

# **Ten best practices for improving Australian commercial property market forecasting**

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## **Abstract**

Property forecasting is an integral component in the property investment decision-making process for property fund executives, supporting asset allocation, property fund strategy and stock selection in a mixed-asset portfolio. It is critical that property professionals employ a wide - range of quantitative and qualitative techniques for property forecasting. The overriding aim with property forecasting is to predict reasonable estimates of property market performance based on core economic drivers. However, real estate forecasts could be prone to misinterpretation due to the high reliance on model assumptions. Hence, this study explores the current state of the Australian commercial property market forecasting to suggest ways of improving the quality of forecasts.

The study follows a qualitative research approach, conducting 22 semi-structured interviews. The analysis has provided useful insights of the factors that aid and impede the forecast accuracy. Hence, a good forecasting does not require powerful algorithms, but following the ten best practices empirically demonstrated to boost accuracy in each step of the forecasting process: (i) clear objective setting, (ii) collaborative approach of knowledge sharing, (iii) spatial data analysis to capture the changes in the determinants, (iv) a theoretical quantitative approach, (v) Adhering to the parsimony principle, (vi) qualitative overlaying, (vii) eliminating biases, (viii) forecast validation, (ix) integrating error positive culture and (x) keep on forecasting. Therefore, the redesigning of the current commercial property forecasting process is highly recommended to improve forecast accuracy.

Keywords: Commercial property market, Forecasting, Forecast determinants

Key in the subject of the topic - Property market analysis

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## 1.0 Introduction

The Australian property market is characterised by high quality, granularity, frequency and geographical spread of performance measurements coupled with high standards of valuation methods and accurate market information with long data time-series (Jones Lang LaSalle [JLL], 2016). This leads to the Australian property market being ranked as the second highly transparent property market globally, behind the UK, in the global real estate transparency index 2016 (JLL 2016); a major factor in the strong demand for Australian real estate assets from global investors.

The commercial property market is generally divided into broad sectors related to its employment streams (office, industrial and retail), while REITs, pension funds, life insurance companies and foreign investors are the major institutional investors. It is best captured as made up of several interlinked submarkets: space market and capital market. The interlinked commercial property markets set out economic relationships that are most relevant to the models of forecasting the performance.

Compared to alternative asset classes, risk of default in the commercial real estate investments holds considerable uncertainty for investors, reflecting numerous investment decisions throughout the life cycle of the property. It is critical that analysts and institutions employ wide-ranged techniques to model and forecast future performance of real estate assets based on a number of input determinants. All the stakeholders in the property market have a strong interest in forecasting as their profitability and success depends on the reasonable estimates of key performance variables (Ball *et al.* 1998, Brooks and Tsolacos 2010). However, there are some common pitfalls that an empirical researcher in real estate is likely to run into. Specifically, forecasting techniques usually rests on several assumptions such as

statistical independence, statistical stationary and the normal distribution are the critical assumptions that are vehemently argued and criticised in the past literature (Mandelbrot and Hudson 2004). If these assumptions cease to hold, the results could be prone to misinterpretation and the accuracy is questionable (Brooks and Tsolacos 2010).

To improve the Australian commercial property market forecast accuracy, this paper aims at evaluating the Australian commercial property market forecasting practice. The structure of this paper begins with a review of literature, which includes commercial property market forecasting. The next section presents the research methodology followed by data analysis. The last section provides the concluding remarks.

## **2.0 Literature Review**

### ***2.1 Commercial Property Market Forecasting***

Real estate assets are characterised by lumpiness and illiquidity involving high unit cost that make decisions irreversible. In Australia, it is significant that direct commercial property investment transaction volumes amounts to approximately 8% of GDP (JLL 2016). The intuitive idea of forecasting is as a structured way of envisioning the future using all available information, prior knowledge on economic relationships. The demand for investment forecast stems from a need to form an educated view of the future before decision making. However, it does not eliminate risk. Rather, forecasting identifies and ranks these risks to assess the likelihood of alternative scenarios to quantify the impact of possible courses of action (Armstrong 2001, Carnot *et al.* 2005).

Property market models have the overriding aim of predicting reasonable estimates of key dependent variables: demand, supply, rent, returns, yield, vacancy, and cash flows based on the information at hand (Brooks and Tsolacos 2000, Brooks and

Tsolacos 2001, Brooks and Tsolacos 2003, Chaplin 1998, Chaplin 1999, Chaplin 2000, Matysiak and Tsolacos 2003). The changes of these variables can be quantified by the internal and the external determinants within which the decisions are made in the market (Higgins 2000). Many researchers witnessed that there is an interlined relationship between property, space and capital markets (Archer and Ling 1997, Geltner and De Neufville 2015, Rowland 2010). The interlinked commercial property markets set out economic relationships that are most relevant to the forecasting models. This has implications of modelling property market performance using macroeconomic variables as systematic risk factors. These indicators are used as warning signals for retrospective and prospective performance appraisal of the real estate (Hargitay and Yu 1993, Higgins 2014, Huang and Wang 2005, Ming-Chi *et al.* 2004, Tracey and Worthington 2006).

Thus, forecast determinants can be grouped under the categories of the aforesaid three-market model. For instance, Space market: GDP, employment, ASX indices; Capital market: interest rates, inflation; Property market: historical data of the dependent variable, construction costs, lease incentives, workspace ratio, and the like (Brooks and Tsolacos 2010, Higgins 2000). Further, macroeconomic factors have been the driving forces in modelling and forecasting the real estate performance, which was revealed in the past scholarly effort of undertaking comparative analysis of the determinants (Brooks and Tsolacos 1999, D'Arcy *et al.* 1997, Giussani *et al.* 1993).

Brooks and Tsolacos (2010) presented a theoretical structure that captures key relationships to determine office rents as presented in Figure 1 where arrows guide the pathway to develop empirical models. However, the availability of data plays a significant role in the formation of the model. In markets where there is an abundance of data, the solid black arrows show that the rent can be modelled by economic

variables, demand, supply, vacancy and other related determinants. In markets with a limited data, office rents can be modelled on economic variables directly or through vacancy as represented in dotted lines through reduced-form models.

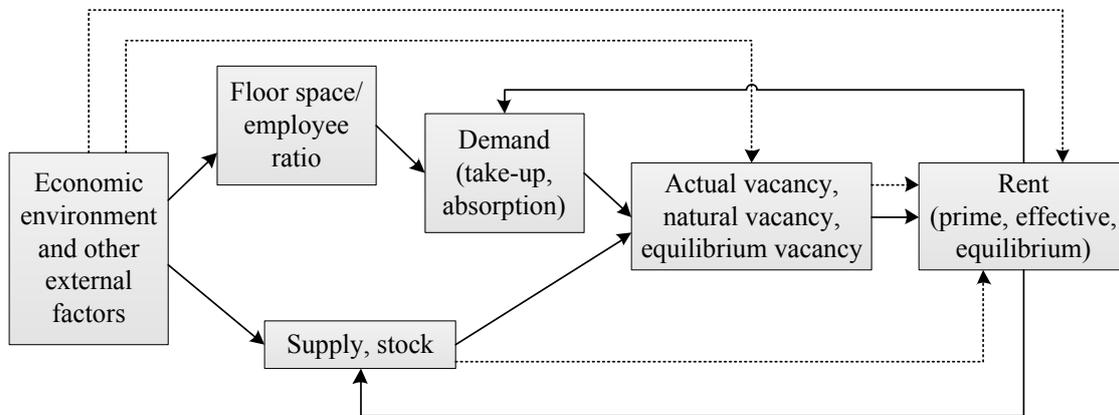


Figure 1: A Theoretical Structure for the Determination of Office Rents

Source: Brooks and Tsolacos (2010 p. 195)

As real estate forms a major part of the mixed asset portfolio, it is critical that analysts and institutions employ a wide range of techniques for forecasting the performance of real estate assets. The forecasting methods are primarily based on quantitative and/or qualitative methodologies. Quantitative methods are divided into univariate and multivariate which uses past patterns and past relationships respectively. The main quantitative approaches include exponential smoothing, single-equation regression, simultaneous equation regression, Autoregressive Integrated Moving Average (ARIMA) and Vector auto regression (VAR). Whereas, judgemental methods are based exclusively upon the forecaster's judgement, intuition, or experience to make long-run predictions without using any explicit model. Nowadays, there is an increasing amount of integration between judgmental and statistical procedures (Armstrong 2001, Carnot *et al.* 2005).

However, past researchers have demonstrated a limited predictive capacity of estimated real estate performance, indicating the existence of degrees of uncertainty in the valuation. The rational decision-making on real estate would not be virtually possible without the quantified evidence of past performance and a reasoned assessment of probable future performance based on accurate historical and real-time market information (Adair and Hutchison 2005, Higgins 2013, Sykes 1983).

### **3.0 Research Methodology**

In the real estate context, Clapp and Myers as cited in Leishman (2003) stated that the form of deductive reasoning has dominated the real estate economics research since the 1960s which focus on the construction of sophisticated models using quantitative techniques. The change in the research paradigm has been forwarded with the idea of behavioural real estate market research in order to capture the qualitative information. Ball *et al.* (1998) described the research belonging to this agenda as ‘behavioural institutionalism’.

Hence, this research falls into the qualitative mode of inquiry following phenomenological approach. Phenomenological approach to the qualitative research is based on a paradigm of personal knowledge and subjectivity, and emphasise the importance of personal perspective and interpretation (Creswell 2014, Giorgi 2009, Lester 1999). The methodology employs inductive reasoning that involves collecting qualitative data from semi-structured interviews among 22 property professionals: property analysts (9), economists (4), fund managers (7) and property market lenders (2). Property analysts and economists provide real estate research and advice to fund managers for their direct property investment decision making while lenders provide the financial assistance.

This qualitative research inquiry involves four key interview themes: (i) current forecasting practice, (ii) forecast errors, (iii) factors beyond econometrics and (iv) proactive strategies to improve forecasts. This paper presents the analysis of the current forecasting practice and forecast errors to propose best practices to improve forecast accuracy. The qualitative data generated from interview transcripts were analysed thematically. Major themes and sub themes were formulated in accordance to the requirements of the research objectives using the QSR NVIVO 11 software.

## **4.0 Analysis and Discussion**

### ***4.1 Whys and Wherefores for Forecasting***

Property forecasting is an integral component within the property investment decision-making process. The objectives of commercial property market performance forecasting are identified under each respective cohort of respondents. These objectives ranged from simple cash flow forecasts (rents and terminal yields) for the valuation methodology to understanding the dynamic market logic and behavioural changes to protect against downside risk and to put forward a proposition to invest and for the asset allocation. These objectives are driven by forecast duration of concern, forecast output style, forecast approach and users of forecasts as illustrated below in Figure 2.

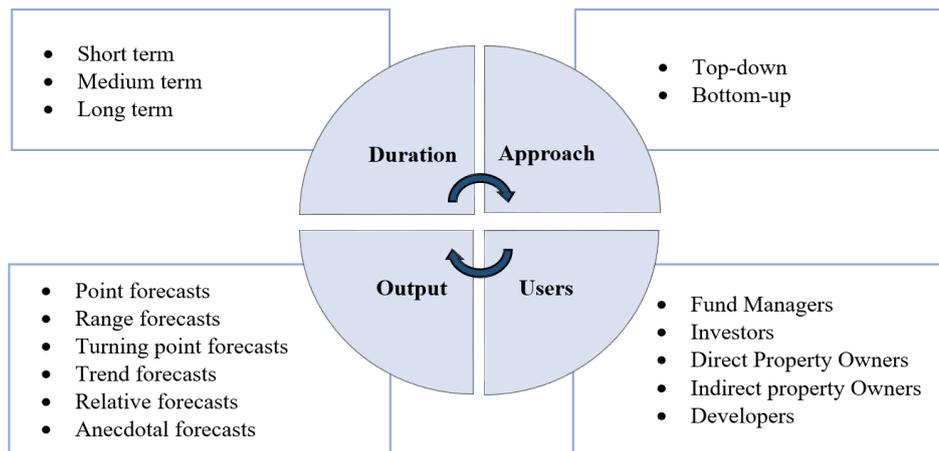


Figure 2: Driving Factors for Setting-up Commercial Property Forecast Objectives

The degree of confidence in forecasts diminishes with the increased length of projections that are subjected to a certain level of uncertainty. Irrespective of this fact, short-term, medium-term and long-term forecasts are being made in the current practice. The decision to make short-term forecasts rely on the matter of audience where investors seek for short-term information for their decision making with the market fluctuation. Yet, the tactical decisions are not based on the near-term forecasts in the current practice. From a short-term perspective, it is difficult to capture all the information in econometric modelling due to frequent noise particularly in markets which are relatively illiquid. Therefore, short-term prediction involves a spatial data analysis of the market as stated below. On the other end of the spectrum, long term rent and terminal yields forecasts are obligatory to produce for standard valuation models. In response to the client's requirement for 10 years' forecasts, the mean reversion approach is highly in the current practice looking at trends, relativities and long-term averages. In the medium term, property forecasters heavily rely on econometric models with the aid of cyclical guidance to determine leads and lags of time series data to responsibly offer property forecasts. Therefore, the use of econometric models for

medium-term forecasting raises a reasonable level of confidence over long-term uncertainty and short-term noise.

To determine a suitable forecast methodology, it raises the question about the forecast output style. According to Brooks and Tsolacos (2010), there are five forms of presenting the forecast results: point forecasts, turning point forecasts, range/confidences, direction/trend and scenario analysis. Additionally, relative forecasts and anecdotal forecast were also identified through the qualitative data analysis. Point forecasts enable decision makers to allocate property funds in a more advantageous way at the right point in the economic cycle. However, the inability to produce realistic point forecasts leads forecasters to focus more on range forecasts, directional forecasts, relative forecasts and anecdotal forecasts instead of producing a definitive outcome. Relative forecasts are made relative to the other asset classes, relative to the past and in between different grades of the same asset class. To improve the clarity of the interpretation of forecasts, anecdotal forecasts elaborate the storyline, including fishbone reasoning (that is, causes and effects). Thus, it enhances the clarity of the projected values by moving away from complex mathematical solutions that are difficult to interpret. Additionally, there are possible overlaps between these output styles to provide more combined output.

As per the interview respondents, forecast approach is another important driver in setting up objectives of forecasting. In the process for projecting estimates for the future, the approach to forecasting could be top-down or bottom-up in other words, macro level or micro level respectively. Top-down forecast looks at the overall market performance pursuing a macro trend evaluation. On the other hand, bottom-up forecasts are much less inclined to look at economic forecasts, but focus on individual levels to form an overall picture. The micro level forecasting evolves from the tenant by tenant

level and then move along the geographical lines (that is, at the level of key cities and state by state level).

Many of the interview respondents raised the question about the target group of forecast users to narrow down the scope of forecasting. As illustrated in Figure 2, fund managers, investors, direct property owners, securitised property owners and developers are keen to overlook at the property market performance. Fund managers pursue macro estimates for their asset allocation decision making. Investors are more focussed on the terminal yield forecasts to determine the capital value growth. Property owners explore individual micro forecasts of investment vehicles or direct physical assets. Whilst, property developers move away from the short-term forecasts which are critical due to the limited time for adapting to the changes in the economy. Therefore, it must be clearly understood the focus group of users at the outset of forecasting.

#### ***4.2 Input Data Collection for Forecasting***

High quality data to accomplish these objectives can be obtained from a variety of sources: primary sources and secondary sources. Most of interview respondents highlighted the collaborative responsibility of data collection by the members of the forecasting team and through the lateral co-integration with other functions of the organisation. The knowledge is shared between individuals within the team and the group's view gets presented thus, the entire team is collectively responsible for the forecast output. These individuals reiteratively provide information not only for the analysis, but also provide feedback into the model. Though many interviewed organisations produce their own property forecasts, it has become highly evident in the empirical analysis that they acquire economic and property forecasts produced by external organisations on a subscription basis. Secondary data is gathered on the following reasons: as a basis, as a benchmark, as a confirmation and as a consensus.

It is evident in the qualitative data analysis that the building block used by forecasters is historical data or the past performance of the market to predict future results. The range of observed data is used to extrapolate when making statistical predictions. Further, historic data is scrutinised for the mean reversion approach to form long-term averages as per the central tendency theory. However, long-term averages can be misleading and non-representative of the market behaviour under extraordinary circumstances applied to the data set. Therefore, the result of reverting to the long-term averages is a part of the central tendency bias which is required to counteract. While many interview experts believe, historical data is a critical component to forecasting, in the viewpoint of the property analysts, historic information is relevant only in the context that had performed relative to the prevailing conditions at the time. Significant reliance on past observations in forecasting is underpinned by the assumption ‘Ceteris Paribas’ (that is, all else unchanged). In the real world, things are Mutatis mutandis, that means everything is changing throughout. Those adjustments come from market intelligence and insights that often derived from scenario analysis. Thus, it is strongly recommended by interview respondents that the historical facts need to be combined with the current data and likely outcomes when producing property market forecasts.

Though Australian property market being ranked as the second highly transparent property market globally, behind the UK, in the global real estate transparency index 2016 (JLL, 2016), interview respondents identified limited property market data, inconsistent data with irregularities, relying on economic data and misleading information are the key problems associated with the data.

### **4.3 *Forecast Input Determinants***

This part of the section evaluates the current use of forecast determinants that were empirically evaluated for its statistical significance in the available literature. The list of

determinants identified in the literature are validated in the body of qualitative data analysis. Many of the interview participants emphasised that the leading indicators for real estate are now following the broader capital market determinants. As per the participants, the following significant facts about determinants can be drawn.

- GDP and employment are key demand side inputs in the office sector
- GDP and manufacturing output are key demand side inputs in the industrial sector
- GDP, retail turnover and population are key demand side input in the retail sector
- State-wise GDP captures the essence of the true performance of the market
- Employment refers to the white-collar employment by sector-wise
- The stock of total floor space is a key supply side determinant that involve net additions allowing for withdrawals, conversions, demolitions and refurbishments
- Supply and rent have a bi-directional causality (that is, supply coupled with strong demand is pushing rents up, but in the reverse logic rent is pushing supply up)
- Vacancy is a function of supply and demand side determinants
- Rental forecasts are driven by vacancy rates, long-term retail sales and the volume of manufacturing output respectively in office, retail and industrial sectors
- Property yield is driven mainly by the operating income and Australian 10-year bond yield, which is used to proxy the risk-free rate

In addition to the forecast determinants discussed above, this section identifies new input determinants that are used in the current industry practice as tabulated in Table 1. These additional determinants categorised under different markets and commercial

property sectors. Further, determinants that are common to all three sectors are given separately.

Table 1: Additional Determinants in the Commercial Property Market Forecasting

	Office sector	Industrial sector	Retail sector	Common
<b>Property market</b>	• Rent per capita	-	-	<ul style="list-style-type: none"> <li>• Development approval</li> <li>• Capital expenditure</li> <li>• Tenants' commitments</li> </ul>
<b>Space market</b>	<ul style="list-style-type: none"> <li>• Business confidence</li> <li>• Office equipment imports</li> </ul>	<ul style="list-style-type: none"> <li>• Number of containers being offloaded</li> <li>• Infrastructure spending</li> </ul>	<ul style="list-style-type: none"> <li>• Online Retail Index</li> <li>• Retailer sentiment</li> </ul>	<ul style="list-style-type: none"> <li>• Dow Jones index</li> <li>• US GDP</li> <li>• US ISM manufacturing index</li> <li>• Local market data</li> </ul>
<b>Capital market</b>	-	-	-	<ul style="list-style-type: none"> <li>• Elasticity of yield</li> <li>• Yield spreads</li> <li>• 5-year bond yields</li> <li>• Cash rate</li> <li>• Currency rate</li> </ul>

In the case of Sydney as a global market, strong leading indicators from the US economy were witnessed by interview participants such include: US GDP, Dow Jones index and US ISM manufacturing index. These indicators are used as proxies to the broader US economy. As the economy changes over time, so does the composition of these indices. Hence, the reflection in the global market could be seen in the property sector demand.

Interview participants trial out different kinds of new drivers to improve the overall model performance. As a proxy to white-collar employment growth, imports of photocopier machines are substituted in the office demand model. The argument is based

on the requirement of office equipment to capture the real footprint in an office building. Further, the number of containers being offloaded at the key ports (Sydney and Melbourne) have historically been a useful leading indicator for industrial rents and industrial take-up. As new capital market determinants, elasticity of yield, yield spreads, 5-year bond yields, cash rate and currency rate were identified.

#### ***4.4 Forecast Data Processing Methodology***

The current industry practice of forecast data processing is pursuant to the demand-supply methodology. This involves quantification, distinction and mapping of demand and supply to project the commercial property market performance. For that, real estate professionals have long been involved in developing explicit and implicit forecasts based on the models and techniques discussing under this section. As per the respondents, most of property forecasts are derived by converging the estimates from econometric models with a qualitative overlay and subsequently followed by a validation process.

Based on the understanding of the current forecast methodology, the satisfaction level of forecasts produced by the models was ascertained. Forecasting with confidence is at its favourable level as illustrated in Figure 3. Those who had given direct positive responses are overly optimistic about their forecasts. Experienced based confidence enables them to produce forecasts at 80-95% level of confidence. On the other hand, two of the respondents expressed the negative level of confidence due to the uncertainty in the market. Therefore, model predictions undergo an extensive moderation. Whilst, the neutral responses highlighted moderate positive outcomes with the need for improvement in the forecast modelling. Despite of vindicating definitive outcomes, they explained their concern towards producing relative outcomes.

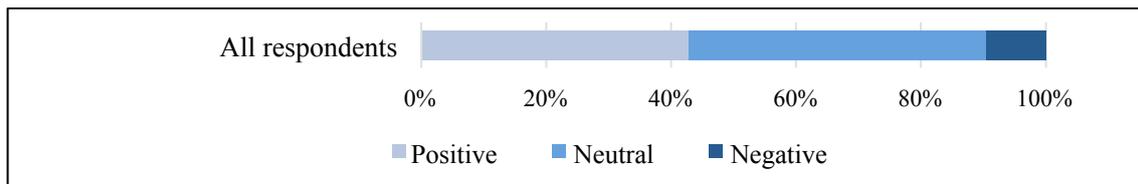


Figure 3: Level of Confidence of Forecast Models

The positive level of confidence in forecast models counteracts with forecast accuracy. Literature offers a wide range of metrics to gauge the accuracy of forecasts. However, it is evident that the forecast accuracy assessment has not been regularly conducted among 20% of the interview participants. The key reason behind evading the forecast accuracy check is due to unrealistic buoyancy about the forecast models. However, out-of-sample forecast validation against the realised values is much needed for the better disclosure of the forecast accuracy to retain the public acceptance.

There are some common pitfalls that an empirical researcher in real estate is likely to run into. Apart from the problems with the data, poor specifications of the model, conflicts of interest, low public acceptance and downside risk events have threatened the accuracy of forecasts. The poor reputation for empirical accuracy of commercial property market forecast models is identified by the respondents due to the unrealistic assumptions, losing the macro-view, increasing complexity and failing to interpret results.

## 5.0 Ten Best Practices to Improve Forecast Accuracy

In summary, the evaluation of the current state of Australian commercial property market forecasting practice has provided useful insights of the factors that aid and impede the forecast accuracy. Thus, good forecasting does not require powerful algorithms, but following the themes empirically demonstrated to boost forecast accuracy as given in Figure 4. The sequential approach of ten best practices that

generated empirically and followed up with a brief explanation of each recommended practice.

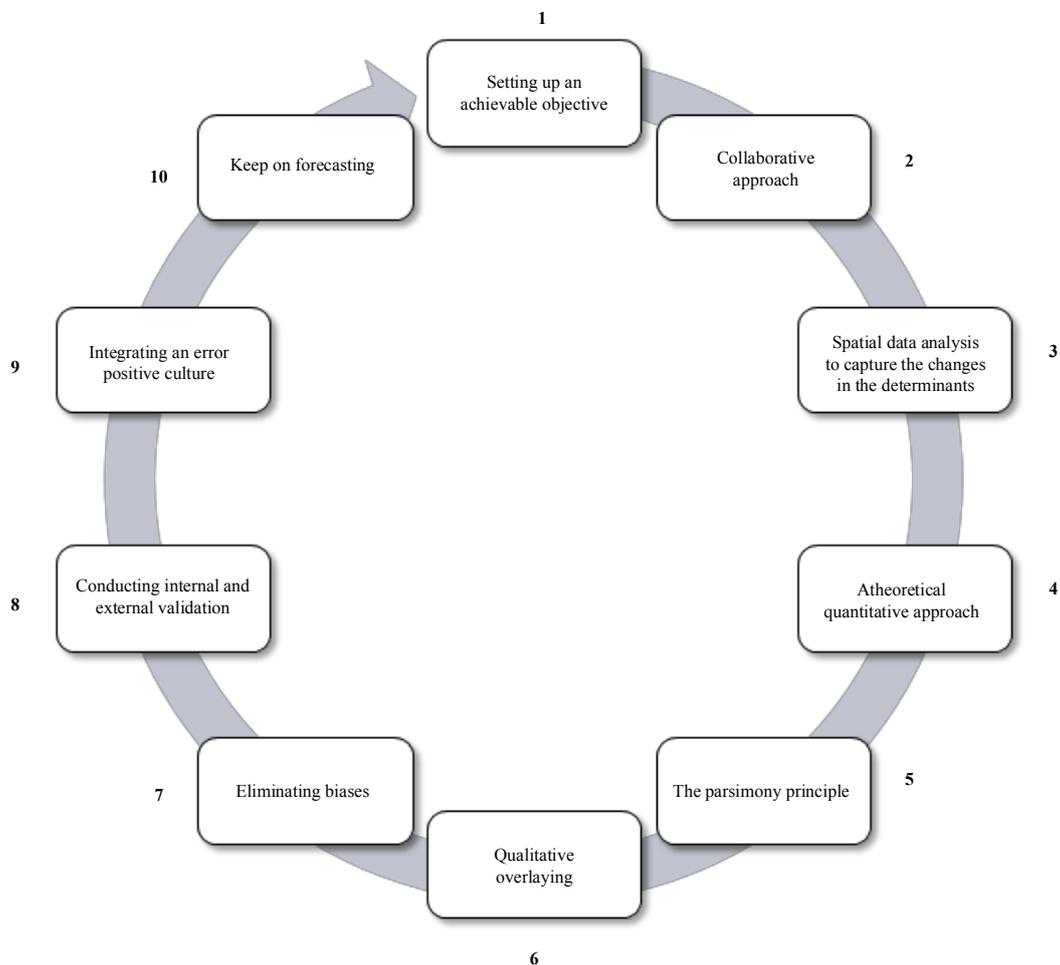


Figure 4: Ten Best Practices to Improve Property Market Forecast Accuracy

- (1) A clearly defined forecast objective is the initial outset of the forecasting process. To define the objective, a due consideration is made for forecast duration, forecast output style, forecast approach and users of forecasts.
- (2) Collaborative responsibility is an initiative to exploit knowledge sharing between the individuals within the research team and co-integration with other functions of the organisation. This offers in depth insights reasonable to reach an agreement.

- (3) Spatial data analysis in commercial property market forecasting seeks to explain the market behaviours in a market with limited precedents. Thus, changes to the forecast determinants can be captured in advance.
- (4) Atheoretical quantitative approach to forecasting stressed on the data instead of theory-based structural forecasting. The ARIMA and VAR models are suggested, implying that their construction and use is unconditional on any underlying theoretical model of behaviour.
- (5) The parsimony principle means the trade-off between improving the model and adding extra complexity is a desirable feature of a model. Adding extra complexity to a model will reduce the model's performance after a certain point at a significant cost of losing the scope.
- (6) A reflective practice in the form of a mixed method design converging econometric estimates with a qualitative overlaying enhances the predictive capacity over ambiguity. It moderates formal model outputs allowing for more flexibility and verification.
- (7) Forecasting process should be attributed as an independent view of property market performance by reducing the likelihood of biases (that are confirmation bias, consensus bias and central tendency bias) and conflicts of interest.
- (8) Forecast validation ensures delivery of the intended outcomes of forecasting. Internal and external validation to evaluate forecast accuracy gain the public confidence.
- (9) Positive error culture admits errors to learn about causal factors rather than suppressing them. These errors can be used as precedents to improve forecasting.

(10) Regardless of producing wrong forecasts, it is recommended to continue forecasting with ongoing reviewing, redefining and remodelling.

## **6.0 Concluding Remarks**

The research paper critically presents the primary data analysis, evaluating the Australian commercial property market forecasting practice. The evaluation has provided useful insights of the factors that aid and impede the accuracy of forecasts. For instance, clear objective setting, collaborative approach, spatial data analysis to capture the changes in the determinants, qualitative overlaying will boost the accuracy while poor specifications of the models, conflicts of interests and downside risk exposure will impede the accuracy of forecasts. Ten best practices empirically demonstrated to improve forecast accuracy that brings together market expertise knowledge on a single model. Therefore, good forecasting does not require powerful algorithms, but following the best practice that inherently useful for forecasters to improve each step in the forecasting process. Although, this study is limited to the Australian commercial property market, it can be extended into other real estate sectors.

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