Regime Switches in Property Market Risk Premiums:
Some International Comparisons

Patrick J. Wilson
John Okunev
Tiffany Hutcheson

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by

Patrick J. Wilson
School of Finance and Economics
University of Technology, Sydney

and

John Okunev
School of Banking and Finance
University of New South Wales

Tiffany Hutcheson
School of Finance and Economics
University of Technology, Sydney

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Introduction

There has been considerable interest in recent times in studying the nature of the process generating the risk premium in financial assets (stock) markets. A couple of years ago Ibbotson and Associates held a conference to examine this important issue. The discussion at this conference showed quite clearly that there does not seem to be any consensus as to what the appropriate value of the equity risk premium might be. This clearly begs the question as to what an appropriate value of the risk premium in securitised real estate may be and how this may reflect market behaviour? To estimate this we model the risk premium implied from the information contained in the price of securitised property shares traded on the stock exchange. We examine these estimates for evidence of regime changes and we undertake cross-country comparisons to ascertain the extent to which the risk premium, under our model, varies.

There have been numerous studies examining the dynamics of the risk premium process and also what factors are important in explaining the risk premium. Papers by Copeland (1982), Fama and French (1988), Finnerty and Leistikow (1993), Reichenstein and Rich (1993), Kairys (1993) and Boudoukh, Richardson and Smith (1993) have all adopted different approaches in attempting to study the risk premium.

For example, Copeland (1982) models ex post holding period returns as composed of an ex ante expected return plus a component of unanticipated return, which may be negative or positive depending whether investors under or over estimate expected returns. Using annual observations on Standard and Poor (S&P) composite stock index and corporate bond index for the period 1926-1978, he concludes that the holding period return spread overestimated the true market risk premium.

Fama and French (1988) argue that the market risk premium tends to revert slowly to its mean, with reversion often taking a few years. Finnerty and Leistikow (1993) model ex post risk premium of various asset classes as a mean reverting process, and find that the risk premium is mean reverting for some asset classes towards a time dependent long term mean for the period 1926-1989. Their model fails to detect mean reversion in the equity risk premium. Finnerty and Leistikow's conclusions have, however, been questioned by Ibbotson and Lummer (1994) on the grounds that they are not supported by their empirical evidence.

Reichenstein and Rich (1993) adopt an ex ante approach and model the long horizon S&P stock returns in terms of the earnings price ratio, dividend yield and the value line forecasts of the risk premium. Their results are similar to those of Fama and French (1988) and Campbell and Shiller (1988) in terms of improved explanatory power with longer term investment horizons. Their study focuses on the more recent time frame of 1968-1990 and shows that risk premiums based on forecasts instead of historical data, provides more consistent predictions of stock returns than either dividend yield or earnings price ratio.

As a first objective in this paper we model the risk premium implied from the information contained in the securitised property price. Using a conventional discounted dividend model, and
making certain assumptions on growth in dividends, we are able to infer the expected risk premium.

It seems reasonable to suppose that such risk premia follow a cyclical pattern. For instance Rich and Reichenstein (1993) argue that a rise in the risk premium for common stock (generated by some shock in the market place - i.e. changed economic circumstances) provides a signal that the stock is overpriced thereby leading to an ensuing fall in this price. That is, when the risk premium is high relative to its long term average the market is concerned about the security of the investment and therefore an extra return is demanded. There is no reason to suppose that risk premia provide signals that are any different in securitised property markets. Certainly there is evidence of cyclical patterns in both physical and securitised property markets. For instance in the US property market: Born and Pyhrr (1994) found that traditional appraisal models that did not explicitly take cyclical fluctuations into account were likely to produce unrealistic valuation estimates - properties being over- or undervalued relative to true market conditions; Irwin and Landa (1987) found cyclical patterns for unleveraged real estate returns with a period of about eight years; Grebler and Burns (1982) found non-residential US construction cycles of about seven years while Wheaton (1987) found office building construction cycles in the US of about ten to twelve years. Research has also produced evidence of cyclical patterns in UK property markets. For instance Barras and Ferguson (1985) used spectral techniques to identify building cycles ranging from four years to twenty years in the United kingdom. In a more recent study for the Royal Institution of Chartered Surveyors Key, Zarkesh, MacGregor and Nanthakumaran (1994) used variations in the rate of all-property return to examine cyclical activity in the UK property market. This study found property cycles ranging from three to nine years duration. Finally, in a recent paper presented to the 14th ARES Conference in Monterey, Wilson and Okunev (1998) using spectral techniques found evidence of cyclical patterns in real estate return data for the US, the UK and Australia.

It is reasonable to suppose that such cyclical patterns in the property market are being driven by underlying economic forces that are reflected in the market's assessment of the risk of real estate investment. If fluctuations in risk premia do provide the signals to expected price changes as suggested by Rich and Reichenstein (1993), then risk premia estimates may be viewed as an indicator of anticipated price change in the market. This raises the question as to how we might take advantage of this information. A second objective of this paper, then, is to examine the risk premia estimates produced using the discounted dividend model for evidence of regime switches that may be used to indicate when the market has entered a new phase or state. Here we follow the approach of Hamilton (1989, 1990) who develops a Markov regime switching model to estimate the likelihood of a turning point occurring in the series (regime shift) given information about the current regime and past states of the series.

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2 Hamilton's work is based on the Markov switching regression models developed by Goldfeld and Quandt (1973). It assumes that the stationary process underlying the series is non-linear then considers the implications if such a process is subject to underlying shifts in regime. Under this assumption of non-linearity recent research has also seen the development of transition autoregressive models popularised by Tong (1990) and Terasvirta and Anderson (1992) (with recent application in the real estate market by Lizieri, Satchell and Dacco (1996))
The layout of the paper is as follows: Section One develops risk premia estimates for securitised property in each of the United States, the United Kingdom, Australia and Japan. The data are also briefly described in this section; Section Two applies Hamilton’s Markov regime switching model to produce probability estimates of likely changes in the market’s assessment of the risk of property investment in each of the countries under study; Section Three presents a brief conclusion.

SECTION ONE

Data Description

Due to differences in availability of data across countries we present all risk premia estimates from January, 1980\(^3\). To represent securitised property in the United States we use the monthly Real Estate Investment Trust (REIT) series through to the end of 1995. In particular we use the ALLREIT series. REITs are investment companies with a particular set of restrictions regarding real estate investment (e.g. there must be at least 100 owners, no real estate dealer activities, at least 90% of income derived from real estate, must distribute at least 95% of income, at least 75% of assets must be in real estate and cash etc.). The ALLREIT series represents a combination of the various REITs series such as MORTGAGE, EQUITY, HYBRID etc. EQUITY REITs invest in real estate equities on a long-term basis, with their principal source of income being rents. They invest in real properties such as apartment buildings, office and industrial buildings and shopping centres. MORTGAGE REITs frequently finance every phase of a real estate venture including acquisition of land, its development and the construction of the building and other improvements. They also invest in permanent mortgages on residential and commercial properties. All the series are value-weighted. For the United Kingdom we use the monthly Financial Times All Property (FTAP) data series through to October 1996 (as available from Datastream International). The FTAP series includes all companies involved in real estate (developers, dealers etc.) For other countries the quality of the data is not as good as that available for the United States and the United Kingdom. In both Australia and Japan we use the securitised property series developed by Datastream International through to September 1997. Initial risk premia estimates are developed in local currencies with base periods set to January 1980.

Methodology for Modelling the Risk Premium

To estimate the risk premium associated with investing in securitised property we make the initial assumption that shares in securitised property trade in the market place in much the same manner as common stock. It is well documented that the share price for common stock represents the discounted value of the expected future dividend stream. Using this definition and under our assumption of similarity the price for securitised property can be represented by:

\[ \text{Price} = \text{Expected Future Dividends} \times \text{Discount Rate} \]

\(^3\text{Data was available from January, 1970 for the UK, from January, 1972 for the US and from January, 1973 in other cases. However data prior to 1980 was used for model initiation and ‘windowing’ as described later.}\]
\[ P(t) = \sum_{t=1}^{\infty} \frac{D(t+i)}{(1+k)^i} + \frac{P(t+n)}{(1+k)^n} \]

where \( P(t) \) is the securitised property price at time \( t \), \( D(t) \) is the dividend paid at time \( t \) and \( k \) is the cost of capital (the discount rate).

To implement the analysis we further assume that the growth in dividends from initial investment to the current period will be maintained. Call this our current information model. Consider this for a conventional (perpetuity) discounted dividend model where, if we know the price at time \( t \), and under our dividend growth assumption above, the discount rate is easily extracted:

\[ P(t) = \frac{D_1(1+g)}{k-g} \]

Figure 1 displays the discount rate if investors use available information on the growth in dividends from initial investment to the current period.

![Figure 1](image)

The implied risk premium is obtained by subtracting the risk free interest rate (long term government bond) from the implied discount rate. Figures 2 through 5 present these risk premia estimates for each of the study countries through the eighties and nineties (these are presented both in domestic currencies to better reflect local investor response to local economic factors, and in US dollars to reflect possible international response to various domestic economic conditions). Comparing the US with the UK both the exchange adjusted and domestic currency risk premia
estimates suggest there were possible arbitrage opportunities for investors in securitised property over the study period. This is because low risk premia estimates in one market compared with the other imply that investors in this market believe property may be overpriced relative to the way investors in the other market view property in that market.

The lower value and lower volatility of the risk premia estimates for Japan in figure 4 probably reflects the generally more stable economic conditions in that country throughout the study period. The low value of risk premium in Figure 5 suggests that arbitrage opportunities may have emerged between Japanese and Australian securitised property markets in the nineties as the risk premia estimates moved in opposite directions.
SECTION TWO

Regime Switching Methodology

In the current context a regime refers to a particular state or phase in which a time series may find itself. For instance, if we are studying risk premia estimates over time we might refer to the time series as being in a rising phase or a falling phase. That is, we might dichotomise the time series and suggest that there are only two regimes for risk premia, rising or falling. In any such analysis, of course, we might introduce several other regimes. For instance, we might introduce two further regimes into rising or falling depending on whether the change was proceeding at an increasing or decreasing rate, and so on ... Changes in regime are often handled by the introduction of dummy variables into an autoregressive (or other) model so that the level of the modelled series changes according to whether certain conditions are in effect or not. For example, the abolition of negative gearing as an allowable taxation deduction had a marked and dramatic effect on property investment in Australia (decrease in property investment), and had a similar dramatic effect upon its re-introduction (increase in property investment). One of the difficulties with this approach is that, if we wish to forecast the series for $n$-periods ahead we have no knowledge as to whether the level of the series will change during our forecast period, that is we have no knowledge of which process is likely to best describe the data.

As a means of dealing with this problem Hamilton (1989, 1990) postulated the change in regime should, itself, be viewed as a random variable. In that case a complete time series model would include a description of the probability law governing the change from one regime to the next. Hamilton (1989, 1990) further postulated that a Markov process provided a means of describing such probability laws. A Markov process (or chain) is a stochastic process in which the probabilities associated with the outcomes at any stage of the process depend only on the outcomes of the preceding stage. Such a process can be explained as follows. Suppose a history of securitised property price movements suggests the following pattern: if the average price in a given month is higher than the previous month, then the probability that the following month’s average price will be higher, unchanged or lower is 0.2, 0.3 and 0.5 respectively. If the average price is unchanged from the previous month, then the probability that the average in the following month closes higher, unchanged or lower is 0.5, 0.2 and 0.3 respectively. Finally, if the average in a given month is lower than the previous month, then the probability that the average in the following month closes higher, unchanged or lower is 0.4, 0.4 and 0.2 respectively. These are the transitional probabilities in moving from one state (e.g. higher) to another state (e.g. lower). This information can be summarised in the following tree diagram:
Figure 6
MARKOV CHAIN OF TRANSITIONAL PROBABILITIES

We can estimate the probability of the average price in the next period being higher given the probability of being in the current state (considering previous possible states) as:

\[ P(H|H,H) + P(H|U,H) + P(H|L,H) = 0.04 + 0.15 + 0.2 = 0.39. \]

We can do this for each regime or state, hence we can estimate the probability of switching from one regime to another. The transitional probability matrix is given as:

<table>
<thead>
<tr>
<th>Current State</th>
<th>State 1</th>
<th>State 2</th>
<th>State 3</th>
<th>...</th>
<th>State n</th>
</tr>
</thead>
<tbody>
<tr>
<td>State 1</td>
<td>( b_{11} )</td>
<td>( b_{12} )</td>
<td>( b_{13} )</td>
<td>...</td>
<td>( b_{1n} )</td>
</tr>
<tr>
<td>State 2</td>
<td>( b_{21} )</td>
<td>( b_{22} )</td>
<td>( b_{23} )</td>
<td>...</td>
<td>( b_{2n} )</td>
</tr>
<tr>
<td>State 3</td>
<td>( b_{31} )</td>
<td>( b_{32} )</td>
<td>( b_{33} )</td>
<td>...</td>
<td>( b_{3n} )</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>State n</td>
<td>( b_{n1} )</td>
<td>( b_{n2} )</td>
<td>( b_{n3} )</td>
<td>...</td>
<td>( b_{nn} )</td>
</tr>
</tbody>
</table>

For instance in the previous example the transitional probability matrix is:

<table>
<thead>
<tr>
<th>Current State</th>
<th>State 1</th>
<th>State 2</th>
<th>State 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>State 1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>State 2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>State 3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
</tr>
</tbody>
</table>
This is a stochastic probability matrix provided: (i) \( b_{ij} \geq 0 \) for all \( i, j \) and (ii) for any row \( i \sum b_{in} = 1 \) for \( j = 1, \ldots, n \) (i.e. the sum of the entries in each row is 1).

For his regime switching process Hamilton (1989) formulates the following model - let any series \( \{y_t\} \) be a first differenced series fully described by:

\[
y_t = a_1 s_t + a_0 + z_t
\]

where \( z_t \) is a first differenced zero mean series following an ARIMA(1,1,0) process:

\[
z_t = \phi_1 z_{t-1} + \phi_2 z_{t-2} + \cdots + \phi_p z_{t-p} + \epsilon_t
\]

and \( s_t \) refers to a particular state or regime at time \( t \), and \( a_0 \) and \( a_1 \) are parameters to be estimated. In the model \( y_t \) is observed, but \( z_t \) and \( s_t \) are not. Postulating that a Markov process describes the transitional probability of moving from one state to another Hamilton (1989) shows how the following basic filter accepts as input the joint conditional probability:

\[
P[S_{t+1} = s_{t+1}, S_{t+2} = s_{t+2}, \ldots, S_{t+r} = s_{t+r} | y_{t+1}, y_{t+2}, \ldots, y_{t+r}]^5
\]

and has as output the probability of being in the current regime:

\[
P[S_t = s_t, S_{t+1} = s_{t+1}, \ldots, S_{t+r} = s_{t+r} | y_{t}, y_{t+1}, \ldots, y_{t+r}]^6
\]

The model also outputs the conditional likelihood of the current value of the series given previous values of the series:

\[
f(y_t | y_{t+1}, y_{t+2}, \ldots, y_{t+r}).
\]

Where \([s_0, s_{t-1}, \ldots, s_{t+r}]]\) denotes the \( r \) most recent values of \( s \) and \([y_0, y_{t+1}, \ldots, y_{t+r}]]\) refers to the complete history of \( y \) observed through date \( t \). An estimate of the probability of moving from one state to the next is obtained from a history of the data and an estimate of the number of previous states to take into consideration in evaluating conditional probabilities is obtained from an ARIMA(1,1,0) model fitted to the original data series.

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4 For which the algorithm is fully described in his papers (Hamilton, 1989 and 1990).

5 Following Hamilton (1989) capital letters denote the random variable and small letters a particular realisation.

6 Hamilton points out that this specification "... refers to a vector consisting of 2 elements. For example, suppose \( r=4 \). The element indexed by \((1,0,1,1)\) denotes the probability that \( s_{t+1}=1, s_{t+2}=0, s_{t+3}=1 \) and \( s_{t+4}=1 \). These 16 probabilities sum to unity by construction, and represent an inference about the unobserved state \((s_{t+1}, s_{t+2}, s_{t+3}, s_{t+4})\) based on the observations of \( y \) through date \( t-1 \)." (Hamilton, 1989, p.367).
Finally we should note that the Markov regime switching model requires a minimum of two states and a minimum order of 2 in the autoregression model to cope with the four possible outcomes: S(0,0), S(0,1), S(1,0) and S(1,1) given any arbitrary starting point. This can be visualised in the following tree diagram:

![Figure 7]

Identifying Switches of Regime in Risk Premia Estimates

To initiate his model testing on US real GNP Hamilton arbitrarily chose an AR(4) model as his representation of the unobservable $z_t$ series. In our analysis we chose the most parsimonious AR($r$) model of the $y_t$ series to provide initial autoregressive parameter estimates of the unobserved $z_t$ series subject to the constraint that $r \geq 2$. In all cases an AR(1) or AR(2) model represented the most parsimonious model choice hence, due to above stated restriction, an AR(2) model was used in all cases.

Since computation times are quite substantial we chose to limit the number of regimes to the simplest two regime model where we refer to the risk premia regimes as rising or falling. Table 1 contains the maximum likelihood estimates for parameters in the Markov switching model for the risk premia estimates in each country under study while figures 8, 10 and 12 present a visual impression of the inferred probability of a regime switch. Overlayed on each inferred probability series is the estimated risk premia series in levels.

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7 All series were first difference stationary.
TABLE 1
Markov Process Switching Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>United States</th>
<th>United Kingdom</th>
<th>Japan</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_0$</td>
<td>0.678</td>
<td>0.699</td>
<td>-1.97</td>
<td>0.587</td>
</tr>
<tr>
<td>$a_1$</td>
<td>-0.848</td>
<td>-0.884</td>
<td>0.27</td>
<td>-0.718</td>
</tr>
<tr>
<td>$\phi_1$</td>
<td>0.139</td>
<td>0.144</td>
<td>0.456</td>
<td>0.88</td>
</tr>
<tr>
<td>$\phi_2$</td>
<td>-0.168</td>
<td>-0.088</td>
<td>0.486</td>
<td>-0.085</td>
</tr>
</tbody>
</table>

A reasonable decision rule on a regime switch might be that a switch has occurred if the probability of being in the current regime based on past information exceeds 0.5, for example $P[S_i = 0|y_T, y_{T-1}, \ldots y_{s+1}] > 0.5$. To maintain a clear distinction on a regime switch we arbitrarily chose a decision rule of $P[S_i = 0|y_T, y_{T-1}, \ldots y_{s+1}] > 0.55$. In each of the following figures this probability is indicated by the short (solid) horizontal line. The probabilities are measured on the LHS axis and estimates for risk premia are shown on the RHS axis.

Figure 8

![Graph showing United States ALLREITs probability of switch to rising risk premia]

As can be seen in figure 8 using this decision rule the Markov process clearly isolated a switch in the market’s assessment of risk (to rising risk premia) in the US property market on about five occasions over the study period - about March 1980, September 1984, October 1987, August 1989 and June 1990. A visual inspection of figure 8 suggests that, in terms of the behaviour of the series this appears to be reasonable, although there are a couple of difficulties.
For example, although the risk premia moved up in March 1980, this higher level was not maintained for long. Also, the risk premia appeared to move to a higher state about March 1982, but the Hamilton model did not detect this. Other switches appeared to be correctly identified.

How useful was this information in terms of the apparent behaviour of investors in the market? The risk premium measures an investor’s aversion to risk. If the risk premium is low this implies that investors are prepared to take on more risk, and this usually occurs in a rising market. When the risk premium is high investors require an added premium to invest in risky assets. This usually occurs in falling markets. Behaviour in the marketplace may be more clearly visualised by standardising prices. Here we have standardised the ALLREIT total return index (i.e. inclusive of price and income) using a five year window. Given the differing estimates of cyclical behaviour in the property market (discussed earlier) a five year window was deemed a reasonable period to permit the dynamics of risk adjustment behaviour on the part of investors to be captured. The standardised index is shown in figure 9 and overlayed on this is the probability of a regime switch in risk premia from the previous diagram.

**Figure 9**
Interestingly the expected market behaviour is captured at the given periods. In March 1980 the market fell briefly, and the model captured this. In August 1984, while the market did not fall, it stabilised for a period before commencing a downward path. The model also captured the sharp market fall in late 1987. In July 1989 the market commenced a fall which was only briefly interrupted about May 1990, before commencing to fall once more. Disappointingly, however, other apparent falls in the market about mid-1983 and about mid-1993 were not captured by the model. However, referring back to figure 8 this market behaviour is not clearly reflected in the risk premia.

The dotted (short) horizontal lines above and below the RHS zero axis in figure 9 represent ±2 standard deviations from the five year mean for the standardised market index. Movements of the standardised index outside these bounds conveys additional information about likely market behaviour. In figure 9 it can be seen that when the index moved outside ±2 standard deviations the market changed direction within twelve months (and often within six months) of this movement. To present an overall picture of market behaviour both the regime switching model and the standardised lines need to be used in combination since, in isolation, both approaches fail to capture all behaviour. For example, the standardised lines fail to capture the downward movement in the US securitised property market in the late eighties/early nineties, whereas the regime switching model did capture this.

Figure 10 shows the regime switch risk premia model for the UK where we again show the probability of rising risk premia. The risk premia in the UK appeared to be more volatile than in the US over the same period and this is reflected in many more probability spikes, ten of which meet our decision rule criteria. Unfortunately some of identified risk premia rises appear relatively minor, although a long rise commencing about July 1990 was clearly identified. In figure 11 we superimpose the probability of risk premia rising on a standardised total returns index for the UK property market to ascertain what this tells us about market behaviour. The probability of risk premia rising should be indicative of the likelihood that the market will fall. In this regard the model produced only two false alarms - about July 1980 and January 1986. In all other cases the model correctly identified a market fall, although these were often minor and relatively short lived (in many cases the market was well into the process of falling when a fall was identified). More noteworthy, however, is the regularly identified falling market from about January 1989 through the early 1990s.
In figure 11 we have again inserted the ±2 standard deviation boundary lines using a five year window for the mean. As was the case with the US market, when the standardised index moved outside these boundaries the market changed direction within twelve months (and usually within six months). In contrast to most instances with the regime switching model, the
standardised boundary model provided a lead time for likely changes in market behaviour.

The probability of risk premia rising is shown for the Australian property market in Figure 12. Again there appeared to be a great deal of uncertainty in this market and this uncertainty is reflected in a very large number of probability spikes indicating the likelihood of risk premia rising (and the market falling). In all there were seventeen probability spikes that satisfied our decision criteria and in the majority of cases the risk premia had already commenced to rise, that is the regime switching model operated with a more pronounced lag effect than in the US or UK markets.

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8 It should be noted, again, that the data for Australia and Japan is from a different source than that for the US and the UK. The data for Australia and Japan comes from indices that are actually constructed by Datastream International.
We again asked what this indicated to us regarding behaviour in the property market. Figure 13 superimposes the probability of a regime switch in risk premia on the total returns index (standardised using a five year window) for the Australian securitised property market. Here we see that on about five occasions where the probability spikes indicated a high probability of risk premia rising the market was either in the process of falling, or fell shortly thereafter. However there were several occasions when the regime switch model did get the signals totally wrong, and the market actually rose. Also in figure 13 we have again supimposed the ±2 standard deviation boundary lines (the Australian market was mostly above its five year mean). As was the case with the US and the UK, when the standardised index moved outside the boundary it signalled that a change in direction was imminent. In the mid-eighties, however, this procedure did not perform well since the market actually fluctuated above the two standard deviation boundary for several years before eventually falling.

As shown in figure 14 the regime switching model appeared overly sensitive and performed poorly when applied to risk premia in the Japanese securitised property market. Using the previous decision rule the model appeared, in the majority of cases, to identify a switch to rising risk premia when risk premiums had already peaked. Furthermore, as was sometimes the case in the Australian and other markets, the risk premium rise was often small and short lived. Interestingly, however, when the probability of a switch to rising risk premia was superimposed on the standardised total returns index (figure 15) the model appeared to correctly identify market falls on most occasions, although again the falls were sometimes small and short lived. When the ±2 standard deviation boundary lines were superimposed on figure 15 it can be seen that this often signalled likely changes in the market although, as was the case with the Australian data set,
this procedure performed poorly in the mid-eighties since the market fluctuated above the two standard deviation boundary line for several years.

**Figure 14**

**PROBABILITY OF RISK PREMIA RISING**

**JAPANESE SECURITISED PROPERTY MARKET**

**Figure 15**

**MARKET BEHAVIOUR**

**JAPANESE SECURITISED PROPERTY MARKET**
SECTION THREE - Summary and Conclusions

This paper had two objectives viz: to estimate the risk premium associated with investment in securitised property in each of the US, the UK, Australia and Japan; and to use a Markov regime switching model in an attempt to discover whether our estimates of risk premia provided any signals on changes in market behaviour.

A conventional discounted dividend model was used to extract the discount rate assuming current knowledge of growth in dividends from initial investment to the current period (with this growth assumed to continue to the next period). Variations in the risk premium reflect investors’ aggregate belief in likely market movements. The risk premium measures an investor’s aversion to risk. If the risk premium is low this implies that investors are prepared to take on more risk, and this usually occurs in a rising market. When the risk premium is high investors require an added premium to invest in risky assets. This usually occurs in falling markets. Thus increases in the risk premium are indicative of a decline in the market price of the asset. To ascertain whether fluctuations in risk premia did yield information on market behaviour a Markov regime switching model was first applied to the risk premium estimates in each country. Using an arbitrary decision rule whereby a switch in regime was deemed to have occurred if the probability of such a switch exceeded 0.55 (given current and past information) a number of changes in state were isolated. In a large number of cases the probability ‘spikes’ in the Markov model occurred simultaneously with a change in state for the risk premia. The probability model was then superimposed on a standardised pattern of total returns for each country (using a five year ‘window’). In a relatively large number of instances across the study countries this procedure provided signals of either current or likely movements in the market - risk premium rises signalled a decline in the market. Unfortunately many such movements were relatively minor and short lived and in a few instances the signals were totally incorrect. As a further means of identifying likely market behaviour ±2 standard deviation boundaries were superimposed on the standardised return index for each country. In most instances this procedure signalled that the market would change within the following twelve months (and, more often than not, within the following six months). It is likely that some combined use of the Hamilton model and the standardised market procedure may provide a means of identifying changes in market behaviour that may prove useful to the portfolio manager.
References


Royal Institute of Chartered Surveyors  *Understanding the Property Cycle*, Published by RICS, 1994.


The BestFit Programme from Palisade Corporation was used to compare possible distributions. While a Chi-square test did not always support the hypothesis that the input distribution was normal, in a ranking of all open ended distributions using the Chi-square statistic a normal distribution was ranked number one and a studentised t-distribution was ranked number two for all countries.