

## *House Prices and Bubbles in New Zealand*

*Patricia Fraser\*, Martin Hoesli\*\* and Lynn McAlevey\*\*\**

*\*University of Aberdeen Business School, University of Aberdeen, Edward Wright Building, Dunbar Street, Aberdeen AB24 3QK, Scotland.*

*\*\* University of Geneva (HEC), 40 boulevard du Pont-d'Arve, CH-1211 Geneva 4, Switzerland and University of Aberdeen Business School, University of Aberdeen, Edward Wright Building, Dunbar Street, Aberdeen AB24 3QK, Scotland.*

*\*\*\* Department of Finance & Quantitative Methods, University of Otago, Dunedin New Zealand.*

*Financial support from the Education Trust of the Royal Institution of Chartered Surveyors (RICS) is gratefully acknowledged.*

*Much of bubble literature centred on financial markets.*

*Dominant theory – if prices deviate from fundamental value for some time then a bubble is said to exist.*

*Bubbles usually characterised in three main ways:*

- *momentum: driven by price alone;*
- *explosive: driven by factors extraneous to asset value;*
- *intrinsic: driven by overreaction to fundamentals.*

*This work: embedded in this stream of the financial economics literature but main focus is on the NZ housing market – although some stock market – housing market comparison conducted.*

## *Why housing bubbles?*

- *The importance of housing in the general economy:*

- ↳ *a major asset in household portfolios (Englund et al., 2002; Flavin and Yamashita, 2002);*

- ↳ *wealth effects have been shown to be greater for housing than for financial assets (Case et al., 2005; Benjamin et al., 2004);*

- ↳ *the impact of housing ‘busts’ on the economy - stronger impact than stock busts both in output and length of slowdown (Helbling and Terrones, 2003);*

*So - correction toward 'true' value is likely to be a prolonged process. Why?*

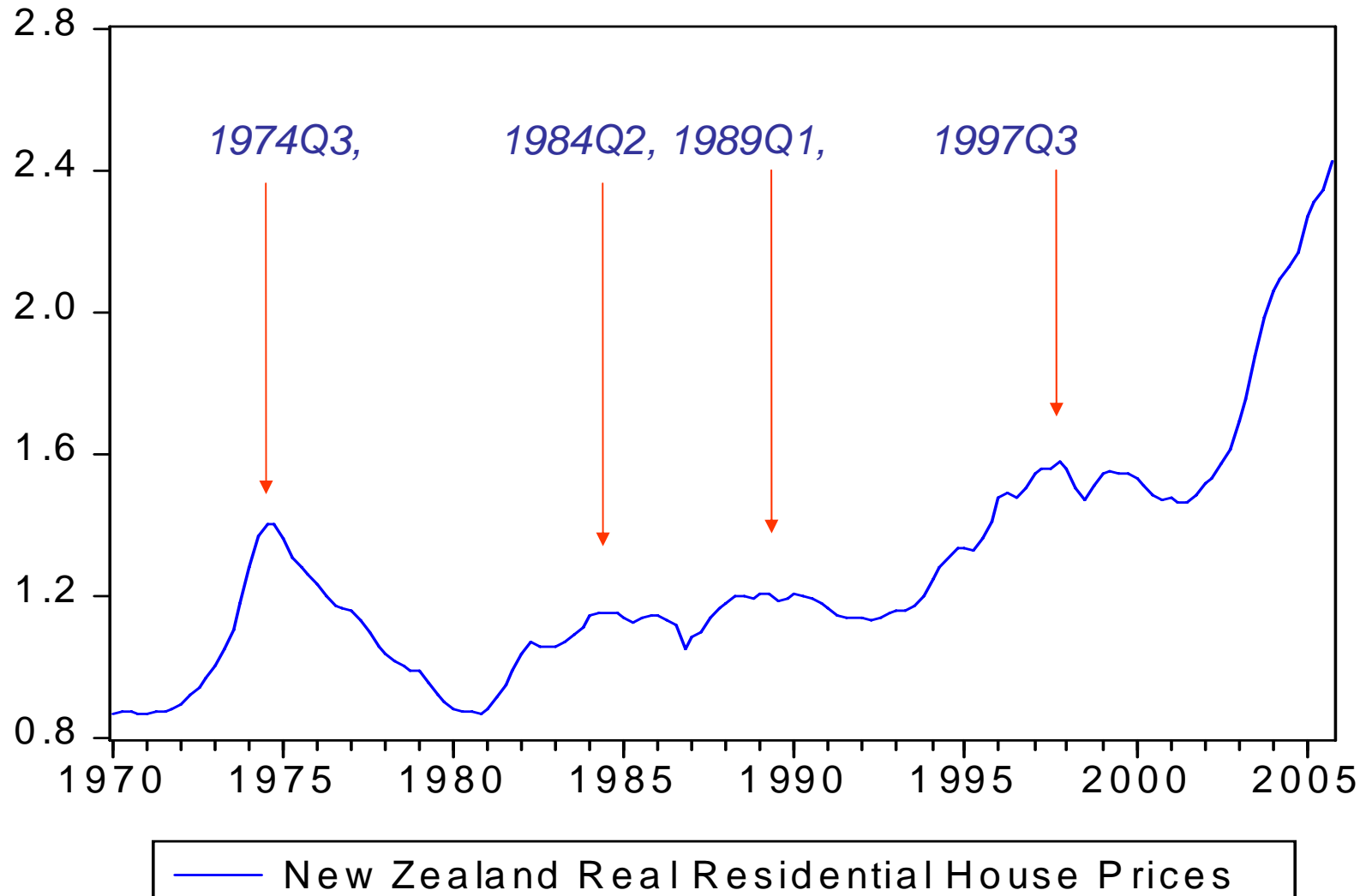
*Purchases are made with a consumption as well as an investment motive;*


*High transaction costs; heterogeneity and illiquidity associated with housing implies arbitrage will be limited.*

## *Why the interest in the New Zealand experience?*

*Several unique reasons:*

- ↪ New Zealand has experienced the greatest number of housing peaks over the period 1970- early 2000's: These occurred in 1974Q3, 1984Q2, 1989Q1 and 1997Q3 (van den Noord 2006).*



 The probability of a turning point (peak) if interest rates were to increase is greater in New Zealand (Van den Noord 2006):

*Prob. of peak if interest rates rise by 1%*

<i>N.Z.</i>	<i>34%</i>
<i>U.S.</i>	<i>12%</i>
<i>U.K.</i>	<i>9%</i>
<i>France</i>	<i>14%</i>
<i>Germany</i>	<i>0%</i>
<i>Japan</i>	<i>0%</i>
<i>Switzerland</i>	<i>0%</i>

↪ *New Zealand also tends to be quite vulnerable higher interest rates (The Economist economies in the 2006). One of the most liberal world.*

↪ *New Zealand households hold a disproportionately high percentage of their assets in housing (Reserve Bank):*



*N.Z. Household Balance Sheet 2005  
(% of Total Assets)*

	<i>N.Z.</i>	<i>U.S.</i>	<i>U.K.</i>
<i>Housing Stock</i>	<i>c. 75.75%</i>		
<i>Direct Holding of Equities</i>	<i>c. 3.99%</i>	<i>c.17%</i>	<i>c. 7%</i>
<i>Deposits with Financial Inst.</i>	<i>c. 10.78%</i>		
<i>Life, Super, Managed Funds</i>	<i>c. 8.53%</i>		
<i>Other Financial Assets</i>	<i>c. 1.95%</i>		

*Equities Held by Super & Insurance Schemes  
(% of GDP)*

<i>N.Z.</i>	<i>U.S.</i>	<i>U.K.</i>
<i>c. 4%</i>	<i>c. 35%</i>	<i>c. 35%</i>

*(source: Reserve Bank)*

*Existing Literature:*

*Extant research shows that bubbles also occur on housing markets.*

*For example:*

*Abraham and Hendershott, 1996, for the US;*

*Ayuso and Restoy, 2003, for the UK and Spain;*

*Chan et al., 2001, for Hong Kong;*

*Bourassa and Hendershott, 1995, for Australia;*

*Hort, 1998, for Sweden;*

*Bourassa et al., 2001, for New Zealand).*

*While some evidence of speculative behaviour is reported (Levin and Wright, 1997, for London; Roehner, 1999, for Paris; Roche, 2001, for Dublin), little evidence on what type of behaviour drives housing bubbles in an economy.*

*This paper:*

*Computes the fundamental value of housing based on the present value of real disposable income.*

*Attempts to provide some insight into forces underlying departure from fundamental values by:*

*Modelling the bubble component that is related to fundamentals (the intrinsic component), making it possible to highlight whether a bubble still exists after that component is accounted for;*

*Analysing any remaining bubble to detect any momentum behaviour.*

## Questions:

- *do house prices depart from their fundamental values for any length of time?*
  - *if so, to what extent are any such deviations rational, due to fundamentals, or due to dynamics (irrational?)?*
- price*

## *Empirical Method:*

*Denote real (aggregate) price of residential property at the end of period  $t$  as:*

$$P_t = E_t \sum_{i=1}^{\infty} \left[ \frac{1}{\prod_{j=1}^i (1 + \rho_{t+j}^*)} \right] Q_{t+i}$$

$P_t$  is the current price;

$E_t$  is the expectations operator;

$\rho_{t+j}^*$  is the real time-varying rate of return required by investors;

$Q_{t+i}$  represents aggregate real disposable income from period  $t$  to  $i$ .

*Using a first order Taylor's approximation, transforming variables to ensure stationarity, and taking conditional expectations, we arrive at:*

$$pq_t = \frac{k}{(1-\mu)} + \sum_{j=0}^{\infty} \mu^{j+1} E_t \Delta q_{t+j+1} - \sum_{j=0}^{\infty} \mu^{j+1} E_t r_{t+j+1}$$

$pq_t$  is the (log) real house price, real disposable income ratio

$p_t - q_{t-1}$ ;

$E_t \Delta q_{t+j}$  is expected income growth;

$E_t r_{t+j}$  is the investors' required return;

$\mu$  and  $k$  are linearisation constants.

*Empirical counterparts to (10):*

$$pq_t = \frac{k-f}{(1-\mu)} + \sum_{j=0}^{\infty} \mu^{j+1} E_t \Delta q_{t+j+1} - \alpha \sum_{j=0}^{\infty} \mu^{j+1} E_t \sigma_{t+j+1}^2$$

*income growth*

*time-varying required return:*

*$\alpha$  is the CRRA (Merton measure);  $f$  is the constant real-risk free component of real required returns.*

*3-variable VAR ( $pq_t, \Delta q_{t-1}, \sigma_t^2$ ) to get forecast of real income growth ( $E_t \Delta q_{t+j}$ ) and housing return variance ( $E_t \Delta \sigma_{t+j}^2$ ).*

*From this - a measure of the fundamental house price-disposable income ratio,  $pq_t^*$ .*

*Finally, from  $pq_t^*$  generate the (log of) fundamental house prices as:*

$$p_t^* = pq_t^* + q_{t-1}$$

*where  $p_t^*$  denotes the fundamental measure of house prices.*

*Can also formally test whether  $p_t$  and  $p_t^*$  are significantly different from zero by restricting the VAR coefficients and constructing a Wald test with 3df.*

*Given the above we can identify the sign, size and significance of any deviations of actual house prices from their fundamental value (as warranted by real disposable income).*



*Data:*

*Quarterly periods from 1970:1 through to 2005:4.*

*House prices data: Quotable Value New Zealand's Residential Sales Summary quarterly publications and the Reserve Bank.*

*This index measures average prices of freehold house sales adjusted for the quality mix of sales in each period.*

*Equity data: Ibbotson Associates*

*Long-Term Government Bond: Ibbotson Associates database.*

*Consumer Price Index: Reserve Bank - used to deflate asset data*

*Real disposable income: Statistics New Zealand.*

## *Summary Statistics:*

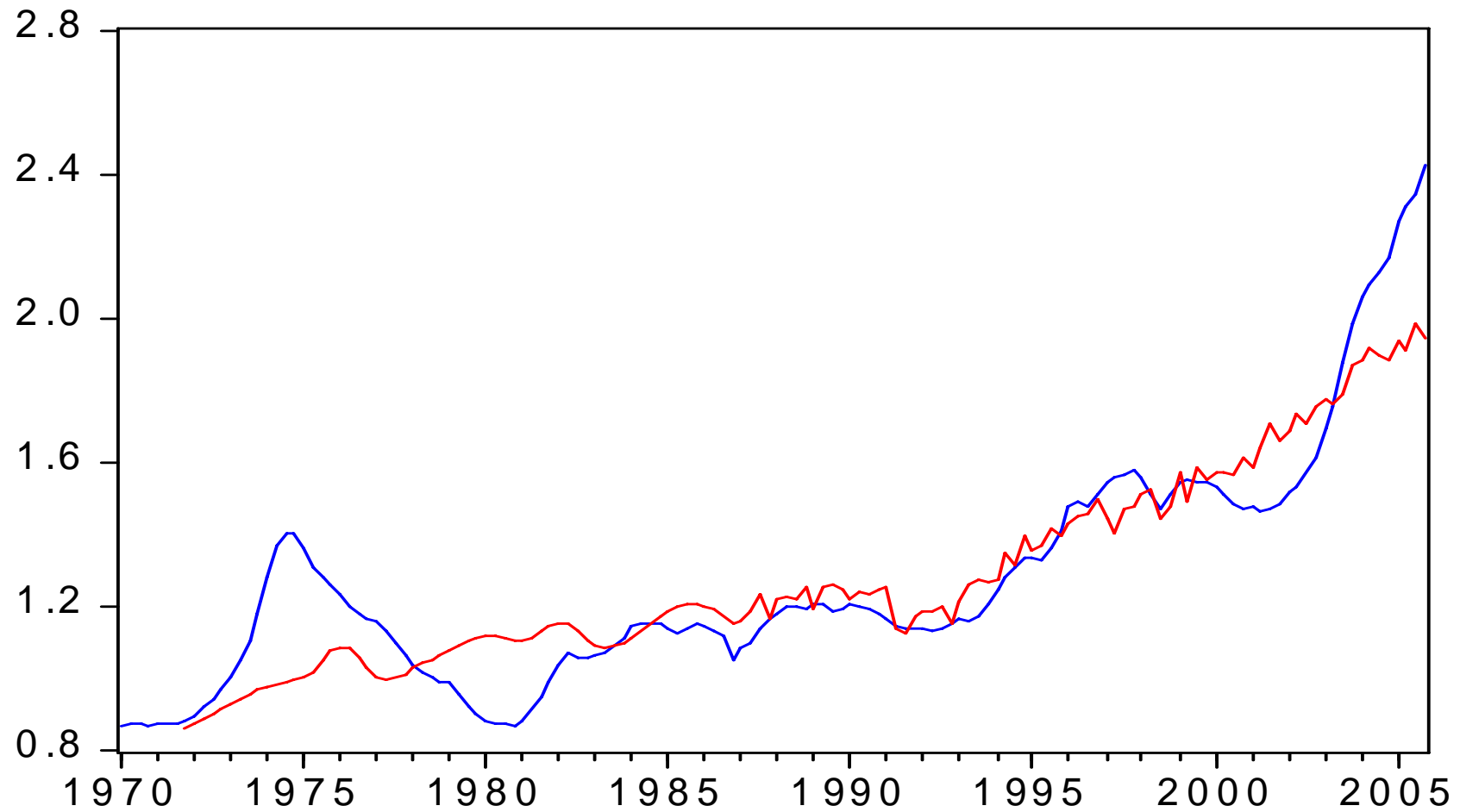
### *Average Real Annual Capital Gain (1970Q1-2005Q4)*

<i>Housing:</i>	<i>2.8%</i>
<i>Gvt Bond:</i>	<i>1.6%</i>

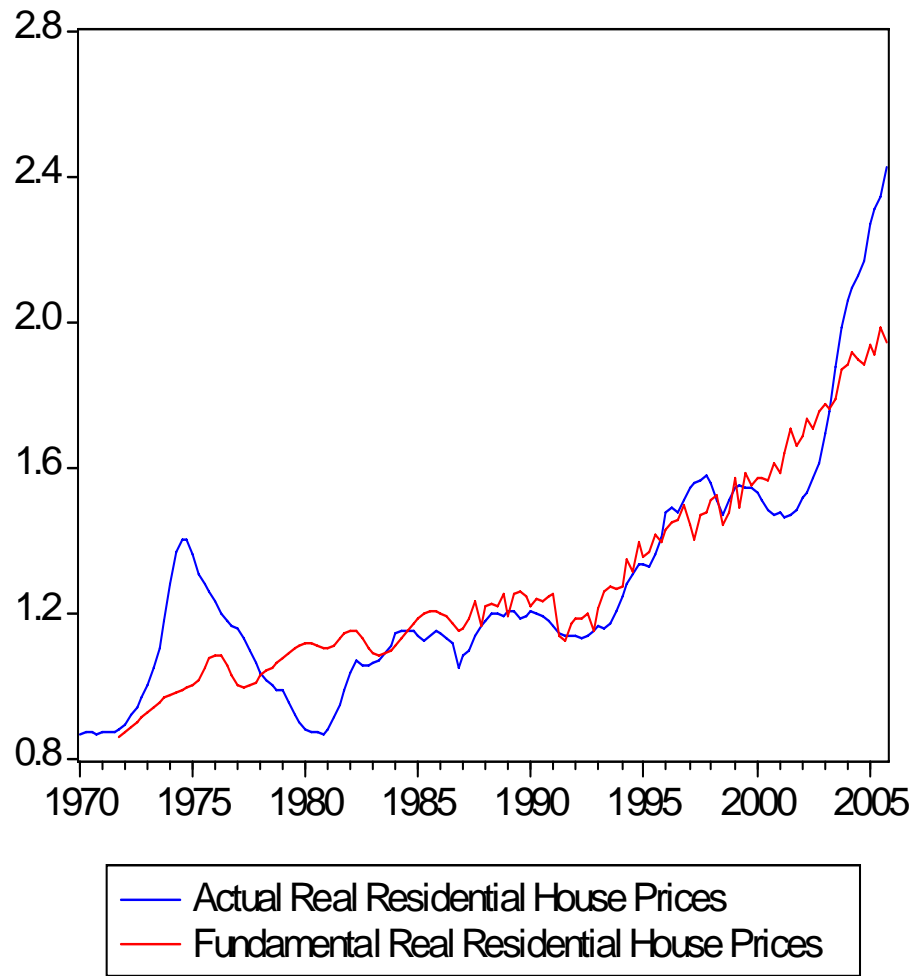
### *Average Annual Returns (1988Q1-2005Q4)*

	<i>Capital Gain</i>	<i>CG+INCOME</i>
<i>Housing:</i>	<i>4.06%</i>	<i>9.06%</i>
<i>Equity:</i>	<i>-0.25%</i>	<i>4%</i>

*Non-risk adjusted out-performance of housing: 5.06%*

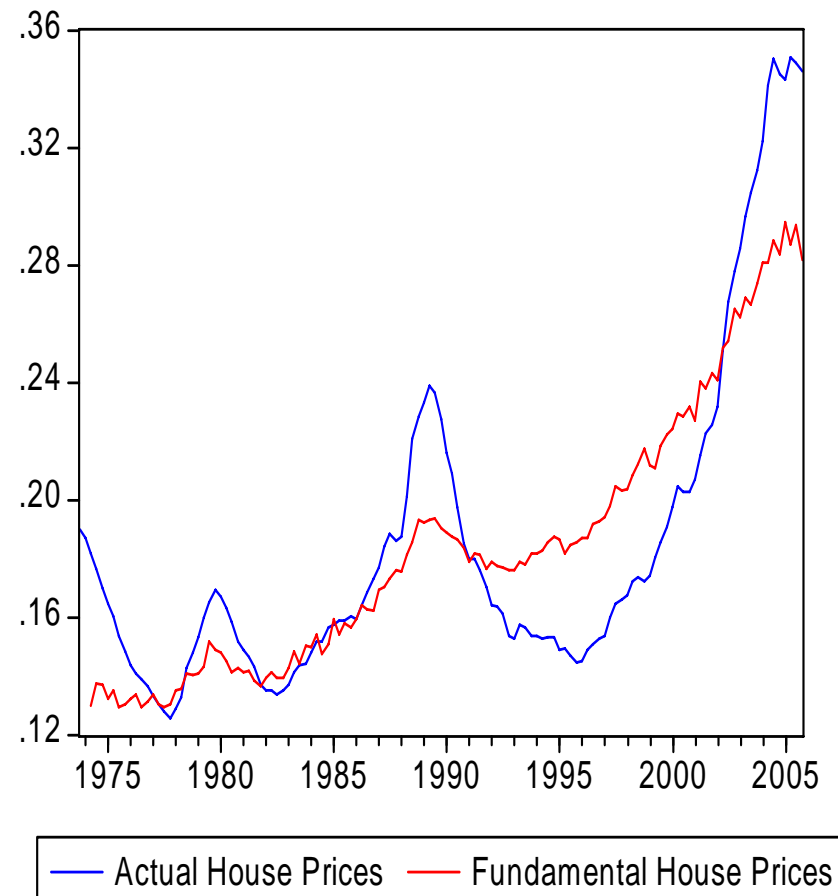


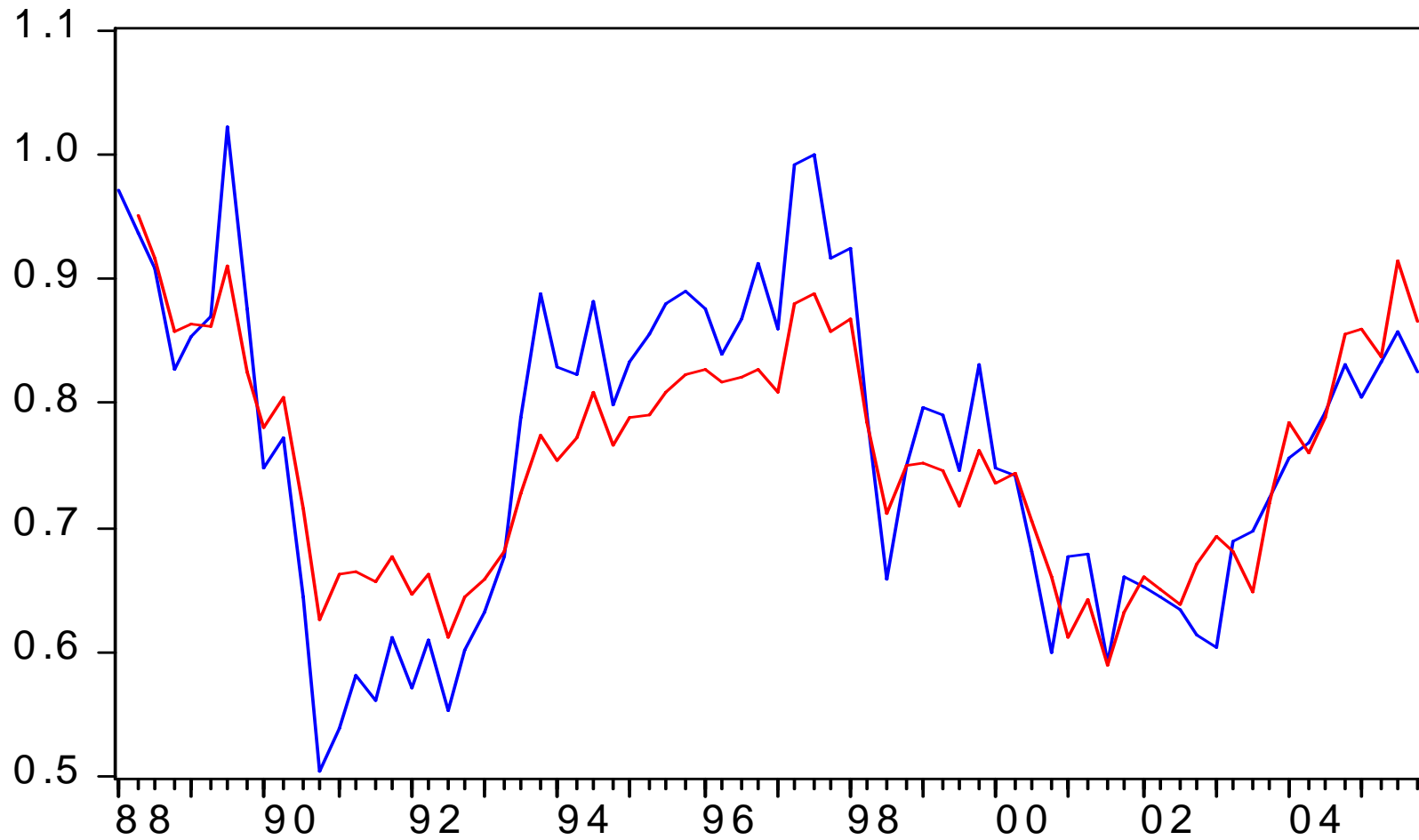
— Actual Real Residential House Prices  
— Fundamental Real Residential House Prices



**NZ**

**UK**





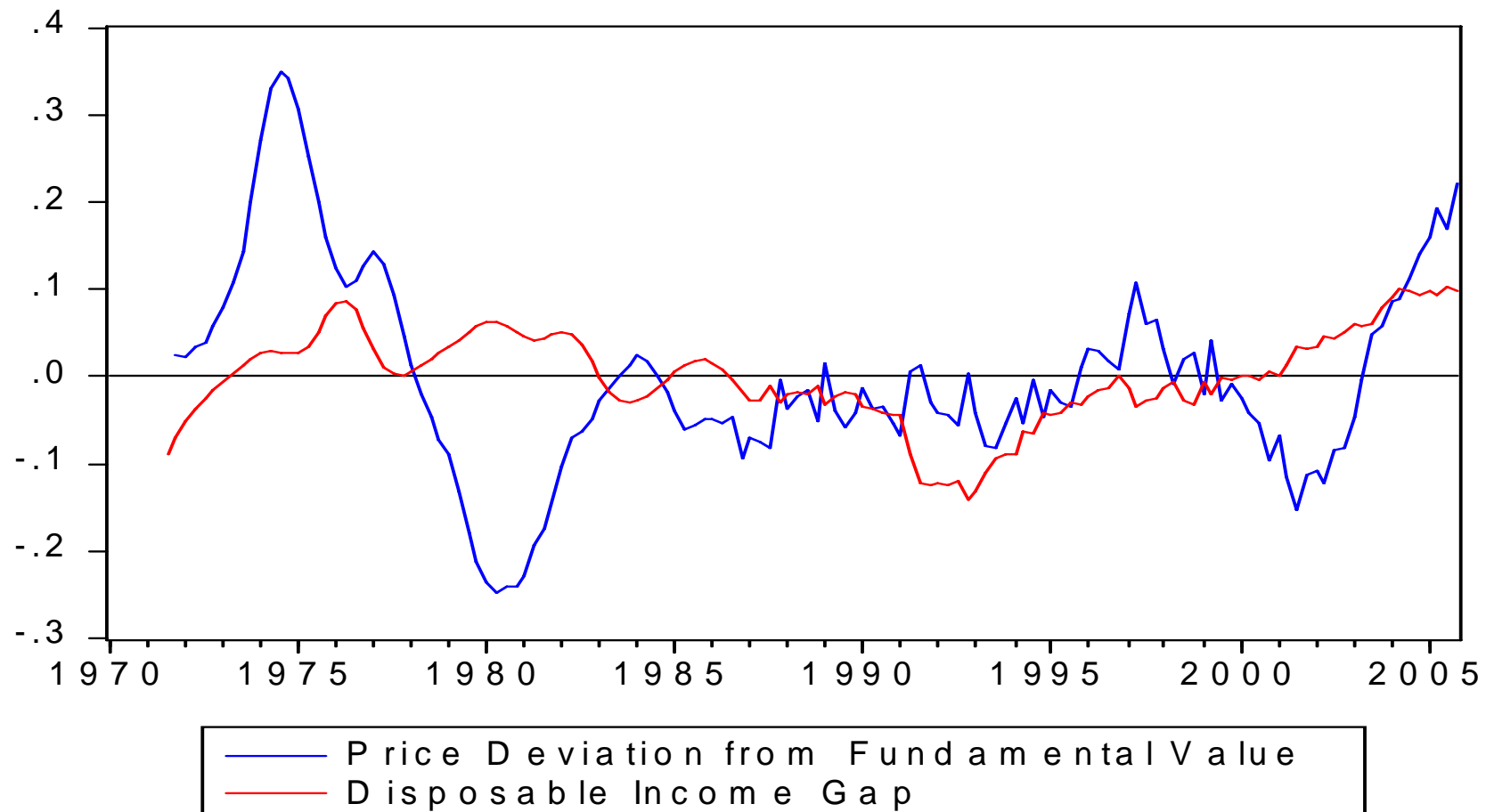
— Actual Stock Prices — Fundamental Stock Prices

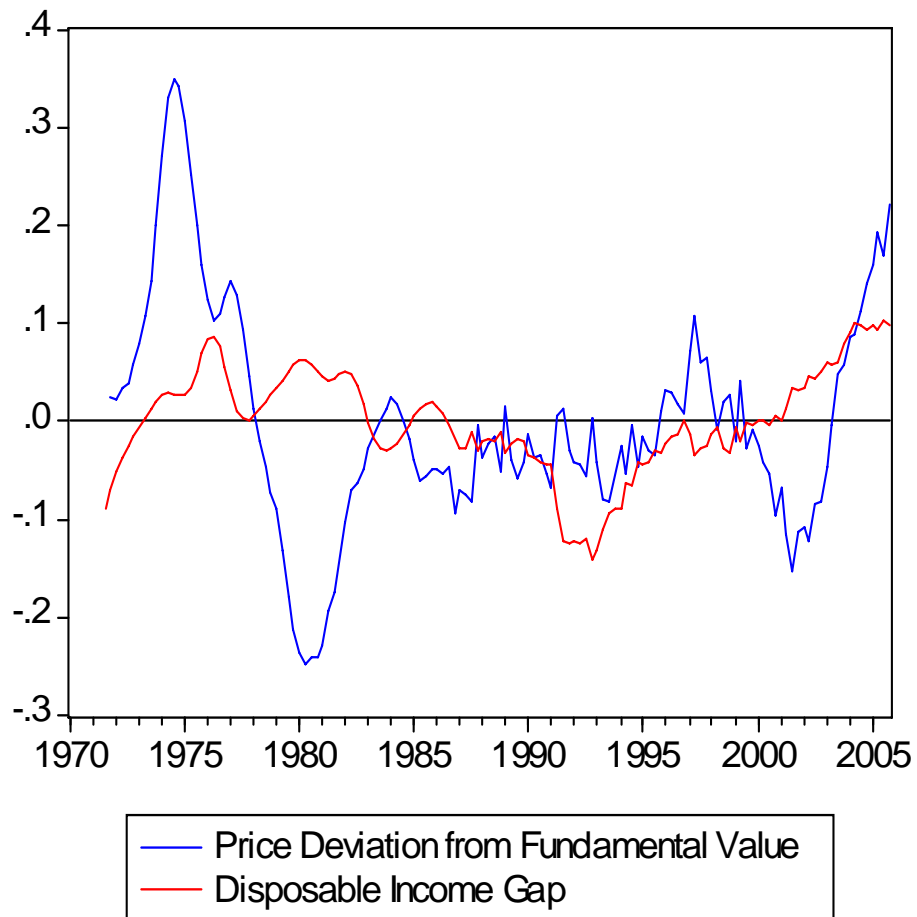
*How can we interpret deviations from fundamentals in the housing market?*

*Are such deviations due to an overreaction to fundamentals or due to price dynamics?*

*To consider this we begin with a comparison of actual house prices with a series that represents periods when real disposable income was either above or below its long term trend – the ‘disposable income gap’ – indicative of relative ‘ability to pay’.*

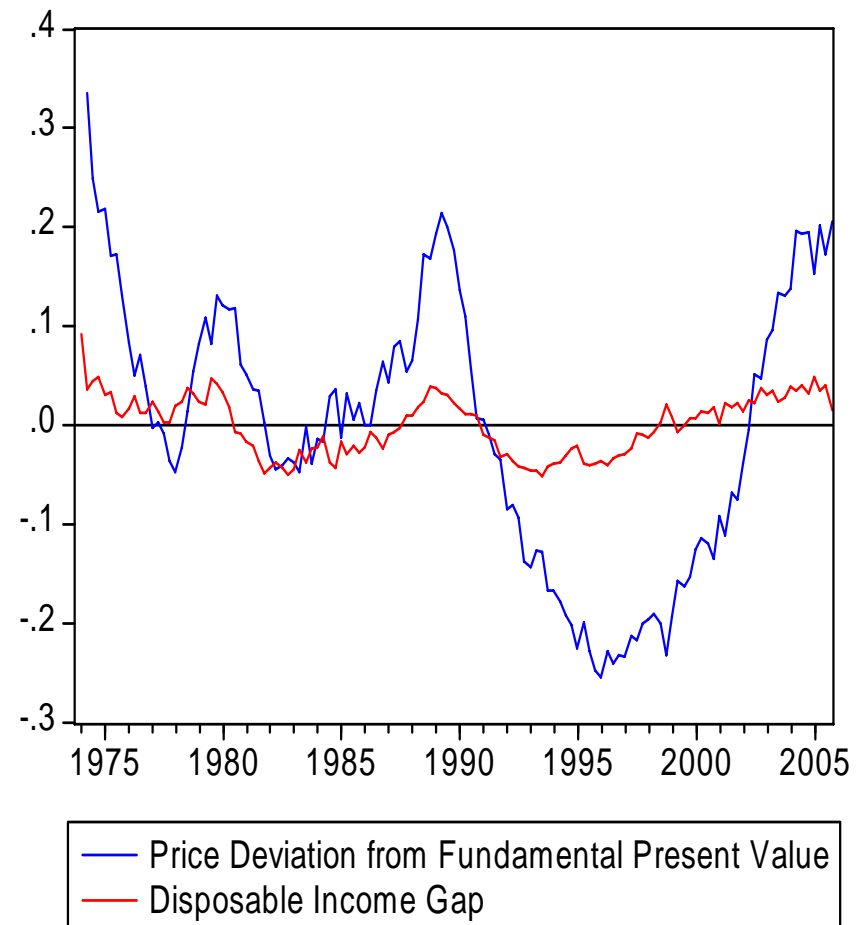
*Actual house prices and periods when real disposable income was above ('good' times for ability to pay) or below ('bad' times for ability to pay) its long term trend – the 'disposable income gap'.*





**NZ**

**UK**



— Price Deviation from Fundamental Present Value  
 — Disposable Income Gap



*Table 4*  
*Summary Statistics on Price Deviations from*  
*Fundamental Value*

<i>Corr(deviations,income)</i>	<i>Corr(deviations,house prices)</i>
<i>0.155</i> <i>(t=1.845)</i>	<i>0.442</i> <i>(t=5.725)</i>

*Q. To what extent to which were bubbles are rational, due to fundamentals, or due to price dynamics associated with momentum trading and the implied lack of aggressive arbitrageurs.*

*To investigate this further we begin with the suggestion that (in levels):*

$$P_t = P_t^* + E_t$$

*$P^*$  is the present value fundamental price and  $B$  is an intrinsic bubble driven exclusively by fundamentals such that and is a solution to the PV equation but one which violates the transversality condition imposed on this equation i.e. that the expected price goes to zero as time goes to infinity.*

*Q. How then might we empirically measure the extent of any intrinsic bubble inherent in house prices?*

*Assuming that real disposable income follows an autoregressive process with drift, we hypothesise that the intrinsic bubble is a non-linear function of the deviations of real disposable income from trend:*

$$B_t = c Q_{dt}^\lambda$$

*where  $c$  is a constant ( $c > 0$ ),  $Q_d$  denotes real disposable income deviations from trend and  $\lambda$  ( $\lambda > 1$ ) is the exponent that permits the bubble to grow in expectation at rate  $1 + \rho$*

Converting (18) into logs:

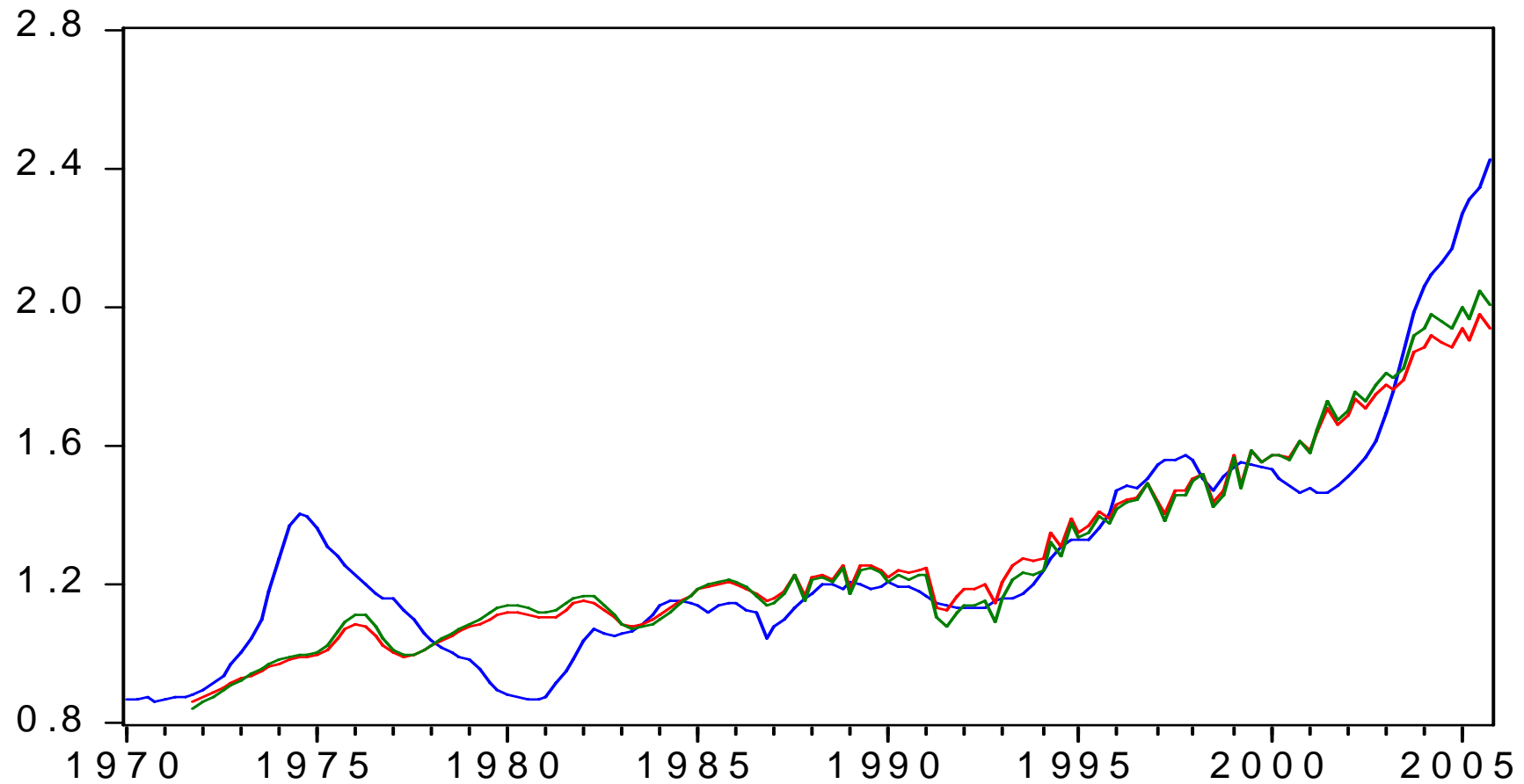
$$b_t = c' + \lambda' q_{bt}$$

where the prime on the coefficients denote logged values.  
This allows us to specify a log-linear regression of the form:

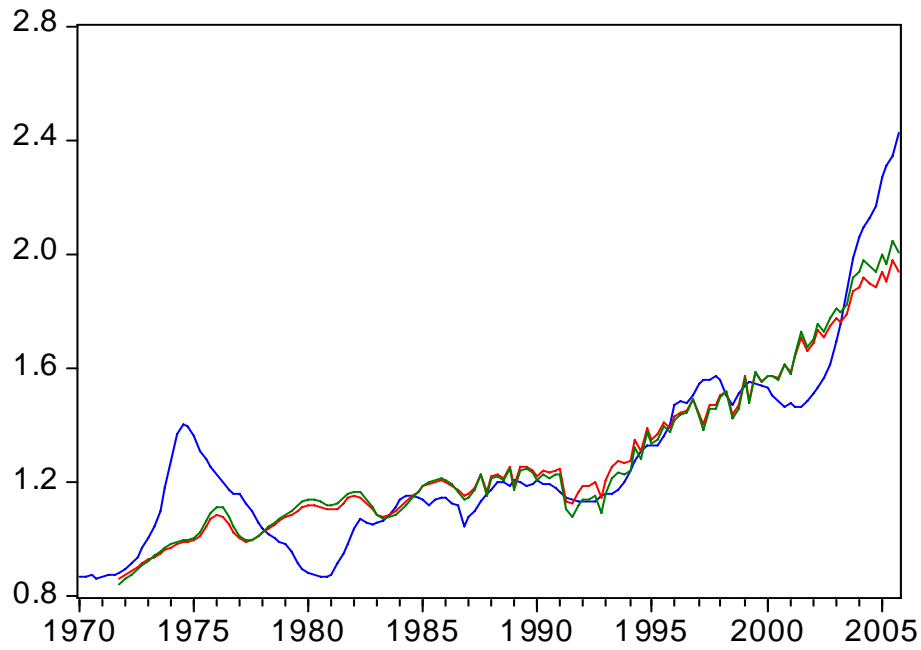
$$P_t - P_t^* = b_t = c' + \lambda' q_{bt} + \omega_t$$

$\omega_t$  is an error term measuring the element of the deviations from present value that is not attributable to an intrinsic bubble. The fitted values of this equation will permit the construction of a series that mimics the path a bubble might take in response to whether income is above/below trend. When the bubble series,  $B_t$ , is combined with  $P_t^*$  we have a present value price which includes a bubble price which can then be compared to actual prices,  $P_t$ .

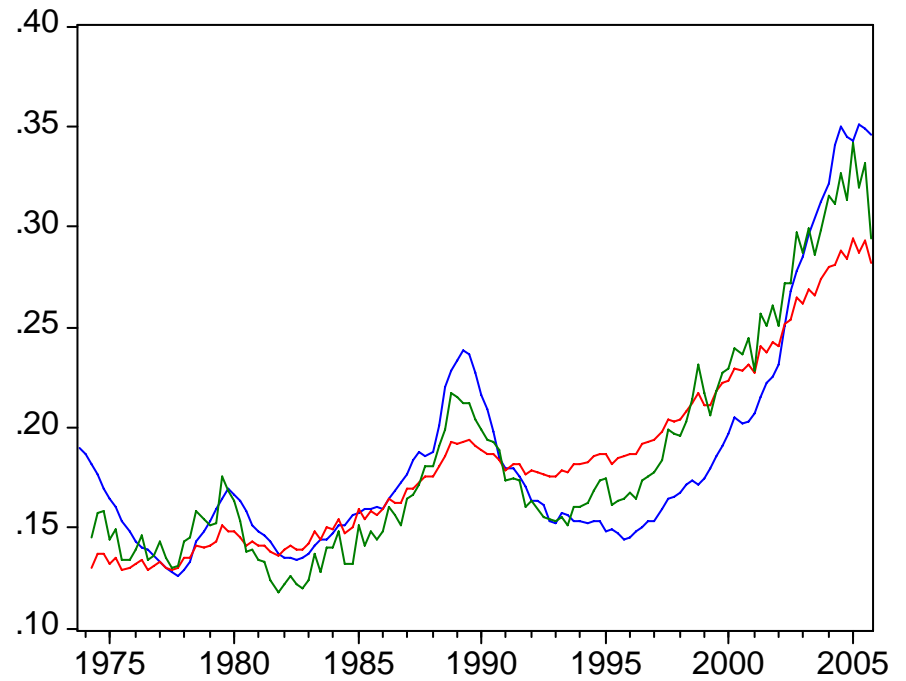
Figure 5



— Actual House Prices  
— Fundamental House Prices  
— Fundamental House Price with Intrinsic Bubble



— Actual House Prices  
 — Fundamental House Prices  
 — Fundamental House Price with Intrinsic Bubble



— Actual House Prices  
 — Fundamental House Prices  
 — Fundamental House Prices with Intrinsic Bubble

*Overall our evidence suggests:*

*International differences re driver of housing bubbles;*

*NZ asset classes behave differently: Stocks v. Housing;*

*Overreaction to fundamentals have a less important role to play in determining house price bubbles than price dynamics, particularly when the housing market is a long-way off its fundamental value. Why?*

*Is it a reflection of the environment that exists in NZ in terms of the construction of household portfolios? Is the momentum itself being driven by 'other' factors such as supply constraints?*

## *Implications Revisited:*

- ⇒ Rapid growth in housing wealth increases consumption, aggregate demand - and fears of future inflation if not warranted by fundamentals;*
- ⇒ If a speculative boom, this may signal the need for the authorities to contain inflation thus helping to avoid a potential economic slowdown when the bubble bursts – no action if justified by expectations on fundamentals;*
- ⇒ Analysis of the ‘intrinsic’ bubble component of prices provides scope for the authorities to consider ‘talking’ expectations on fundamentals either ‘up’ or ‘down’ depending on whether they view such expectations to be unjustified.*



## *Further work:*

*Cross-country comparisons – Australia and New Zealand*



*Proposed stock market merger*

*Valuable insights into economic integration issues;*

*Comparisons with countries where residential property does not dominate householders portfolios and where prices have not increased markedly;*

*Analysis of the timing of deviations from fundamentals for the housing and stock markets*



*Better understand the correlations between these asset classes, and so better allocate household wealth between assets.*