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BUILDING APPROVALS AS A LEADING INDICATOR OF PROPERTY SECTOR INVESTMENT

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Abstract

Overall, building approvals for new houses (BANHs) are viewed by most economic analysts/commentators as a leading indicator of property investment due to the importance of this sector to the whole economy and employment. This study seeks shed some additional light on modelling this seasonal behaviour of BANHs by: (i) establishing the presence of seasonality in Victorian BANHs; (ii) ascertaining it as to whether is deterministic or stochastic; (iii) estimating out-of-sample forecasting capabilities of the modelling specification; and (iv) speculating on possible interpretation of results. The study utilises a structural time series model of Harvey. Factors corresponding to June, April, December and November are found to be significant at five per cent level. The observed seasonality could be attributed to both the summer holidays and the end of financial year seasonal effects. Irrespective of partially incomplete nature of this research, the findings should be appealing to, among others, researchers, all levels of Government, construction industry and banking industry.

Keywords: Property investment, Structural time series modelling, Building approvals for new houses, Summer holiday seasonal effect, End of financial year seasonal effect
JEL Classification: R30, R38

1. Introduction to Property Sector

This paper examines the impact of seasonal influences on Australian housing approvals, represented by the State of Victoria BANHs. All construction works in most countries have to be approved by the relevant government authority before building commences. In particular, BANH statistics are used to inform as to how many residential buildings are in the pipeline, that is, are expected to be constructed in the near future. In Australia, from July 1990, BANHs include all approved new residential building work valued at A$10,000 or more. Because BANHs provide timely estimates of future residential building work, BANHs statistics are viewed by many economic analysts/commentators as a leading indicator of property investment. Due to the importance of property sector to the whole economy, the general level of economic activity and employment, the data are relevance for the residential property sector as well as the property sector as whole. The demand for new housing fluctuates according to a range of determinants such as costs of building materials, finance costs (such as fees and interest rates) home buyer incentive schemes and employment opportunities. While non-residential building approvals can be viewed as an indicator of investment in a region, the local level residential building approvals are commonly viewed as an indicator of the availability of financial resources and commitment to live in an area.

In the years before the global financial crisis (GFC), Australian house prices rose faster than house prices in the United States of America (USA) and the United Kingdom (UK), implying that the then house price is a bubble.[1] House price bubble can be defined as situation when the behaviour of house prices satisfies at least one of the following four conditions: (i) house prices are significantly above its long-term average; (ii) house prices are significantly above comparable property prices in other economies; (iii) house price to house rent ratio is significantly above its long-term average, and (iv) house price to household income ratio is significantly above its long-term average.

During the GFC, compared to other developed countries, Australian economy proved much more resilient. According to the Australian Bureau of Statistics (ABS) (2010), Australian house prices fell from March 2008 to March 2009, by 5 per cent.[2] Nevertheless, already in the year to the last quarter of 2009, house prices increased by 15 per cent. The relentless house prices rises continued in the following quarter (the year to the first quarter of 2010), peaking at 20 per cent. The following yearly, quarter to quarter, house price increases retracted to much more moderate levels, e.g. from June 2010 to June 2009, from September 2010 to September 2009 and from December 2010 to December 2009, house prices increased by 16 per cent, 11 per cent and 6 per cent, respectively. Rising house prices, together with persistence of stabile financial and banking systems and prevalence of moderate interest rates, have maintained strong mortgage activity, encouraged overall consumer spending and as such supported Australian economic performance. The impact of the GFC on financial markets first became apparent in 2007. However, it was not until September 2008 that the Reserve

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[1] In the USA house prices peaked just before the GFC, in February 2006. By late 2006 house prices started to fall. Some argue that they are still to hit the bottom.

[2] Measured by the weighted average of the eight state / territories capitals.

Bank of Australia (RBA) responded with the first in a series of decreases in official interest rate (the cash rate). From September 2008 to April 2009 the RBA reduced the cash rate five times.[3] Subsequently, with the improvement in the economic condition the RBA started increasing the cash rate.

In fact, a high level of concern due to the emergence of the GFC existed in the Australian economy only in early 2009. This was short-lived owing to the effective and efficient fiscal and monetary policy measures undertaken by the Australian Government. By the end of 2009, the economic momentum began to lift. Speaking at an Australian School of Business (Australian School of Business 2009) alumni event, Australia's Treasury Secretary at the time, Dr Ken Henry, assessed the Australian Government's response to the GFC as follows: "the Rudd government's immediate announcement of the A$10.1 billion fiscal stimulation package, was timely, targeted and temporary". The aim of the initial stage of the fiscal strategy was to quickly increase household spending. This was achieved by making two sets of payments directly to households. The following stages of the fiscal strategy were characterised with investment in infrastructure and skill development, aiming to ensure ongoing fiscal stimulus once the initial boost from the payments directly to households abates.

The monetary policy response was also deemed a big success. In October 2009 the Australian Government announced that it would guarantee deposits and wholesale funding of Australian banks, building societies and credit unions. This was complemented with the monetary policy settings of the RBA, which, from the peak interest rate of 7.25 per cent in March 2008, eased cash rate to a low of 3.00 per cent in April 2009.

According to the ABS (2011), the Australian economy grew by 1.8 per cent in final three months of 2000 after the Government stimulus helped it shrug off the worst of the GFC. The growth of similar nature (1.9 per cent on average, between December quarter 2009 and March quarter 2011) continued in the following quarters.

The awareness of the sizeable impact of the property sector on the soundness of financial institutions and the level of economic activity is not a new observation. It is commonly accepted that the boom-bust nature of property prices plays an important role

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[3] The cash rate can be defined as interest rate paid by banks in the overnight money market in Australia and New Zealand. In other parts of the world other terms are used to identify the same interest rate, such as overnight LIBOR (the London Interbank Offered Rate) and overnight EURIBOR (Euro Interbank Offered Rate).

in explaining business cycles.[4] Typically, reducing housing prices tend to impose additional pressure on the banking sector. This happens not only because of increases in bad debts for mortgage loans, but also because of deterioration in the balance sheets of corporate borrowers that rely on property as collateral. Not surprisingly, fluctuation of housing prices and the extent to which they interact with the financial sector and the whole economy are very much of interest, among others, to the Government, the reserve bank and other financial regulators.

The conventional literature recognises for a long time that investment in housing and consumer durables lead non-residential business fixed investment over the business cycle (e.g. Burns and Mitchell 1946). Among others, this is corroborated by Fisher (2006), who observed that in seven of the ten post-war recessions in the USA, household investment achieved its peak and trough before business investment. Ball and Wood (1999) conducted comparative structural time series analysis of housing investment in advanced world economies. They looked at the impact of housing investment on the economy and concluded that housing investment fluctuations after 1960s become a destabilizing factor. This finding highlighted the significance of this category of investment and further accentuated the relevance of studies focusing on better understanding housing investment volatility.

As previously stipulated, the focus of this study is to examine the impact of seasonal influences on Australian housing approvals (represented by Victorian BANHs).[5] Victoria is geographically the second smallest state in Australia. It is also the second most populous state in Australia. Victoria has been selected as a test case because of its geographical homogeneity and economic relevance. Victoria is Australia's most urbanized state: nearly 90 per cent of residents living in cities and towns, it is the most densely populated state (22 people on square kilometre), and has a highly centralised population, with almost 75 per cent of Victorians living in the state capital and largest city, Melbourne. At the same time, the state of Victoria is the second largest economy in Australia, only after New South Wales, accounting for almost a quarter of the nation's gross domestic product (GDP).[6] All other Australian states are either geographically dispersed (cover a wide geographical region across different time and climatic zones) or

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[4] By strengthening the upswing and amplify the downswing.

[5] Australia has six states (New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia), and two territories (the Northern Territory and the Australian Capital Territory).

[6] According to the ABS (2011), in 2008/2009 Victoria contributed 22.6 per cent of the Australian GDP.

economically insignificant.[7] This is very relevant to the focus of this research, as seasonal impacts would be much harder to isolate if the data include different time and climatic zones.

Furthermore, it is specifically important to note that the focus of the study is not on modelling the behaviour of time series in terms of explanatory variables (the conventional modelling approach). The conventional modelling approach assumes that the behaviour of the trend and seasonality can be effectively captured by a conventional regression equation that assumes deterministic trend and seasonality. Instead, the aim is to use a univariate structural time series modelling approach (allows modelling both stochastic and deterministic trend and seasonality) and show that conventional assumptions of deterministic trend and seasonality are not always applicable. Specifically, the study seeks to cast some additional light on BANHs by: (i) establishing the presence, or otherwise, of seasonality in Victorian BANHs, (ii) if present, ascertaining is it deterministic or stochastic, (iii) determining out of sample forecasting capabilities of the considered modelling specifications and (iv) speculating on possible interpretation of results. To do so the study utilises a basic structural time series model of Harwey (1989). Compared to the conventional procedure, Harvey's (1989) structural time series model involves an explicit modelling of seasonality as an unobserved component.

Empirical evidence of seasonal variations in property related variables is relatively limited. Studies come from a range of different perspectives and employ a number of modelling techniques. Harris (1989) provided empirical evidence of strong second and third quarter seasonality in the USA house prices. Ma and Goebel (1991) established the presence of January seasonal effect for securitised mortgage markets, while Friday and Peterson (1997) and Colwell and Park (1990) established presence of a January seasonal effect in returns of Real Estate Investment Trusts (REITs) in the USA. Rossini (2000) examined seasonal effects in the housing markets of Adelaide, South Australia, and, with respect to the volume of detached dwelling transactions, determined presence of statistically significant 'summer' and 'autumn' seasonal effects. Similarly, Costello (2001) examined the impact of seasonal influences on housing market activity in

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[7] As shown in the ABS (2011), Tasmania is Australia's smallest and the most compact state, nevertheless it has the lowest Gross State Product (GSP) of all states (in 2008/2009 contributed only 1.8 per cent of the Australian GDP). GSP is a measure of the economic output of a state (i.e., of a sub-national entity). It is the sum of all value added by industries within the state and serves as a counterpart to the GDP.

Perth, Western Australia, and found that the volume of transactions and hence demand is greatest during the first quarter of a year and lowest during the last quarter. Karamujic (2009) confirmed presence of both cyclicality and seasonality in Australian residential mortgage interest rates in the two major Australian banks (National Australia Bank (NAB) and Commonwealth Australia Bank (CBA)).[8] Most studies, to varying degrees, point to the existence of seasonality. A study of the literature on housing variables found no empirical research focusing on seasonal fluctuations in BANHs. It also uncovered that most studies are focusing on house prices.

The paper is organised in 4 sections. The following section (section 2) of this paper outlines the methodology used. Section 3 provides data specification, presents modelling test results and interprets the modelling results. Finally, in section 4, the paper concludes.

2. Methodology

A structural time series framework approach used in this paper is in line with that promulgated by Harvey (1989). Such models can be interpreted as regressions on functions of time in which the parameters are time-varying. This makes the approach a natural vehicle for handling changing seasonality of a complex form. Once a suitable model has been fitted, the seasonal component can be extracted by a smoothing algorithm. Following Harvey (1989) and Harvey, Koopman and Riani (1997), the basic structural time series model is formulated in terms of a trend, seasonal and irregular components. All are assumed to be stochastic and driven by serially independent Gaussian disturbances that are mutually independent. If there are s seasons in the year, the model is

$$y_t = \mu_t + \gamma_t + \varepsilon_t, \quad \varepsilon_{\mathrm{t}} \sim NID\left(0, \sigma_\varepsilon^2\right), \tag{1}$$

where the trend, seasonal and irregular are denoted by μ_t, γ_t and ε_t, respectively. The trend is specified as follows:

$$\mu_t = \mu_{t-1} + \beta_{t-1} + \eta_t, \quad \eta_{\mathrm{t}} \sim NID\left(0, \sigma_\eta^2\right), \tag{2}$$

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[8] According to the Bankersalmanac.com‘s (2011) selection of the top banks worldwide (ranked on the total assets of a bank in USA$), calculated from yearend figures gained from submitted balance sheets, NAB and CBA were ranked thirty-fourth and forty-seventh respectively.

$$\beta_t = \beta_{t-1} + \varsigma, \quad \varsigma_{\mathrm{t}} \sim NID\left(0, \sigma_\varsigma^2\right)$$

where μ_t is the level and β_t is the slope. The disturbances η_t and ς_t are assumed to be mutually independent. Setting $\sigma_\eta^2 = 0$ gives a trend that is relatively smooth.

The seasonal component is generally constructed in terms of stochastic trigonometric functions at the $s/2$ seasonal frequencies, although deterministic and dummy-variable formulations are also possible. The fundamental point is that, although the seasonal component is non-stationary, it has the property that the expected value of the sum over the previous *s* time periods is zero. This ensures that the seasonal effects are not confounded with the trend. It also means that the forecasts of the seasonal component will sum to zero over any one-year period. The statistical treatment of the model is based on the state-space form, with $s+1$ elements in the state vector. Estimation, forecasting and signal extraction are carried out by means of the Kalman filter and associated algorithms.

The trigonometric form of stochastic seasonality used in models of the form (1) where *s* seasons in the year is

$$\gamma_t = \sum_{j=1}^{[s/2]} \gamma_{j,t}, \quad t = 1, \ldots, T, \tag{3}$$

and each $\gamma_{j,t}$ is generated by

$$\begin{bmatrix} \gamma_{j,t} \\ \gamma_{j,t}^* \end{bmatrix} = \begin{bmatrix} \cos\lambda_j & \sin\lambda_j \\ -\sin\lambda_j & \cos\lambda_j \end{bmatrix} \begin{bmatrix} \gamma_{j,t-1} \\ \gamma_{j,t-1}^* \end{bmatrix} + \begin{bmatrix} \omega_{j,t} \\ \omega_{j,t}^* \end{bmatrix}, \tag{4}$$

where $\lambda_j = 2\pi j/s$ is frequency, in radians, for $j = 1, \ldots, [s/2]$ and ω_t ω_t^* are two mutually uncorrelated white-noise disturbances with zero means and common variance σ_ω^2. The basic structural model consisting of the stochastic trend in (2) with trigonometric seasonality is easily put in state-space form by defining the $(s+1)\times 1$ state vector $\alpha_t = \left(\mu_t, \beta_t, \gamma_{1t}, \gamma_{1t}^*, \gamma_{2t}, \gamma_{2t}^*, \ldots\right)$. The measurement equation is then

$$y_t = \left(1, 0, \mathbf{z}_t^{'}\right)\alpha_t + \varepsilon_t, \tag{5}$$

where $\mathbf{z}_t^{'} = (1,0,1,0,\ldots)$. If the Kalman filter is initiated with a diffuse prior, as shown by De Jong (1991), an estimator of the state with a proper prior is effectively constructed from the first $s+1$ observations.

On the other hand, if we choose to fix the seasonal pattern in (1), thus specifying a deterministic seasonal component, γ_t, may be modelled as:

$$\gamma_t = \sum_{j=1}^{s} \gamma_j z_{jt} \tag{6}$$

Where *s* is the number of seasons and the dummy variable z_{jt} is one in season *j* and zero otherwise. In order not to confound trend with seasonality, the coefficients, γ_j, $j = 1,\ldots,s,$ are constrained to sum to zero. The seasonal pattern may be allowed to change over time by letting the coefficients evolve as random walks as in Harrison and Stevens (1976). If γ_t denotes the effect of season *j* at time *t*, then

$$\gamma_{jt} = \gamma_{j,t-1} + \omega_{jt}, \quad \omega_t \sim \mathrm{NID}(0,\sigma_\omega^2), \quad j = 1,\ldots,s. \tag{7}$$

Although all *s* seasonal components are continually evolving, only one affects the observations at any particular point in time, that is $\gamma_t = \gamma_{jt}$ when season *j* is prevailing at time *t*. The requirement that the seasonal components evolve in such a way that they always sum to zero is enforced by the restriction that the disturbances sum to zero at each point in time. This restriction is implemented by the correlation structure in

$$\mathbf{Var}(\omega_t) = \sigma_\omega^2(\mathbf{I} - s^{-1}\mathbf{ii}') \tag{8}$$

where $\omega_t = (\omega_{1t},\ldots,\omega_{st})'$, coupled with initial conditions requiring that the seasonal sum to zero at $t = 0$. It can be seen from the equation above that $\mathbf{Var}(\mathbf{i}'\omega_t) = 0.$

In the basic structural model, μ_t in (1) is the local linear trend of (2), the irregular component, ε_t, is assumed to be random, and the disturbances in all three components are taken to be mutually uncorrelated. The signal-noise ratio associated with the seasonal, that is $q_\omega = \sigma_\omega^2 / \sigma_\varepsilon^2$, determines how rapidly the seasonal changes relative to the irregular. An example of how the basic structural model successfully captures changing seasonality can be found in the study of alcoholic beverages by Lenten and Moosa (1999).

3. Modelling Results and Their Interpretation

The data are sourced from the ABS. For consistency, the sample for each variable is standardised to start with the first available July observation and end with the latest available June observation. The structural time series model represented by (1) is applied to seasonally unadjusted monthly BANHs data for Victoria, between 2000:06 and 2009:05. The results are presented below.

Table 1: Estimated Coefficients of Final State Vector

State Variable /Test Statistic	**Model with Stochastic Trend and Deterministic Seasonality**
μ_t	2533.30 (17.28)
β_t	1.17 (0.05)
γ_1	288.62 (**3.53**)
γ_2	154.24 (1.89)
γ_3	266.56 (**3.28**)
γ_4	31.38 (0.39)
γ_5	94.81 (1.17)
γ_6	100.83 (1.25)
γ_7	-390.32 (**-4.82**)
γ_8	-657.19 (**-8.12**)
γ_9	-50.03 (-0.62)
γ_{10}	20.75 (0.26)
γ_{11}	-78.88 (-0.97)
ε_t	274.39
R_s^2	0.31
R_d^2	0.59
DW	2.09
Q	15.08
N	6.37
H	0.41
AIC	11.51
BIC	11.88

As shown in the previous section, all three considered modelling specification include trend (composed of the level (μ_t) and slope (β_t)), seasonal and irregular components. Two modelling specifications include a stochastic trend, while the third considered modelling specification incorporates deterministic trend. On the other hand, one modelling specification incorporates stochastic seasonal component, while other two modelling specifications incorporate deterministic (fixed) seasonal components.

The final state vector is obtained when (1) is estimated by utilising all the information contained in the whole sample for each model. All three modelling specifications were analysed and the modelling results of estimating the univariate time series model for the modelling specification with the best results of goodness of fit measures and diagnostics test statistics are presented in Table 1.

More precisely, Table 1 reports the estimated components of the state vector (μ_t, β_t and γ_{1-11}), their *t-statistics*, goodness of fit measures and diagnostics test statistics. With respect to the goodness of fit, the modelling results are well defined. Overall, the diagnostic tests are also predominately passed. The only exception is the test for serial correlation (Q) which is slightly above the statistically acceptable level.

Figure 1 provides a visual interpretation of the seasonal elements for the selected modelling specification. The seasonal components evidenced in the figure show a constant repetitive pattern over the sample period, providing a visual evidence of the deterministic nature of the seasonal component (fixed seasonal components) in the number of new dwellings approved in Victoria.

Figure 2 shows this even more clearly with individual monthly seasonals represented by horizontal lines, implying an unchanging seasonal effect across the whole sample period. In summary, the analysis points out that the behaviour of BANHs exhibits stochastic trend and deterministic seasonality. As a result, any model based on assumptions of deterministic trend and seasonality is bound to be mis-specified. Out of the eleven seasonal factors relating to the Model two, presented in Table 1, factors corresponding to June (γ_1), April (γ_3), December (γ_7) and November (γ_8) are found to be significant at five per cent level.[9]

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[9] Shown as variables with t statistics values above 1.96.

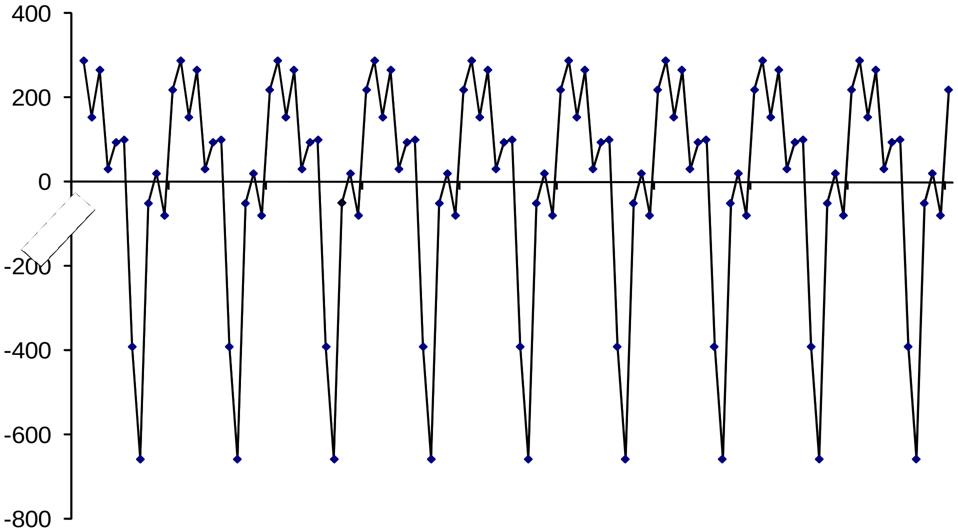

Figure 1: Seasonal Component

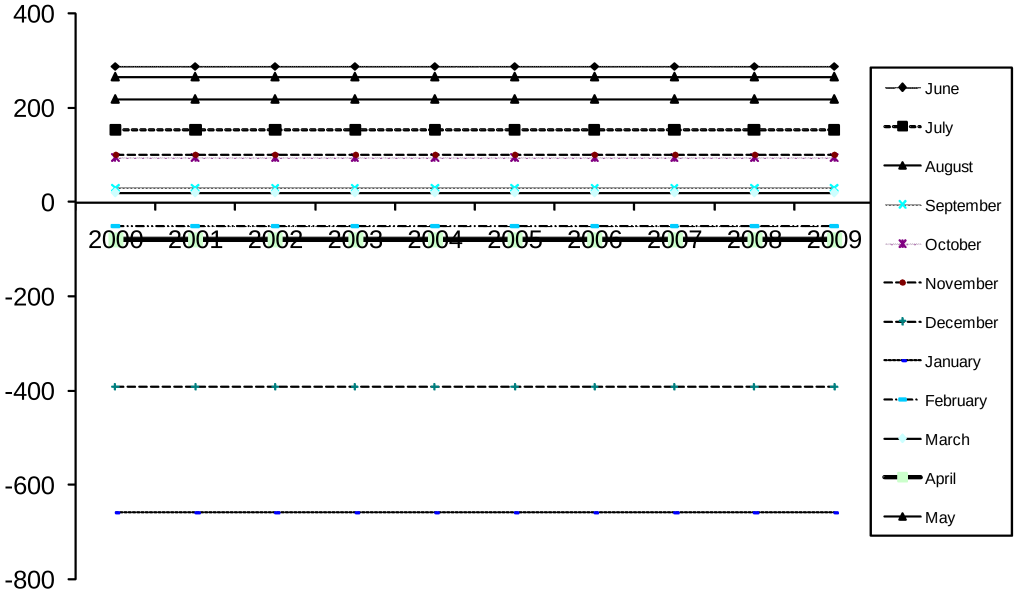

Figure 2: Individual Seasonals

The factors corresponding to December (γ_7) and November (γ_8) exhibit the season-related reduction in the number of BANHs, while the factors corresponding to June (γ_1) and April (γ_3) demonstrate season-related increases.

A possible explanation for the observed statistically significant reduction in BANHs during December (γ_7) and November (γ_8) is the reduction of the level of activity caused by approaching to the ‘summer holidays’ season. It is well known that there is an unavoidable time leg between getting the building approval and starting of the construction of the dwelling. Furthermore, it is also commonly recognised that construction industry in Australia almost completely shuts down from late December to the end of January. Anecdotally, the most commonly quoted cause of this is the ‘summer holidays' season. The 'summer holidays' season typically covers the period from the second half of December to the end of January. Cause of this seasonality predominantly lies in human-induced factors. For a period of six weeks from the second half of December, summer school holidays and several public/religious holidays take place in Australia. Not surprisingly, it is also the time when most workers take annual leave. Consequently, this is a period when the construction and real estate industries almost shut down.

Another possible explanation for the 'summer' seasonal effect is the slowing of activity in the housing construction sector caused by the hot Australian summer. It should be noted that Australia (being in the bottom part of the southern hemisphere), has completely opposite climatic seasons to countries in upper part of the northern hemisphere, e.g. when it is summer in European (June to August) it is winter in Australia.

On the other hand season-related increases during June (γ_1) and April (γ_3) may be explained by a spike in the level of activity during 'the end of financial year' season. 'The end of financial year' season typically starts by the end of April or the beginning of May, and finishes at the end of the first week in July. This is another interesting example of a human-induced seasonal factor. This time the seasonal effect is related to the seasonal pattern of government tax collection. This season is generally characterised by an excess in spending in the month or two before the end of the financial year. With respect to BANHs, this season is particularly characterised by an increase in demand for housing approvals and subsequent home finance that allows prepayment of interest and, as such, enables the prepaid interest to be claimed as expenditure in the current year.[10] The primary cause of this seasonal effect is that the Australian Taxation Office (ATO) accepts prepayment of the interest payable on investment properties.[11] In order to test the robustness of the models specified as well as to determine forecasting power of the three models considered, out-of-sample forecasting was undertaken. Firstly, the three models are estimated over the period 2000:6 - 2005:5.

10According to Karamujic (2009), with respect to the interest rate repayment structure, all home loans can be viewed as having either interst only (IO) or principal and interest (P&I) repayment structures. A typical example of these kind of home loans are fixed rate home loans (FRHLs). From the repayment point of view, a FRHL is offered as either IO or P&I. Most of contemporary lenders offer IO FRHLs (FRIOHLs) as one, two, three, four and five years fixed rate IO repayment products, where the interest is payable monthly in arrears. They also can come as one, two, three, four and five year fixed rate IO repayments, payable in advance, however these are generally only available for investment purposes. It is important to note that the fixed rate term must be less than, or equal to, the IO period. At the end of the IO period, the loan typically automatically converts to a P&I Standard Variable Rate Home Loan (SVRHL) for the remainder of the loan term.

11 For more see Income Tax Assessment Act (1997).

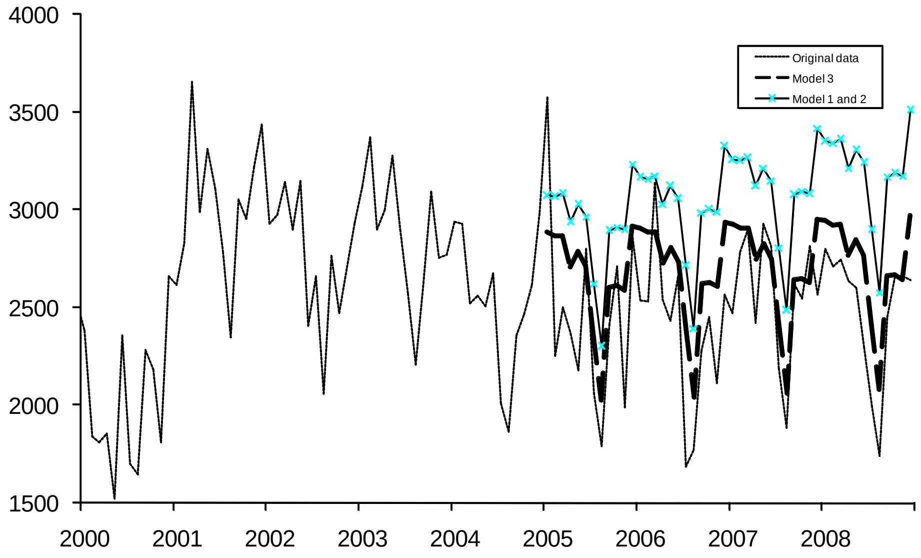

Figure 3: Out-of-sample Forecasting

These estimates are then used to forecast the behaviour of BANHs for the period 2005:6 - 2009:5. Even superficial observation of forecasts presented in Figure 3, shows that in all cases, the variability in the actual data was difficult to predict with the exception of the specifications including the fixed seasonals. This is corroborated again in Table 2, which reports on the following two statistics that measure the forecasting power: the sum of absolute forecasting errors and the sum of squared forecasting errors.

Table 2: Sum of absolute/squared errors of the forecasting values

	Model
Sum of absolute errors	9,987
Sum of squared errors	5,063,177

4. Conclusion

This study uses Harvey's (1989) univariate structural time series mode to examine the impact of seasonal influences on the Australian housing time series, with the generic objective of enhancing the practice of modelling housing variables. Specifically, the paper seeks to cast some additional light on the seasonal behaviour of BANHs by: (i) establishing the presence, or otherwise, of seasonality in Victorian BANHs, (ii) if present, ascertaining is it deterministic or stochastic, (iii) determining out of sample forecasting capability of the considered model and (iv) speculating on possible interpretation of the results. The goodness of fit measures and the diagnostic test statistics indicate that the Model, which is comprised out of stochastic trend and deterministic seasonality, is unambiguously superior to the other two specifications. The examination of the out-of-sample forecasting power of the selected model clearly shows that the seasonality apparent in the actual data is well picked up by specifications entailing deterministic seasonal factor, corroborating the earlier finding that the seasonal pattern in the number of dwelling units approved in Victoria is deterministic and not stochastic.

A possible explanation for the observed statistically significant reduction in BANHs during December (γ_7) and November (γ_8) is the reduction of the level of activity caused by approaching to the 'summer holidays' season, while the season-related increases during June (γ_1) and April (γ_3) may be explained by a spike in the level of activity during the 'end of financial year' season and preparation for a surge in contraction activity during the 'spring' season.

To corroborate the modelling results and explanations provided, the scope of the analysis would need to be extended. It is reasonable to expect that these substantial season-related changes in monthly BANHs are, to a large extent, correlated with home loan drawdowns and housing starts. Thus, extending the research to include home loan drawdowns and housing starts could be a rewarding area for further research. Irrespective of the incomplete nature of the research, due to the commonly accepted perception of BANH as a leading indicator of property sector investment, the findings of this research should be appealing to, among others, researchers, all levels of Government, construction industry and banking industry.

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