

## **Booms and Busts in Housing Markets: How Vulnerable is New Zealand?**

by

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\*It may seem presumptuous for an American to write about housing finance in New Zealand, but, for someone who has devoted a career to analyzing financial institutions, the temptation proved irresistible. I am grateful to generous support from the Victoria University of Wellington Foundation for providing me with the opportunity to live, work and study in New Zealand for ten weeks during 2006 and to my colleagues at Victoria University, The Reserve Bank of New Zealand and to bankers at ANZ National Bank, ASB, BNZ and Westpac who helped me learn about housing markets and housing finance in New Zealand. I would especially like to thank Grant Allerby, Steve Anderson, Chris Bloor, Glenn Boyle, Phil Briggs, Stephen Burnell, Aaron Drew, Viv Hall, Tim Hampton, Ian Harrison, Bob Hargreaves, David Hargreaves, Bernard Hodgetts, Tim Ng, Ian Nield, Adrian Orr, Les Oxley, Grant Spencer, Clive Thorp, and James Twaddle for their insights and analyses. In addition, I am grateful to Paul Kupiec, Phil Lowe, John Quigley and the participants in the workshop on “Financial Sector Balance Sheets and Vulnerability to Financial Crises,” for comments on an early version of this paper. Ed Kane and Jack Guttentag, the co-author with whom I developed the disaster myopia hypothesis, also provided useful comments on this paper. Above all, I owe an enormous debt of gratitude to Clinton Watkins who introduced me to experts inside and outside the RNBZ, acted as a sounding board for many of the ideas in this paper, and collected and analyzed much of the data and provided valuable comments on earlier drafts.

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### Abstract

House-price booms are sometimes followed by busts in which inflation-adjusted housing prices fall by 15 percent or more. This paper examines why housing markets are especially vulnerable to booms and busts and develops the hypothesis of disaster myopia which may lead both borrowers and lenders to underestimate the probability of a shock to the housing market.

New Zealand has enjoyed a sustained boom in housing prices. This paper reviews a variety of evidence – indicators of affordability, measures of asset market equilibrium and econometric models based on fundamental determinants of housing prices – to consider whether the house-price boom has gone too far and will end in a bust. While evidence is mixed, the possibility of a bust cannot be dismissed.

Although banks in New Zealand have a heavy concentration of exposure to mortgage lending relative to most other advanced countries, they appear to be reasonably well-protected from the direct consequences of a house-price bust. The conclusion regarding the household sector is less optimistic, however.

The logic portfolio diversification implies that New Zealand residents should invest a large share of their wealth in a diversified portfolio of foreign assets to mitigate some of the risks of living in a small, relatively undiversified economy. Instead, there is a pronounced home bias in household investment that reflects the preference of New Zealanders for investing in homes. Relative to other advanced countries, households in New Zealand have very large concentrations of exposure to residential real estate. While disaster myopia may have contributed to this concentration of exposure, tax incentives have also played a role. This vulnerability of households to a housing bust is compounded, moreover, by the design of mortgage contracts that leaves borrowers with most of the risk of a sustained increase in interest rates and creditor-friendly bankruptcy laws that constrain borrowers from obtaining relief from their mortgage creditors by forfeiting their homes when their equity positions become negative.

The paper concludes with a brief consideration of reforms to reduce the vulnerability of the New Zealand economy to a bust in housing prices.

## 1.0 Introduction

Households generally regard their homes as their safest and most profitable investment. In comparison to other assets, owner-occupied housing offers the enticing additional benefit of providing shelter (and often access to a cluster of location-specific benefits such as schools and parks), even as it is appreciating in value. Moreover, the annual return on owner-occupied housing<sup>1</sup> is usually untaxed, in contrast to dividends on stock and interest payments on most bonds. Households generally consider housing so safe an asset that it is their most (or, sometimes, only) leveraged investment.

Part of this perception of safety comes from the fact that *nominal* housing prices sometimes rise rapidly, but seldom fall. When demand weakens, owner-occupiers will typically try to hold-out until demand strengthens rather than accept a lower nominal price. Weak demand shows up mainly as a decline in the volume of transactions rather than as a fall in nominal prices. Consequently, on the downside, the housing market usually stalls at the prevailing *nominal* price until general inflation has lowered the *inflation-adjusted* price enough to clear the market.

In contrast, once the inflation-adjusted price has fallen enough to clear the market, nominal prices can rise quite sharply when demand strengthens. Over the past four decades, New Zealand residents have not experienced even one sustained drop in the *nominal* prices even though they have risen sharply in several periods, most notably the last three years. (See Figure 1.)

[INSERT FIGURE 1 ABOUT HERE]

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<sup>1</sup> That is, the income that could be imputed from services provided by owner-occupied housing.

In most advanced economies, residential housing is the largest component of household net worth. Among eight member states of the Organization for Economic Cooperation and Development (OECD) for which comparable data are available, New Zealand households stand out for the high proportion of their net worth concentrated in residential housing. Over the last decade the share of residential housing has risen from about 65% to 75% of total household assets. (See Figure 2.)<sup>2</sup>

*[INSERT FIGURE 2 ABOUT HERE]*

Banks in New Zealand also have unusually large exposures to residential housing. Over the past fifteen years, residential mortgages have increased from a little over 20 percent of total bank assets to just under half of bank assets. During 2005, exposures of individual banks varied from 45 percent of total lending to as much as 95 percent of total lending. (See Figure 3, New Zealand Banks Exposure to Residential ‘Mortgages.’)

*[INSERT FIGURE 3 ABOUT HERE]*

If residential real estate were a perfectly safe asset, the heavy exposures of the household and banking sectors would not be a source of concern. Unfortunately, the last forty years have provided numerous instances in which housing booms, like New Zealand and several other countries have experienced in recent years, are sometimes followed by housing busts in which real (inflation-adjusted) housing prices fall by substantial amounts even though nominal house prices may remain steady.

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<sup>2</sup> Fraser, Hoesli & McAlevey (2006, p. 31) observe that in New Zealand, “Property is held and has always been held in **disproportionately, high** amount in household portfolios. In contrast direct holdings of stock by households are extremely low in comparison to other countries.” [Emphasis added.]

The OECD (Girouard et al 2006) conducted a study of booms and busts in housing prices for 18 countries from 1970 to 2005I<sup>3</sup> and identified 26 instances in which countries sustained a decline in inflation-adjusted housing prices of 15 percent or more. In 20 of these instances, the fall in inflation-adjusted housing prices exceeded 25 percent and the duration of these slumps ranged from 12 quarters to 41 quarters. The only housing bust in New Zealand during this period lasted from 1973III to 1980IV and resulted in a 37.8 percent decline in inflation-adjusted housing prices, even though nominal prices remained relatively flat. (See Figure 4, Inflation-Adjusted House Prices in New Zealand.)

*[INSERT FIGURE 4 ABOUT HERE]*

Although stock-price busts happen more frequently, housing price busts appear to last longer and lead to greater losses in output. In part, this is because households and the banking system are much more heavily exposed to housing prices than to equity prices, but also because of the importance of residential construction and related activities to aggregate demand.<sup>4</sup>

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<sup>3</sup> Girouard et al (2006, p.6) define booms and busts as episodes in which the cumulative real price of housing changes by 15 percent or more. For a more sophisticated analysis of housing cycles in New Zealand, employing a non-parametric technique to identify cycles, see Hall, McDermott, and Tremewan (2006).

<sup>4</sup> Case and Quigley (2007) estimate large consequences for the economy from the downturn in the housing sector, but negligible wealth effects on consumption. Case, Quigley and Shiller (2005) show that the wealth effect of given change in real house values has more powerful and immediate impact on consumption than an equal change in real share values, but they question the importance of the wealth effect in a downturn because it appears to be asymmetric. While they find that the effect of a ten percent increase in housing wealth upon consumption is large and highly significant, the estimated effect of a decrease in household wealth upon consumption is uniformly small and insignificantly different from zero. Case and Quigley (2007) thus conclude that although the buoyancy of the housing market after the turndown in world stock markets in 2000-2003 helped avert a recession in the developed work, the recent slowdown in the housing market will not lead to a lower level of consumption.

The IMF (2002, p.61) reviewed booms and busts in the equity and housing markets in 14 countries (including New Zealand)<sup>5</sup> over the period from 1970 through 2002 and concluded that “Housing price busts<sup>6</sup> were less frequent, but lasted nearly twice as long and were associated with output losses that were twice as large, reflecting greater effects on consumption and banking systems, which are typically heavily exposed to real estate.” From their sample of 14 countries, the IMF (2002, p. 63) concluded that “roughly one bust a country occurred every 20 years.” The IMF (2002, p. 61) also noted that “busts have often been associated with declines in economic activity, financial instability, and sometimes, large budgetary costs from the recapitalization of banking systems.”

A boom (1970I-1974III) preceded the housing bust in New Zealand,<sup>7</sup> but this pattern does not always occur. An especially severe shock to the economy can cause house prices to fall, even if there has been no preceding indication of a boom. Given the shocks that hit the New Zealand economy during the 1970s – which included a pair of oil price shocks and the loss of preferred access to the British market -- some drop in housing prices would likely have occurred in any event.<sup>8</sup> But to the extent that the preceding boom created imbalances that needed to be unwound, the length and severity

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<sup>5</sup> Other countries included in the analysis were Australia, Belgium, Canada, Denmark, Finland, Ireland, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States.

<sup>6</sup> To qualify as a “bust” in the IMF (2002, p. 63) study, the contraction in real housing prices must exceed 14%. On average the decline in real house prices was 30 %.

<sup>7</sup> New Zealand benefited from a worldwide boom in commodity prices from 1971-74 and experienced substantial net flows of immigrants until 1975.

<sup>8</sup> Nonetheless, the IMF found that busts in housing prices are more likely to be preceded by booms than are busts in equity prices (IMF 2002, p 66).

of the adjustment process was probably increased. Moreover, a boom may give rise to a bust, even without a preceding economic shock.<sup>9</sup>

Of course, New Zealand was a very different economy during the 1970s -- heavily regulated, surrounded by trade barriers and financially repressed (Bollard et al, 1996). This undoubtedly impeded adjustment to the external shocks. But the question remains: could New Zealand suffer another housing bust? This paper investigates: (1) Why housing markets are subject to booms and busts? (2) Whether the current New Zealand housing boom has gone too far? (3) What consequences might follow a housing bust? and (4) How could the vulnerability of the New Zealand economy to a housing bust be reduced?

## 2.0 Why housing markets are especially vulnerable to booms and busts

### 2.1 The fundamentals

In comparison to most financial assets, residential housing is relatively illiquid. Transactions costs for buying and selling a house are high and lumpy relative to transactions costs for trading stocks and bonds. It is much more costly to inventory housing than stocks or bonds and so dealers do not provide market-making services as they do in several financial markets. Trading is relatively infrequent and prices are based largely on inferences from “comparable” transactions. However, considerable time may elapse between such transactions and quality-adjusted price comparisons are imprecise because no two houses are exactly alike.

Residential housing markets also lack two forces that limit sustained price increases above equilibrium prices in other markets. First, when market participants

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<sup>9</sup> For example, the bust in Japanese real estate prices during the 1990s appears to have occurred mainly because of a shift in sentiment, not an external shock.

believe prices are too high, there is no convenient way to sell housing short. Housing transactions are spot transactions and do not have corresponding, organized forward, futures or options markets that would enable market participants to hedge transactions in the spot market or take a view on future prices.<sup>10</sup>

Second, the supply of new homes is inelastic in the short- to medium term. In comparison to many other markets in which supply increases quickly in response to an increase in demand, considerable time may elapse before an increase in the supply of houses can respond to, and constrain an increase in prices. Not only does it take time to design and build a new home, but also, zoning and environmental regulations can cause considerable delays before construction can begin. In some areas, these factors may effectively suppress any increase in supply.

Although there is broad agreement about the fundamental determinants of house prices,<sup>11</sup> this understanding is not strong enough to generate reliable estimates of equilibrium house prices. As a result, opinions frequently differ about whether a given upswing in house prices is the consequence of improving fundamentals or evidence of worrisome overvaluation.

The growth of income is widely acknowledged to be a key driver of demand for housing. Higher per-capita income not only increases the purchasing power of

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<sup>10</sup> During June 2005, the Chicago Mercantile Exchange introduced futures contracts on ten US cities based on indices developed by Karl Case and Robert Shiller. This financial innovation holds enormous potential to enable households in the US to hedge their most important financial risk, but it is too soon to evaluate whether this potential will be realized.

<sup>11</sup> For a recent review of the fundamental determinants of house prices in industrial countries see the IMF (2006). Although housing is usually regarded as the quintessential nontraded good, the IMF analysis identified common, global factors in house price movements across industrial countries. In this regard, New Zealand is an outlier. The IMF (2006, p.84) notes that “global factors appear to explain about 70 percent of house price movements in the United Kingdom and the United States, but only about 3 percent of house price movements in New Zealand.” See also Stevenson (2005) for an application of three different specifications of fundamentals-based models to Ireland.



households, but also enhances their ability to borrow. The distribution of income also seems to matter. Increases in inequality tend to increase housing prices because relatively wealthy households often demand more houses and also more-expensive houses and tend to buy houses in areas where it is especially difficult to increase supply because of geographical or regulatory constraints.

Demand also depends on the cost and availability of credit. The IMF (2006, p. 76) attributes much of the recent rise in home prices in many industrial countries to the fall in average short-term interest rates, which increases the borrowing capacity of households and enables them to bid more for houses. Moreover, the development of secondary markets in mortgage instruments tends to improve the terms on which credit is available and may contribute to a rise in housing prices.

Demographic factors are also important, particularly the growth of the population cohort aged 30-40 years old, which is often most likely to buy houses.<sup>12</sup> Household formation rates may be influenced by numerous other economic and social factors as well.<sup>13</sup>

Immigration may matter as well, particularly when flows of immigrants are large relative to the existing population, as has been the case in New Zealand on occasion. Analysts at the Reserve Bank of New Zealand have shown that the sharp increase in inflation-adjusted house prices during the 1970s was highly correlated with a sharp

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<sup>12</sup> Stevenson (2005) presents results showing that a somewhat broader cohort, the population aged 25-44, performed best as the demographic variable explaining real house prices in Ireland.

<sup>13</sup> Grimes and Aitken (2004, p. 14) analyze panel data for the 74 Territorial Local Authorities in New Zealand and conclude that the elasticity of real house prices with regard to growth in the population is about one.

increase in net migration and the subsequent fall coincided with a sharp drop in the rate of population growth.<sup>14</sup>

*[INSERT FIGURE 5 ABOUT HERE]*

Finally, in addition to these fundamental factors, the demand for housing responds positively to the anticipation of higher, future prices. Indeed, the anticipation of higher future prices may become a self-fulfilling prophecy: the anticipation of higher prices drives current prices still higher as people rush to buy now before prices rise so high that they are closed out of the market. However, if current prices rise too far above levels justified by the fundamentals, demand will ultimately falter and a housing boom may turn to into a housing bust.

In addition to these determinants of demand, two supply factors matter as well. First are construction costs. When the price for the existing stock of homes rises above the replacement cost, builders have an incentive to initiate new construction that will, over time, increase the supply of homes. If construction costs rise, home prices are likely to rise as well. Nominal construction costs have surely risen over time, but in the United States at least, inflation-adjusted construction costs have fluctuated, turning down in recent years.

Shiller (2005) has produced an index of inflation-adjusted construction costs for the US from 1890 to 2006. His data (see Figure 6) indicate technological improvements since the 1980s have more than offset rising labor costs so that real construction costs

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<sup>14</sup> The authors (Gaiduch and Hargreaves) conclude from their analysis that the demand for housing is highly inelastic, but the supply of housing is about one in the long run. Ireland, a country with a population of similar size to that of New Zealand, has also experienced substantial flows of immigrants over the past thirty years. The 1980s saw new emigration of 172,016, while the period from 1995 to 2003 experienced net immigration of 174,901. Stevenson (2005) found that increases in population tend to increase inflation-adjusted housing prices in Ireland

were actually lower in 2006 than in 1980. Taking account of the trend in real construction costs thus deepens the mystery of why real home prices have increased in the United States since 1980. Although a comparable index of real construction costs is not available for New Zealand, it seems plausible that construction firms in New Zealand would have benefited from many of the same technological advances as their counterparts in the US. Thus, rising real construction costs are unlikely to have contributed to the increase in real house prices in New Zealand over the past quarter of a century.

*[INSERT FIGURE 6 ABOUT HERE]*

## 2.2 The crucial role of land prices

When house prices rise far more than any plausible increase in construction costs, a second supply factor, the supply of buildable land is likely to be implicated. In the short- to medium-term, the supply of “buildable” land is strictly limited.

Mark Carey (1990) has developed a simple model that shows how financing and expectations about future land prices may drive the dynamics of land pricing.<sup>15</sup> By implication, these factors influence the prices of residential real estate as well. In Carey’s model,  $N$  investors differ only with regard to their reservation prices for land,  $P$ . Investors may augment their own resources by borrowing an amount,  $L$ , to invest in land. The price of land adjusts so that the demand for land precisely equals the supply of land,  $Z$ . Optimists, defined as those investors with reservation prices above price justified by the fundamentals, determine the price of land and become landowners. In the general case:

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<sup>15</sup> The Carey model was originally applied to agricultural land. For a more detailed exposition of the Carey model and an application to commercial real estate bubbles, see Herring and Wachter (2003).

$$N (1 - F(P)) L = P Z,$$

where  $F(P)$  is the proportion of investors who have a reservation price less than  $P$  and  $(1 - F(P))$  is the proportion of investors who have a reservation price greater than or equal to  $P$ . Other things equal, an increase in the number of investors will increase the price. In mature industrial countries, population grows too slowly to be a plausible cause of rapid increases in real house prices. Population growth may be very important, however, with regard to regional housing markets within a country, when, for example, new job opportunities lead to significant internal migration.<sup>16</sup> Financial liberalization may also have a strong impact on housing prices by augmenting the number of domestic investors with investors from abroad. If increases in immigration in a particular region are significant relative to the total domestic population in that region, they may also have an important impact on demand. This is particularly likely to have been the case in New Zealand where net immigration flows in several years have significantly increased the population in some regions to the extent that now one fifth of New Zealanders was born overseas (Merwood, 2006, p. i).

The supply of buildable land is usually regarded as fixed in the short- to medium-term, but over time, technology and reclamation projects may augment the quantity of buildable land, which, other things equal, would reduce the price of land. Planning restrictions, zoning laws and environmental regulations, however, may constrain the supply of buildable land, even when geographical barriers do not. New Zealand has a very low population density relative to other OECD countries, but it also has very tight regulations on new construction in areas where many people want to live for economic

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<sup>16</sup> For example, the commodity boom, as led to a substantial internal migration in Australia to Perth, where house prices have increased markedly while prices in Sydney and Melbourne have stagnated.

reasons or life-style preferences. These restrictions have been cited as a reason for especially sharp increases in prices in some regions.<sup>17</sup>

An increase in the proportion of optimists among investors (or the heterogeneity of reservation prices as represented by an increase in  $(1 - F(P))$ ) leads to an increase in the price of land.<sup>18</sup> We will show why land prices may be particularly vulnerable to waves of optimism below.

Finally, an increase in the supply of loans available to investors will increase the price of land, by increasing the amount that optimists can bid. Thus banks play a critical role in the dynamics of land prices that will also be investigated below.

Figure 7 illustrates the Carey model for a simple case in which investor's reservation prices have a uniform distribution centered on  $P^*$ , the "fundamental value" of land, defined as the price that is equal to the discounted present value of the net income that could be generated from renting the land.<sup>19</sup> The parameter,  $h$ , represents the heterogeneity of reservation prices among investors. On the margin, the most optimistic optimists get the mortgages and will become landowners. An easing of the terms or an increase in the availability of mortgage financing thus contributes directly to an increase in land prices. As land prices increase, optimists can borrow still more using the appreciation of their land as collateral. Ultimately, the price of land must be consistent with the stream of net income that can be produced from its use, but in the

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<sup>17</sup> Grimes and Aitken (2006) develop a model of the supply of housing in which land costs play a central role. Their empirical results show that restrictions on land use have led to sharp increases in prices in some parts of New Zealand.

<sup>18</sup> Strictly speaking, an increase in the heterogeneity of reservation prices among investors will increase the price only so long as the total resources available to half the investors exceeds the value of land at the fundamental price ( $P^*$  defined below) where the distribution of reservation prices is symmetric around the fundamental price.

<sup>19</sup> The key assumption is that investors do not share the same view regarding the level of  $P^*$ . This may happen because of errors made in projecting future rents, or the discount rate. Or because individual investors believe they have private information that gives them an advantage.

short run, it will also reflect the capitalized value of anticipated future increases in the price of land, which may not be sustainable. Banks thus may play a central role in a boom in land prices and by inference in housing prices.

[INSERT FIGURE 7 ABOUT HERE]

Similarly, when the boom turns to bust and borrowers default, banks may suffer losses if nominal house prices fall below the collateral values needed to support mortgage loans. Banks will generally refuse to lend more and, indeed, are likely to call loans to the extent that they can do so. Some optimists may find themselves overextended and withdraw from the market<sup>20</sup> or be removed from the market by bankruptcy proceedings. The departure of these optimists leads to a fall in demand and prices.<sup>21</sup> In addition, the fall in prices, may lead the pessimists to become still more pessimistic causing additional downward pressure on prices. (These dynamics will be considered below where bank behavior is examined in greater detail.) Thus, real estate booms may end in banking busts, a pattern which has occurred repeatedly across a wide range of countries with differing regulatory systems and differing levels of development.<sup>22</sup>

### 2. 3 The role of banks

As a first approximation, it is plausible to assume that banks maximize expected profits subject to the constraint that the risk of insolvency *not* exceed some maximum probability. This prudential constraint may be imposed by the regulatory authorities in order to achieve public policy objectives or by the board of the bank in response to

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<sup>20</sup> As will be noted below, optimists subject to cognitive dissonance may view the fall in prices as an opportunity to buy and become even more overexposed.

<sup>21</sup> In effect, the distribution of reservation prices becomes skewed below the fundamental price when the most optimistic investors are forced to withdraw from the market. More pessimistic investors, on the other hand, are less likely to adversely impacted.

<sup>22</sup> See Herring and Wachter (1999) and Girouard et al (2006) for examples in both emerging markets and mature industrial countries.

market incentives. The Basel II approach to capital adequacy regulation will impose this constraint by requiring that banks hold sufficient capital to absorb 99.9% of all losses likely to occur within a year, given a synthetic distribution. But, most major banks target an even lower probability of insolvency in order to be able to borrow on more attractive terms in capital markets.<sup>23,24</sup>

In the context of this simple model, a bank's allocation of assets to mortgage loans will increase as the promised return on mortgage loans increases relative to the promised return on other assets and decrease as the expected probability of default ( $\pi$ ) and the perceived correlation with the other assets in the portfolio *increases*.

A simple proxy for the promised return on mortgage lending (relative to the cost of funds) is the weighted average margin for mortgages.<sup>25</sup> Although these data are available for only the latter half of the period over which banks have increased the share of their portfolios in mortgage lending, the promised return has *declined* over that period. (See Figure 8.) Over the past eight years, the weighted-average margin has fallen from nearly 160 basis points to just over 90 basis points. Thus, higher promised returns can not explain the increased share of mortgage lending in bank portfolios.<sup>26</sup>

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<sup>23</sup> The internal-ratings based models are calibrated to produce a level of capital that is roughly equivalent to a BBB credit rating, while most internationally active banks, including the four large Australian banks and their New Zealand subsidiaries have credit ratings that are AA or better.

<sup>24</sup> See Guttentag and Herring (1986) and Herring and Wachter (2003) for an algebraic exposition of this model.

<sup>25</sup> Banks usually employ swap contracts to transform the mostly floating rates they pay on their liabilities into a fixed rate matched to their fixed-rate mortgage assets (RBNZ, 2005, p. 19). The interest rate repricing profile of fixed rate mortgages shifts over time as does the proportion of floating rate mortgages. The weights applied to swap rates and the floating rate reflect these changes (RBNZ, 2005, p. 25). This is, of course, only a very crude approximation. The cost of residential mortgage lending includes not only the bank's cost of funding the mortgage, but also the cost of originating and servicing the mortgage and the cost of the credit and interest rate risk associate with holding the mortgage. Nonetheless, this series reflects the promised return relative to the cost of funds.

<sup>26</sup> In principle, it is possible that the expected returns on alternative assets have decreased even more relative to the cost of funds, but this seems unlikely in an era in which liberalization of financial regulations has increased the range of asset choices available to banks.

*[INSERT FIGURE 8 ABOUT HERE]*

If an increase in promised returns cannot account for the increase in mortgage lending, this simple model implies that perceived risks must have decreased – expected probabilities of default have fallen and/or the anticipated correlation between mortgage lending and the rest of the portfolio has declined. In principle, the actual risks of residential mortgage lending might have declined enough to warrant the increased allocation of bank assets. The repayment record on residential mortgages has been remarkably strong. More than a generation has passed since the last sustained decline in nominal housing prices in New Zealand.<sup>27</sup>

Unfortunately, we do not have a direct measure of the risks. We lack sufficient a priori knowledge to make precise, analytical estimates of the probability of default, the loss given default, and anticipated correlation of the returns on mortgage loans with other bank assets. Moreover, the experience with mortgage loans has been so favorable that it is not possible to infer meaningful estimates of the probability of a shock to housing prices from the statistical record with a high level of confidence. We cannot tell whether risks actually have declined or whether we have simply had a run of very good luck that has led banks to underestimate the probability of a housing shock.

As noted above, real estate busts tend to be low-frequency shocks that are difficult to predict on the basis of theoretical models or empirical experience. Guttentag and Herring (1984, 1986a) have argued that the underestimation of such low-frequency

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<sup>27</sup> Since mortgage contracts are stated in nominal amounts, it is declines in nominal house prices that jeopardize the value of collateral.



shocks may be a plausible consequence of the way in which decisions are made under uncertainty, which may be termed “disaster myopia”.<sup>28</sup>

Cognitive psychologists have found that decision makers, even trained statisticians, tend to formulate subjective probabilities on the basis of the “availability heuristic,” the ease with which the decision maker can imagine that an event will occur (Tversky and Kahneman, 1982). Since the ease with which an event can be imagined is highly correlated with the frequency with which that event occurs, this rule of thumb provides a reasonably accurate estimate of high-frequency events. But ease of recall is also affected by other factors such as the time elapsed since the last occurrence. Under such circumstances, the availability heuristic can give rise to an “availability bias.” On this hypothesis, the subjective probability of a shock to housing prices is a declining function of the time elapsed since the last shock. In Figure 9, this is shown as a decline in the subjective probability of a shock ( $\pi_t$ ) as the elapsed time since the last shock increases. In a prolonged boom, the subjective probability of a shock eventually falls below the actual (but unobservable) probability of a shock.

*[INSERT FIGURE 9 ABOUT HERE]*

This tendency to underestimate shock probabilities is exacerbated by the threshold heuristic (Simon 1978). Busy decision makers allocate their scarcest resource, managerial attention, by this rule of thumb. When the subjective probability falls below some threshold amount, it is disregarded and treated as if it were zero. (This threshold probability is shown as  $\pi^*$  associated with time  $t+n^*$  in Figure 9.) Once this threshold has

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<sup>28</sup> Herring and Wachter (1999, 2001) have applied this hypothesis to commercial real estate markets. Herring (1998) has applied the hypothesis to the Savings and Loan crisis in the United States and the banking crisis in Japan. This section on disaster myopia draws on these earlier accounts.

been reached, behavior seldom changes until a shock occurs, even in the face of evidence that the actual shock probability has increased.<sup>29</sup>

The availability and threshold heuristics together cause “disaster myopia,” the tendency over time to underestimate the probability of low-frequency shocks.<sup>30</sup>

To the extent that subjective probabilities decline even though actual probabilities remain constant or increase, banks take on greater exposures relative to their capital position and the banking system becomes more vulnerable to a shock. This is an insidious process. Disaster myopia can lead banks to become more vulnerable to a shock without anyone having taken a conscious decision to increase insolvency exposure.

Susceptibility to disaster myopia may be reinforced by several institutional factors. Although standard accounting practices are useful for monitoring, pricing and provisioning against high-frequency shocks, the usual reporting period is too short to be useful in controlling exposures to low-frequency hazards. Thus, managerial accounting systems may inadvertently favor activities subject to low-frequency shocks by making them appear to be more profitable than they would be over a longer period that included a shock. Indeed, the absence of bad outcomes in the accounting data may intensify pressures to reduce the default premium charged to borrowers and reserves accumulated by banks.

In the absence of an appropriate provision for potential losses, an activity subject to low-probability shocks will appear misleadingly profitable during a boom. This

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<sup>29</sup> However, the tension between observations and beliefs may give rise to cognitive dissonance. When confronted by evidence that challenges the competence of their decisions, bankers, like other decision makers, first tend to ignore it, then reject it and finally accommodate it by changing other beliefs in order to protect their self-esteem as prudent lenders.

<sup>30</sup> Although the exposition in the text relies heavily on cognitive psychology to explain disaster myopia, Guttentag and Herring (1984) show that the hypothesis is consistent with the Bayesian approach to optimization for low-frequency events.

distortion of profitability is compounded if fees in connection with the mortgage are recognized up front, when the loan is booked, rather than being amortized over the life of the loan. Additional problems occur to the extent that salaries and bonuses are based on reported short-term profits without adjustment for reserves against shocks. In effect, the line officers who are the best position to assess shock probabilities will have an incentive to disregard them. The prospect of job mobility may exacerbate this problem. Managers may expect that they will be elsewhere – in another job, perhaps in another institution – before problems emerge. Moreover, the appearance of high profitability may also impede the effectiveness of the supervisory authorities, who find it difficult to restrain banks that appear to be highly profitable.<sup>31</sup>

Competition may interact with disaster myopia to increase vulnerability. If banks are apparently earning returns above the competitive level (disregarding the need for reserves against future shocks), equally myopic banks will be encouraged to enter the market, thus eroding those returns. As competition increases, banks will reduce margins and increase loan-to-value ratios and attempt to protect target rates of return on equity by increasing their leverage. Such actions can be readily rationalized not only in terms of the need to meet the competition and maintain target returns in the face of shrinking margins, but also because the subjective probability of a shock has declined. Anecdotal evidence suggests that loan-to-value ratios have been rising for at least some new loans in New Zealand.<sup>32</sup> Indeed, if disaster-myopic banks price transactions as if the probability

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<sup>31</sup> The Reserve Bank of New Zealand has largely forsworn this approach to official oversight, but Basel II, as we shall see below, depends heavily on the supervisory authorities negotiating prudential measures and the appropriate level of capital with each bank.

<sup>32</sup> One proprietary empirical analysis suggests that higher loan-to-value loans were less likely to default than lower loan-to-value loans. The number of defaults was so small however, that the power of the test was very weak. Moreover, it is likely that banks grant higher loan-to-value ratios to borrowers with a stronger capacity to repay.

of a shock were zero, then other banks will be obliged to follow or exit the market. Thus competition, interacting with disaster myopia, may accelerate the process through which banks become increasingly vulnerable to a major shock.

Once a shock occurs, disaster myopia may turn into disaster magnification. Just after a shock has occurred, it is all too easy to imagine that an additional shock will occur and so the subjective shock probability will rise above the true shock probability. Figure 10 illustrates the case where a shock occurs at time  $t+n$  and the subjective probability rises from zero to 0.001. As Guttentag and Herring (1984) have shown, an abruptly higher subjective shock probability will lead lenders to try to reduce exposures and increase risk premiums. The drop in the flow of credit will put further downward pressure on real estate prices. This is also likely to diminish lending to other sectors of the economy as banks try to rebuild their reserves and capital to cope with the perceived higher risk of default. Supervisory authorities may also be susceptible to disaster myopia that, in the event of a shock, can turn into disaster magnification.

The Reserve Bank of New Zealand has developed a distinctive bank regulatory regime that relies heavily on market discipline and sound corporate governance and abjures most of the tools of prudential supervision that are common in other industrial countries.<sup>33</sup> In these other countries, however, disaster magnification in the wake of a shock may lead the authorities to take measures that will put still more downward pressure on prices. When the subjective probability of a shock rises sharply, these supervisory authorities may seek to protect the banking system by requiring higher

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<sup>33</sup> We argue below that the Pillar 2 of the Basel II Agreement will cause the New Zealand regime to converge to the norm in the rest of the world.

capital ratios and more aggressive provisioning against potential losses. Thus they are likely to react too late and too forcefully, indeed, perhaps perversely.

*[INSERT FIGURE10 ABOUT HERE]*

### 3.0 Has the Housing Boom Gone Too Far?

The recent growth in house prices has far exceeded the growth in household income or rents, but this is not definitive evidence that prices are too high. Analysts commonly approach the question in three different ways. These include: (1) indicators of affordability; (2) measure of asset market equilibrium; and (3) econometric models based on the fundamental determinants of real house prices. We shall explore what each approach implies about current house prices in New Zealand.

#### 3.1 Affordability measures

The concept of affordability is difficult to define and harder still to measure. Robinson, Scobie and Hallinan (2006, p. 33) survey a broad range of approaches and define affordability as “The relationship between housing costs and some ability to pay criteria.” They argue, “Affordability is best considered as a continuum. A particular point on the continuum represents the financial stress that housing exerts.” From this perspective, house prices are too high if the cost of housing places an unsustainable burden on household income.

Girouard et al (2006) present evidence for 16 OECD countries with regard to affordability measures. The first measure is the ratio of the nominal house price to disposable income, which serves as a proxy for the ability to pay. For 11 of the 16 countries in the sample, current price-to-income ratios are substantially above long-term

averages.<sup>34</sup> New Zealand's ratio (see Figure 11) is higher than it has been at any time since the beginning of the series in 1962, with home prices approaching a multiple of 4.5 times disposable income.

*[INSERT FIGURE 11 ABOUT HERE]*

This measure may be misleading, however, because most home purchases are financed rather than paid for out of current income. Thus, the ability to service debt out of disposable income may be a more relevant indicator of affordability than the house price, itself.<sup>35</sup> Although debt- service requirements depend on the size of the mortgage (and thus the price of the house), they also depend on mortgage interest rate. In many countries, declines in the mortgage interest rate have more than offset the impact of greater debt. For example, mortgage debt burdens have been stable or falling since the early 1990s in Denmark, France, Germany, Ireland, Italy, Spain, Sweden and the United Kingdom. In contrast, New Zealand and Australia have experienced rising mortgage debt burdens.<sup>36</sup> (See Figure 12.) Indeed, households in New Zealand appeared to have the heaviest mortgage debt burden in 2003 among the sample of 15 countries.

*[INSERT FIGURE 12 ABOUT HERE]*

Analysts at the Reserve Bank of New Zealand extend the OECD analysis by including amortization payments in addition to interest payments to give a more complete picture of debt service obligations and extended the time series to include the period from

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<sup>34</sup> Although there is considerable discussion in the popular press about a worldwide housing boom, price-to-income ratios for five countries in the sample (Finland, Germany, Japan, Korea, and Switzerland) were below their long-term averages at mid-year in 2005 (Girouard et al (2006, pp. 16-17).

<sup>35</sup> Changes in the structure of the mortgage instrument such as the introduction of "interest only" or "negative amortization" features may also affect affordability. Moreover, average disposable income may not be the relevant variable. The distribution of income may matter as well since homebuyers tend to have above average per capita incomes.

<sup>36</sup> The Netherlands experienced a substantial increase from 1992 to 2000, but a slight reduction from 2000 to 2003.

1962 through 2005. Figure 13 shows the evolution of mortgage payments as a proportion of household income in New Zealand under three different assumptions regarding loan-to-value ratios (and corresponding amortization schedules): 80%, 90% and 100%.

Although the burden of servicing mortgage debt has increased substantially since 1992, it is markedly lighter than it was during the latter half of the 1980s and roughly comparable to the burden in the mid-nineties. Thus while the burden for households in New Zealand of servicing mortgage debt seems high relative to other countries in the OECD, it falls within the bounds of recent New Zealand experience.

*[INSERT FIGURE 13 ABOUT HERE]*

But even this measure fails to take account of all of the annual costs of home ownership.

In addition to the costs of servicing a mortgage, a homeowner will incur property taxes, depreciation or maintenance costs, insurance costs, and the opportunity cost of interest forgone on capital invested in the home, all of which may be offset to some extent by the anticipation of capital gains on the house.<sup>37</sup>

### 3.2 Capital market indicators

In an efficient capital market, the price of housing will adjust so that the user cost of annual ownership just equals the annual rent. In theory, households would shift between rentals and owner-occupied housing until the expected costs are equal.<sup>38</sup> In practice, of course, housing markets have significant frictions that inhibit arbitrage.

Transactions costs, such as brokerage fees and moving costs, limit the scope for arbitrage and characteristics of rental units may differ substantially from those of homes available

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<sup>37</sup> The emphasis on “imputed rent” stems from the work of Hendershott and Slemrod (1983) and Poterba (1984). Recent applications can be found in Himmelberg, Mayer and Sinai (2005), Feinman (2006) and Girouard et al (2006). The formulation can vary in countries where mortgage interest and property taxes are deductible in computing taxable income. In New Zealand, this option is not open to owner-occupiers.

<sup>38</sup> Ed Kane has observed that zero-equity “owners” are actually “renters.”

for purchase so that exact comparisons are difficult. Nonetheless, this measure can provide some insight into whether house prices are too high relative to rents.

Algebraically we can express the annual cost of ownership ( $P^*u$ ) as:

$$P^*u = P^*r_f + P^*\rho + P^*t_x + P^*d - P^*g$$

Where the first term on the right-hand-side of the equation,  $P^*r_f$ , represents the interest foregone (the price of the house times the risk free rate). The second term,  $P^*\rho$ , represents the risk premium necessary to compensate homeowners for the risk of investing in housing rather than the risk-free asset. The annual property tax is  $P^*t_x$  and the annual cost of maintenance/depreciation is  $P^*d$ . To some extent these costs may be offset by the anticipated appreciation,  $P^*g$  – or, if negative, increased by the anticipated depreciation. In a world of frictionless arbitrage:

$$R = P^*u$$

and

$$P/R = 1/u = 1/[r_f + \rho + t_x + d - g].$$

The right hand side of this equation can be used to compute an equilibrium price-to-rent ratio that can be compared with the observed ratio. This formulation of the problem makes clear that the price-to-rent ratio can rise (or fall) sharply whenever components of the user cost fall (or rise). This means that a sharp rise (or fall) in the price-to-rent ratio need not imply that house prices have lost touch with the fundamentals. Indeed, falling interest rates are believed to have accounted for a considerable proportion of the



increases in home prices relative to rents experienced in many countries over the past five years.<sup>39</sup>

Girouard et al (2002) have compared actual price-to-rent ratios with user-cost based computations of price-to-rent ratios (“fundamental ratios” in their parlance) for sixteen countries.<sup>40</sup> They classify countries as “over-valued” (or “under-valued”) based on the extent to which the actual price-to-rent ratio exceeded (or fell short) of the fundamental ratio. Based on computations extending through 2004, they found evidence of slight overvaluation in New Zealand.<sup>41</sup> (See Figure 14.)

*[INSERT FIGURE 14 ABOUT HERE]*

Relative to international standards, an exceptionally large proportion of New Zealand households invest in rental housing. Balmer (2004) reports that New Zealanders have invested more than the capitalized value of the entire New Zealand stock market in rental property. Indeed, many New Zealanders appear to be relying on rental income as their primary source of post-retirement income. Thus, in the New Zealand context, it is also important to evaluate the price of housing from the perspective of an investor-manager as well as that of an owner-occupier.

One common measure of the return to investors is the rental yield, the inverse of the price-to-rent ratio, which is analogous to the price-to-earnings ratio for shares. It is difficult to track this ratio with precision in New Zealand because rental income data

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<sup>39</sup> The IMF’s (2006, p.84) analysis showed that global factors, which included interest rates, explain 40 percent of house price movements. However, the IMF found that New Zealand was an outlier in this regard. While global factors appear to explain about 70 percent of house price movements in the United Kingdom and the United States, they explained only 3 percent of house price movements in New Zealand.

<sup>40</sup> They used a slightly different variant of the equation described in the text because they wanted to account for differences in income tax laws across countries. For an explanation of their approach see Girouard et al (2006, p. 21 and Appendix A.3).

<sup>41</sup> The degree of overvaluation was roughly ten percent and described in the text (Girouard et al (2006, p.22)) as “not very significant.”

cannot be linked with the corresponding house-price data. Analysts at the Reserve Bank of New Zealand have compared median annual rental income to the lowest quartile house price on the assumption that rental properties are typically of lower value than owner-occupied houses. Unfortunately, reliable rental data are available only since 1993, but they show a relatively consistent downward trend in the rental yield. Over much of the period, however, mortgage rates have fallen even faster so that cash flow yields to investors were positive. Currently, however, mortgage payments exceed rental income, which indicates that investors who are liquidity constrained may be experiencing some stress. (See Figure 15.)

*[INSERT FIGURE 15 ABOUT HERE]*

Of course, investors in rental housing are likely to focus on not just annual cash flows, but on total returns that include both the current rent and the anticipated future growth of rents. Current prices should reflect both current and expected future rents. Indeed, as a first approximation, investors should be willing to pay an amount for a house equal to the discounted present value of all future rents.<sup>42</sup> In the special case where real rents are expected to grow at a constant rate,  $g$ , and the property is expected to be held in perpetuity, we can solve for the investor's implicit real return on the rental investment,  $\delta$ , based on the current real price,  $p_0$ :

$$p_0 = \sum_{t=0}^{\infty} r_0 (1 + g)^{t+1} / (1 + \delta)^t$$

$$p_0 = r_0 / (\delta - g)$$

$$\delta = (r_0 / p_0) + g$$

Under these assumptions, the implicit real return on rental housing can be computed as the sum of the current rental yield and the anticipated growth in real rents. Since the

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<sup>42</sup> This model and the associated data are drawn from Bloor (2005).

rental yield has been declining since 1993, it is not surprising to observe that the implicit real return has been declining as well. (See Figure 16.) Does this imply that current prices for rental housing are too high? That depends on investors' opportunity cost of funds. If we assume that investors might otherwise have invested in long-term government bonds or shift into covered dollar bonds as the swap rate, then returns to rental housing may simply reflect the declining returns generally available to fixed income investors and need not imply that real house prices are unsustainably high.

*[INSERT FIGURE 16 ABOUT HERE]*

Griffiths (2007) has constructed a discounted-cash-flow model to value house prices from two different perspectives: (1) that of an owner-occupier; and (2) that of a highly-leveraged investor-manager. Because of data limitations he focuses on the evolution of the median (quality-adjusted) house price since 1995. Griffiths finds that the owner-occupier valuation model tracks the actual house price quite well until mid-2003. At this point, he hypothesizes that highly-leveraged investors became the dominant marginal buyers. Griffiths (2007, p.5) finds that “To justify house prices after late 2005, it is necessary to start factoring in expectations for continued strong house price appreciation...” He concluded that house prices in 2005 were about 32 percent above the level that could be justified by the owner-occupier valuation model.

### 3.3 Econometric models

Economists have also attempted to model house prices using econometric models reflecting the evolution of the basic determinants of the demand for houses such as disposable income, real interest rates and population growth. Because real house prices and disposable income tend not to be stationary in their levels – that is, there is no

tendency for these time series to revert to their mean level – econometricians generally specify and estimate co-integration relationships among these variables. The co-integrating relationship is then interpreted as the fundamental (or long-term equilibrium) house price to which current prices can be compared.<sup>43</sup>

Fraser et al (2006) have recently made estimates of a parsimonious model of real housing demand for New Zealand.<sup>44</sup> They specify a model in which real house prices are a function of the present value of future disposable income discounted at the (possibly time-varying) inflation-adjusted discount rate, representing the return required by households on their home investments. They use this relationship to calculate the fundamental house price, based on data from 1970 through 2005, and measure the size of deviations from this fundamental value through a vector autoregression. This enables them to identify whether the sign, size and significance of any deviation of actual house prices from their fundamental value is warranted by real disposable income. Their model implies that by the end of 2005, real house prices in New Zealand were approximately 25% higher than warranted by real disposable income.<sup>45</sup>

Noord (2006) has approached the question of overvaluation somewhat differently by attempting to estimate the probability that house prices are nearing a peak.<sup>46</sup> He

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<sup>43</sup> Girouard et al (2006) provide a survey of recent results for a number of OECD countries.

<sup>44</sup> The authors achieve this parsimony in modeling by making the strong, simplifying assumption that the present value of the representative agent's residential property will be a constant proportion of the expected value of future real disposable income.

<sup>45</sup> They performed a similar analysis for share prices in New Zealand and found (Fraser et al, p. 21) that real house prices “display greater deviations from fundamental value than stock prices.”

<sup>46</sup> To qualify as a “peak” in this study, real prices must have previously risen over a period of at least six quarters and subsequently have fallen over a period of at least six quarters. Moreover, the cumulative real price increase from trough to peak must equal at least 15%. See Hall et al (2006) for a more sophisticated approach to identifying cycles in house prices.

estimated probit<sup>47</sup> models for 17 OECD countries including New Zealand using data from 1970-2005.<sup>48</sup> His estimates were based on a broad range of explanatory variables including interest rates, the gap between house prices and their long-run trend, and rate of change in real house prices in the recent past. These equations estimate the probability that real house prices were currently nearing a peak in each of the countries. By the end of 2005, the probabilities that the housing boom would end during 2006 were generally lower than 25 percent, with New Zealand registering a probability just over 25 percent. Noord's (2006, p. 13) measure of overvaluation indicated that real house prices were about 37 per cent above their long-term trend in New Zealand at the end of 2005.<sup>49</sup>

In addition, to assess the vulnerability of these housing markets to interest rate shocks, Noord simulated scenarios in which interest rates increase by 100 and 200 basis points. In most OECD countries, housing markets appeared to be resilient to interest-rate hikes as large as 100 or 200 basis points from levels that prevailed at the end of 2005. The two striking exceptions were Denmark and New Zealand, where the probability of reaching a peak rose above 50 percent. Thus, a model based on predicting turning points in housing cycles yields implications that are consistent with the direct estimate of housing prices based on the fundamentals.

In summary, the indicators commonly employed by analysts to assess whether a housing boom has gone too far yield mixed signals for New Zealand. Measures of

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<sup>47</sup> The endogenous variable was the probability that a house peak would occur during the following quarter. The model assumes that the probability can be described by the standard normal distribution, which specifies the probability of a peak if the latent variable exceeds a threshold amount. The latent variable is assumed a linear function of the real interest rate and measure of overheating in the housing market.

<sup>48</sup> New Zealand experienced the largest number of peaks over the sample period with peaks recorded in 1974III, 1984II, 1989I and 1997III. Of these peaks, only the 1974III episode was followed by a major downturn.

<sup>49</sup> Noord (2006, p.11) defines the real house price gap as the difference between the logarithm of the real house price index and the log-linear trend of the real price index.

affordability show that New Zealand households are under greater financial stress than their counterparts in other OECD countries. This degree of financial strain, however, is less than they have been able to manage successfully during the 1990s.<sup>50</sup> Measures based on the rate of return indicate that residential housing prices may not be out of equilibrium with rents. Although returns to investors in rental property appear to have declined, the opportunity cost may have declined as well. Finally, econometric attempts to estimate the fundamental price of residential housing indicate that prices at the end of 2005 may be substantially above long-term equilibrium prices.

In short, those who wish to be reassured might find some comfort in the measures of affordability and real returns and the extended period of monotonic and sometimes sharp increases in nominal prices is conducive to disaster myopia. Those who are seriously concerned, however, will not be reassured and will tend, instead, to focus on the econometric evidence. Unfortunately, no one can be sure whether the boom simply reflects favorable fundamentals or a worrisome degree of overvaluation. In such circumstances, it is prudent to consider the worst-case consequences and how they might be prevented.

#### 4.0 Potential consequences of a substantial fall in house prices

What might cause a substantial fall in real home prices? Shocks are, by definition, difficult to predict. They may be generated by external events, completely outside a country's control such as a pandemic, a terrorist disruption of travel and trade links, or blunders in macroeconomic policy in the world's largest economies that disrupt global financial markets and drive up interest rates. Alternatively, they may be the result

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<sup>50</sup> This extended period of largely favorable outcomes may have contributed to disaster myopia, however.

of country-specific shocks such as earthquakes, tsunami's, hurricanes or errors in fiscal, monetary or regulatory policy in New Zealand.

It is easier to identify the kind of shock that would be most damaging to the residential housing market in New Zealand. Any shock that raises debt-servicing requirements, while at the same time reducing the capacity to service debt, has the potential to cause widespread defaults. This sort of double-whammy is most likely to begin as a rapid increase in interest rates accompanied by widespread unemployment.<sup>51</sup> And, given the heavy dominance of Australian banks in the New Zealand banking system, any shock that adversely affects Australia at the same time would create a perfect storm for the financial sector.

#### 4.1 Impact on the banking sector

What might be the impact on the banking sector? To the extent that the fall in nominal house prices does not wipe out household equity the direct impact (losses on mortgage lending), might be relatively light. Unfortunately, publicly available statistics on loan-to-value ratios do not enable us to assess the margin of safety for banks in New Zealand. Many observers believe the ratio is significantly less than 80 percent on average, but anecdotal evidence suggests that ratios may have increased as house prices have risen and competition in the mortgage lending has become more intense.

If borrowers cannot service their mortgages and the fall in nominal house prices wipes out their equity, then foreclosures may be necessary. New Zealand appears to have quite efficient bankruptcy and foreclosure procedures relative to other advanced countries. Djankov et al (2006) have collected data comparing across countries the costs

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<sup>51</sup> Hampton and Harrison (2006) note that an increase in interest rates will affect all borrowers and is, therefore, likely to be more damaging than an increase in unemployment, which will affect fewer borrowers.

of enforcing a debt contract.<sup>52</sup> Their results indicate that the time it takes to enforce a debt contract and the cost of enforcement are significantly lower in New Zealand than in other high-income countries.<sup>53</sup> (See Figure 17.) The foreclosure process is likely to reduce the value of the home still further<sup>54</sup> and so households in distress will tend to sell their homes before foreclosure to obtain the highest possible price to reduce their debts as much as possible.

*[INSERT FIGURE 17 ABOUT HERE]*

New Zealand's creditor-friendly laws ensure that households will make all possible cutbacks in discretionary spending before defaulting on their mortgages. Thus, a shock to the housing market may lead to major reductions in discretionary consumer spending across the board. Moreover, since the financing of small businesses in New Zealand is largely based on residential mortgages, small-business spending, is likely to suffer as well. Thus, the indirect consequences for banks of a drop in house prices may exceed the direct impact. Losses in other lines of business, caused by the drop in consumer and small-business spending and residential construction, might exceed the direct losses on mortgage lending. If losses were expected to become very large, this could undermine confidence in New Zealand banks and lead to difficulties in rolling over foreign borrowing.

Banks in New Zealand, however, have relatively strong shock absorbers currently in place. Earnings, reserves and capital all appear above international averages for

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<sup>52</sup> Their focus was the cost of enforcing a commercial mortgage contract, but it is plausible that similar comparative results would hold for residential mortgages.

<sup>53</sup> Of course, if the number of foreclosures were to increase substantially, serious questions would arise about whether the foreclosure process would remain efficient if only because so few bankers, lawyers and judges have had experience in dealing with foreclosures on residential housing.

<sup>54</sup> The industry "rule-of-thumb" appears to be that the value of a home will fall another 15 percent in the foreclosure process.



comparable banks in other countries. Indeed, the leading banks have all received strong credit ratings from internationally recognized ratings agencies. Moreover, in a worst-case scenario, the major New Zealand banks, which are all subsidiaries of foreign banks, would likely receive additional support from their parent banks. So long as the amount of the necessary capital injection would not jeopardize the credit standing of the parent bank, the parent bank would likely support its New Zealand subsidiary in order to protect its franchise value and reputation rather than exercising the option to limit its liability and let the subsidiary fail.<sup>55</sup>

Capital requirements are the principal tool of prudential regulation and are subject to international agreement. Despite concerns about the boom in house prices, the minimum regulatory capital requirements for residential mortgages are scheduled to fall. Currently banks in New Zealand comply with the Basel Accord on Capital Adequacy (Basel I). This internationally agreed framework attempts to make capital requirements more sensitive to the risk exposures of banks than the earlier, simple limits on bank leverage that were employed in many countries.

Under Basel I, residential mortgages are assigned a risk weight of 50 percent, which means that banks are required to hold half as much regulatory capital for mortgage loans as for most other loans to the private sector. The original Accord will soon be replaced by the revised international capital framework usually referred to as “Basel II”.

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<sup>55</sup> New Zealand has made a deliberate policy choice to require that the major foreign-owned banks operate as subsidiaries rather than branches. Although this approach enhances New Zealand’s oversight of the systemically important banks (Woolford and Orr 2005), in some circumstances, it may reduce the probability that the parent banks would bail out their New Zealand operations. In contrast, if the New Zealand operations were organized as branches, the full capital (as well as the full faith and credit) of the parent bank would stand behind the liabilities of its New Zealand operations. The foreign parent bank would not have the option of walking away. For an analysis of the complications that may arise when a foreign branch cannot pay its liabilities when due, see Herring and Kübler (1995).

Basel II will substantially reduce the risk weight applied to residential mortgages.<sup>56</sup> In the Standardized variant of Basel II, the risk weight on residential mortgages will drop from 50 percent to 35 percent. Under the internal ratings based (IRB) approaches the decline will be even sharper.<sup>57</sup>

The 5<sup>th</sup> Quantitative Impact Survey (QIS5), conducted by the Basel Committee on Banking Supervision (Basel Committee, 2006), revealed that minimum capital requirements for retail mortgage portfolios would decline more than for any other line of business. The biggest declines were reported by banks that intend to use the Advanced Internal Ratings Based approach (AIRB) in which qualifying banks may use their own estimates of the probability of default (PD), loss given default (LGD), exposure at default (EAD) and maturity as inputs in the regulatory model. The largest of the G-10 banks reported a decline in minimum capital requirements for mortgages of 64.4 percent.<sup>58</sup> For the largest non G-10 banks, which included the Australian parent banks of the main New

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<sup>56</sup> Kupiec (2006) notes the irony that one of the chief motivations for revising the original Accord was the concern, articulated by supervisory authorities in the US, that banks were engaged in regulatory capital arbitrage, especially with regard to mortgages. As Roger Ferguson (2003) formerly Vice Governor of the Federal Reserve Board noted, the “[P]roblem with Basel I is that its overly simplistic risk measures, when combined with advances in financial engineering technologies and improved risk measurement and management practices, have given banks the incentive and the means to game the system ... For example, low-risk residential mortgages are often securitized rather than held on a bank’s books in part because the market requires less capital than does Basel I.” The results of the 4<sup>th</sup> Quantitative Impact Study for US banks indicate that application of the Advance Internal Ratings Based Approach will result in substantial reductions in the capital required for exposures to securitized mortgages.

<sup>57</sup> To some extent, this is by design. The Basel Committee has sought to give banks an incentive to adopt more-sophisticated risk management techniques by calibrating the risk weights in each of the approaches so that banks qualifying for the more advanced approaches will be subject to lower minimum capital requirements. The QIS5 analysis (Basel Committee 2006, p. 2) showed that current calibration of capital charges does produce this result: “[C]apital requirements provide an incentive for banks on average to move to the more advanced approaches (with minimum required capital for G10 Group 1 banks being 13.3% lower under the foundation IRB approach than under the standardized approach, and 5.1% lower under the advanced IRB approach than under the foundation IRB approach, not taking account of the transitional floors).

<sup>58</sup> See Basel Committee (2006, Table 11). These results are for Group 1 banks under the “most likely approach,” which in most cases is the Advanced Internal Ratings Approach. But the results in Basel Committee (2006, Table 1) imply that not all Group 1 banks are likely to adopt the Advanced Internal Ratings Based approach. Group 1 banks are banks that have Tier 1 capital in excess of €3 billion, are diversified and internationally active (Basel Committee, 1986, p. 6).

Zealand banks, the drop was even larger: 82.5 percent.<sup>59</sup> Although banks may choose to continue to hold the same amount of capital in relation to their residential mortgage exposures and/or their supervisors may require them to hold more than the required minimum, the internationally agreed minimum capital standards for such exposures will decline.<sup>60</sup>

Should this be a cause for concern? To the extent that the regulatory model accurately reflects the risks in mortgage lending, perhaps not. But, quite apart from data limitations and the inherent difficulties in making statistically meaningful estimates of low-frequency shocks, there are reasons to believe that the regulatory model is deeply flawed and likely to yield underestimates of the capital needed to achieve the desired level of safety.<sup>61</sup> Moreover, the model focuses on credit risk alone and fails to address the other fundamental aspects of the risk of mortgage lending – interest rate risk and liquidity risk.<sup>62</sup>

The Basel Committee has proposed to deal with these issues under “The Supervisory Review Process” (Pillar 2 of the Basel II proposal).<sup>63</sup> Under Pillar 2 (Basel

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<sup>59</sup> See Basel Committee (2006, Table 13). Non-G10 banks included Australia, Bahrain, Brazil, Bulgaria, Chile, Cyprus, the Czech Republic, Finland, Greece, Hungary, India, Indonesia, Ireland, Malta, Norway, Peru, Poland, Portugal and Singapore.

<sup>60</sup> This assumes that the riskiness of the mortgage portfolio remains the same. But those who worry about regulatory capital arbitrage would argue that banks may shift their portfolios in favor of safer assets that were penalized by Basel I risk weights that greatly exceeded economic capital requirements. They would argue moreover, that the safeguards that a bank must adopt in order to qualify for the AIRB approach would reduce the risk associated with a given exposure. Greater use of mortgage insurance might also reduce risks to the banking system. The use of mortgage insurance in New Zealand is low by international standards. The implementation of Basel II is likely to increase the incentives for use of mortgage insurance by permitting a reduction in capital charges for portfolios covered by mortgage insurance.

<sup>61</sup> See Herring (2005) and Kupiec (2006) for a critical overview. The analysis focuses on the AIRB approach because this is the approach most likely to be used by the big four Australian banks and it appears to lead to the lowest capital charges. See the Appendix for more a more detailed discussion.

<sup>62</sup> Mismanaged interest-rate risk (and concentration risk) destroyed a substantial portion of the US Savings and Loan industry, which specialized in residential mortgage lending. Because mortgages in New Zealand are repriced at relatively brief intervals, interest-rate risk is unlikely to be a serious problem for banks. But, it will be argued below that it is a potentially serious problem for the household sector.

<sup>63</sup> For a full discussion of the Supervisory Review Process, see Basel Committee (2005)

Committee, 2006, p. 204), “Supervisors are expected to evaluate how well banks are assessing their capital needs relative to their risks and to intervene, where appropriate.” In addition to periodic reporting by the bank to the supervisor, this may involve on-site examinations, reviews of work done by external auditors and discussions with bank management. The supervisory review process may result in an additional capital charge, which will not necessarily be disclosed to the public. This approach is sharply at variance with the current regulatory regime in New Zealand, which relies instead on strong corporate governance, transparency and market discipline.

How effective the Pillar 2 supervisory review process will prove in practice is open to question. Supervisory authorities generally have great difficulty in constraining the risk exposures of profitable banks that meet minimum capital requirements.<sup>64</sup> But, if the supervisory authorities do not require additional capital for mortgage exposures, then regulatory capital requirements will almost certainly fall. Even if regulatory safeguards are weakened, however, the vulnerability of the New Zealand banking sector to a housing shock is much less worrisome than the vulnerability of the household sector.

#### 4.2 Impact on the household sector

New Zealand is a wonderful place to live. It has natural beauty, a relatively pristine environment, moderate climate, political freedom and stability that are the envy of much the rest of the world. But, it is a small, relatively undiversified economy that is vulnerable to a wider variety of shocks than larger, more diversified economies.

Inevitably, New Zealanders acquire special knowledge, skills and relationships that are specific to New Zealand and so their human capital is vulnerable to these shocks.

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<sup>64</sup> See Herring (2004) for an extended discussion of the inherent difficulties in enforcing supervisory discipline.

Individuals could offset this risk to their human capital to some extent by holding financial assets that are broadly diversified in world financial markets. But as we have seen, many New Zealanders prefer to invest in housing located in New Zealand. (Figure 18 shows that the rental share of mortgage debt has been growing since the late 1980s.) Worse still, the understandable preference for do-it-yourself property management and maintenance leads many New Zealanders to buy investment properties near their primary residence, thus foregoing even the limited amount of diversification that could be achieved by investing in property located in different regions of New Zealand.

*[INSERT FIGURE 18 ABOUT HERE]*

The phenomenon of “home bias” is well documented in international finance. The concept refers not to the preference of households to invest in housing but rather the tendency of investors in every country to allocate a disproportionate share of their portfolios to home-country assets. Home bias has been documented for large diversified economies, where households can achieve a reasonably well diversified allocation of assets even though they invest mainly at home. But, the phenomenon can also be found in smaller, less-diversified economies, where investors are much more dangerously exposed to country-specific shocks that could easily be diversified in global financial markets. The IMF (2005) has reported evidence that over the 1990s home bias eased in Germany, Japan, the Netherlands, the United Kingdom and the United States.

In contrast, the preference of New Zealanders for investments in housing leaves them even less diversified than they were a decade ago. In effect, the usual “home bias” is compounded by the bias of New Zealanders toward investing in homes.

#### 4.2.1 Disaster myopia, poor information and inadequate analysis

Why do investors in New Zealand take on such heavy concentrations of exposure? Earlier we argued that banks might be subject to disaster myopia. But disaster myopia may afflict the household sector as well. The availability heuristic and the threshold heuristic are at least as likely to apply to households as to bankers. A lengthy period in which nominal house prices have often risen sharply, but seldom fallen will engender the view that the probability of a shock to house prices is negligible.

It has been more than a generation since the last major shock to housing markets, while memories of the 1987 stock market crash that accompanied financial liberalization are more recent.<sup>65</sup> Fraser et al (2006, p. 17) suggest that the lower perceived riskiness of property (relative to stocks) in New Zealand “is a direct consequence of cycles in the housing market being longer and of less magnitude than in stock markets.”

Media attention to buoyant house prices may reinforce disaster myopia. Figure 19 shows that media attention to the merits of real estate investment has risen markedly as house prices have risen.

*[INSERT FIGURE 19 ABOUT HERE]*

The willingness of households to take on such large exposures to house price shocks may also be a reflection of poor information and weak analysis just as in other countries.<sup>66</sup> Because housing markets are illiquid, households lack up-to-date information on current conditions in the housing market. They tend to form impressions

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<sup>65</sup> About the same time, the tax advantages previously available to pension funds were removed. Substantial withdrawals occurred and it is likely that many participants reinvested some of the proceeds in investment properties.

<sup>66</sup> Evidence from the United States suggests that many households do not regard themselves as “investing” in their homes. Quigley and Deng (2001) have found considerable evidence of heterogeneity among house owners in the United States with regard to incentives to prepay or default on mortgages and conclude that many households do not think of themselves as investors at all, but simply regard themselves as homeowners paying off debt. These households do not exercise the option to prepay even when it is deeply in the money. Although we lack parallel evidence for New Zealand, it seems plausible that similar heterogeneity would be observed among homeowners in New Zealand as well.

based on anecdotes regarding recent transactions that are, in any event, reported without making any inflation or quality adjustment to the appreciation in price. Moreover, the decision to buy a home is seldom based on rigorous analysis. Investors frequently overlook maintenance and insurance costs, transactions costs and, especially, the opportunity cost of funds in reporting their returns on home investment. They tend to be guided by maxims that do not bear up under scrutiny such as the following three propositions:<sup>67</sup>

(1) “Buying property is far safer than buying shares because property is tangible.” This is an example of the fallacy of misplaced concreteness (which too often results in misplaced concrete). Residential property is more expensive to sell and much more costly to maintain precisely because it is tangible in contrast to securities (which are often dematerialized to minimize storage and transactions costs.

(2) “Even if house prices overshoot, they will level off, not fall.” While this is a plausible inference from New Zealand’s historical experience, it may not hold in the future. The adoption of inflation targeting by the Reserve Bank of New Zealand has reduced the inflation rate well below levels that prevailed during the last major shock to housing in New Zealand in which inflation reduced real house prices by nearly 38%. At current inflation rates, if current house prices rose a similar amount above levels justified by the fundamentals, it would take many more years to equilibrate the market. Homeowners who need to sell may not have the capacity to wait until demand strengthened and may need to accept reduced nominal prices. Moreover, the growing share of rental property may change the dynamics of the housing market in the event of a

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<sup>67</sup> I heard these propositions (and others like them) repeated a number of times during casual conversations with New Zealanders about their decisions to buy a house. I hear similar assertions in the US as well.

shock. If owners or rental housing are not making sufficient returns to service their debts, they will be under considerable pressure to sell even if it means accepting a lower nominal price.

(3) “It’s always better to buy or than to rent.” This is not true if annual rent is less than the full annual cost of owning a home – the so-called “user cost” – which includes interest paid, property taxes, depreciation or maintenance costs and the opportunity cost of investment foregone offset by the anticipated capital gain. Moreover, if the anticipated appreciation is unsustainable the current price is too high and the anticipated capital gain may turn out to be a capital loss.

#### 4.2.2 Perverse tax incentives

Finally, the willingness of households to take on such large exposures to house price shocks may also be a consequence of perverse tax incentives. In New Zealand, as in several other advanced countries, the benefits of owner-occupied housing are not taxed, while an equal amount of money invested in securities would usually be subject to tax on interest or dividends.<sup>68</sup> Although the McLeod Committee on tax reform rejected an OECD proposal<sup>69</sup> to tax returns to owner-occupied housing, it noted “[T]he current system is both inefficient, since it induces overinvestment in housing at the expense of accumulation of financial assets, and inequitable, since it favours high income earners and the elderly at the expense of struggling lower income families.”<sup>70</sup>

In addition, the Committee (2001, Ch.2, footnote 27) observed that the non-deductibility of interest on owner-occupied housing encourages households in owner-

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<sup>68</sup> Countries within the OECD that do tax imputed rental income include Belgium, Denmark, Luxembourg, The Netherlands, Norway, Poland, Sweden, Switzerland and Turkey (McLeod Committee, 2001, 2.54).

<sup>69</sup> See OECD (2000).

<sup>70</sup> The McLeod Committee (2001, paragraph 2.51).



occupied housing to repay their mortgage as quickly as possible, which contributes to the low level of non-housing investment held by New Zealand households. The OECD (2000, p. 151) concluded that tax incentives are the primary reason households are so heavily exposed to a housing shock, noting “Since the implied rental value as well as capital gains on the residence are untaxed, and since the mortgage interest is non-deductible, the optimal saving strategy is to pay down debt, rather than diversifying the portfolio of assets. By exempting investment in housing from taxation other than the local property tax, a tax preference is (generally) allowed to such investment compared with financial investments, which are taxed on income and in some cases also on capital gains.”<sup>71</sup>

Based on average annual nominal return from 1970-98, the OECD computed the tax efficiency of investment in housing relative to other assets. These results (see Figure 20) indicate that taxes take a much larger bite out of the returns on other assets available to retail investors than the returns on housing. The tax efficiency of investment in housing was at least a third greater than for other investments.

*[INSERT FIGURE 20 ABOUT HERE]*

New Zealand does not have a separate capital gains tax. This provides investors with a strong incentive to convert otherwise taxable income into capital gains. Burman and White (2003, p. 356) observe, however, “New Zealand has tried to stem such tax avoidance by defining at least 25 kinds of assets and transactions as “revenue” – that is,

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<sup>71</sup> Although mortgage interest is not deductible for owner-occupied housing, taxpayers who have rental property that generates taxable income, can attribute their debt to the income producing property rather than their own home. Since the interest on a rented property is deductible, but capital gains (if any) generally are not taxed, rental properties may show tax losses even when more than offset by positive capital gains (McLeod Committee (2001, 2.64).

taxable by nature. As a result, New Zealand now has a hybrid tax system in which some gains are excluded from income, some are taxed as they accrue, and others are taxed only when the underlying asset is sold.” Courts, however, have excluded appreciation in the value of property from income and thus from the income tax. Thus, non-occupier homeowners do not face a capital gains tax on the appreciation of their homes (and can deduct mortgage interest expenditures from their taxable income).

In contrast, investors in actively managed savings and investment entities, examples of the kinds of investments that could help New Zealanders diversify their wealth, are subject to tax on any gains on sales of shares in their portfolio. Similarly, appreciation on investments in most foreign companies, superannuation schemes, and life insurance are taxed.

Moreover Burman and White (2003, p. 357) argue that the “[C]apital-revenue boundary is not clearly defined in law or precedent, so taxpayers face a great deal of uncertainty in trying to determine whether the gains on an investment will be subject to tax and, if so, how.” Whether capital gains are classified as “active” (and therefore taxable) or “passive” is determined by what the OECD (2000, p172) termed “[R]ather ad hoc methods, such as the so-called “trader/non-trader” test, to establish if there is an intention to earn from capital appreciation or not.” This uncertainty is likely to favor property investment relative to investment in securities. Heavy transactions costs mean that property is unlikely to be traded with much frequency, even if the investor is expecting to benefit from substantial appreciation in price. On the other hand, even buy-and-hold investors are likely to trade securities with some frequency if only to rebalance

their portfolios to restore their preferred, strategic allocations after substantial movements in relative returns.<sup>72</sup>

Whatever the reason for the lack of diversification – disaster myopia, weak data and inadequate analysis, or perverse incentives – the resulting concentration of exposure to a housing shock is made more dangerous by the fact that New Zealand households are highly leveraged (see Figure 21) and highly vulnerable to an increase in interest rates.

*[INSERT FIGURE 21 ABOUT HERE]*

#### 4.2.3 Leverage

What might be the impact of a substantial fall in house prices on households? In contrast to the United States, where households can and do walk away from their homes when their home equity becomes negative,<sup>73</sup> households in New Zealand will make every effort to keep current on their mortgage payments to avert foreclosure. Cultural factors may account for some of this difference in behavior between Americans and New Zealanders, but differences in bankruptcy laws clearly play a major role. The United States has some of the most debtor-friendly laws in the world, while New Zealand has some of the most creditor-friendly laws in the world.<sup>74</sup> New Zealanders cannot obtain relief from their mortgage creditors by simply forfeiting their homes because they can be pursued by their creditors until any shortfall between the value of the house and the amount owed is repaid.

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<sup>72</sup> Since equities are likely to be traded more often than housing, the “purchased with the intent to resale” test may be easier for the tax authorities to apply to capital gains in equity markets than in the property market.

<sup>73</sup> Negative equity occurs when the market value has fallen below the amount of the mortgage loan outstanding.

<sup>74</sup> Djankov, McLiesh and Shleifer (2006) have recently analyzed creditor rights in 126 countries. New Zealand receives a score of four, the top designation “strong creditor rights,” while the United States received a score of one, only one notch above the bottom designation “poor creditor rights”.

In addition, New Zealanders bear a much heavier burden of interest rate risk than their counterparts in the United States, where long-term (up to 30 year), fixed-rate mortgages are widely available.<sup>75</sup> Moreover, most mortgage contracts in the United States permit the borrower to refinance at any time without penalty. Thus, households in the US can protect themselves against an increase in interest rates by selecting long-term, fixed rate mortgages, while retaining the option to benefit from a decline in interest rates. Banks can offer this flexibility to households at relatively low cost because they can transfer the interest rate and prepayment risk via mortgage-backed securities to institutional investors who have a preference for or comparative advantage in managing such risks.

In contrast, mortgage contracts in New Zealand generally have repricing periods that extend no longer than three to five years and borrowers must pay a penalty to refinance their mortgages at a lower rate. Consequently, New Zealand households are more vulnerable to an increase in mortgage interest rates and have less opportunity to benefit from a decline in mortgage interest rates than households in the United States have.

## 5. 0 Concluding Comment

Analysts differ about whether the boom in New Zealand housing prices has gone too far to be justified by improving fundamentals. However, even if the boom were to be fully justified by the fundamentals, the lack of diversification of the household sector is a source of concern because the housing market could be shocked in a wide variety ways, not just from the collapse of a speculative bubble in the housing market.

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<sup>75</sup> The Danish housing finance system also affords borrowers a comparable flexibility in refinancing at very low cost.

Apart from educating investors about the importance of diversification, especially international diversification, it is important to remove distortions that may inadvertently encourage overinvestment in housing. Both the OECD and the McLeod Committee identified features of the tax law that favor investment in housing over investment in marketable securities. In principle, the best approach may be to broaden the tax base to include all capital gains and to use the incremental revenue to lower tax rates. Broadening the base would remove distortions and reducing the rate would reduce the incentives for tax avoidance and ease the remaining distortions in the tax system.

The OECD recommended adoption of a comprehensive capital-gains tax, which was dismissed as a political nonstarter. The McLeod Committee proposed a tax on (some) net asset positions based on the inflation-adjusted risk-free rate of return, but that proposal has failed to gain popular support.<sup>76</sup>

If extending the tax base to include housing returns meets insuperable political obstacles, it may be possible to move closer to neutrality by removing the current taxation of gains and losses on other assets. This would reduce uncertainty about the tax consequences of investment decisions and eliminate a key disincentive for portfolio diversification.<sup>77</sup>

Finally, efforts should be made to broaden the range of mortgages available to households in New Zealand. The allocation of interest-rate risk to households seems inappropriate and inefficient. Financial institutions can support or transfer this risk in capital markets at much lower cost than households can hedge it.

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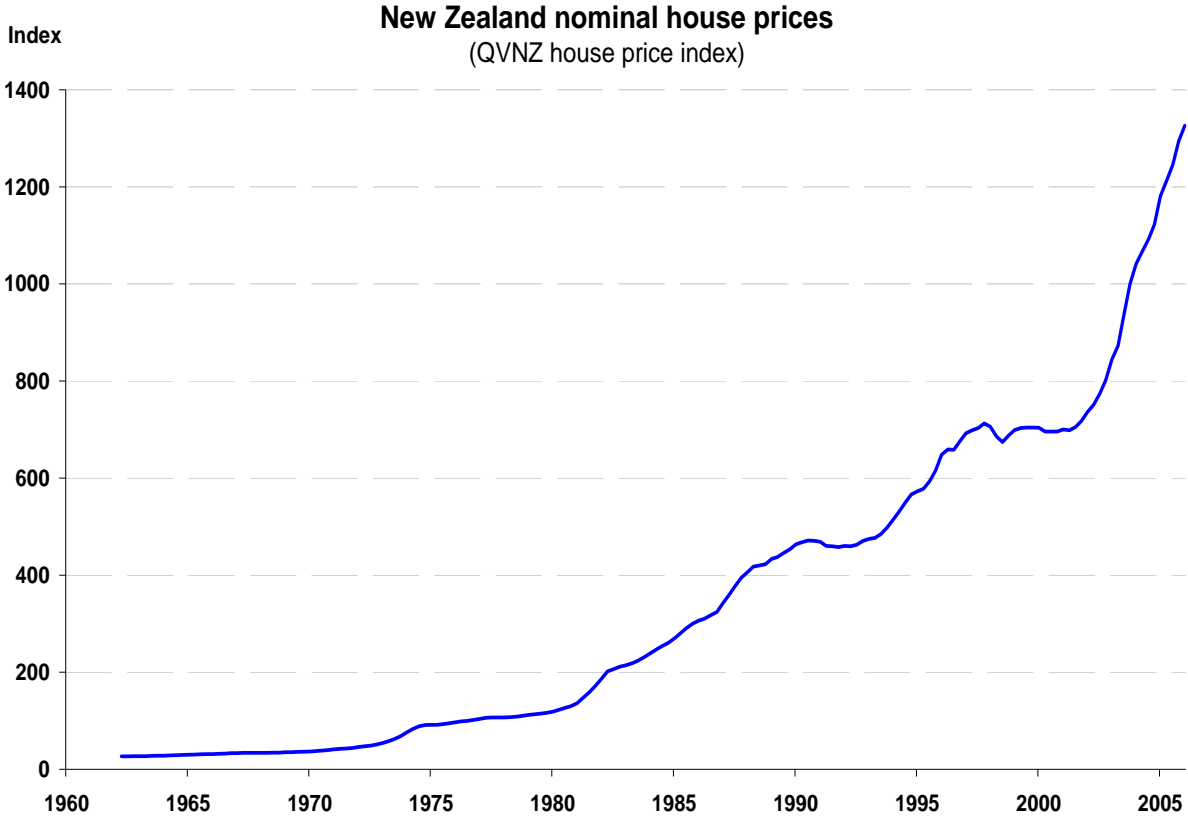
<sup>76</sup> See Burman and White (2003, p. 271) for a critique of this approach

<sup>77</sup> The loss of revenue is unlikely to be large, but, as Burman and White (2003, p. 370) note, it would increase the relative tax disadvantage of taxable forms of income on capital such as dividends, interest, rent and royalties.

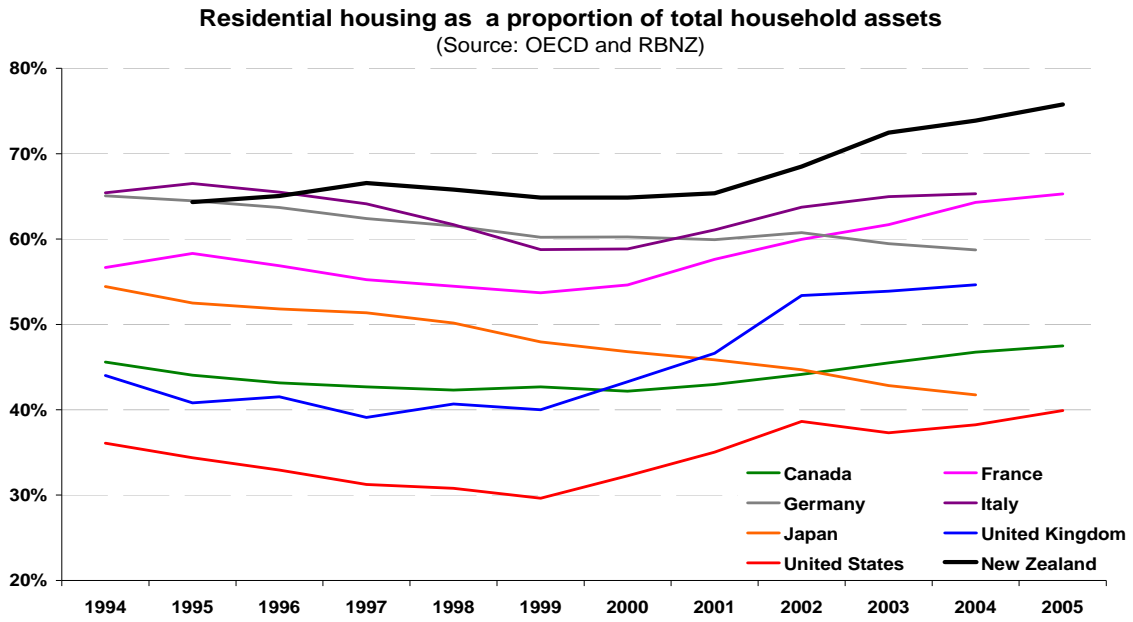
Long-term, fixed-rate mortgages, incorporating low cost pre-payment opportunities have long been a reality in Denmark, an agricultural country with its own currency and a population approximately the same size as that of New Zealand. New Zealanders should have comparable flexibility in managing their exposure to interest-rate shocks.

Burdening the household sector with interest-rate risk on top of its heavy exposure to the housing market, increases the likely damage in the event the housing boom turns into a housing bust. Moreover, it places a much greater burden on crisis management policies than if the household sector were well diversified and less vulnerable to an interest-rate shock.

**Figure 1. Nominal House Prices in New Zealand**

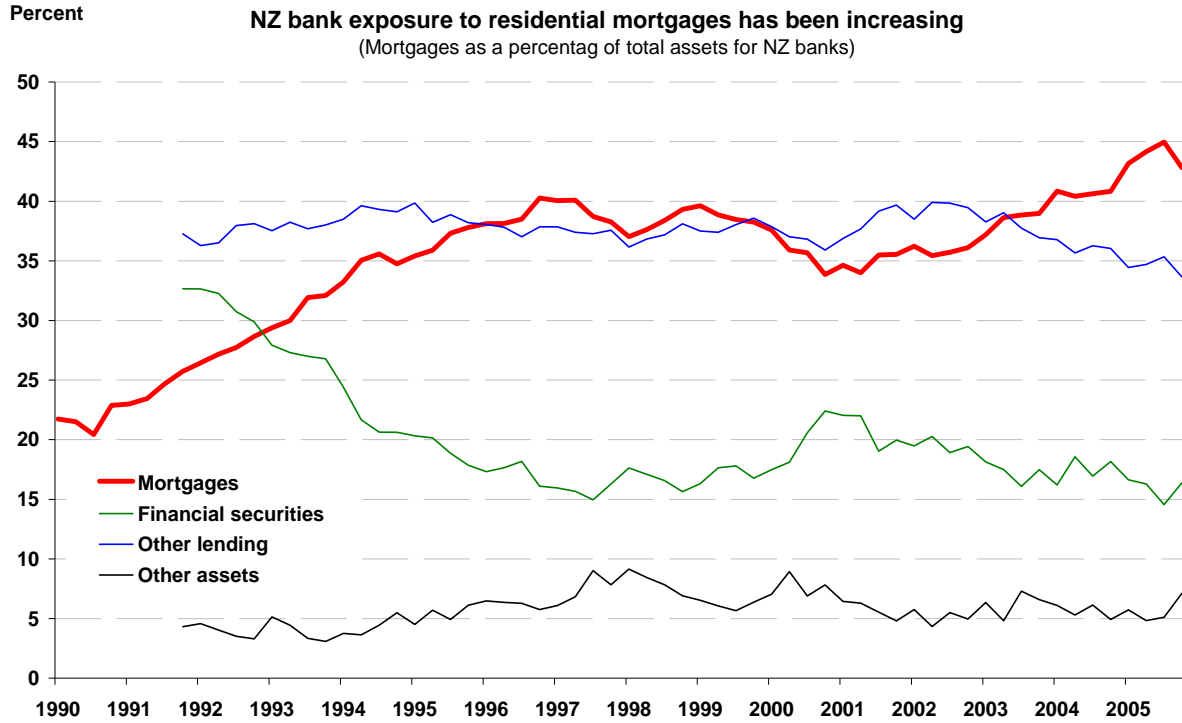


**Figure 2. Residential Housing as a Proportion of Total Household Assets**





**Figure 3. New Zealand Banks' Exposure to Residential Mortgages**



Source: RBNZ

**Figure 4. Inflation-Adjusted House Prices in New Zealand**

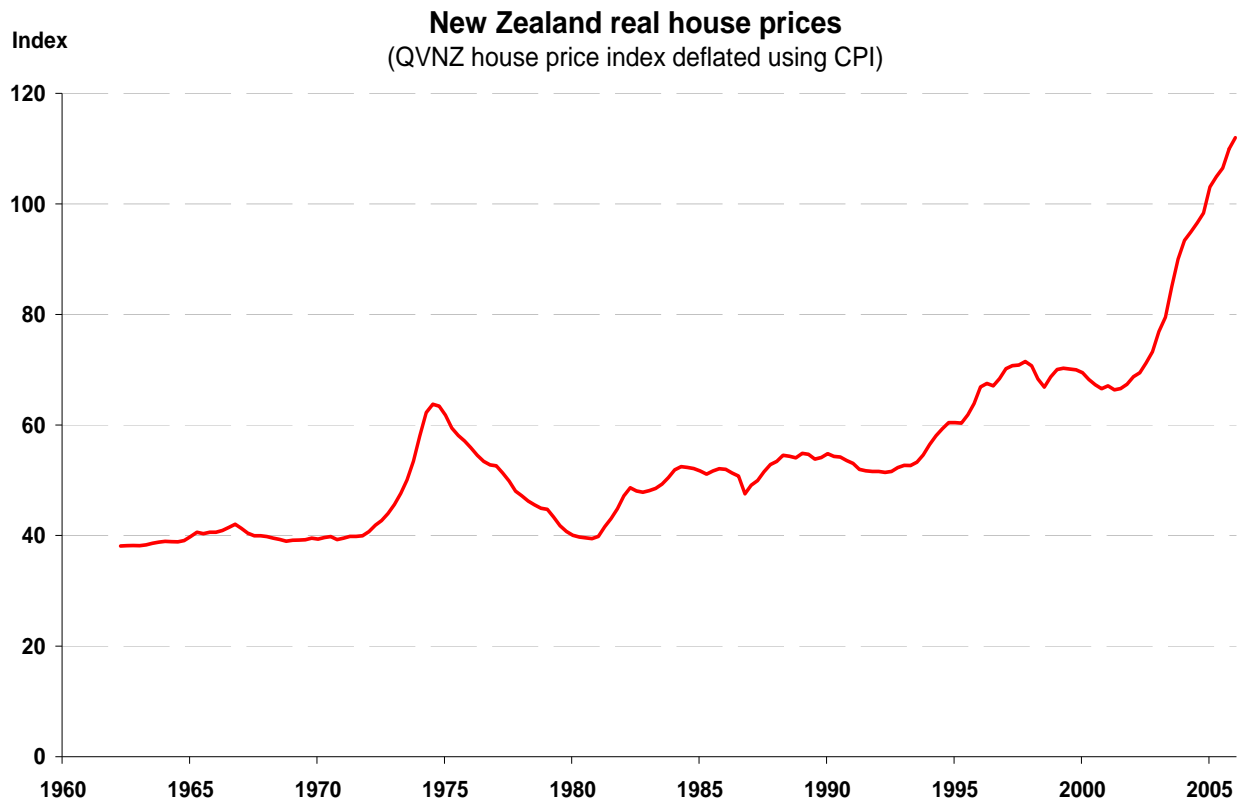
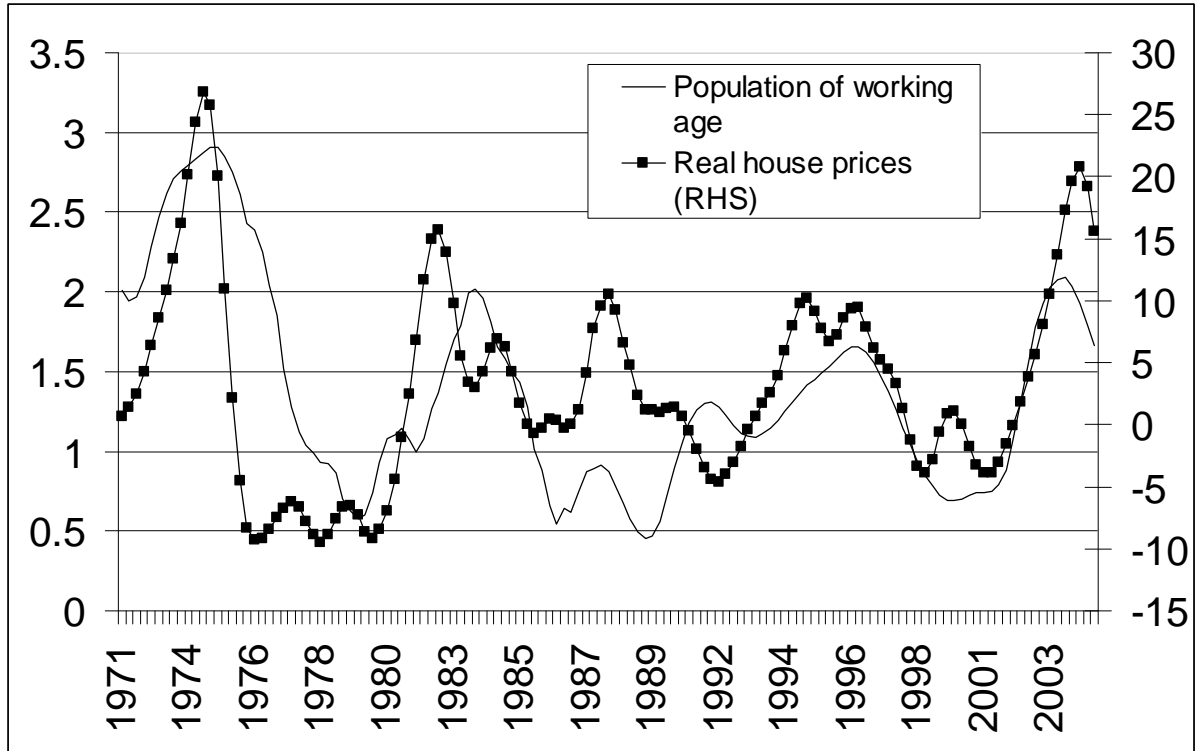
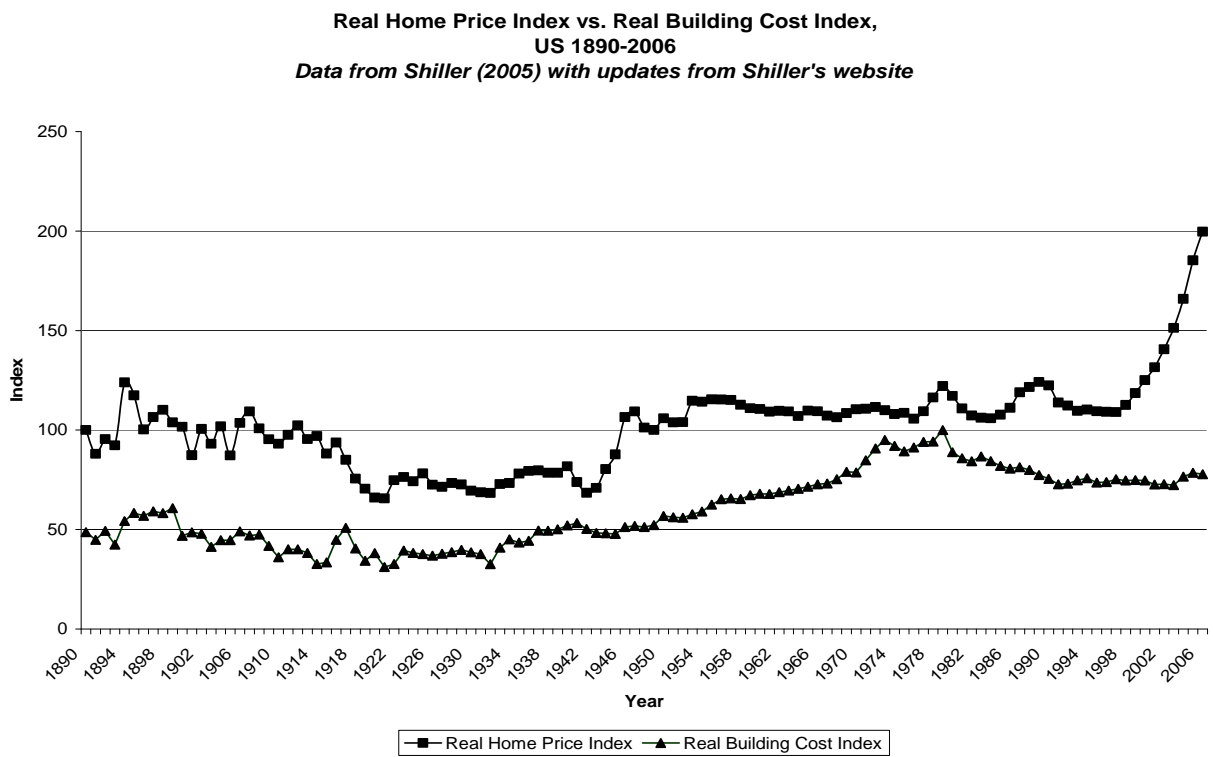


Figure 5: Annual percentage change in population and real house prices, 1971-2004



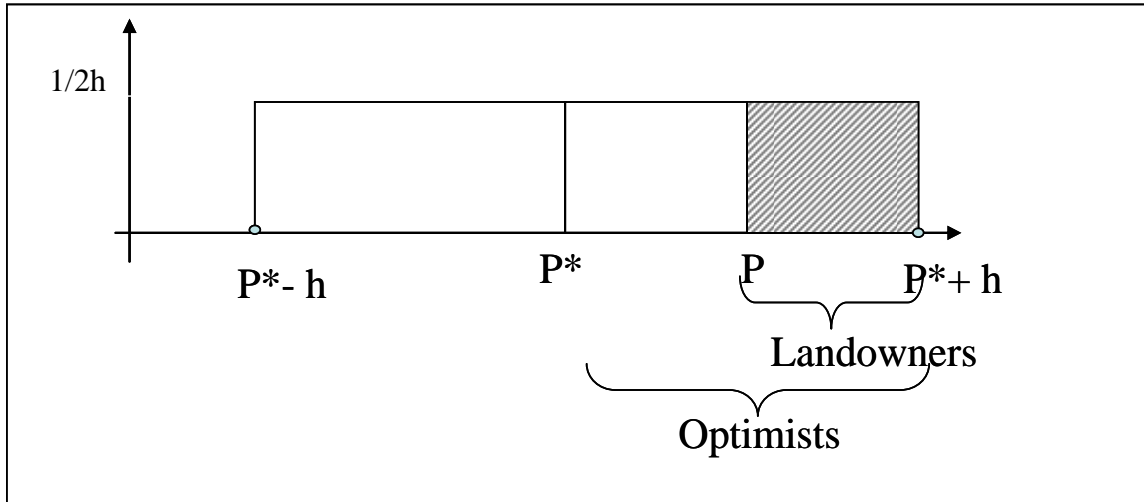
Source: RBNZ Internal Memorandum

**Figure 6. Real Construction Costs and Real House Prices in the US, 1890-2005**

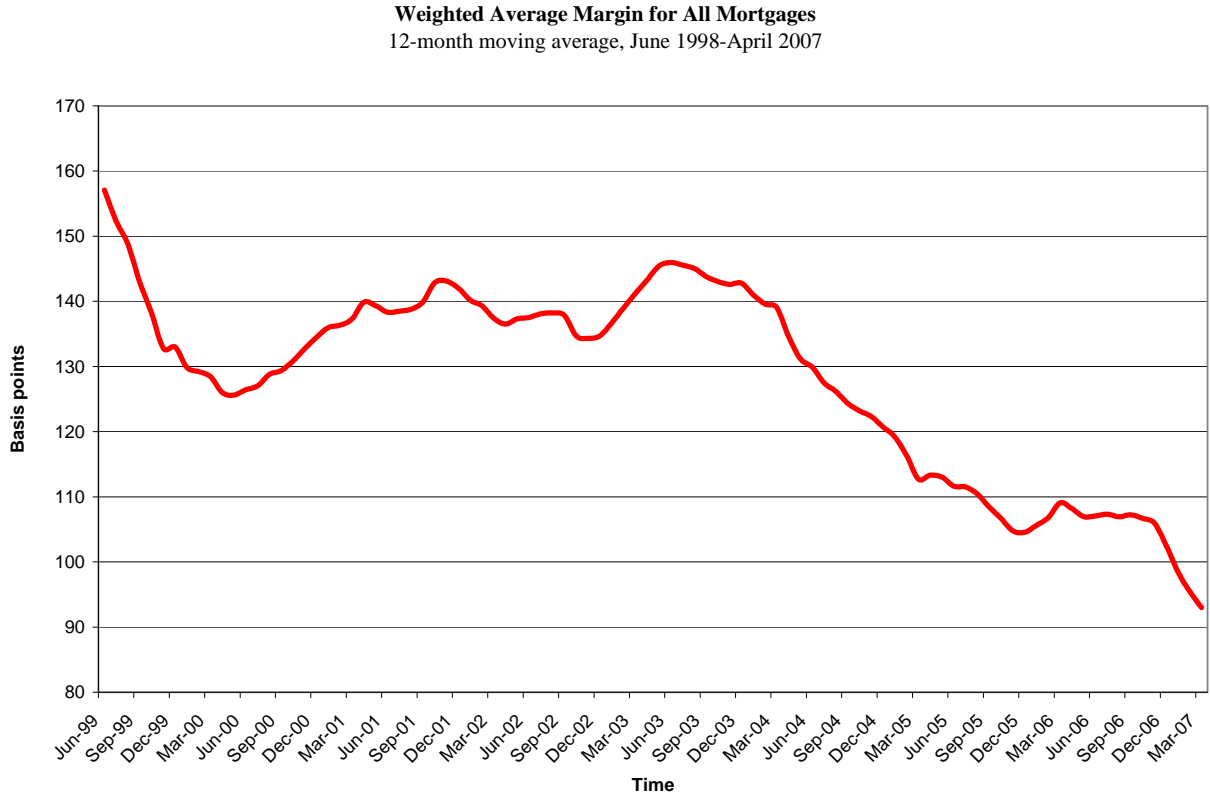


Source: Robert J. Shiller, 2005, *Irrational Exuberance*, 2<sup>nd</sup> Edition, Princeton University Press, with updates from Shiller.

**Figure 7. The Carey Model of Land Prices when Reservation Prices are Uniformly Distributed**



**Figure 8. The Evolution of Promised Returns on Mortgage Loans  
June 1999 – April 2007**



Source: RBNZ calculation

Figure 9. Disaster Myopia

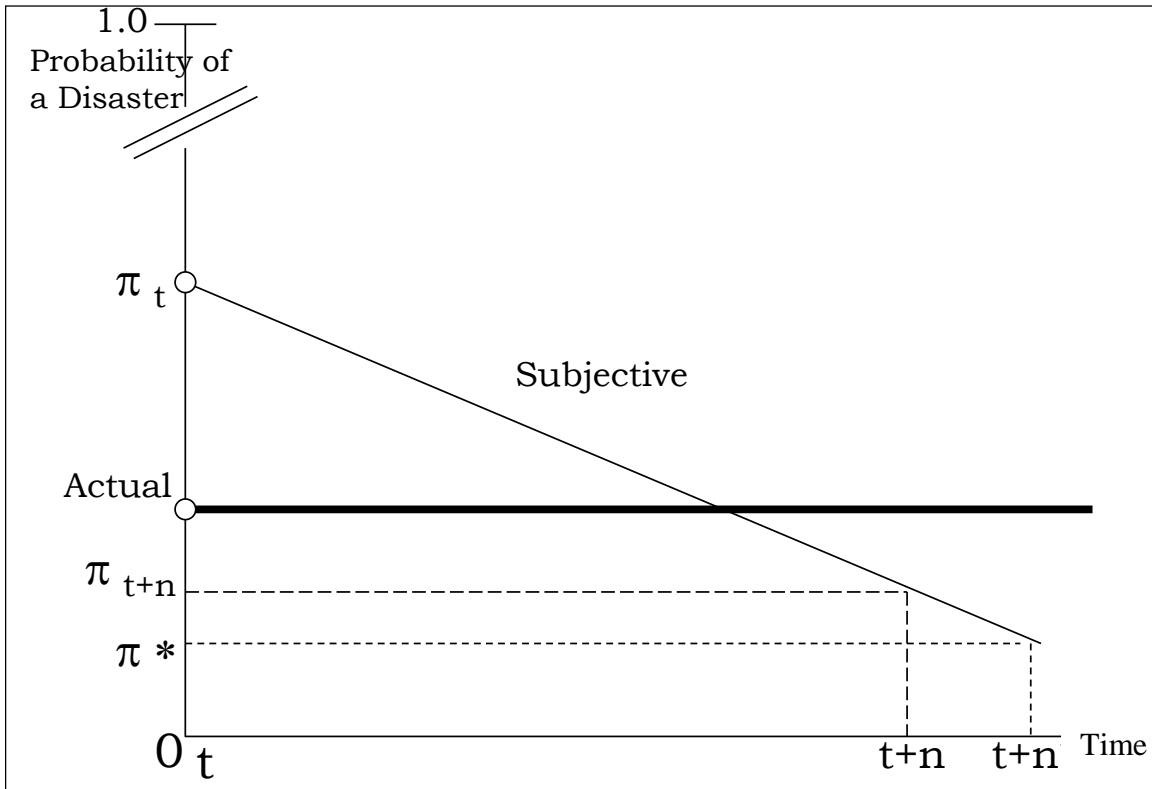
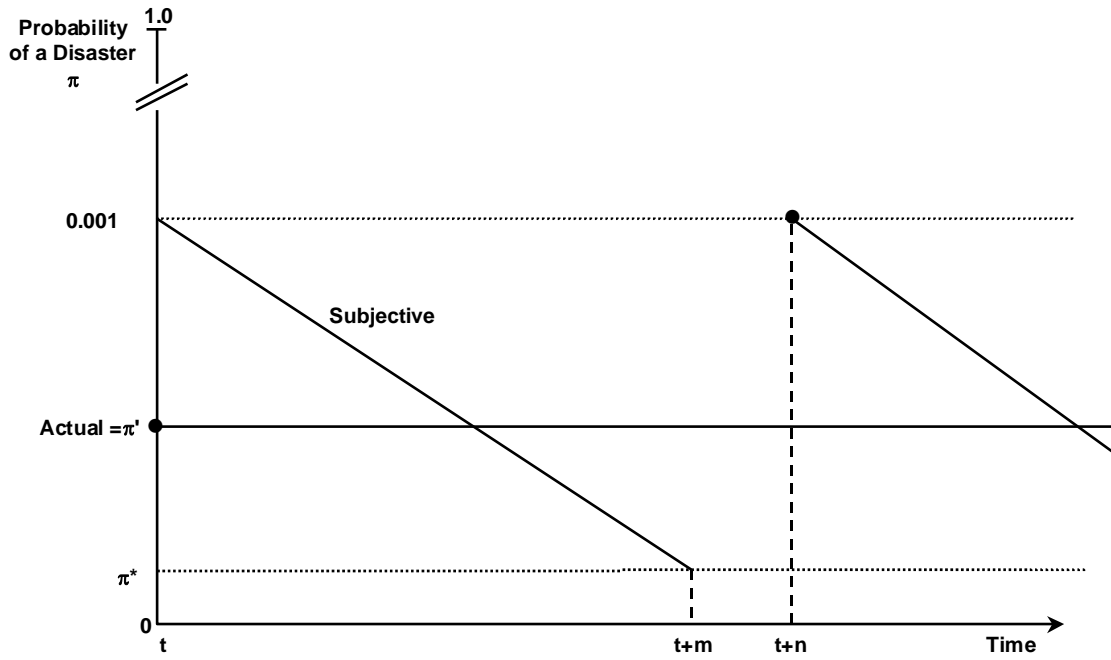
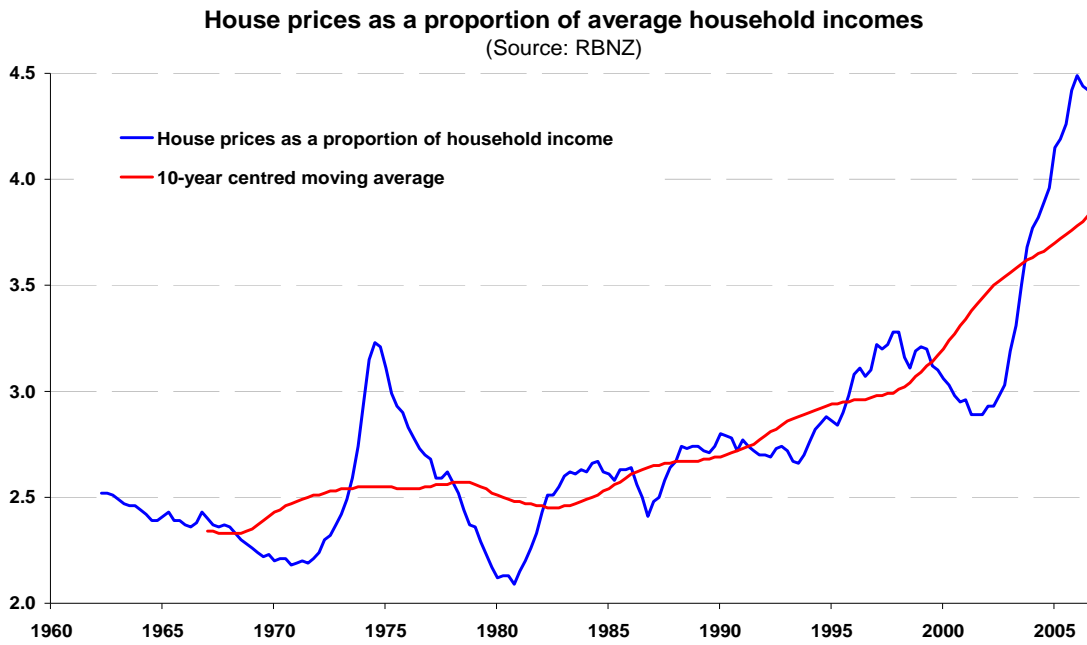


Figure 10. Disaster Magnification

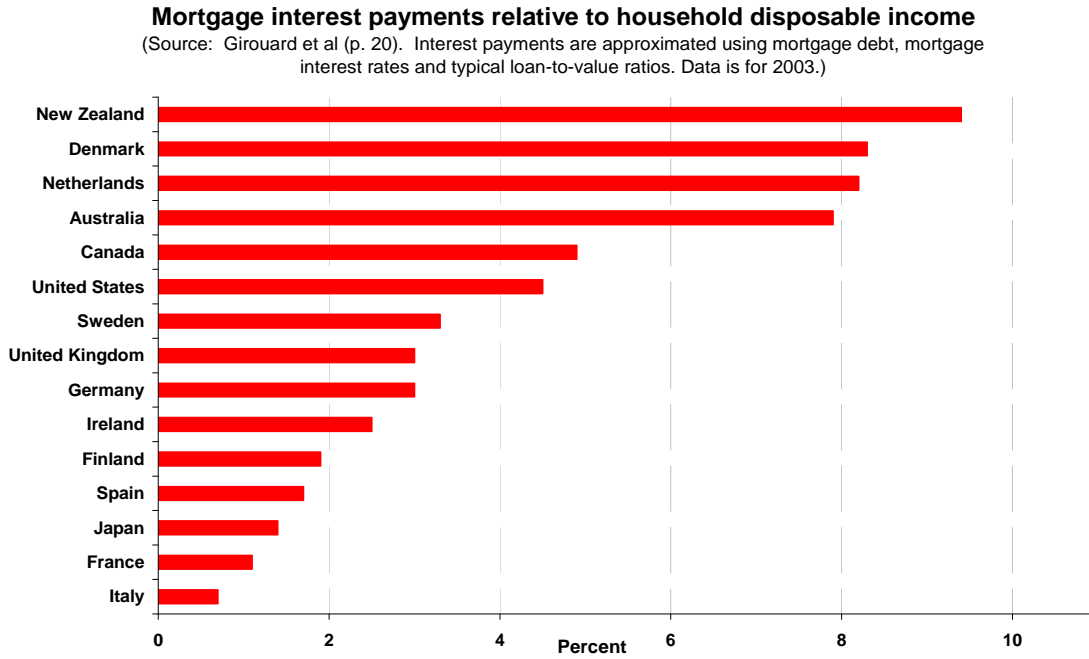




**Figure 11. The Price-to-Income Ratio in New Zealand**

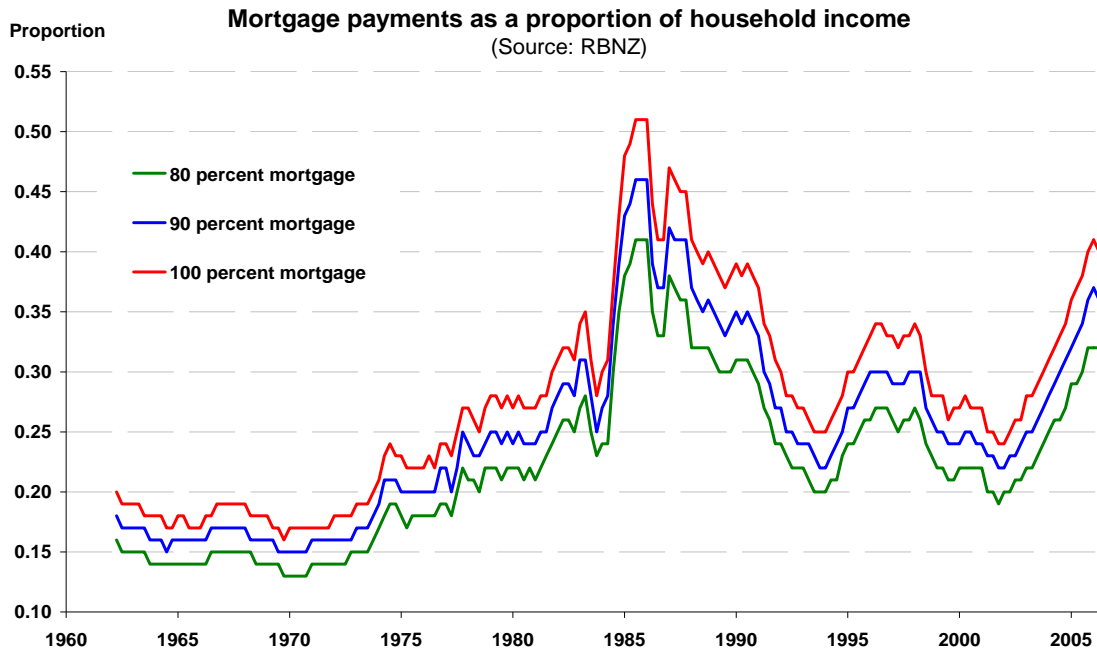


**Figure 12. Mortgage Interest Payments as a Proportion of Household Disposable Income for Selected Members of the OECD**



Source: Girouard et al (2006, p. 20). Interest payments are approximated using mortgage debt, mortgage interest rates and typical loan-to-value ratios.

**Figure 13. The Evolution of Mortgage Payments as a Proportion of Household Income in New Zealand, 1962-2005**

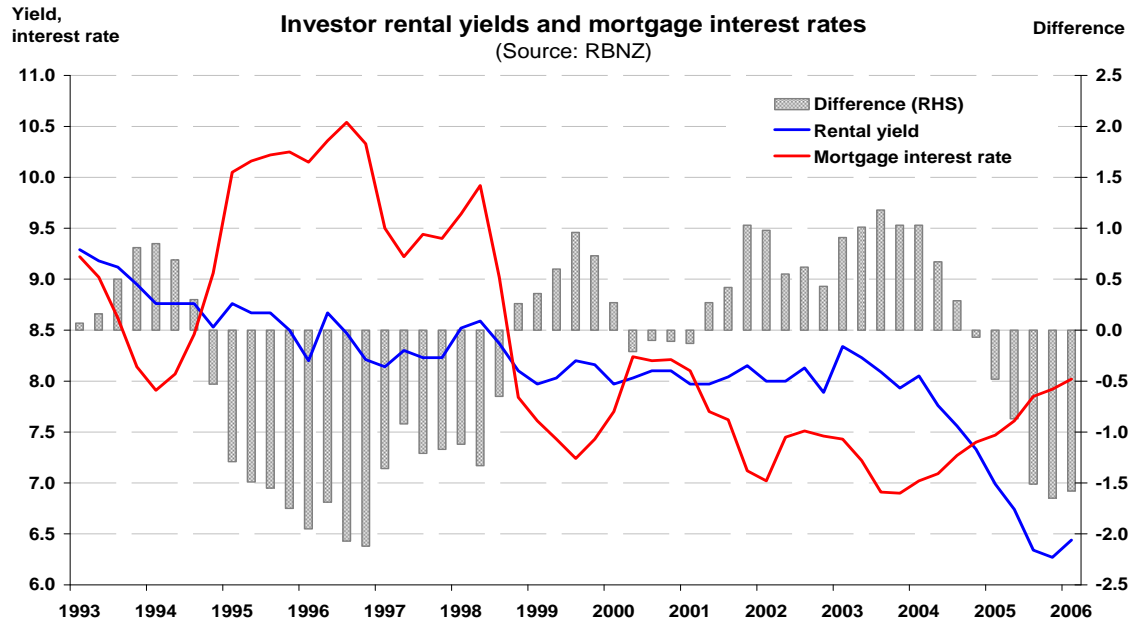


**Figure 14. Extent of Overvaluation Based on Price-to-Rent Ratios Relative to User Cost Ratios for Selected OECD Countries, Yearend 2004**

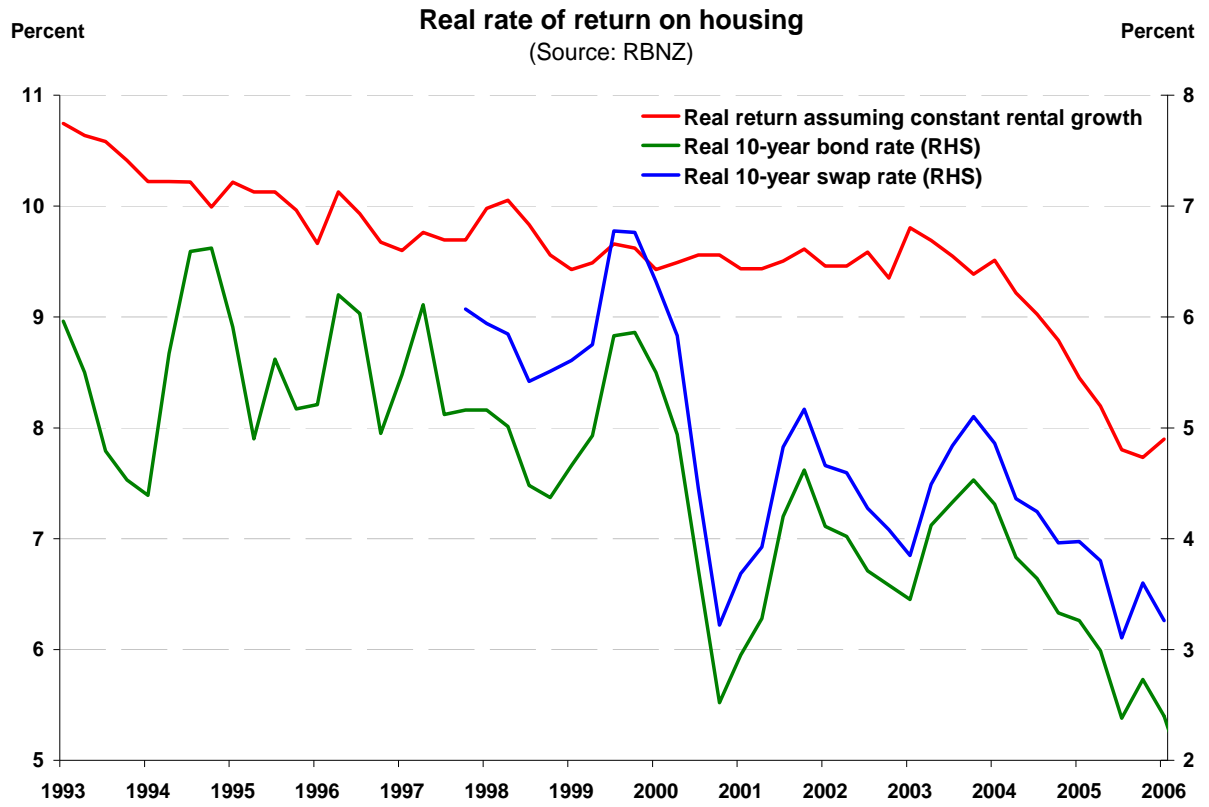
<b><u>Possible Overvaluation</u></b>	<b><u>Possible Slight Overvaluation</u></b>	<b><u>Negligible Evidence of Overvaluation</u></b>	<b><u>Possible Undervaluation</u></b>
<b>United Kingdom</b>	<b>France</b>	<b>Finland</b>	<b>Japan</b>
<b>Ireland</b>	<b>Canada</b>	<b>Italy</b>	<b>Germany</b>
<b>The Netherlands</b>	<b>Denmark</b>	<b>The United States</b>	<b>Switzerland</b>
<b>Spain</b>	<b>Sweden</b>		
<b>Australia</b>	<b>New Zealand</b>		
<b>Norway</b>			

Source: Table is based on Girouard et al (2006, p. 22)

**Figure 15. The Evolution of Rental Yields and Mortgage Interest Rates, 1993-2005**



**Figure 16. Imputed Required Return on Rental Housing versus 10-Year Bond and 10-Year Swap Rates**

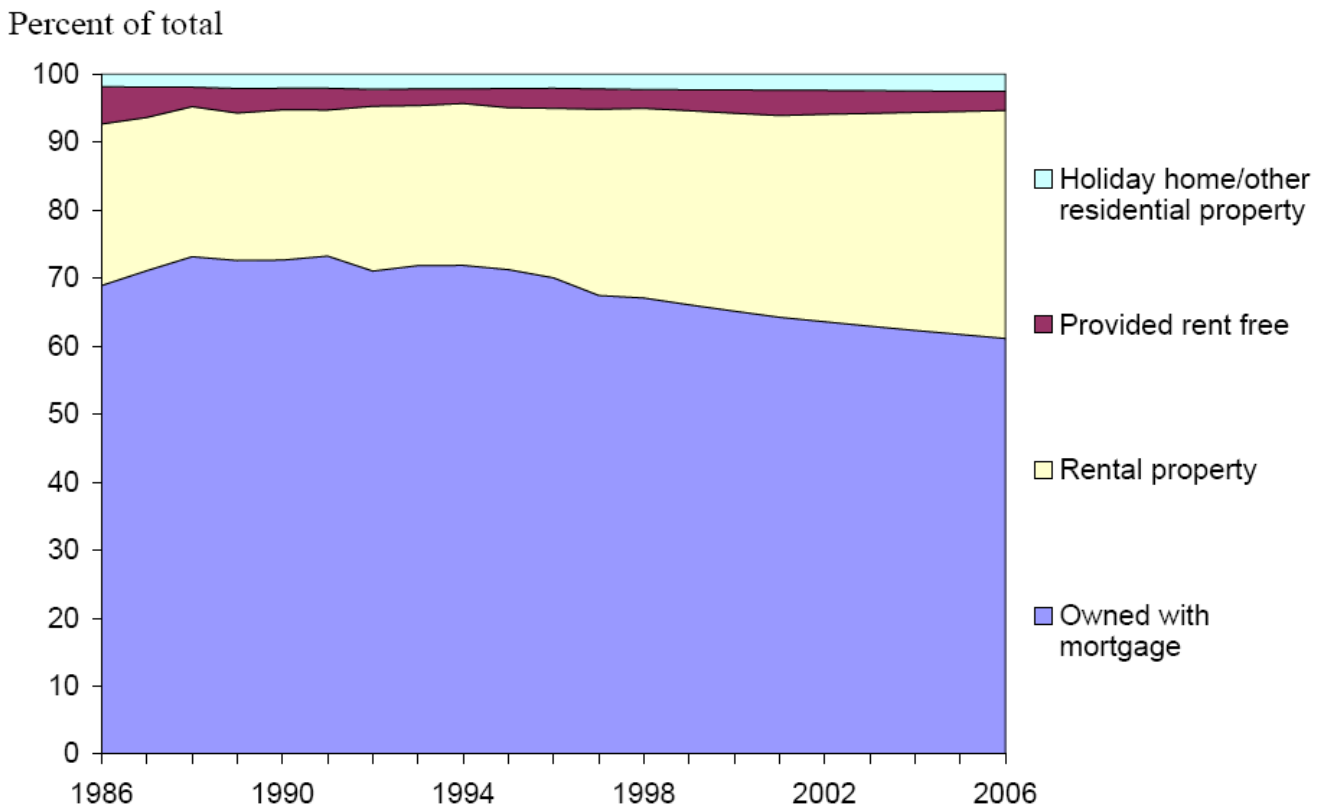


**Figure 17. Costs of Enforcing A Debt Contract in New Zealand vs. Other High Income Countries**

	<b>Time (years)</b>	<b>Cost (% of debt)</b>
<b>New Zealand</b>	<b>0.67</b>	<b>4%</b>
<b>Australia</b>	<b>0.58</b>	<b>8%</b>
<b>High Income Countries</b>	<b>1.51</b>	<b>9%</b>

Source: Table 2 in “Debt Enforcement around the World,” by Simeon Djankov, Oliver Hart, Caralee McLiesh and Andrei Shleifer, December 2006. These results are based on a survey of insolvency practitioners from 88 countries who were presented with an identical case of a hotel about to default on its debt.

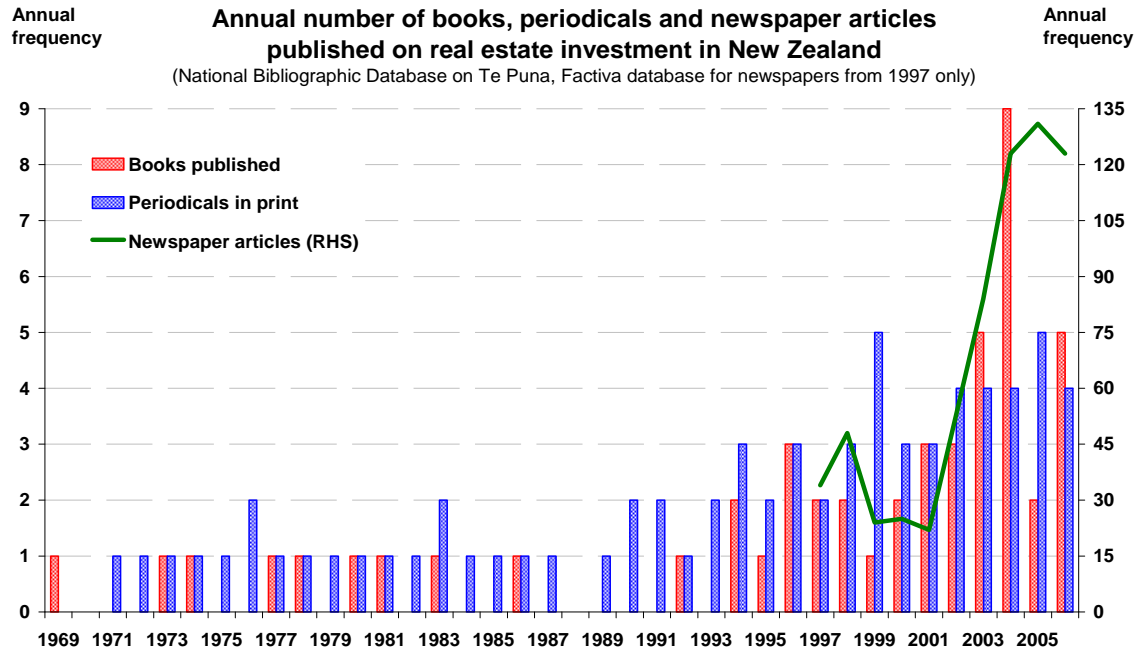
**Figure 18. The Estimated New Zealand Mortgage Debt by Property Type**



Source: Reserve Bank of New Zealand



**Figure 19. Media Attention to Real Estate Investment**

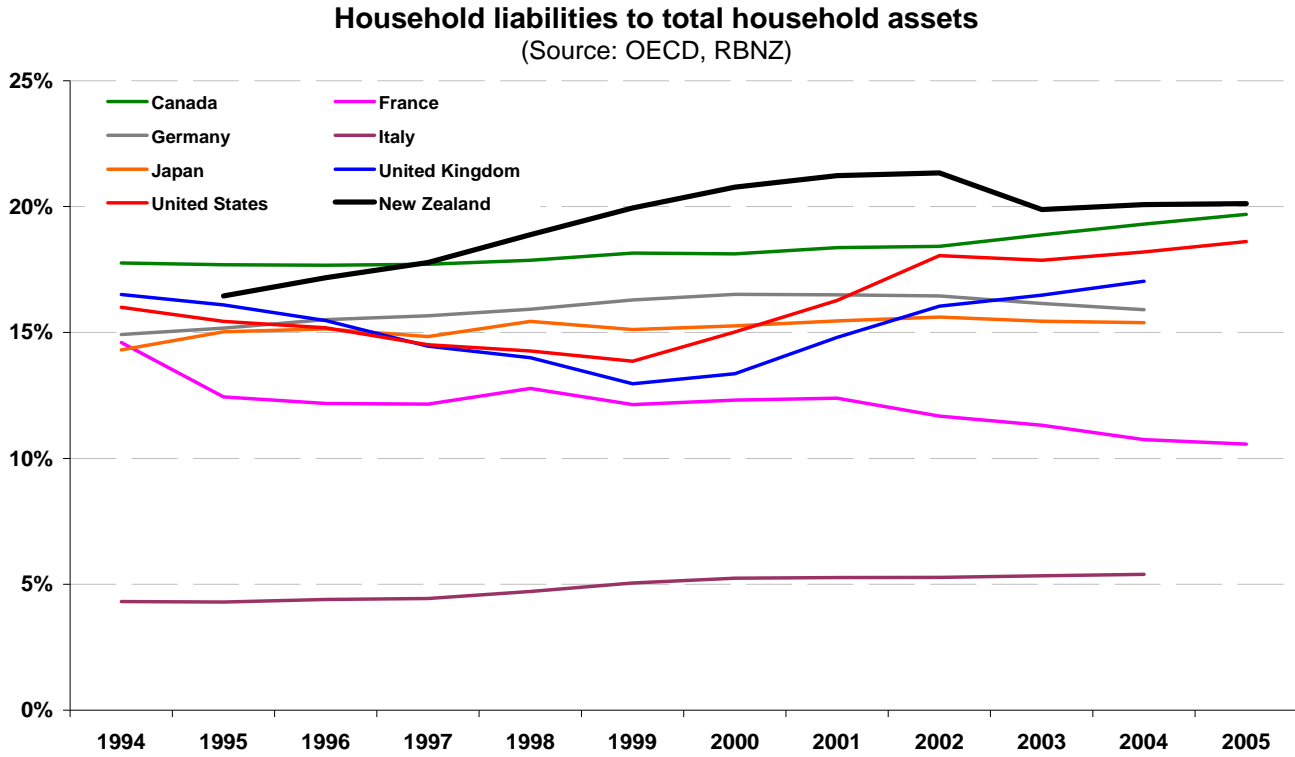


**Figure 20. Taxation in New Zealand Favors Returns on Housing**

<b>Asset</b>	<b>Post-tax return as % of pre-tax return</b>
Housing	93
Funds held in financial institutions	67
Private shareholdings	67
Passive investment funds	67
Managed funds	52

Source: OECD (2000, p. 154). The calculations are based on average annual nominal returns (1970-98). The underlying data are to be found in Joint Working Group – Treasury Officials and ISI (1999), “Savings Rates and Portfolio Allocation in New Zealand,” New Zealand Treasury Working Paper No. 1999/9.

**Figure 21. Household Liabilities Relative to Total Household Assets for Selected OECD Countries, 1994-2005**



Source: OECD and Reserve Bank of New Zealand

## **Appendix: Basel II and Mortgage Lending**

Kupiec (2006) provides a critical review of the AIRB approach that addresses not only the logic used to set minimum capital requirements but also the way in which it is being implemented. The Basel Committee has adopted a soundness standard intended to ensure that there is at least a 99.9 percent probability that each bank will remain solvent over the coming year. The Basel II capital charge should, in principle, be large enough to cover all but the most unlikely losses – losses that would occur with a probability of .0001 or less. The regulatory model attempts to depict the distribution of potential credit losses through a single factor model that calculates the default rate for a large, well-diversified portfolio of mortgages.<sup>78</sup> With addition of an assumption about the LGD and EAD for each loan the modeled default rate can be transformed into a distribution of credit losses. The correlation assumption is “reverse engineered” to produce an AIRB capital requirement approximately equal to those produced by a group of large internationally active banks (Basel Committee, 2005, p. 14).

Even if the probabilities of default could be estimated with precision, the treatment of LGD, EAD, correlation and maturity all raise troubling issues. First, LGD and EAD are clearly not constants. In fact, they are likely to vary with the probability of default. In recessions, when probabilities of default tend to increase together, losses given default are likely to rise as well. And, to the extent that households can draw on home equity lines of credit, exposures might also be expected to increase. In addition, Kupiec (2006, p. 11) observes that several independent studies have found default correlations increase as the credit quality of a portfolio declines. For all these reasons (and because the regulatory model also ignores concentration risks), it is likely that the

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<sup>78</sup> This implicitly ignores concentration risks, which are to be considered under Pillar 2 discussed below.

regulatory model underestimates the regulatory capital necessary to achieve the targeted 99.9 percent level of safety.

In addition, Kupiec (2006, p. 17) notes that the regulatory model sets minimum capital requirements without regard for a bank's need to pay interest on its own liabilities. He shows (Kupiec, 2006, p. 21) this results in "a soundness standard... [that] will decline (i.e., the probability of default will increase) when interest rates are high.... Conversely, AIRB capital standards engender the strictest solvency standard when interest rates are low."

For both of these reasons – because the regulatory model fails to deal with concentrations of credit risk and correlations among the LGD, EAD and probability of default and because the minimum is set without regard for the interest banks must pay to finance exposures to credit risk -- capital charges may need to be substantially higher to reach the targeted level of safety.

Supervisors are supposed to deal with a number of risks that are not captured in the Pillar 1 regulatory model under the Pillar 2 supervisory review process. Three of these risks may be especially relevant for institutions that specialize in mortgage lending: interest rate risk, concentration risk and cyclical factors. With regard to interest rate risk,<sup>79</sup> banks must report to the supervisor the changes in economic value relative to capital they would experience in the event a designated interest rate shock should occur. This result would be based on the bank's own internal measurement systems. The supervisor's role is to determine whether the bank is holding capital commensurate with

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<sup>79</sup> Relative to the difficulties in quantifying credit and operational risk, it is straightforward to measure interest rate risk. The US Office of Thrift Supervision has done so quite effectively for a decade. Nonetheless, the Basel Committee has chosen not to designate a specific capital charge for interest rate risk, but rather to treat it as a matter for supervisory review.

its exposure to interest rate risk. If the supervisor finds that a bank's exposure is too large relative to a bank's capital then the supervisor should require that the bank reduce its exposure and/or increase its capital.<sup>80</sup>

The Basel Committee (2006, p. 228) has observed the credit concentration risks are "arguably the single most important cause of major problems in banks." The regulatory model that generates the Pillar 1 capital charges, however, relies on the assumption that credit risk portfolios are perfectly diversified and so does not take account of concentration risks. Under Pillar 2, the supervisory authorities are supposed to oversee the bank's own policy and procedures for dealing with concentration risks and require that exposures be reduced and/or capital be increased if they are not satisfied that a bank's concentration risk is not commensurate with its capital. It is not clear how (or whether) these guidelines will be applied to banks that specialize in mortgage lending in a setting where the repayment record has been quite strong and the does not include a housing bust that adversely affected many borrowers at the same time.

Finally, Basel II charges the supervisors with the responsibility of overseeing stress tests of the internal ratings based inputs to the regulatory model. This may include the specification of stress scenarios and requirements for how the stress tests should be conducted. In the case of mortgage lending this will surely include a consideration of how the PD and LGD may vary over the business cycle and in response to a variety of shocks. It should also include a consideration of direct and indirect effects and draw on international experience to augment the limited amount of data available domestically.

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<sup>80</sup> Since the repricing interval on mortgages in New Zealand is relatively short, most of the exposure to an interest rate shock is transferred to the borrower. It should be relatively easy for New Zealand banks to hedge their exposures to interest rate risk, if the interest rate shock is more than borrowers can bear it will come back to haunt banks as credit risk.

See Hampton and Harrison (2006) for an innovative approach to specifying a stress scenario.

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