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DEVELOPING AN APPRAISAL-BASED RESIDENTIAL PROPERTY INDEX

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Abstract:

Whilst an appraisal-based index for commercial property is now well established, no such index exists for residential property.

The paper considers existing approaches to measuring movements in the residential property market, issues surrounding index construction and includes a brief literature review.

Based on data provided by the Australian Valuation Office, the paper considers the development of an appraisal-based residential property index and concludes with comments on potential index application.

Introduction

The majority of indices for price movements in Australian residential real estate are currently based on concepts of movements in median transaction prices and appear unexpectedly volatile due to the basis of their construction.

To develop an index that more closely tracks movements in the residential real estate market, some groups have sought to refine median transaction price indices to reduce the apparent volatility whilst another is actively investigating an appraisal-based index.

This paper considers existing approaches to measuring movements in the residential property market, issues surrounding index construction and the development of an appraisal-based index.

Why are appraisal-based indices for residential property not well supported?

According to the RBA Bulletin, 'Measuring Housing Prices: An Update' (June, 2006):

> "*To be meaningful, measures of housing prices should be based on prices in actual transactions rather than on perceptions of valuations.*"

This is certainly a very widely held view but it is questionable whether the statement holds up under close scrutiny.

Firstly, there are questions of the meaning and interpretation of the statement. By "measures of housing prices" (a price index), is it movements in price which are of interest or is it something much more – a primary interest in the movement in property values generally (as reflected in price movements)? This is a deep and fundamental question – not simple semantics. Clearly, prices relate to transactions but, in Australia, only about 6% of residential properties are transacted each year. Most of the problems associated with existing price indices relate to the fact that only a small proportion of houses are transacted in any given (short) period. Giving the heterogeneous nature of housing generally, this leads to the clearly observable fact that the composition of housing transactions in any given period, can vary considerably from period to period (Reserve Bank, 2004, 2006; Goodman and Thibodeau, 2003; and numerous other authors).

All these considerations lead to the clear conclusion that residential price indices are used as a means of estimating movements in values – not simply in prices. Given the problems associated with existing methods of constructing residential house price indices and the fact that there is no agreement on a "best" method to measuring movement in house values (prices), the authors respectfully suggest that methods based on valuations (and therefore indirectly on transactions) rather than directly on transactions (prices) should not be so quickly dismissed.

This paper will:

1. examine methods used to generate house price indices;

2. contrast this with a situation for commercial (and especially investment grade) property; and

3. suggest some approaches to the development of an appraisal-based residential property index.

Construction of residential price indices and Australian examples

While there have been a great many different methods proposed in the literature for constructing property price indices, they all, essentially, come down to one of four main types. However, before examining the construction of house price indices, it is critical to consider *exactly* what the house price index (HPI) is intending to measure. As discussed by the Australian Bureau of Statistics (ABS, 2005):

> *"In order to compile a meaningful house price index and address the issues outlined above, it is first important to define precisely what the measurement objective of the HPI ought to be. The ABS is of the view that the most appropriate target should be a measure of price change for the stock of residential dwellings (including the land component) that is unaffected by changes in the qualities of those dwellings over time."*

While other authors may state this slightly differently, the objective of most house price indices is as described by the ABS. Considerations of house price indices in this paper are as outlined by the ABS.

In addition to trying to reflect the temporal movement in values (prices) of housing of constant quality, there are a number of other considerations when constructing a housing price index. Most important of these are data considerations including:

- the timeliness of available data;
- the quality and completeness of data; and
- the property characteristics available for each housing parcel.

While these are important considerations, they will not be considered to any great extent in the current paper.

Returning to four main approaches to index construction based on property transactions, these are:

1. Methods based on tracking the median (or mean) house price over time (Hendershott and Thibodeau, 1990; Prasad and Richards, 2006);

2. Repeat sales methods, that is methods based on tracking the prices of properties transacted on two or more occasions over the time for which data is available (Bailey et al, 1963; Case and Shiller, 1987; Shiller, 1991; Goetzmann, 1992);

3. Hedonic methods, in practice using regression techniques to control for variation in the characteristics of properties being transacted (Rosen, 1994);

4. Hybrid Methods, usually combining hedonic methods with repeat sales or median-based approaches (Case and Quigley, 1991; Quigley, 1995).

There are a number of papers which compare different methods of index construction (eg Mark and Goldberg, 1984; Crone and Voith, 1992; Meese and Wallace, 1997; Hansen, 2006) while Geltner and Ling (2006) give an extremely comprehensive discussion of considerations in the design and construction of investment real estate price indices. In particular, Geltner and Ling consider a model which permits the comparison of transaction-based compared to appraisal-based price indices.

In an Australian context, papers by Rossini et al (1995), Costello (1997, 2005), Flaherty (2004) and Hargreaves and Song (2005) consider the construction and interpretation of house price indices in different Australian and New Zealand jurisdictions.

Over the last two to three years, a number of groups and organisations in Australia have been working to improve the available information on price movements in residential real estate and on approaches (methodologies) to generate the more accurate residential property indices.

These initiatives have included:

1. Reserve Bank of Australia (RBA):

    a. Hansen, 2006, comparing hedonic and repeat sales measures;
    b. Prasad and Richards, 2006, using stratification to improve median-based index methods.

2. Rismark/RP Data:

    Rismark/RP Data have been examining a number of approaches (including those from the Reserve Bank, above) to develop relevant indices from data collected and cleansed by RP Data.

3. Australian Valuation Office (AVO):

   The AVO has been seeking to improve the methods used to generate property value information (and indices) for their (largely Government) clients.

Possible problems with existing residential price indices

Regrettably, all four approaches to index construction have their failings, although it is generally agreed that the more complicated hybrid methods produce the best results; but possibly at a prohibitive cost.

1. Indices based on the median (or mean), while by far the simplest indices to construct, suffer from the problem of variation in the composition of sales over time and from the trend of property improvement over time (more of a problem in the long-term than the short) and of lesser concern when looking for turning points.

   To try to overcome these problems, weighting or stratification (by region or price distribution) are generally incorporated into the index.

   Generally available Australian indices of this type are produced by:

   - ABS;
   - LJ Hooker/BIS Shrapnel;
   - REIA; and
   - Commonwealth Bank (CBA)

2. Repeat sales indices. These are generally seen as superior to simple median-based price indices (Hansen, 2006) but require extensive data sets to ensure sufficient repeat sales. Given the desire for a constant quality index, one challenge is to identify and correct for those repeat sales which include significant property improvement. Churn (the observation that some, generally cheaper, properties are transacted more frequently than others) can also impact the repeat sales index. A further problem can be the need to revise the index, as current (repeat) sales continue to provide information on the value changes in prior time periods.

   Weighting, stratification and hybrid methods can be used to try to overcome these problems.

   The index produced by Residex is the main Australian index of this type.

3. Hedonic approaches try to overcome the deficiencies of other index construction methods by adjusting for the property characteristics (the value determinants such as land size, number of bedrooms, geographic location, etc) for each transacted property. These approaches attempt to correct for different property characteristics thereby seeking price changes for constant quality, but the index obtained can be significantly impacted by the choice of model and available property data. Hedonic methods generally require an extensive database of property characteristics which need to be continually updated.

While extensively used in academic research, there are currently no generally available indices of this type in Australia.

4. Hybrid models. It is generally agreed that hybrid methods have the potential to produce the "best" results but there are real questions in terms of cost benefits with these methods which generally require extensive data at very considerable cost.

   Rismark/RP Data are producing hybrid indices but these are not currently widely available.

Summaries of the Australian house price indices are given in RBA (2004) while an international comparison is included in RBA (2006).

Commercial/investment indices

In stark contrast to the situation for residential property described above, in the commercial property sector (and especially for the critical investment grade property sub-sectors) appraisal-based indices to measure total property returns are the norm. There are a number of reasons for this but, primarily they relate to:

a. the scarcity of market transactions; and
b. the difficulty in analyzing sales when they do occur (eg in accounting for partial interests).

Geltner and Ling (2006, op cit) provide a model which permits comparison of appraisal-based and transaction-based property indices. They show that under particular circumstances, a transaction-based commercial property index would be superior to an appraisal-based one. Fisher et al (2007, to appear) propose a transaction-based alternative to the NCREIF indices. It is doubtful, however, that the conditions for the superiority of a transaction-based commercial property index would be met outside the USA, primarily due to relative market sizes. It is also questionable that concern b. (above) relating to the analysis of sales data can be satisfactorily resolved.

In Australia, the primary commercial property index (including separate indices for each component sector; retail, industrial and office) is produced by IPD/PCA. This is an appraisal-based index using IPD methodology producing a quarterly index based on almost 700 assets with total value in excess of $A72 billion (IPD, 2006).

Possible problems with commercial property indices

The main drawbacks with an appraisal-based commercial property index are:

- temporal lag/bias (appraisal smoothing);
- the seasonality of valuations; and
- "stale" valuations (valuations in use in the index long after the valuation was made).

The "stale" valuation problem and the seasonality of valuations can be removed by using the repeat-measure regression (RMR) method originally proposed by Bailey et al (1963). As with appraisal smoothing, the seasonality of valuations does have an impact on the measurement of property risk (Newell and MacFarlane, 1998).

Appraisal smoothing is, however, generally a problem as identified and evidenced by Brown (1985), Brown and Matysiak (1998) and Diaz and Wolverton (1998) and can be absorbed into adjusted risk measures (Newell and MacFarlane, 1995, 1996). If the temporal lag/bias is large relative to the random noise of the valuation variability, then the impact of appraisal smoothing can be severe. Lack of transactions, thus requiring the use of outdated comparables, together with the lack of independence (in statistical terms) of valuations on the same property are contributing factors to the extent of the temporal lag/bias.

As demonstrated by Geltner and Ling (2006, op cit), it is the relative size of the temporal lag/bias compared to the valuation or transaction price/value noise which determines whether appraisal-based or transaction-based indices are favoured, with a lower ratio (ie relatively lower temporal lag) favouring the appraisal-based index.

Overall, the main concern with an appraisal-based commercial price index is the temporal lag/bias (or appraisal smoothing) brought about by combination of:

- a lack of fresh market evidence; or
- a lack of independence of the current valuation of a property to the prior valuation(s) for the same property (appraiser bias) and/or current valuations of other properties.

Why these problems are not so relevant for residential property

In a residential context, there should be no problem with the availability of plentiful fresh market evidence (transactions) although this is impacted both by the frequency of index updates and through the identification of relevant housing sub-markets (Bourassa et al, 1999).

The question of (statistical) independence of valuations (appraiser bias) relates largely to the process by which the valuations are conducted. In a benchmarking regime (as currently used by the AVO), this means that repeat valuations on the same property should, ideally, be conducted by different valuers. At the very least, if conducted by the same valuer, the valuation should be performed without any reference to prior valuations of the subject property and without reference to the current or prior valuation of other properties in the location; relying solely on the available market (transaction) data. This constraint is likely to add significantly to the cost of the valuation exercise as it mitigates against a single valuer being responsible for a region over a period of several valuation cycles. Conversely, however, there is a clear requirement that the valuer has sufficient knowledge of the housing market in the area to be able to produce a competent valuation.

With these provisos, there is no reason why an appraisal-based residential property index cannot produce results at least as good as traditional transaction-based methods while avoiding many of the pitfalls of the current transaction-based index methods. An appraisal-

based process using benchmarks (which can readily be changed as required) can much more easily meet the requirement of constant quality while avoiding the inherent problems of churn and variation over time in transaction composition – problems which beset transaction-based residential property index methods.

While there are inherent costs in performing the relevant valuations required in an appraisal-based approach and in maintaining a moderate database of benchmarks and sales; the cost may well still be considerably less than that required to facilitate an effective hedonic price index.

Possible approaches to an appraisal-based residential index

As has been indicated earlier, in recent times several Australian Government agencies have been giving considerable attention to residential price indices. These include:

- a significant revision of the ABS house price index series (ABS, 2005). This includes changes to the weighting of the index components and a substantial increase in the level of geographic/regional stratification incorporated into the index.
- the examination, by the Reserve Bank, of an alternative approach to stratification when constructing a residential property price index based on median transaction prices (Prasad and Richards, 2006). This approach extends the geographic (regional) stratification by also incorporating a level of stratification based on the long-term average price level of houses in each region.
- Hansen (2006), also from the Reserve Bank, compares hedonic and repeat-sales measures as well as the median, mix-adjusted approach of Prasad and Richards (op cit) using data from Sydney, Melbourne and Brisbane over the period 1993-2005. Hansen concludes that these three methods produce comparable results over the sample period and all three are less volatile and indicate higher average annual price growth than an unadjusted median price index.

The methods outlined by the ABS and RBA have been applied in a transaction-based context. However, they are equally applicable to an appraisal-based approach and should help to produce a high quality index in this context.

Key challenges for the development of an appraisal-based residential index include the collection of a sufficiently large sample size on a regular basis using a common valuation approach.

As Australia's only wholly owned, nationwide valuation practice, AVO has valuers undertaking residential valuations in most major settlements in Australia using a standard valuation approach on a regular basis.

Following significant research (Whiley, 2005), AVO has established a process of valuing indicative residential properties in the majority of Australian postcodes on a quarterly basis. The process includes carefully defined criteria for the selection of indicative residential

properties for inclusion in the sample together with other measures to address the problems in appraisal-based approaches outlined above.

Having completed numerous quarterly valuation cycles, AVO has now amassed a significant bank of data for transformation into proprietorial residential indices at postcode, city, state and national levels.

Three of the authors (MacFarlane, Newell and Rossini) have been negotiating with the AVO to review the work previously undertaken by the AVO and RBA and to generate appropriate indices from the data previously collected by the AVO. The fourth author (David Parker) will oversee this work on behalf of the AVO.

This paper has provided a preliminary overview of the development of an appraisal-based residential property index. It is hoped that this work will progress in the coming months and the results will be reported at a later Conference.

Conclusion

The development of a rigorously based residential index is anticipated to provide a much clearer view of trends in the residential property market, unobscured by the volatility inherent in transaction price indices.

An appraisal-based index that is also both national and timely will provide an insight into the residential property market not previously available in Australia.

It is anticipated that such an appraisal-based index may have potential application in a range of areas including economic management, government policy setting, bank lending, financial planning and wealth management.

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