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# Australian Business Cycles and Commercial Property Markets: Some Empirical Evidence Over Four Decades

By

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## Abstract

*The commercial real estate market in Australia exhibits periods of boom and slump. A feature of the cycles across different commercial real estate sectors is the timing of the base turning points; they are all generally grouped within a two-year period. The relationship between the business cycle and the turning points for these real estate cycles has changed over the 40 years of the data used in the analysis. The paper takes a macro approach to explaining construction supply cycles. A literature review of property cycles and the links to business activity is followed by analysis of the data. Finally, the results are discussed before concluding that links between the commercial property market and the broader economy have weakened and now operate differently compared to historical links. Commercial real estate cycles appear to now relate more strongly to property demand and supply disequilibrium.*

**Keywords:** *property cycles, economic indicators, business cycle, data decomposition, time series analysis*

## Introduction

Over the last few years there has been much attention to the cyclical behaviour of commercial property markets and the underlying long-term relationships with business activity. Many property specialists who promote and value property developments and investments place considerable emphasis in their decision-making process on the co-movement of property markets with leading economic and capital market indicators.

The concern with this approach is the timing and intensity of business activity on commercial property markets may be restricted to specific time periods. A better understanding of business cycles and commercial property market determinants can provide for more comprehension and explanation of commercial property market dynamics.

In cycle analysis, the aim is to identify any underlying cyclical patterns in the expansion, boom, contraction and trough phases, despite varying in length from a short duration of two years to an extended cycle in excess of fifty years. Historical analysis of economic activity identified five classic cycles:

1. Cobweb cycles evolved from when agriculture and commodities were the dominant sectors of the economy, with its focus on relative price fluctuations to the economy.
2. Kitchin cycles are primary inventory cycles, commonly adopted as the business cycle by many economists, and are an average of four to five years in length.
3. Juglar cycles relate to business expenditure on equipment and structures. Niemira and Klein (1994) reported an average six year cycle with a range of four to 10 years on a US study between of capital expenditure between 1951 and 1991.
4. Kuznet cycles are a measure of the residential building market. Van Duijn

- (1983), calculated the average length of the Kuznets cycle to be about 16 years.
5. Kondratieff cycles link innovations to changes in the technique of production and communication. These cycles are between 45 and 60 years.

The Commonwealth of Australia Treasury (1998) explained movement in the business cycle as the products of economic disturbances or economic shocks. A conceptual framework (Table 1), was formed to explain the process where economic disturbances give rise to two

kinds of effect known as destabilising reactions and stabilising responses. The former generally occur in business fixed capital investment, stock/inventory investment and construction activity. When this happens, the macro investment and activity levels are altered. The stabilising responses are the adjustment of prices in product markets, and in the financial market, adjustments are made to interest rates to keep investment attractive and/or to re-stimulate investment.

**Table 1. Economic Shocks and the Business Cycle**

Economic disturbances	Factors influencing the economy's response	Outcome
<ul style="list-style-type: none"> <li>• Domestic financial shocks</li> <li>• Drought and other natural phenomena affecting primary production</li> <li>• Labour supply disturbances (eg, reductions in hours worked per worker)</li> <li>• Institutional wage adjustments</li> <li>• Underlying total factor productivity changes</li> <li>• Changes in public and private investment (eg, as a consequence of mineral discoveries)</li> <li>• Commodity price fluctuations</li> <li>• Changes in world real interest rates and equity prices</li> <li>• Changes in export demand</li> </ul>	<p>Destabilising factors</p> <ul style="list-style-type: none"> <li>• Business investment response</li> <li>• Stock/inventory investment</li> <li>• Construction activity</li> </ul> <p>Stabilising factors</p> <p><i>Product market adjustment</i></p> <ul style="list-style-type: none"> <li>• Relative and aggregate price movements</li> <li>• Import response</li> <li>• Savings response</li> <li>• Automatic public sector stabilisers (cyclical changes in expenditure &amp; taxation receipts)</li> <li>• Changes in fiscal and monetary policy</li> </ul> <p><i>Financial market adjustment</i></p> <ul style="list-style-type: none"> <li>• Interest rate adjustment</li> <li>• Exchange rate adjustment</li> </ul> <p><i>Labour market adjustment</i></p> <p>Real wage adjustment</p>	<p>Recurring deviations from the trend in aggregate economic activity and the rate of growth of the activity</p>

Source: Commonwealth Treasury of Australia "The Business Cycle – Developments in the Economy's Response to Disturbances", *Economic Roundup – Summer 1998*, AGPS, Canberra, p. 48.

Barras (1994), found that the UK real estate market is subject to not one, but several cyclical

influences. His study examined new orders for building, property rents and yields over periods

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of 20 to 40 years with four real estate cycles identified and linked back to economic literature, namely:

1. The classical business cycle of four to five years' duration, which act on all aspects of economic activity and operates on the real estate market through occupier demand.
2. Long cycles of nine to 10 years duration which, generated by the exceptionally long production lags involved in property development, create a tendency for property supply to outstrip demand in across the business cycle.
3. Long swings with a period of up to 20 years associated with major building booms.
4. Long waves, lasting as long as 50 years, have been proposed to explain alternative phases of high and low growth in industrialised economies based on the impact of new technologies.

The Australian commercial real estate markets displays strong cyclical characteristics representing both a problem and opportunity for investors and developers (Hooker 1994), while Lewis (1998) noted the regular ups and downs in commercial property prices being almost an ingrained feature of Australian life.

The aim of this paper is to identify features of leading macro economy and capital market indicators and their relationship with commercial property market supply. The components and characteristics of the business cycles in a long data series will be analysed in a two-stage approach:

1. Analysis of cycle elements - the process involves separating the time series into set of sine waves (cycles), and measures the wavelength, amplitude and angle of cycle.
2. Multiplicative decomposition model - the approach is to divide the time series into several components, namely: trends, seasonal variations, cycles and irregular occurrences. The estimates of these factors are used to describe the time series.

The multiplicative decomposition model is

$$y_t = TR_t * SN_t * CL_t * IR_t \quad (1)$$

where:

- $y_t$  = the observed value of the time series in time period  $t$
- $TR_t$  = the trend component in time period  $t$  (a linear regression of deseasonalised observations in time period  $t$ )
- $SN_t$  = the seasonal component in time period  $t$  (by averaging the data points for each of the periods making up the complete length of seasonality)
- $CL_t$  = the cyclical component in time period  $t$  ((a 3 period moving average)
- $IR_t$  = the irregular component in time period  $t$

These tests highlight uniformed characteristics in the macro economy and capital market indicators relating business cycles and turning points to those of commercial property markets (office, industrial and retail). Evidence of historical patterns in the time series data can provide a platform for property decision theory. Furthermore, the decomposition technique is particularly beneficial in identifying the possible structure and cause of variations in the time series data. Comparisons can highlight the data stability and suitability with any patterns in cyclical and irregular values utilised and augmented for long-term forecasts.

This is the second in a series of papers dealing with Australian commercial property cycle characteristics. The first (Higgins 1999) analysed 40 years of Australian construction supply data and identified the characteristics of the supply cycle in office, retail, industrial and non-residential building. The paper highlighted the random nature of past property cycles and the limited value of providing forecasts supported solely on empirical property based evidence. The current paper takes a macro approach to explaining those supply cycles, while the third paper will address the problem of explaining construction supply cycles from the perspective of the relationship between the space, property and capital markets (ie. establishing the microfoundations of the cycles).

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The remainder of this paper has been divided into four sections: firstly, a literature review of property cycles and the links to business activity; secondly, details of the data and methodology; thirdly, the results and associated discussion; and finally, some concluding remarks.

## Literature Review

Measurement of real estate cycles is based on the approaches used to analyse business cycles. Using methods developed in the 1930s and fully articulated in *Measuring Business Cycles* Burns and Mitchell (1946) developed a set of statistical approaches to measuring economic time series. The qualitative features of business cycle behaviour they described have become the empirical foundation for modern business cycle theory. Their approach has provided the framework for a growing literature to find the best statistical representation for measuring and modelling aggregated macroeconomic time series, (Hess and Iwata 1997, Firardo 1994, Pagan 1997).

Early analysis of property and real estate cycles was by Hoyt (1933), for the Chicago residential market, and Daly (1982), for the Sydney real estate market. More recently, the real estate crash of the late 1980s has renewed interest. RICS (1994), Pyhrr (1994) and Mueller (1996) have produced comprehensive reports on the causes, dynamics and implications of commercial real estate cycles. Pyhrr *et al* (1999) have an extensive survey of property cycle literature, and they recommend the definition offered by RICS (1994): "Property cycles are recurrent but irregular fluctuations in the rate of all-property total return, which are also apparent in many other indicators of property activity....."

The RICS (1994), study covered real property returns for the period 1962 to 1992, with real estate cycle durations of four to five years. Also for the UK, Barras *et al* (1985) and Barras (1994), utilising spectrum analysis to review the post-war UK property market, detailed the interaction of real estate with the four to five year business cycle. They found an eight to ten year commercial building development cycle, interacting with a four to five year business cycle. These studies also identified the peaks of four distinct long cycles of commercial building

development (new orders) in post-war commercial buildings in 1964, 1972-73, 1981 and 1988-89.

Research on commercial property market cycles has been restricted to the availability of regular long-term data series. For the Australian property market, the total return indices of property companies and the benchmark Property Council of Australia Investment series displays less than two complete cycles. The five to six cycles exhibited in the 40 years of new construction supply data provides an acceptable Australian proxy (Higgins 1999).

Brown (1984) and Witten (1987) recognised that the frequency and magnitudes of cycle rhythms come from the individual dynamics of each market, with evidence of an 18-year US construction cycle between 1830 and 1975. A sample of 10 US office markets by Wheaton (1987), established a 10-12 year cycle with turning points within one or two years of the combined average. Leinberger (1993), identified three general phases in the relationship of real estate cycles to market conditions: (1) upturn, lasting one to two years; (2) mature, lasting two to five years; and (3) downturn, lasting two to four years.

Similarly, the Ball *et al* (1998) study of eight major OECD economies for the past century provided evidence of a range of construction cycles with reported links to respective macro-economies, although the characteristics vary over time and between countries. Earlier work by Ball, Morrison and Wood (1996) on international comparisons of building investment found common characteristics in property cycles across eight industrialised economies.

Central to the commercial real estate cycles theory is the acceptance that changes are driven partly by the market's internal momentum and partly by the external parameters by which property decisions are made. Separating the physical space (demand and supply) and financial (capital flows and price movement) elements can in part explain cyclical movement, and particularly, lags that appear to exist between market movements and property prices (Mueller 1996). Long (1940) developed a comprehensive theory of the investment framework in which both external and internal

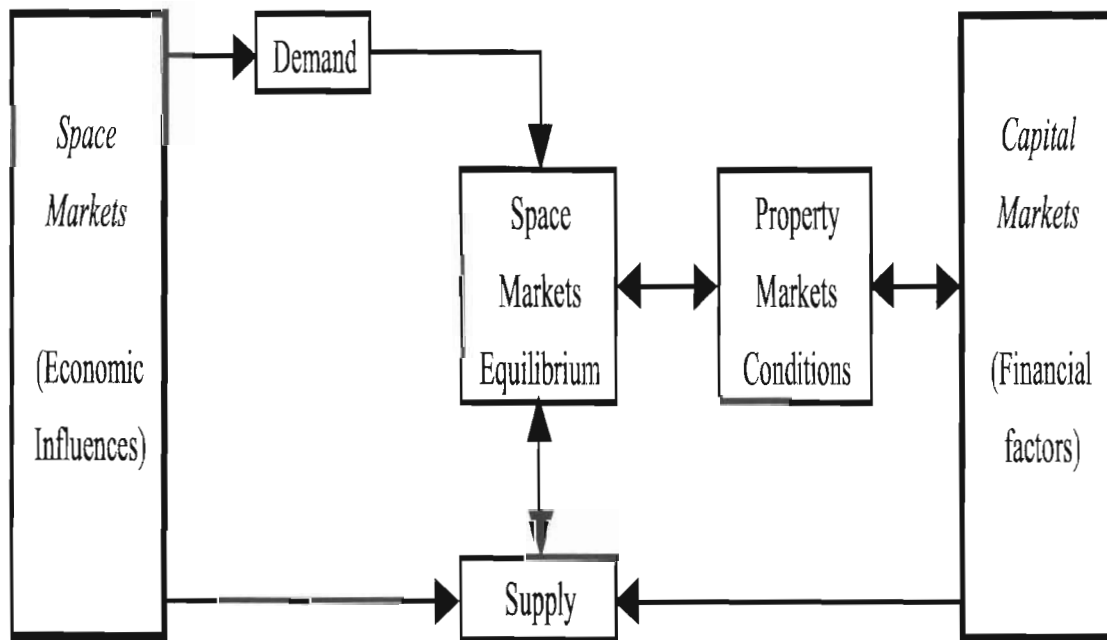
factors affecting building were examined, and concluded that the availability of credit is the main driver.

Several studies have modelled property cycles on business activity. The selection of independent variables depends on locality, time frame, data type, level of analysis and model selection. Leading international reports prepared by Ball *et al* (1998), Kling and McCue (1987), Mueller (1996), RICS (1994), and Wheaton and Torto (1988) have identified various macro

economy and capital market links to commercial property market performance.

Figure 1 adapted from Archer *et al* (1997) provides a simple analytic framework, illustrating the important connections between the space (macro economy) and capital markets. A central feature of the commercial property market is that it is subjected to several variables, which can vary in importance, impact and timing.

Figure 1 **Determinants of the Commercial Property Markets**



Adapted from Mueller 1996 and Archer *et al* 1997

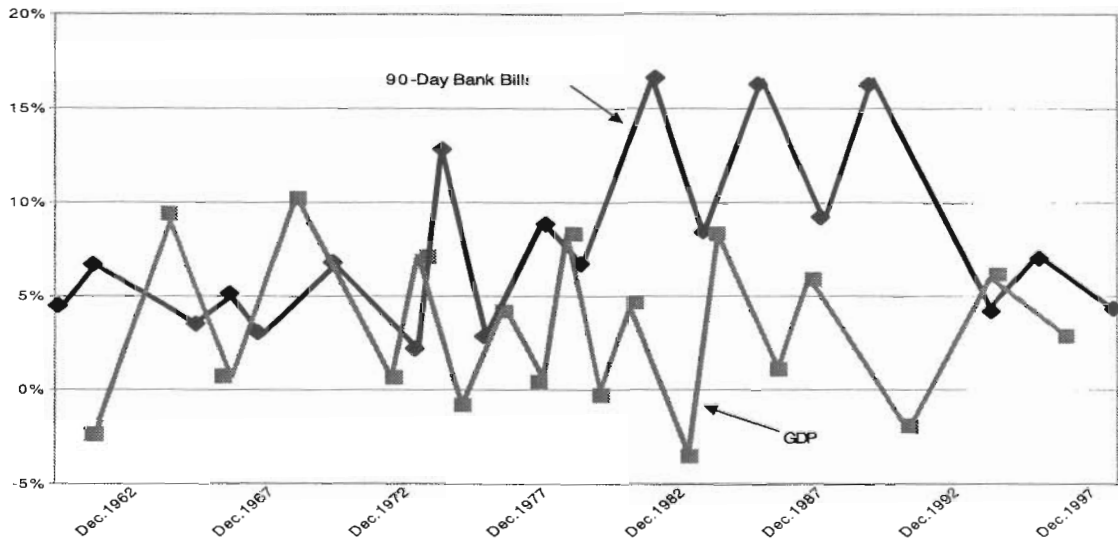
For Australian commercial property markets, Newell and Higgins (1996) linked employment, gross domestic product and the nation's savings to appraisal-based total property returns. JLW (1992,1993) established that the macro economy and interest rates have a significant influence on prime Sydney CBD office market yields. Similarly, the Hooker (1994) study of the Sydney office rental market selected nominal interest rates among other variables.

Higgins (2000) reported on the current status of Australian property market forecasts with a survey of fifteen Australian property analysts. The principal variables selected by the property analysts for five-year net effective rent forecasts were different components of the local economy

and, for the equivalent yield forecasts, various interest rate components.

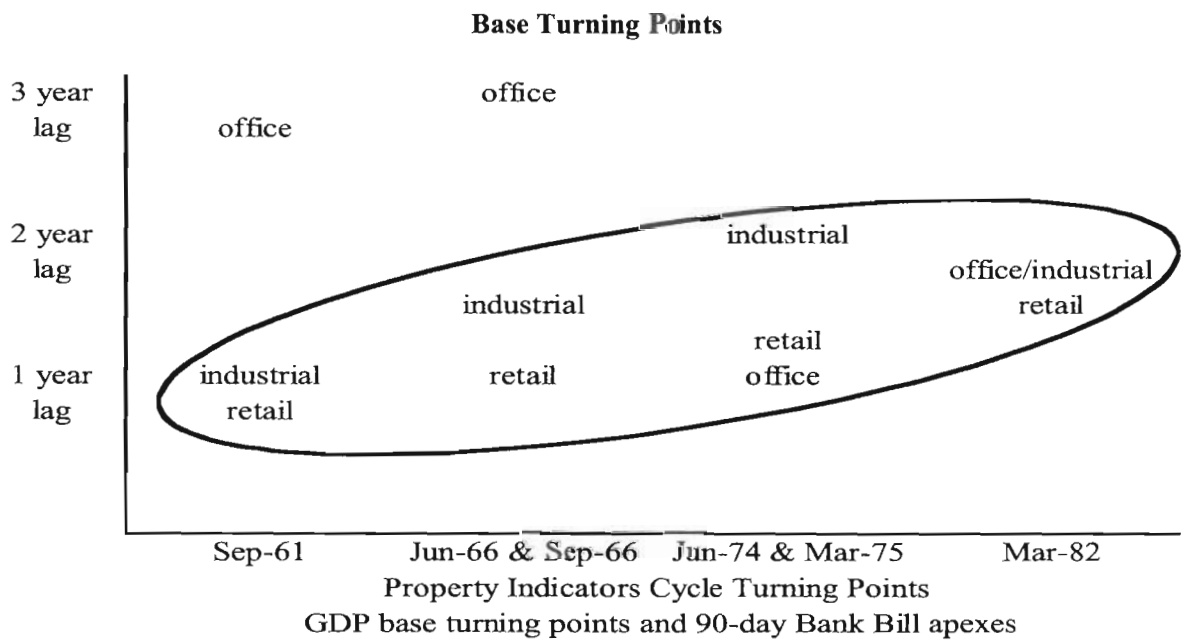
The cyclical nature of business activity is well documented in literature. Mitchell's (1927) pioneering study and the subsequent work by Burns and Mitchell (1946) provide the theoretical foundation for empirical analysis of cyclical macro economic activity and established a framework for a body of literature on the statistical methods for measuring and modelling aggregated macro economy. Oppenlander (1997) and Zarnowitz (1992) provide a comprehensive review of business cycle theory and analysis.

Figure 2 **Turning Points of Leading Property Indicators**



Source: ABS

Figure 3 **Leading Property Indicators and Commercial Property Supply**



**Data and Methodology**

The Australian Bureau of Statistics (ABS) collects and publishes economic and financial time-series data. Selected were seasonally adjusted Gross Domestic Product (GDP A, the average of the income expenditure and output

measures of GDP used by the ABS), to represent macro economic activity, and 90-day

bank bills for capital markets. The main criteria were their recognition and time series availability to correspond with the ABS

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quarterly property activity (new construction supply) data from March 1958 to June 1999, which is a time series of 166 data points.

To determine the long-term relationship between the leading indicators and Australian property markets, the data was separated into a set of sine waves (cycles). In accordance with Pagan's (1997) approach, cycles were measured from trough to a peak of not shorter than six months and a complete cycle of at least fifteen months. The wavelength, amplitude and angle of cycle can then be evaluated and comparison made to the major turning points of the office, retail and industrial markets.

The nature of the various components in time-series data can be separated by the classic multiplicative decomposition method, a straightforward technique segregating the time series into several factors: trend, seasonal, cyclical and irregular (random) components. The process is explained and demonstrated in Bowerman and O'Connell (1993: 354).

## Results

The cycles were calculated and plotted from the 40 years of ABS data. Figure 2 details the turning points in real terms of the moving annual percentage change in the selected leading property indicators: GDP and 90-Day bank bill interest rates. The 90 day bank bills move in a 2 percent to 10 percent band except in four distinct time periods of high real interest rates.

The GDP time series data exhibited nine cycles of a loose four-yearly duration. Both wavelength and amplitude upswing and downswing exhibited similarities in cycle components. The pattern highlights the individual nature of the GDP cycles in the time series.

The initial analysis of the 90-day bank bill cycles indicates similarities to GDP time series with nine cycles of four-year average duration. On further investigation the disparity is in cycle composition with dissimilar wavelength upswing and downswing. The 90-day bank bill data exhibited generally stable pronounced upswings (ranging from 1 to 2.75 years) to

irregular downswings (ranging from 1 to 4.50 years).

Although, the cycle elements of the property indicators appear dissimilar, the GDP base turning point and 90-day bank bill apex in cycles one, two and four are all grouped within a one-year time frame. These turning points, and the 90-day bank bill cycle six apex (March 1982), lead the various commercial property supply base turning points by 9 to 36 months, as shown in Figure 3. There is no evidence of this relationship in the subsequent base turning points of commercial property supply (December 1994 to June 1995). This study could not find any business activity links to commercial property supply top turning point.

Figure 3 illustrates the high correlation in the 1960s and 1970s between specific macro economy and capital market turning points and the subsequent turning points of commercial property supply. What is significant is the clear change in the relationship between the Australian business cycle and the property market and new non-residential building activity levels. Since the 1980s there have been increasing signs of disequilibrium effects as the lags between GDP and interest rates, as the leading property indicator time series, have lengthened and dispersed. The cause of this will be the subject of a further paper.

As the leading property indicators display recurrent but irregular fluctuations, a breakdown of the time series can provide an important perspective on the underlying cause and effect relationship in the time series. Figures 4 and 5 detail the decomposition model cyclical and irregular components for GDP and 90-day Bank Bills

Separating the cyclical and irregular component highlight the structural features in the GDP time series, with a regular underlying cyclical pattern alongside inherent instability. The cyclical components reveal asymmetrical cycles similar to the seasonally adjusted GDP data displayed in Figure 2. The irregular component exhibits major fluctuations, which appear random to the cyclical component since 1982. Prior to this date, some similarities appear in the timing of the main base turning points.

Figure 4 **Decomposition of Gross Domestic Product**

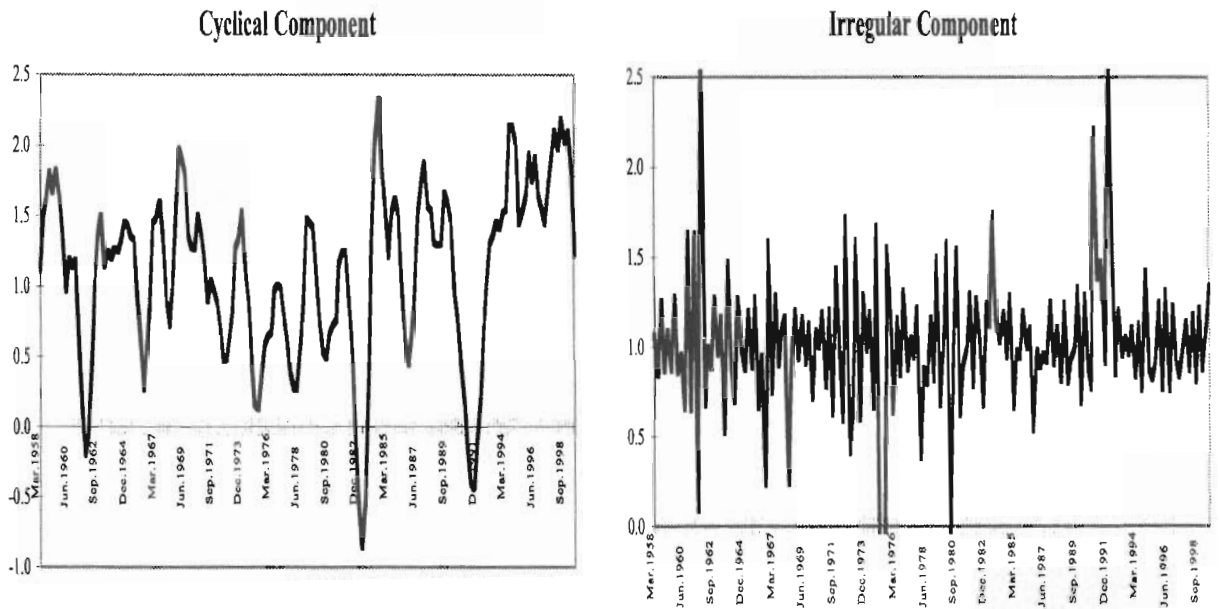
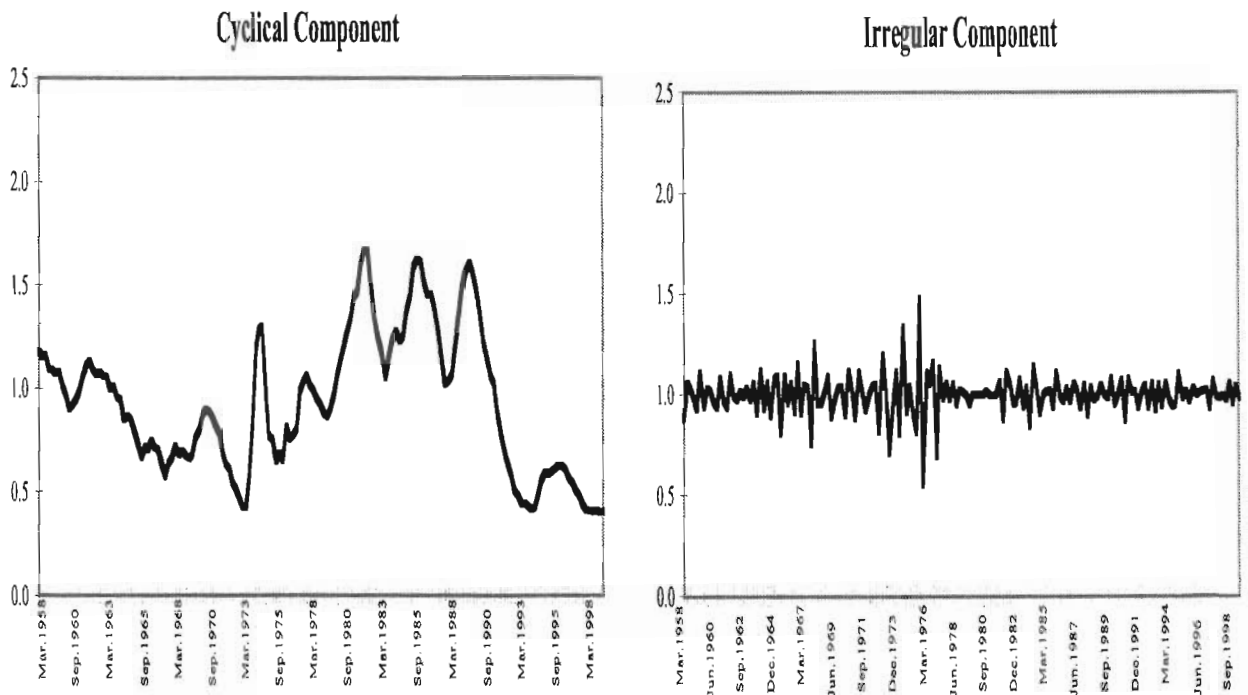


Figure 5 **Decomposition of 90-Day Bank Bills**



The 90-Day Bank Bills decomposition model provided limited evidence of similarities in the cyclical and irregular components. Regular cycles were difficult to identify in the cyclical

component. The cycles appeared to be stable in specific time frames, and then vary with inconsistencies in adjoining periods. Overall the cyclical component provided nominal evidence



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of symmetrical cycles. The irregular component appeared relatively stable, and since 1978 there has been reduced volatility.

The decomposition model shows the disparity in cycle elements, in that the volatility of GDP in the irregular component is considerably more than the irregular 90-day bank bill time series. And the data appears unrelated to GDP cyclical component. This suggests that the GDP time series is heavily affected by unexpected economic shocks as it moves in some form of asymmetric cycle.

## **Conclusion**

This paper investigated the relationship between the business cycle and non-residential building activity. The 40 years of macro economic and capital market data studied exhibited nine cycles each of approximately four-years duration. The GDP and 90-day bank bill cycle structure varied considerably, a highlight being the component variations within the 90-day bank bill cycle and the contrasting movements in the GDP cycle across the time series. Even with the fluctuations in cycles the GDP base turning points and 90-day bank bill apexes were grouped within a one-year time frame, and led the various commercial property base supply turning points by 9 to 36 months.

The decomposition model illustrated the disparity in cycle elements, most noticeably the irregular component, where 90-day bank bills volatility is considerable less than the GDP time series.

This could support the theory that economic shocks cause the underlying volatility in the economy, as it moves in some form of systematic cycle, driven by swings in business and consumer confidence. In contrast, 90-day bank bills exhibit inherent flexibility, anticipating and promptly reacting to economic conditions.

As commercial property market links to business activity are always in an open-ended process of motion, interaction, and transformation, decision-makers need to understand the selection of leading property indicators should relate less to historical evidence, and more to data stability and market mechanics in prevailing business conditions. The focus on data exhibiting a low irregular component can provide the first step to improve the analysis of future commercial property markets and the links to business activity.

The GDP, bank bills and commercial property measures all display recurrent but irregular fluctuations, and all appear to be subject to several cyclical influences. Since 1982 the timing of commercial property base supply turning points is different from the leading business indicators. This suggests the links between the commercial property market and the broader economy have weakened and now operate under a different dynamic compared to historical business activity links. Commercial real estate appears to now relate more strongly to property demand and supply disequilibrium.

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