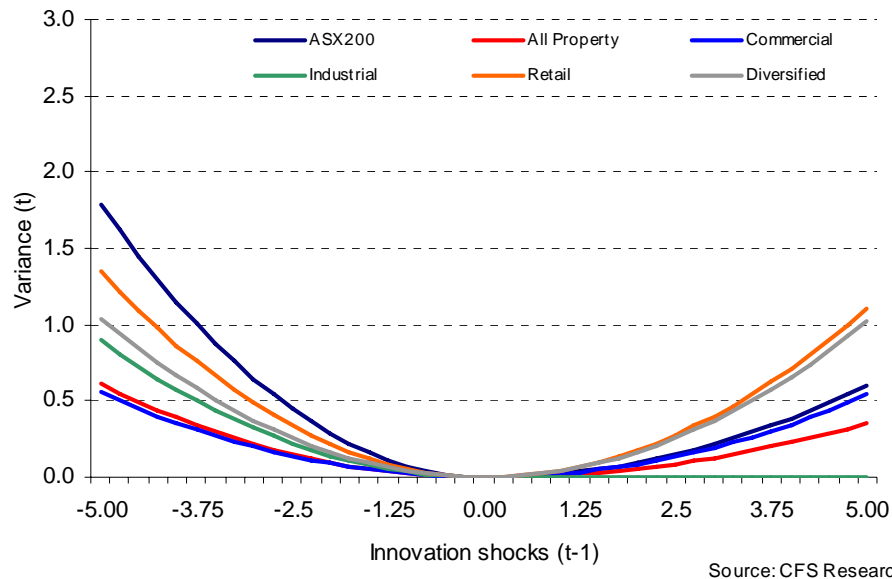


- The above two charts show NICs constructed on models estimated over the two sub-samples
- We can make the following points:
  - AUS-REITs display relatively little asymmetry in their response to either good or bad news compared to general equities across the two sub-samples.
  - AUS-REITs appear to have become significantly more responsive to both good and bad news in the second half of the sample considered, therefore indicating they are riskier.

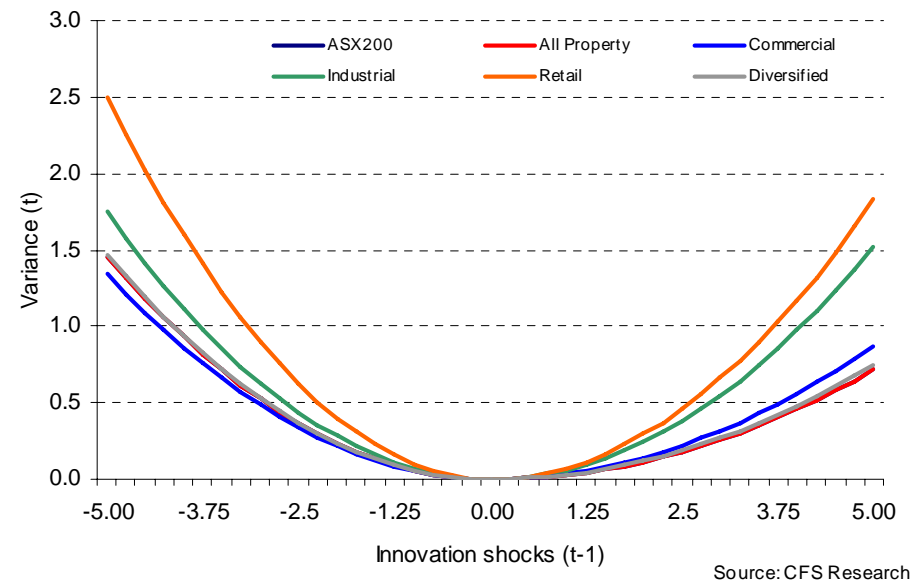
# Empirical results

## - NICs sub sets of the sample period

**News impact curve - AUS-REIT sectors**  
AUS-REIT analysis, 18/09/95 to 28/12/01



**News impact curve - AUS-REIT sectors**  
AUS-REIT analysis, 04/01/02 to 28/12/07



- The above two charts show NICs constructed on models estimated over the two sub-samples for the sub-sector indices.
- We can see that on the earlier sub-sample, all sectors respond less to bad news compared to equities, however, in the second sub-sample, the retail sector has become the most responsive to bad news, and the second most responsive to good news (behind All Property)



# Summary and implications

# Summary and implications

- Our empirical analysis shows that, as a result, the earning risk profile for the AUS-REIT sector has increased. Estimated time varying Betas show more variability and a general upwards trend over the last couple of years. While we also find that risk is dependant on the direction as well as magnitude of good or bad news.
- The recent market downturn that occurred in the AUS-REIT sector over the end of 2007 has been the result of a miss-pricing of risk in the AUS-REIT sector (similar to what has occurred across financial markets on the back of the credit crunch).
- As a consequence, the present situation warrants a review of investment strategies, as it is likely to lead to investors becoming more risk adverse (desiring more secure returns). As such, it might lead to a shift in demand towards more 'core' styled investment products.
- REITs who have not undertaken these riskier activities and are positioned to offer a more pure property investment are likely to benefit from this result.

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