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Real Estate Cycles and Their Strategic Implications for Investors and Portfolio Managers in the Global Economy

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Abstract. This study synthesizes relevant research and commentary on real estate cycles in a micro-decision-making context and discusses their strategic implications for investors and portfolio managers. It begins with an extensive review of the macro-economic, micro-economic and practitioner literature on cycles, with special emphasis given to the emerging topic of global real estate cycles.

The second major section of the study presents the basic theory of cycles, examines the nature and dynamics of real estate cycles, identifies the many different types of interdependent cycles that affect real estate performance and presents strategies for dealing with multiple interrelated cycles. Understanding the complex and dynamic macro-to-micro cycle relationships is believed to be the foundation for understanding real property performance in a specific market, submarket and site-specific location. Successful cycle strategies that achieve above-market returns over the long run are dependent on this understanding, good market timing and a degree of contrarianism.

Eight cycle models are presented in the third major section of the study. Each presents an analytical definition of cycles, seeks to measure cyclical impacts on key investment variables in an ex ante framework and provides insight into some aspect of investment timing or other property/portfolio decisions. The final major topics addressed are the key strategic and decision implications for investors and portfolio managers, and a proposed cycles research agenda for the future.

Introduction

Real estate cycles have been a significant underlying reason for the financial successes and failures of real estate investments throughout history. Cycles are a major determinant of success or failure because of their pervasive and dynamic impacts on real estate returns, risks and investment values over time—impacts that should not be ignored or over-simplified. Because of this recognition, as well as a growing industry focus on real estate as a distinct asset class that deserves increased portfolio allocations, investors and portfolio managers are placing increased emphasis on the

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strategic and decision-making implications of real estate cycle theory and analysis (Roulac, 1996).

The concept and importance of real estate cycles was central to the early land economics work of Homer Hoyt in the 1930s (Hoyt, 1933), which represents the foundation for the urban land economics discipline, and which later evolved into the real estate finance and then real estate investment disciplines. Even prior to Hoyt's work, Wesley Mitchell established the theoretical foundation for and empirical evidence of cyclical economic activity in the United States (Mitchell, 1927), and a strong body of knowledge developed on the subject of business cycles over the next fifty years. However, despite its early importance in the general business and land economics literature, real estate cycles have been largely ignored or discounted by real estate academics and practitioners until recent years.

In recent years, an intense interest in the subject of market and property cycles has developed among real estate academics and industry researchers and decision makers, as evidenced by the rapidly expanding academic body of knowledge on the subject and the inclusion of cycle references and analysis in a wide variety of proprietary industry publications. This growing body of knowledge can be measured by the number of articles appearing in the real estate literature, as well as paper and panel sessions at annual meetings of organizations such as the American Real Estate Society (ARES), the International Real Estate Society (IRES), the European Real Estate Society (ERES), the Asian Real Estate Society (AsRES) and the Pacific Rim Real Estate Society (PRRES). One example of the growing recognition of the important role of real estate cycles is the observation by the recently merged Equitable Real Estate and Yarmouth pension fund advisory groups (representing assets worldwide in excess of \$40 billion) from their publication *Emerging Trends in Real Estate 1998*: "Today's real estate investors have literally emerged from the Dark Ages. They're better positioned to gauge cycles, and can move more rapidly to take advantage. Real estate has always been a cyclical business, but you were always looking through a rear-view mirror trying to figure out what was going on. That's not true today."¹

Purpose of Study

The purpose of this study is to synthesize relevant research and commentary on real estate cycles in a micro-decision-making context, including a review of cycle literature, theory and financial modeling, and to discuss their strategic implications for investors and portfolio managers. While limited research studies are currently available on real estate cycles in a global decision-making context, researchers are focusing more attention on global cycle considerations because of increasing commitments by investors to real estate in other countries. Also, researchers and investors recognize that investment and portfolio returns and risks are increasingly being influenced by international economic events and flows of investment funds. Special emphasis is therefore given to the emerging topic of global real estate cycles.

We devote a substantial early section of the study to a fairly exhaustive review of the macro, micro and practitioner literature on real estate cycles.² We offer this review

for three reasons: (1) it has not been done previously; (2) it reveals the growing but fragmented body of knowledge on cycles and suggests an opportunity for researchers to develop a cohesive theoretical and analytical framework for evaluation of cycles; and (3) it provides academics and practitioners with a basic body of knowledge summary and reference list for future research on the subject, whether that research is macro or micro, theoretical or empirical, or analytical or anecdotal in nature.

The Relevancy of Cycles

To provide a context for consideration of real estate cycles it is helpful to recognize that cycles in nature are everywhere and interdependent. Among the dynamic cyclic patterns that have repeating and predictable behavior are a quartz watch crystal vibrating 10 billion times a second, an Ice Age every 100,000 years, the Milky Way spinning on its axis every 200 million years, as well as the sunrise, sunset, the new moon, the full moon, high tide, low tide, heartbeat and seasons. Other cycles that occur in the same place, and occur again and again, but do not recur in any set time period include earthquakes, floods and forest fires (Miller, 1997).

Comprehension of cycles, specifically understanding, planning for and exploiting predictable cycles concerning the food supply, was central to the emergence of hunting and gathering societies and their location decisions. Basic, then, is to understand that “a cycle is a sequence of events that repeat,” (Miller, 1997). Consequently, the capacity to perceive events as susceptible to repetition as opposed to being isolated, random and non-recurring is crucial to coping with nature, political economy, business and investing.

With growing contemporary interest in both history and futurism, reflected by an interest to learn lessons of the past and comprehend the implications of change, cycles are central to effective functioning in a contemporary world. Indeed, cycles are basic to such diverse involvement as surfing—the tide cycle; dairy farmer—weather, seasonal milk production and daily milking; and music—coherence, rhythm, the tonal system cycle from rest to complexity to return to rest (Kaufman, 1997).

Cycle impacts from space (the solar system), the Earth’s atmosphere and the Earth itself are manifested as forces that affect the physical environment in which we live. Changes in the physical environment, in turn, affect human behavior and economic activity. Human behavior and economic activity affect supply and demand forces in the real estate markets, which in turn affect the financial performance of properties through changes in rents, vacancy rates, operating and capital expenses and capitalization rates. Changes in financial performance, which are caused by these external forces, are measured through rate of return and risk analysis, which are the key parameters that determine rational investment decisions. Now, if most or all of the physical forces from the solar system to Earth to our immediate physical environment are cyclical, then it is logical that property performance is also cyclical.

It is our belief that understanding the complex macro-to-micro cycle relationships and “linkages” described above is the foundation for understanding real estate property

performance in a specific market, submarket and location. Thus, cycles at every level should be studied and modeled, and the resulting information used for making better investment decisions. These beliefs, however, are not universally held by our real estate and finance contemporaries.

Not surprisingly, there are two schools of thought on the question “Are real estate cycles relevant?” The “first school” argues that real estate cycles are not relevant and therefore can be ignored; the “second school” argues that real estate cycles *are very relevant* and should be carefully studied by analysts and investors. By relevant, we mean that an investor or portfolio manager can use the theory and knowledge of cycles to make better decisions that result in greater wealth over the long run.

The Case for Ignoring Cycles

Over the past twenty-five years of research on the subject, authors have recounted numerous reasons for and arguments on the irrelevancy of cycles. As recent as the late 1980s, it was not uncommon to hear a finance professor dismiss the concept of real estate cycles as a research topic and decision variable, and suggest that research on the subject was misguided. Support for these assertions is based on fundamental concepts embodied in the efficient market hypothesis.³ Also, valuation theorists and appraisers have historically ignored cycles in their valuation frameworks and models (Born and Pyhrr, 1994; and Pyhrr, Born, Robinson and Lucas, 1996). Sixteen reasons and arguments that real estate cycles are not relevant, or can be ignored, are summarized in Exhibit 1.

While these arguments continue to be prevalent among “first school” advocates, the thought leadership of the real estate discipline has steadily shifted its allegiance to the “second school” of thought: the belief that real estate cycles are relevant, have significant and measurable impacts on investment returns and risks, and therefore have important strategic implications for investors. The “preponderance of evidence” cited by these “second school” cycle advocates can be placed into three categories: macroeconomic, microeconomic and practitioner.

Distinction between Macroeconomic and Microeconomic Literature

A wide variety of “macro” and “micro” real estate cycle topics are addressed in the literature presented in this article. Macroeconomic cycle studies are defined here as those whose primary cycle focus or emphasis is at the national, international or regional levels. The general business cycle, inflation cycles, currency cycles, population and employment cycles, and technology cycles are examples of cycles that are generally classified under the macroeconomic category. Demand (absorption) cycles, supply (construction) cycles, occupancy cycles, long cycles and short cycles, when studied at the regional or national levels, are also considered macroeconomic for classification purposes.

In contrast, microeconomic cycle studies are defined as those whose primary cycle focus or emphasis is at the metropolitan area market, submarket or property location

Exhibit 1
Reasons Why Real Estate Cycles Are Not Relevant or Can Be Ignored

1. *Little academic interest in cycles:* Not many academics are interested in conducting research on real estate cycles; therefore, cycles must not be very relevant.
 2. *Financial theory does not address cycles:* Modern financial and portfolio theory does not explicitly address cycles; therefore, cycles must not be very important.
 3. *Cycles cannot be measured:* If there is such a thing as a cycle, one cannot measure it, or determine where one is in the cycle, or forecast where the cycle is going. Statistical research cannot validate the presence of cycles.
 4. *Economic forces are random:* The economic forces that are perceived to create or represent cycles are random in nature, thus cannot be forecast or modeled.
 5. *Real estate markets are efficient:* Therefore, knowledge about cycles cannot be used to increase the returns of a portfolio (or reduce risk), if the portfolio is properly diversified to begin with.
 6. *Diversification eliminates cycle effects:* With a large portfolio, a manager can diversify away the effects of cycles through good property type and geographic diversification; therefore a portfolio manager can largely ignore them.
 7. *Long-hold approach eliminates cycle effects:* Many investors, especially institutions such as pension funds and Life Insurance companies, are patient investors that ignore short-term market cycles.
 8. *Cycle strategy gains are offset by costs:* If there are increased returns from “playing the cycle,” any potential extra gains will be eliminated because of the additional information and transaction costs and risks associated with turning over properties in the portfolio.
 9. *Lack of evidence about economic cycle impacts:* Little is known about the effects of economic cycles on cash flow variables—rents, vacancy rates, operating and capital expenses, capitalization rates.
 10. *Cycle model specification is difficult:* Accurate specification of analytical models that explicitly consider cycles and their impact on investment returns/risks is difficult or impossible.
 11. *Inadequate data:* Adequate and accurate market and financial data needed for inputs into a cycle model are not available.
 12. *Lack of investor interest in cycles:* There is no evidence that investors use cycle forecasts in their investment decision making or strategies.
 13. *Simplicity and lower cost of trend analysis:* Traditional DCF models that input constant rent and expense increases over the analysis period are easy to use, inexpensive and have become the market standard among individuals and institutions.
 14. *Tradition:* Since cycles have not been considered a relevant decision variable in the past, they can be ignored in the future; traditional investors are slow to change their perception of the investment environment and cling to traditional investment evaluation techniques.
 15. *Vested employment interests result in conventional wisdom strategies:* Most portfolio managers have vested employment interests and justify their positions by employing the safe, acceptable “prudent-man” strategy. They do what their peers in the industry do or they “go with the flow” and “conventional wisdom,” which largely ignores cycles strategies. Mavericks and contrarians are not generally acceptable in bureaucratic institutional environments.
 16. *No crystal ball:* Most portfolio models are based on historical data inputs. In contrast, cycle decision models require the analyst to input forecast data. This is difficult since the real estate industry has not developed good forecasting and prediction models. Further, as one manager has observed, “If you live by the crystal ball, you will die by eating a lot of broken glass.” Forecasting is a high-risk business. Most investors and portfolio managers are risk adverse and seek to minimize the probability of being wrong.
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levels. This classification also includes comparative analyses to identify investment opportunities among specific metropolitan areas (or submarkets) located within a region or nationally. Examples of cycles that are generally classified under the microeconomic category are urban cycles, neighborhood cycles, physical life cycles, ownership life cycles, rent rate cycles, occupancy cycles, capitalization rate cycles and portfolio mix cycles. Generally, studies that focus on project level or portfolio level decision making are classified as microeconomic studies.

Whenever a study includes elements of both a macro and micro nature, often with the purpose of linking together or integrating cycles at both levels, the primary purpose and conclusions of a study are used as a guide to subjectively determine its proper classification. Clearly, the process is subjective and we apologize to our colleagues for any resulting mis-classification of their research work.

Cycle Relevance: Macroeconomic Literature

Cycles in the national economy. The cyclical nature of the national economy is well documented in the literature beginning in the 1920s. A radical Russian economist at that time, Nikolai Kondratieff, noticed that since the start of the industrial revolution capitalist economies experienced long waves of growth and contraction (Stoken, 1993). These long waves, which became known as the “Kondratieff Wave,” consist of twenty-five to thirty-five-year waves of increasing prosperity and living standards and are followed by a decade or more of depression and falling living standards and employment. As Kondratieff (1928) explained it, these severe economic depressions come at fairly regular forty-five to sixty-year intervals, and are followed by another long surge of business activity that results in a new peak of economic output and prosperity. Kondratieff also identifies temporary setbacks, known as recessions, that occur during the twenty-five to thirty-five-year up cycle period. The Soviet government did not like the capitalist implications of his theory for their socialist economy, so Kondratieff was quickly relocated to Siberia where his publications ceased, but not before certain notable U.S. capitalist economists (e.g., Schumpeter, Forrester and Rostow) embraced his work and cycle theories.

Another early pioneer of long real estate cycle research was an American by the name of Roy Wenzlick, who published one of the first real estate periodicals, *The Real Estate Analyst* (Rabinowitz, 1980). Wenzlick charted long cycles of housing transactions from 1795 through 1973 at the national level, and concluded that the average length of the long cycle was eighteen and one-third years.

Much of the early economic cycle research in the U.S. was concerned with moderating fluctuations in the national economy and promoting growth in the macroeconomy. Mitchell's (1927) work for the National Bureau of Economic Research established the theoretical foundation for and empirical evidence of cyclical economic activity in the U.S. This was complemented by Burns and Mitchell's NBER report (1946). Dauten and Valentine (1974) expanded on Mitchell's theoretical base and included macroeconomic theory to help explain economic cycles. Klein and Wolman (1975) then showed that economic cycle instability during post-World War II periods was

greater than during pre-World War II. Moore (1983) updated Mitchell's work and included an extensive theoretical and empirical treatise on business cycles and inflation in the national economy. Fabozzi and Greenfield (1984) built on the theory and empirical evidence specifying linkages between economic factors and capital spending, construction activity, interest rates and inflation.

Recent thought regarding the implementation of counter cyclical monetary policies to dampen business cycles through financial market controls was reviewed by Chatterjee (1999). His review included examination of works studying pre-WWII and post-WWII business cycles to evaluate the effectiveness of counter cyclical policies in damping the variability in business sector productivity that is judged to be the underlying cause of cyclical economic activity in the nation. Real business cycle theory is the foundation for this research, and Chatterjee suggests that policy initiatives to buffer the effects of business cycles may not be necessary. He notes the possibility that post-WWII programs such as FDIC insurance, superior control of the money supply and income-maintenance programs may have contributed to reducing the instability that characterized pre-WWII business cycles. Consequently, monetary and financial disturbances have not been the main issues of concern. Business-sector productivity, instead, has surfaced as the main source of business cycles. Macroeconomists have not developed reliable techniques for damping the cycles of business-sector productivity without causing a reduction in long-term economic benefits to individuals.

National economy linked to real property. Economic cycles impact a major portion of the national wealth. In 1997, total fixed reproducible tangible wealth (real estate) in the U.S. was about three times greater than the annual gross domestic product (Statistical Abstract of the United States, 1998). Consequently, the connection between this large percentage of national wealth and economic cycle activity is important. Burns (1935) compiled the first authoritative summary and analysis using the mass of economic data collected by government agencies and private parties concerning the long construction cycles. The work was linked to macroeconomic research by Mitchell and Burns. Grebler and Burns (1982) analyzed total construction, public construction, private construction and residential property construction over the period from 1950 to 1978 and found six cycles in residential construction and four cycles in nonresidential construction in the U.S.. They also found that peaks in GNP lead the peak in the construction cycle by about eleven months. Brown (1984) evaluated existing single-family home sales during the period from 1968 to 1983. His purpose was to validate that there were cycles in real estate after removing seasonality and trend factors. He also found a high correlation between economic cycles and real estate performance during the period studied.

Pritchett (1984) analyzed the impact of the national economy on cycles in investment grade real estate during the period from 1967 to 1982 to understand which key real estate cash flow variables indicated the change in cycle phase. He concluded that: (1) demand leads supply as the construction cycle rises to a peak but lags supply as the cycle falls to a trough; and (2) the best indicator of the cycle phase is vacancy rate. Usually, vacancy rates reach high levels during the recession phase of the cycle,

declining during the expansion phase, then reaching a low point as the peak of the construction cycle is approached. Hekman (1985) evaluated aggregated office market data from fourteen cities over the 1979 to 1983 period. He developed and tested two models: the first regressed class "A" office building rents on vacancy rate, constant dollar gross national product (GNP), total metropolitan area employment and the metropolitan area unemployment rate; and the second regressed value of office permits on the ratio of employment in 1980 to that in 1970 for three industrial sectors—finance/insurance/real estate, service and government. He found that office market rents adjusted in response to local as well as national economic conditions, construction of office space was highly correlated with inflation-adjusted office rents and rents showed a strong response to current vacancy rates. Furthermore, in his study of the office sector, he concluded that office construction was highly cyclical at the national level.

Kling and McCue (1987) considered the influences that the macroeconomic factors have on office construction. They employed vector autoregression models evaluating monthly office construction, money supply, nominal interest rates, output (GNP) using personal income as a proxy and aggregate prices (CPI). They concluded that office overbuilding and market cycles resulted from a decline in nominal interest rates that raised developers' projections of GNP and future demand for space on a macroeconomic level. They also substantiated the effect of the 1981 tax act on stimulating office construction.

In a study of publicly traded real estate investments trusts (REITs) and real estate companies during the 1973–1987 period (14.5 years), covering several business cycles, Sagalyn (1990) showed risk and return relationships between these two classes of firms to be quite different, and more pertinent to this study, also showed the effect of the business cycle on the cycle of real estate asset performance.

Downs' (1993) work concluded that differences in equilibrium vacancy rates in different markets are due to fundamental differences in market supply and demand conditions in those markets. He argues that, because some markets contain a higher proportion of rapidly growing firms, or are experiencing more rapid population growth, dynamic markets will have higher vacancy rates than static markets. He also validated the linkage between real estate cycles and general economic cycles.

Janssen, Kruijt and Needham (1994) used the economic theoretical approach of the honeycomb cycle in a study of Netherlands housing over a fourteen-year period (1976–1989). They demonstrated a cyclical manifestation in the national market as well as cycles at the metropolitan level that were different from each other and different from the national market aggregate.

Two works completed by Roulac are further examples of national economic cycles linked to real property. First, the Roulac and Sobolik (1985) study evaluated the ex post impact of tax reforms on real estate performance. Second, Roulac's (1993) perspective view of twenty-five years of real estate business provided a general philosophical examination of important cyclical relationships that existed and might

be expected to be important in the future. He evaluated real estate markets influenced by the economy, office demand, office construction, property values, volume of transactions, capital for real estate, investor interest and tax climate factors. The vitality of capital flows to commercial real estate were categorized for pension funds, financial institutions, foreign investments, securities and corporate investments. Finally, the implications of the market changes were time-period segmented for space users, real estate services providers, developers and the public sector.

Macro real estate cycles. There is extensive evidence of real estate market cyclicity. In this section, we review the literature on macro real estate cycle characteristics and cyclical indicators that can be measured.

Early real estate cycles research evaluated market behavior based on a homogenous national market. More recent analyses explore inter-market distinctions and linkages between macroeconomic variables and real estate market variables. Wheaton (1987) evaluated post-World War II national office building construction activity and vacancy rates and found a recurring twelve-year cycle. He found a direct linkage between office employment changes and both supply and demand variables and noted that supply responded more quickly than demand.

A number of studies have examined the cyclic movement of the commercial property market in the U.S. Kling and McCue (1987), Wheaton (1987) and Grenadier (1995) have all documented long-run cyclic movements in office rents, construction and vacancy that do not match the more frequent macro-economy fluctuations. By contrast, the Grebler and Burns (1982) and DiPasquale and Wheaton (1994) studies of the U.S. housing market show that both single- and multi-family housing movements tended to be much more closely aligned with macroeconomic movements.

Vacancy rates are identified by numerous researchers as a key variable linked to rent cycles and building cycles. In their analysis of the national office data for the period between 1968 and 1986, Wheaton and Torto (1988) found a clear indication that office vacancy rates and real rents were cyclical. The peaks and troughs of the real rent cycle lagged the trough and peak, respectively, of the vacancy rate cycle by about one year. Both tenants and office managers apparently recognized the need for real rent adjustments in response to vacancies above and below the structural (natural) vacancy rate. In 1968, the natural vacancy rate in the U.S. was about 7.5%, but by 1988 it had increased to nearly 12%. Wheaton and Torto broadly documented evidence of real estate cycles, but cited the failure of existing explanations to provide a satisfactory answer for the boom-and-bust behavior in real estate markets. The severity of the boom-and-bust cycle has been attributed to developers lagging optimum timing, building too late in the boom, and continuing to build into the bust.

Grenadier's (1995) work on the persistence of real estate cycles provides further insight into the causes of the mismatch between supply and demand that result in prolonged periods of abnormally high vacancy rates, which are followed by periods of abnormally low vacancy rates. The combination of demand uncertainty, adjustment costs and construction lags leads to two phenomena that offer explanations of market

persistence. First, the reluctance of owners to adjust occupancy and rent levels, even when they face large shifts in renter demand. And second, the phenomenon of periods of sustained overbuilding even in the face of already high vacancy rates. Grenadier develops a theoretical option-pricing model that helps explain that such behavior on the part of owners and developers is not myopic (lacking knowledge and foresight), nor is a result of leasing hysteresis (the failure of owners to reverse their behavior even when the underlying causes are fully reversed). Rather, such behavior is said to be a logical result of optimal planning and development strategies in an environment of demand uncertainty, high costs (tenant improvements and leasing costs) of adjusting to demand shifts and long planning and construction periods for real estate assets. His model further explains why the office market (as compared to the industrial and apartment markets), is most prone to periods of over-building due to longer planning and construction times.

Chinloy (1996) linked both production and absorption of apartment units to prices and rents of both existing units and new construction in a theoretical construct. The model showed that when builders under-forecast rent increases, unexpected excess returns trigger construction. Apartment market rents depend on the behavior of the vacancy rate cycle, which affects new supply. He found that rent adjustments were sluggish to return to equilibrium after a macroeconomic shock.

Clayton (1996a) studied the determinants of commercial property prices over the Canadian property cycle and the implications for real estate investment strategies. He developed a time series vector autoregressive (VAR) model to study the linkages between economic or business cycles (measured by cycles in GDP growth) and real estate cycles (measured by cycles in aggregated total real estate returns for all property types), the effects of market cycles on pricing and property income and the implications for buy-and-sell decisions. The study results suggest that commercial property prices may be “forecastable” and that major market movements (cycles) may be detectable in advance. The VAR forecasting model developed yielded sensible buy-sell decisions over the fifteen-year study period (1979–1994) and hence appears to be a potentially valuable tool for investors managing a widely diversified multi-city portfolio (all property types, all metropolitan areas). Within this framework, Clayton makes a strong case for attempting to time real property acquisitions and dispositions. Another significant finding was that the relative importance of capital market forces and real estate supply and demand changes over the real estate cycle. Capital market forces become relatively more important than real estate supply and demand fundamentals in real estate pricing during periods of volatile market cycles and during market upswings. Hence, it is important for market participants to become aware of which factor is the primary driving force behind property price changes at different points in the real estate cycle when making investment and valuation decisions.

Kaiser’s (1997) study on long cycles in real estate examines seventy-eight years of real estate aggregated performance data comparing institutional real estate returns; data characterizing construction, office employment, inflation, interest rates and stock

indexes; and property type performance measures to obtain a sense of the cyclic relationships among these macro-variables. Kaiser discusses the presence of three types of long cycles (thirty-year, fifty-to-sixty year and several hundred year), which he believes better explain the behavior of the real estate markets than shorter-term cycles.⁴ The study of short cycles, in contrast, are highly useful in the management of real estate portfolios—in the timing of purchases and sales—but of very limited use in deciding how much to allocate to the real estate asset class.

Wheaton and Rossoff (1998) developed a structural model of the lodging industry, examining the 1969–1994 period, and found that occupancy and room rental rates followed the cyclical movement in supply. Hotel demand, however, seemed to move closely with the macroeconomic cycle. The model results indicated long lags between occupancy and room rental rate changes as well as long lags between room rental rates and new supply changes.

The most recent study on macro real estate cycles, as of the time of this writing, is one commissioned by The Royal Institution of Chartered Surveyors (RICS, 1999) and undertaken by the Investment Property Databank, and published in January 1999. The study is an analysis of property cycles in the United Kingdom from 1921 to 1997 and is an extension of a basic treatise on understanding the property cycle, which RICS published in May 1994 (RICS, 1994). The study's primary measure of the property cycle is the rate of all-property total return, although other indicators of property activity (rental values, yields, building rates) are also used to describe cycles, but have varying leads and lags against the all-property cycle. The study concludes that property cycles have durations ranging from four to twelve years, with an average of eight years. The upswings run from two to seven years, and downswings from two to nine years. Also identified by the statistical tests are the possibility of two underlying cycles, of roughly five years and nine years in duration. Comparisons between the scale and timing of the property cycle and the national economic growth cycle show that there are strong correlations between the two for many cycles, but not all, and that these relationships have changed over time. Unfortunately, because of the empirical model used, which limits data inputs to highly aggregated all-property total returns, the model has limited usefulness for understanding individual property markets or forecasting purposes.

Conclusion

The economic and real estate literature demonstrates that economic factors are cyclical, cash flow variables (rents, vacancies, capitalization rates) are cyclical and real estate performance (rates of return) is cyclical at the national and regional levels. While modeling at the national and regional levels is useful for understanding the relationships between economic and real estate market cycle variables in a general sense, its power as a tool for forecasting and decision making at the property and portfolio levels is limited. As will be seen, the usefulness of cycle modeling increases as we move from macro-to more micro-level analysis at the metropolitan area and property location levels.

Cycle Relevance: Microeconomic Literature

In recent years, several researchers have analyzed the effects of cyclical economic factors on real estate investment performance at the metropolitan area, submarket and property levels. These analyses were structured to reflect more realistic cycle (versus trend) relationships between economic factors and cash flow variables. In addition, valuation frameworks and models have been extended to include cycle analyses and linkages, and investment strategies that take advantage of cycle forecasts and projections.

Relatively few articles, papers and chapters on micro real estate cycles appeared in the literature in the 1980s, with notable exceptions including those by Pyhrr and Cooper (1982), Peiser (1983), Brown (1984), Pritchett (1984), Wheaton (1987), Witten (1987), Voith and Crone (1988), Wheaton and Torto (1988) and Pyhrr, Cooper, Wofford, Kapplin and Lapidés, (1989). Beginning in 1990, there has been a proliferation of micro real estate cycle research, including articles and papers by Pyhrr, Born and Webb (1990), Roulac (1993, 1996), Born and Pyhrr (1994), Mueller and Laposa (1994), Mueller (1995), Shilton (1995), Clayton (1996, 1997), Gordon, Mosbaugh and Canter (1996), Hendershott (1996), Mueller, Laposa and Wincott (1996), Pyhrr, Born, Robinson and Lucas (1996), Mueller and Pevnev (1997), Wheaton, Torto and Evans (1997) and Kaiser (1997).

Born (1984) developed cycle theory, models and applications that considered cyclical inflation in a real estate investment analysis framework. He also demonstrated that cyclical inflation can produce performance results that are significantly different from results using a constant inflation rate. In subsequent research, Pyhrr, et al. (1989), used this analytical framework and expanded it by incorporating other economic and property specific cycles. In addition, several authors have found that inflation has a significant impact on real estate returns (*e.g.*, Lusht, 1978; and Hartzell, Heckman and Miles, 1987).

A number of authors have addressed the strategic importance of measuring the dynamic impacts of cyclical economic factors on real estate investment performance. In a classic prescriptive article, Roulac (1982) recited a litany of change during the 1960–1980 period including volatile inflation and markets, increasing complexity of financing mechanisms, shifting national markets and the internationalization of markets combining to produce increased economic uncertainty. His prescription for including real estate cycle considerations in the analysis of real estate investments is clear: “Investment analysis and valuation techniques must be compatible with the dynamic market they seek to measure... Explicit economic approaches that forecast every relevant item in the investment analysis and employ reasonable real return numbers are preferable to static models that have long dominated the United States markets” (p. 573).

Peiser (1983) studied inflation linkages to the capitalization rate. Using the accepted linkage between inflation and the discount rate (discount rate equals real return plus inflation plus business risk) in a DCF framework, Peiser showed the overall

capitalization rate (ratio of current NOI to sales price) to be negatively correlated with inflation induced expectations for growth in property value. This linkage was the underlying cause for capitalization rate decline with an expectation for increasing inflation rate.

Lusht and Fisher (1984), while reviewing the predictive capability of standard valuation models, observed that an anticipated decline in economic growth rates may be an important determinant in underwriting decisions as lenders attempt to minimize the probability of loan default. Pritchett (1984) evaluated the construction dollar volume of investment grade real estate (office, industrial and retail) in New York City during 1967 to 1982. His results show about one and one-half cycles, with cycle magnitude (from trough to peak) varying between 50% (industrial) and 160% (office) of the average value. Office activity was the most volatile and industrial the least volatile, with volatility of retail and residential activity falling in between the two.

Hekman (1985) studied the office sector in fourteen cities over the 1979–1983 period and found that construction was highly cyclical when the areas studied were aggregated. Apgar (1986), although implicitly recognizing cyclicity of economic variables, suggested the use of a strategic framework to avoid missing important economic factors. The suggested strategy included key factors related to property type, entrepreneurial involvement, investment strategy, investment structure, target market and, ultimately, target properties.

Corgel and Gay (1987) evaluated the potential for regional investment diversification and found significant differences in the economic vitality of the thirty largest metropolitan areas in the U.S. Corcoran (1987) refined the economic relationships between office rents, vacancy rates, asset prices, user costs and reproduction costs. The linkages between the rental market (tenants) and the asset market (investors) are through opportunity cost (user cost) of competing investments and replacement cost of real property. He explained that rising vacancy rates in the face of strong growth in demand in the asset market for rental properties in the 1980s, was due to extra incentives in the asset market. Specifically, office building acquisition prices rose more rapidly than reproduction costs, and encouraged new construction that led to overbuilding and high vacancy rates.

Witten (1987) applied basic regional and metropolitan area analysis to understand the effects of economic cycles on the timing of real estate investment acquisitions and dispositions. Rodino (1987) connected Apgar's (1986) strategic framework with market data and stressed that market research is the key to satisfactory analytical results. He suggested that supply, demand, economic base and investor factors should be considered. He carried this structure through market analysis, and concentrated on acquisition and resale capitalization rates, vacancies, rental income and expense escalations. The framework was anchored on the metropolitan statistical area (MSA) economic data linked to supply/demand variables for each property type. The suggested process emphasized the consideration of the impact of market cycles on each variable, and developed linkages between exogenous factors and cash flow variables. He suggested that the analyst can use the conclusions drawn from market

research (*i.e.*, through an objective evaluation of current and projected market conditions for each property including cyclicality of cash flow variables in a pro forma context) to time acquisitions when the market is soft and dispositions when the market is tight.

Voith and Crone (1988) evaluated office market vacancy rates in seventeen large metropolitan areas in the U.S. for the period June 1980 through June 1987. There were clear indications of cyclic vacancy rates and market differences between metropolitan areas both in cycle frequency and amplitude. Furthermore, the natural (structural) vacancy rate was upward sloping in thirteen metropolitan areas, almost constant in two metropolitan areas and slightly downward sloping in two metropolitan areas during this period, which included two recessions (January–July 1980, and July 1981–November 1982). They asserted that inter-market variations were significant and suggested that additional research was needed to validate the relationships between the natural vacancy rate and market conditions.

Pyhrr, Born and Webb (1990) developed an empirically-based discounted cash flow model to measure the relationships between key economic variables and real estate performance. They develop a decision framework and operational model for projecting investment returns for different inflation cycle scenarios and demonstrate their application for developing dynamic real estate investment strategies. Pyhrr, Webb and Born (1990), and Born and Pyhrr (1994) later expanded the inflation cycle model to include supply and demand cycles, property life cycles, and urban area economic cycles, and their impact on real estate valuation analysis, optimal holding period, solvency, mortgage debt structure and asset diversification. Three important concepts introduced were market equilibrium (and equilibrium property rents), new construction market rents and the rent catch-up cycle. These models and their decision-making implications are discussed in greater depth later.

Pollakowski, Wachter and Lynford (1992) suggested that it was inappropriate to assume a single structure for demand and supply relationships in all markets. They tested for structural differences among metropolitan areas by office market size. Based on rental data from the REIS reports for twenty-one metropolitan areas over the time period 1981 to 1990, they concluded that real estate cycles are clearly not uniform across markets. Their results suggest that market outcomes vary by city size, larger markets are better modeled using “standard procedures,” and Manhattan behaves quite differently from the other markets.⁵

Clapp (1993) evaluated office markets nationally. In a case study, Clapp quantitatively validated the relationships between cyclical economic factors, including employment, location factors of supply and demand, and office market performance variables of absorption and vacancy rates. Initially, he explored measurement of the natural vacancy rate in office market cycles. The case study included analysis of four metropolitan areas in the northeastern U.S. compared with the nation. The results indicated that in the 1990s, the four MSA markets studied were highly correlated with the national office market which suggests that, in the long-run, investment grade office properties in metropolitan areas held in institutional portfolios tend to perform about

like the national office market during periods of national economic prosperity. Also, he concluded that estimates of office supply growth are necessary to forecast office space supply, rent rates, expenses and vacancies, and that such market forecasts should establish a range of possible outcomes, not just a single possible outcome, for decision making.

Mueller and Laposa (1994) investigated the cyclical movements of fifty-two office markets around the U.S. By examining average vacancy and deviations from this average as an indication of market risk or volatility, they classified and captured the nature of cyclical risk inherent in these markets. They found that there were cycle differences between markets and that by examining the duration, amplitude and timing of the market cycle, one could better understand the market forces that affect real estate investment risk. Also in 1994, Laposa and Mueller (1994) developed a submarket cycle model to study the cyclical behavior of submarkets within SMAs relative to the SMAs as a whole. Then in 1996 and 1997, Mueller, Laposa and Pevnev developed models for analyzing rent distributions under alternative market cycles (Mueller and Laposa, 1996) and rent growth rates during different points in the real estate cycle (Mueller and Pevnev, 1997). These models, the study conclusions and decision-making implications are discussed in depth in the cycle modeling section of this study.

Shilton (1995) also examined office market cycles in a framework designed to promote an understanding of the cyclic characteristics of office employment demand. He found that the economic base of a city influenced the rate of overall growth in office employment. He also showed the link between cyclic office employment and market volatility and concluded that markets experiencing higher volatility in office employment are more likely to experience higher levels of office vacancy.

Gordon, Mosbaugh and Canter (1996) studied office market volatility, showing that different metro areas behave differently over time and that some markets have longer cycles or less volatility than others. The study utilizes the C.B. Commercial/Torto-Wheaton database for thirty-one metropolitan areas over the time period 1978 through 1995, and the change in vacancy rate over time as its measure of the real estate cycle. Their study focused on identifying economic factors to determine the underlying causes of office market cyclicity and risk. The analysis suggests that movements in vacancy rates are likely to be affected by different factors at different stages of the cycle. In the long run, the analysis shows that capital flows have the strongest effect on the volatility of vacancy rates, while employment growth and market conditions (*e.g.*, size and economic diversification) were also major contributing factors. In contrast, during the recovery phase of the cycle (following periods of excess construction), demand-side factors such as employment growth and economic diversification appear to be the dominant influence on market behavior.

Wheaton, Torto and Evans (1997) studied the London Office market covering the 1970–1995 period and found “generally inelastic supply and demand relationships that yielded a dynamically stable system.” They determined that the 1980s building boom was a delayed response to the one-time huge growth in service employment

that occurred during this period. In his study of the Sidney office market, Hendershott (1996) noted that investors grossly overestimated property value at the peak of the cycle and undervalued it at the trough. This investor behavior profile provides additional insights into the explanation of developer response to supply/demand imbalance studied at the national level by Grenadier (1995), as previously discussed in the macroeconomic literature section.

Although not as volatile as other property types, residential real estate cycles research provides important information regarding economic factor relationships. Clayton (1996b) evaluated the quarterly time series of prices of single-family detached housing over the 1979:1 to 1991:4 period in the Vancouver, B.C. metropolitan area, using immigration and new unoccupied single-family housing (new supply) as the explanatory variables. The structure used was a simple asset-based forward-looking model of housing price determination to explain the dramatic cyclical movement in Vancouver housing prices over the twelve-year period. The extensive econometric evaluation and test results reject rational expectations, suggesting that housing markets are characterized by irrational expectations that, at times, deviate from fundamental values. These deviations suggest that irrational expectations may aggravate cyclical movements in housing markets.

In a follow-up study, Clayton (1997) evaluated condominium housing price cycles during the 1982–1994 period in eight submarkets in Vancouver, B.C. using a time-series framework. The data are housing prices, rents and property assessed valuations, and represent a cross section of housing submarkets. Clayton's model tested the efficiency of housing markets at a more micro level than did his 1996 study. Nevertheless, the 1997 study had similar conclusions—significant evidence against rational expectations in condominium housing prices since prices deviated significantly from fundamental values over the real estate price cycle. House price changes moved in the opposite direction from rational expectations in the test of an efficient asset market model. Such inefficient markets can provide cycle investors with excellent arbitrage profit opportunities.

Gallagher and Wood (1999) recently studied the risk and predictability of overbuilding in the office sector and examined three techniques that can be used to examine the probability of overbuilding. Using quarterly data on thirty-four MSAs from 1977–1997, their research concluded that both economic base employment (McNulty, 1995) and the Space Market Index (Miles, 1997) provide the most practical methods for assessing the risk of overbuilding. There was considerable variation across MSAs in terms of risk of overbuilding, which has important implications for investors from a tactical asset allocation viewpoint.

In an extension of his 1997 long cycles study, Kaiser's (1999) study examined ex post data over a forty-six-year period to evaluate the benefits of including real estate in a mixed-asset portfolio, and concluded that "a model that takes into account fundamental value (as measured by real estate cap rates, stock market earnings yields and ten-year bond yields) offers superior return/risk ratios to any single asset comparisons." In general, two complete cycles of activity were evident in Kaiser's

data. Kaiser's "fundamental value" model allocates portfolios between stocks and real estate, and between bonds and real estate, based on relative yield comparisons between the assets, then reallocates these portfolios as relative yields change over the real estate and capital market cycles. His results illustrate how a portfolio can be periodically rebalanced using "switching strategies" to take advantage of real estate and capital market cycles and thereby raise returns while simultaneously lowering risk (bond and real estate portfolio), or lower risk with the same return level (stock and real estate portfolio).

Other researchers have also become interested in the impact of real estate cycles on the return and risk characteristics of mixed-asset portfolios. Knowing how assets co-move over different market phases or market conditions is important for portfolio management, asset allocation, weightings and understanding future inter-asset correlation dynamics (Newell and Acheampong, 1999). Such research can be expected to proliferate in the future as more reliable databases are developed and made available to researchers.

At the micro as well as macro level, the real estate literature supports the theory that real estate markets are cyclical, cash flow variables (*e.g.*, rents, vacancies, capitalization rates) are cyclical, and real estate values and returns/risks are cyclical. Further, as we move across the continuum from macro to micro to practitioner categories, the research focus becomes more decision-making oriented and applied, as contrasted with theoretical and empirical in nature. In the following section we turn our attention to the cycles literature that has evolved rapidly in the real estate industry, primarily from institutional real estate investment organizations who have significant research and publication capabilities in-house.

Cycle Relevance: The Practitioner Literature

The increased popularity and perceived importance of market cycles among practitioners is evidenced in recent research. For example, Leinberger (1993) has stated that the real estate cycle is the most important determinant of strategy of real estate participants. Roulac (1996) adds, "Perhaps second in influence only to the location, location, location real estate investment selection criteria, the concept of *market cycles* dominates the concerns of, and is employed as a rationalization by, real estate investment professionals. Perceptions of real estate cycles influence market participants' strategies and transactions decisions."

A recent study of 685 real estate plan sponsors by Ziering and Worzala (1997) indicate that real estate cycles has become a very hot research topic among portfolio managers as a result of the dismal performance of institutional real estate portfolios in the late 1980s and early 1990s. Nearly 40% of respondents rated Real Estate Cycles and Their Predictability as the most important research topic and 80% rated it among the top three.

Roulac (1996) notes that the concept of real estate cycles has been more used in professional practice than has been addressed in the academic literature, and has

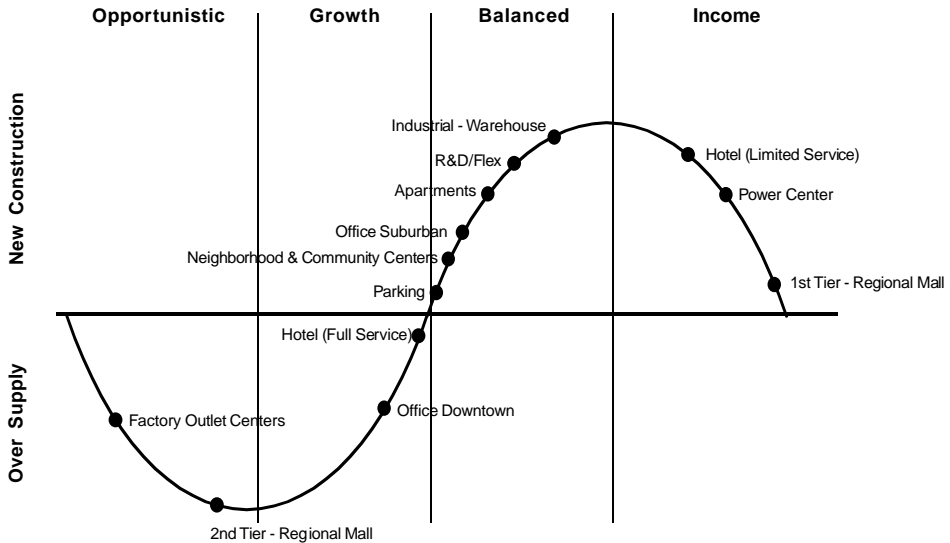
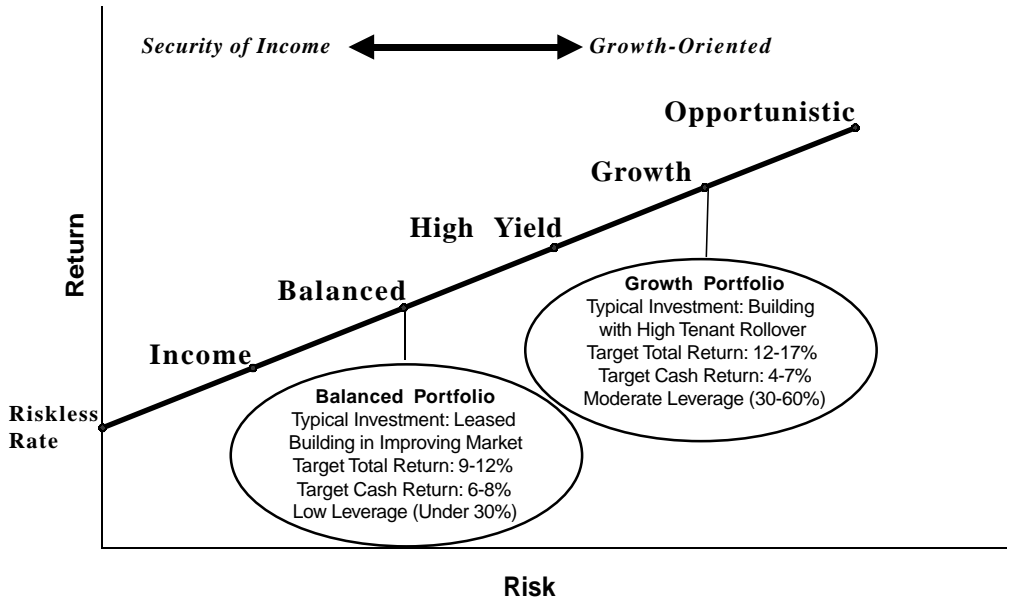
received only very limited attention in real estate education. As a result of recent experience with volatility in real estate performance, decision makers have become ever more concerned about when the Adownturn might turn up or the current expansion might top off that downturn. @ If *location, location, location*, is used as the vehicle to justify a specific investment opportunity, *market cycles* is increasingly becoming the vehicle for justifying the timing of various real estate strategies with regard to portfolio allocations, property types and geographical market selection.

Often ignored in the past, the concept of real estate cycles is now in the forefront of consciousness of virtually every practitioner involved in the real estate markets. Reflective of this cycle consciousness is the highlighted, boxed introductory statement to the feature story in the July 1997 Real Estate Forum on "Real Estate Services 2000," as follows: "Like a wheel of fortune, the real estate cycle presents varied changes and opportunities. Can you bet with confidence in your response?" (Dobrian, 1997). Then, the cover story profile on Barney Skanska Construction Company describes the CEO's intention "to build a cycle-proof CM firm," (Salustri, 1997). The extent to which interest in real estate cycles has extended is reflected in a recently advertised NYU Stern School of Business one-day conference (1999) on the impact of real estate cycles on the real estate industry.

Numerous pension fund advisors and investment banking companies have developed cycle research capabilities to enhance their investment advisory services and company publications. The focus of these cycle research activities is very diverse, including everything from macroeconomic presentations on portfolio property-type recommendations or the status of hotel markets in Europe, to analyzing an office and industrial REIT's target property markets, to specific investment strategies for identifying hot markets for acquisitions and weak markets for dispositions. A few examples are presented to illustrate these applications.

Macroeconomic/portfolio strategy cycle recommendations. LaSalle Advisors (and more recently their merged entity, the global real estate conglomerate Jones Lang LaSalle) has been one of the leaders in applying macroeconomic cycle concepts to the analysis of real estate markets and portfolios. In the company's quarterly publication *Market Watch* and its *Investment Strategy Annual*, cycle analyses are presented as a basis for developing strategic recommendations. For example, Exhibit 2 illustrates how model portfolio strategies for various investors seeking specific types of risk-return combinations (income, balanced, high yield, growth, opportunistic) can be matched with different property types that appear at different risk-return points on the property cycle. LaSalle makes portfolio recommendations for a three-year investment horizon based on matching client objectives with property cycle characteristics as shown here. For example, in 1998, a diversified mix, which avoids malls and hotels, was recommended for a balanced portfolio; CBD office and full-service hotels were recommended for growth investors. In making global investment and portfolio allocation recommendations, LaSalle analyzes the position of each country for each property type on the real estate cycle, as shown in Exhibit 3 for European hotel markets.

Exhibit 2
Real Estate Cycle Analysis: Determining Portfolio Strategies

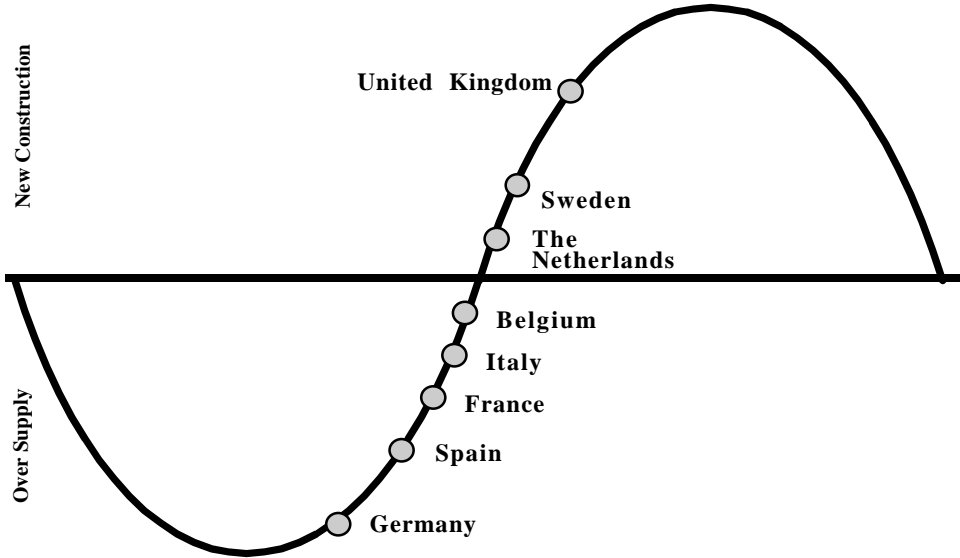


Source: 1998 Investment Strategy Annual, page 27. LaSalle Investment Management Research, Chicago.

Exhibit 3
Real Estate Cycle Analysis: Status of European Hotel Markets

Status of European Hotel Markets

Second Quarter 1998



Source: Second quarter 1998, *Market Research*, page 7. LaSalle Investment Management Research.

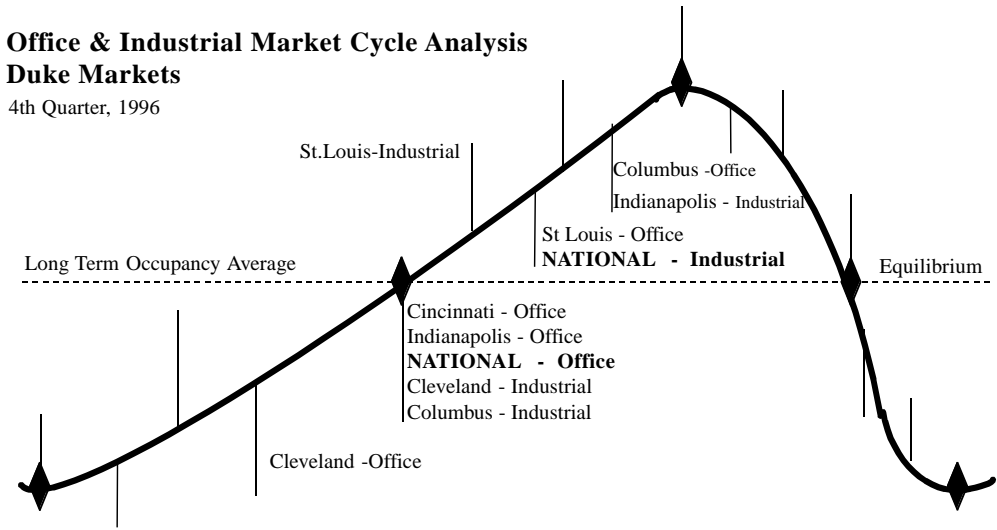
Analyzing REIT portfolios. The real estate research group of a major east coast investment banking firm, Legg Mason Wood Walker, uses various types of cycle analysis to evaluate real estate opportunities by property type in over sixty metropolitan areas in the U.S., and publishes a quarterly report called *Real Estate Market Cycle Monitor*. A most interesting use of cycle analysis is its application to the evaluation of new REIT offerings and existing company stock evaluations. Exhibit 4 shows the market cycle analysis for the office and industrial markets that make up the portfolio of Duke Realty Investments (as of 1996:4). Duke's portfolio was concentrated in steady but slower-growth Midwestern office and industrial markets, which were in the up-cycle phase of their market cycles where rents would slowly be trending upward over the next five years.

Identifying hot markets for acquisition. The strategic planning and research group of a large pension fund advisor, The O'Connor Group, publishes a report called *Horizon*, which describes various cycle investment strategies. The September 1997 report states that O'Connor's approach to cycle investing "provides investors—public or private—with a way to find opportunities and to time markets with more analytical discipline and rigor." Most importantly, our approach identifies "hot markets" that the herd has stampeded right by." O'Connor's cycle model is actually a "tri-cycle" model because it takes into consideration: (1) economic cycles; (2) property cycles; and (3) capital

**Exhibit 4
Real Estate Cycle Analysis: REIT Stock Analysis**

**Office & Industrial Market Cycle Analysis
Duke Markets**

4th Quarter, 1996



Source: *Equity Research Company Analysis*, February 18, 1997, page 4. Company Reports and Legg Mason Research, Baltimore.

flow cycles. The basic cycle-investing construct used in its analysis is shown in Exhibit 5 and applied to the Boston metropolitan area for the years 1977–1996. Using this model, O’Connor analyzes 700 submarkets across fifty-four U.S. markets.

Cycle Relevance Conclusion

The overwhelming academic and practitioner interest in real estate cycles, as evidenced by the growing body of knowledge on the subject, leads to the clear conclusion that real estate cycles are relevant and will become a more important decision variable for investors and portfolio managers in the future. While in the past, the concept of market cycles has been oversimplified and used more to support self-serving assertions about probable market recovery than as a guide to investment decisions, the situation appears to be changing rapidly. Increasing numbers of investors and portfolio managers appear to understand the dynamics and complexity of real estate cycles and their implications for investment and portfolio strategies and decisions.

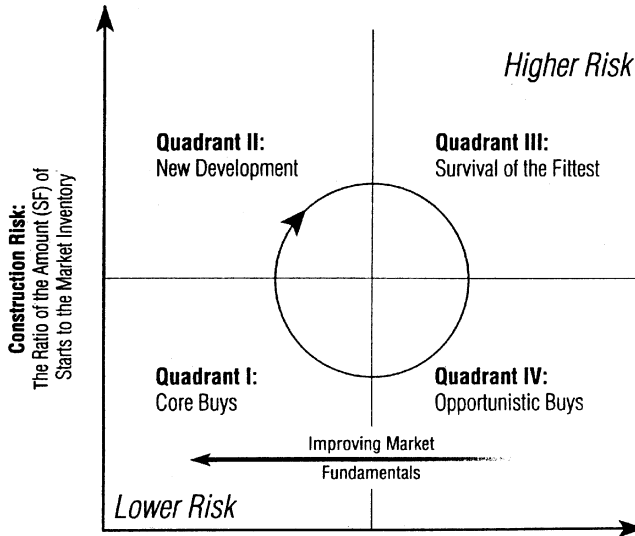
Basic Theory of Cycles

Cycle Definitions

“Before a phenomenon can be measured, it must be carefully defined.”⁶ Unfortunately, the published literature on real estate cycles uses the term to describe

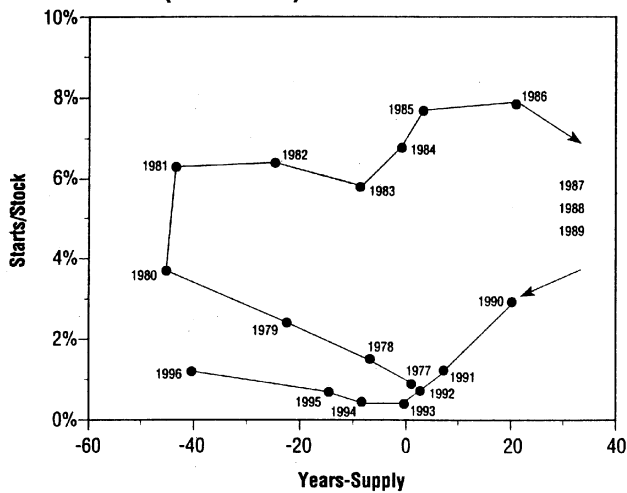
Exhibit 5
A Cycle-Investing Construct For Analyzing Markets and Submarkets

The Cycle-Investing Construct



Years-Supply:
 The Number of Years Needed
 to Achieve Market Equilibrium

Boston (1977 - 1996)



Source: *Horizon, Strategic Planning & Research*, Volume II, Issue I, September 1997, pages 4 and 7, respectively. O'Connor Group, New York.

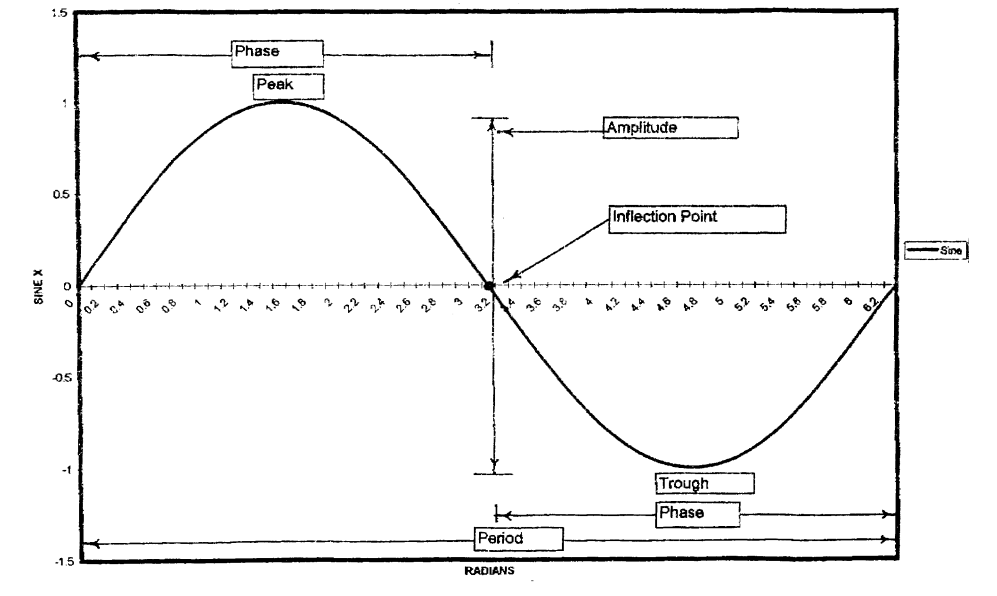
many things—such as rental growth, absorption, vacancy and construction activity—but never develops a standard definition of a cycle as economists have done in the business cycle literature. One of the few concise definitions of the real estate (property) cycle is offered by The Royal Institution of Chartered Surveyors in its 1994 publication on *Understanding the Property Cycle*: “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, but with varying leads and lags against the all-property cycle.”

While we might argue about the above definition, and proclaim that real estate cycles are elusive and hard to define with precision, we should also recognize that at least one precise definition has now been offered for consideration, pending more rigorous definitions that may evolve as further theoretical and empirical research is completed.

The Basic Mathematical Construct

The basic language and definitions of cycles were established in physics and engineering three quarters of a century ago, as illustrated in Exhibit 6.⁷ The cycle is depicted as a sine wave with its important characteristics being the cycle period, frequency, peak, trough, amplitude, phase and inflection point. We would encourage all cycle researchers to adopt these basic time-tested definitions and not reinvent them for personal or professional reasons.

**Exhibit 6
Sine Wave Plot of a Cycle and Its Basic Characteristics**



Cycle Phase Nomenclature and Economic Characteristics

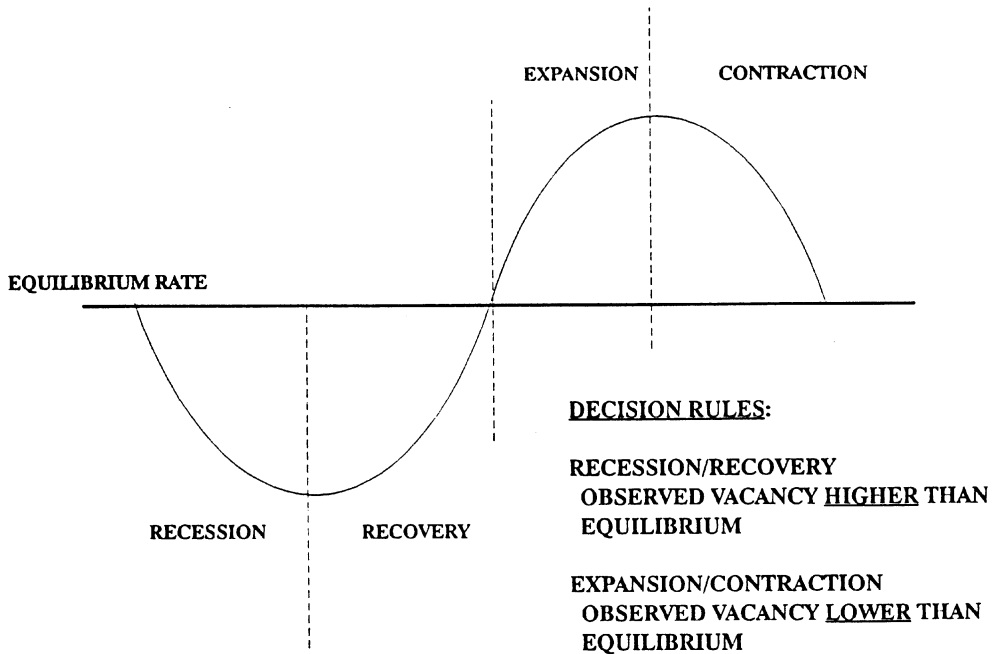
A further distinction and expansion of the sine wave construct, adapted to real estate, is shown in Exhibit 7 (Mueller and Laposa, 1994). The four phases of a real estate cycle are defined as: (1) recession; (2) recovery; (3) expansion; and (4) contraction (oversupply). Phases 2 and 3 (recovery and expansion) are characterized by falling vacancy rates, while phases 4 and 1 (contraction and recession) by rising vacancy rates. The equilibrium vacancy rate line is the “inflection point” that differentiates positioning and direction for markets. When investors refer to the “cycle upside” or “upcycle,” they are describing the recovery and expansion phases of the cycle, while the use of the term “cycle downside” or “downcycle” refers to the contraction and recession phases of the cycle. Another approach to the conceptualization of cycle phases is offered in Exhibit 8 (Pyhrr, Webb and Born, 1990). This approach distinguishes between supply and demand cycles and their key economic characteristics. Cycle phases are defined according to the interaction of supply and demand forces over time and the resulting vacancy rate.

Fundamental Cycle Concepts

As previously emphasized, real estate cycles have dynamic and complex impacts on the investment variables that determine a project’s or portfolio’s returns and risks. Cycle impacts should be considered at virtually every step of the investment decision making process, as illustrated in Exhibit 9. The challenge for the investor or analyst is to understand how market and property specific cycles should be considered at each stage of this process and how they impact each investment variable at each stage.

For example, an investor’s strategy (Step 1) will define cycle-determined investment objectives and criteria, and plans and policies that direct acquisition efforts in specific cities, submarkets and property types that are positioned correctly to take advantage of a forecasted market recovery, expansion, contraction or recession period. Properties will be identified that meet the basic market cycle and other screening criteria benchmarks (Step 2), and each property will be analyzed using basic financial feasibility models (Step 3) that input cycle-determined financial information (*e.g.*, a lower NOI capitalization rate might be appropriate in a market that is in the early recovery stage of the cycle that is characterized by relatively low, but rapidly increasing occupancy and rent rates). As illustrated by several models presented later, the detailed feasibility and due diligence research (Step 5) is the key cycle analysis stage that produces forecasts of occupancy rates, rent rates and operating/capital expenses over alternative economic and market cycle scenarios. This data is then used in Step 7 to perform DCF analysis and evaluate a property’s rate of return, risk and portfolio impact characteristics. If acquired, the property is managed and leased (Step 9) using a strategy that takes advantage of the cycle DCF forecasts (*e.g.*, lease structures that capture rapidly rising market rents over a forecasted recovery phase through rent step-up or short-term lease renewal provisions). The property is sold (Step 10) at an appropriate point in the market cycle, and the net proceeds are reinvested in other properties or assets that meet the then-current cycle-based

Exhibit 7
Real Estate Cycle Phase Nomenclature

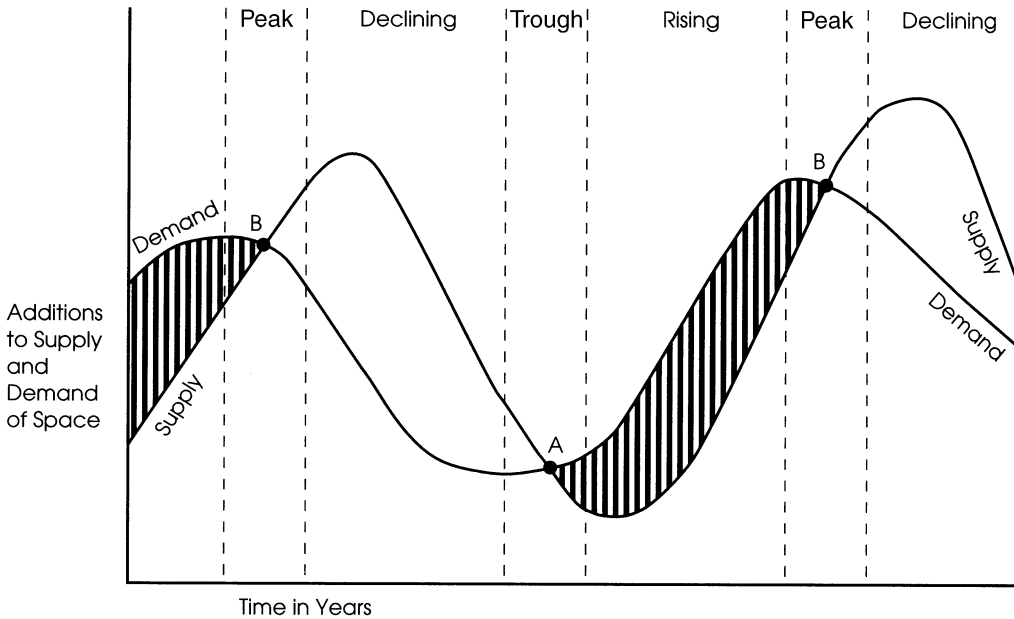


Source: Mueller and Laposa (1994).

investment objectives and criteria of the investor. (Step 1 is repeated.) At this stage, a full investment life cycle has been completed and the investor's portfolio mix has been revised.

As previously concluded, virtually every phenomenon in social affairs, political economy, business and real estate is cyclical in nature. However, most investors and analysts incorrectly view such phenomena as "trends," not cycles. Because of this perception, most investors capitalize the present economic situation into perpetuity when forecasting the future, acting as if the current trends (whatever they are) will continue forever. As a result, most investors do the wrong thing at the wrong time over the cycle, buying high (during the boom) and selling low (a foreclosure sale during the bust), following the "herd instinct" and doing what the crowd is doing. The divergence between investor assumptions and property performance reality over the cycle is illustrated by Roulac (1996) in Exhibit 10, where he compares economic forces and property performance in the 1980s and 1990s. As further explained by Stoken (1993) in his book on *The Great Cycle*, the majority of investors are victims of their own experience. "They see things in light of what has happened in the past and commit themselves to one phase of a cycle. Like most politicians and generals,

Exhibit 8 Phases of the Real Estate Supply/Demand Cycle

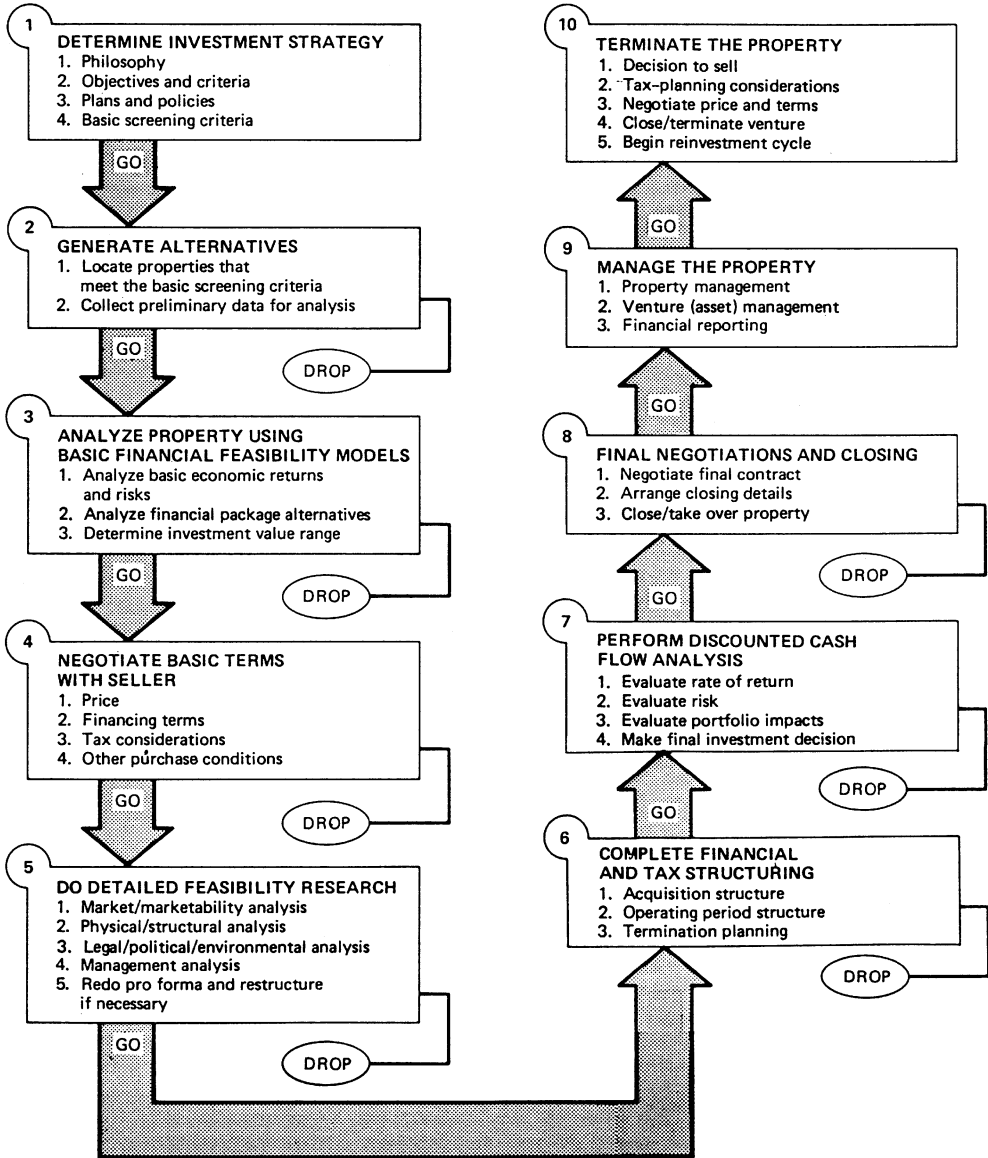


Economic Characteristics of the Real Estate Cycle (Pritchett, 1984; Wheaton, 1987; and Witten, 1987).

- In a growing economy, the rising and peak phases of the cycle dominate (in years) the declining and bottom phases of the cycle. On average, there are more years of "good times" than "bad times" for investors.
- In a growing economy, the long-term trend line for both change in demand and supply is upward sloping. At the peak of each new cycle (point B), the additions to supply and demand reach new peaks as compared to the previous cycle. The opposite occurs in a declining economy.
- Change in supply is somewhat more volatile than change in demand. Develop/lender enthusiasm causes supply to rise above demand during the peak phase, and developer/lender pessimism causes supply to fall below demand during the trough phase of the cycle.
- The demand cycle leads the supply cycle by a period of time. The lengthy process of planning and financing a new project makes it difficult for development to begin as soon as the market demonstrates a need, or to stop as quickly as demand begins to decline.
- The best indicator of the phase of the cycle is the occupancy rate. Occupancy rates reach a low point during the trough phase of the cycle (point A), increase gradually during the rising phase, reach a high point at the peak of the cycle (point B), then gradually decrease during the declining phase.

Source: Pyhrr, Webb and Born (1994:476).

Exhibit 9
Cycle Considerations in Each of the Ten-Step Investment Analysis and Financial Structuring Process



Source: Pyhrr, Cooper, Wofford, Kapplin and Lapides (1989:90).

Exhibit 10
Economic Forces and Property Performance: 1980s Trend Assumptions and 1990s Cyclical Reality

1 9 8 0 s A S S U M P T I O N S		1 9 9 0 s R E A L I T Y										
ECONOMIC FORCES	MARKETS	PROPERTY PERFORMANCE ATTRIBUTES	PERFORMANCE REALITY									
<p><u>PREMISE OF CONTINUITY</u></p> <p>Uninterrupted economic expansion</p> <p>Continued office employment growth</p> <p>Incremental new construction is consistent with demand</p>	<p><i>PROPERTY</i></p> <p>Strong sustained space demand relative to supply</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">High</td> <td style="text-align: center;">Rent</td> <td style="text-align: center;">Low</td> </tr> <tr> <td style="text-align: center;">High</td> <td style="text-align: center;">ASSUMPTION Occupancy</td> <td style="text-align: center;">Low</td> </tr> <tr> <td style="text-align: center;">High</td> <td style="text-align: center;">Cash Flow</td> <td style="text-align: center;">Low</td> </tr> </table>	High	Rent	Low	High	ASSUMPTION Occupancy	Low	High	Cash Flow	Low	<p><i>PROPERTY</i></p> <p>Supply surplus relative to demand</p>
High	Rent	Low										
High	ASSUMPTION Occupancy	Low										
High	Cash Flow	Low										
<p>Investors continue to favor property investments</p> <p>Tax law provides incentives and subsidies to real estate investing</p>	<p><i>CAPITAL</i></p> <p>Strong sustained investor demand</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">High</td> <td style="text-align: center;">Return on Investment</td> <td style="text-align: center;">Low</td> </tr> </table>	High	Return on Investment	Low	<p><i>CAPITAL</i></p> <p>Market investors disinterested; capital flows down</p>						
High	Return on Investment	Low										
<p><u>GRAVITY AND DISCONTINUITY PREVAIL</u></p> <p>Economy sags in 1990 and downturn persists through 1993</p> <p>Declining office employment</p> <p>New construction outpaced demand</p>	<p>Investors perceive property has adverse return-risk characteristics</p> <p>Tax law treats real estate activities in punitive manner</p>											

Source: Rouillac 1996, page 10.

they find themselves continually fighting the last war. So, perhaps we learn the lessons, or at least some of the lessons, of history too well.”

The Nature and Dynamics of Real Estate Cycles

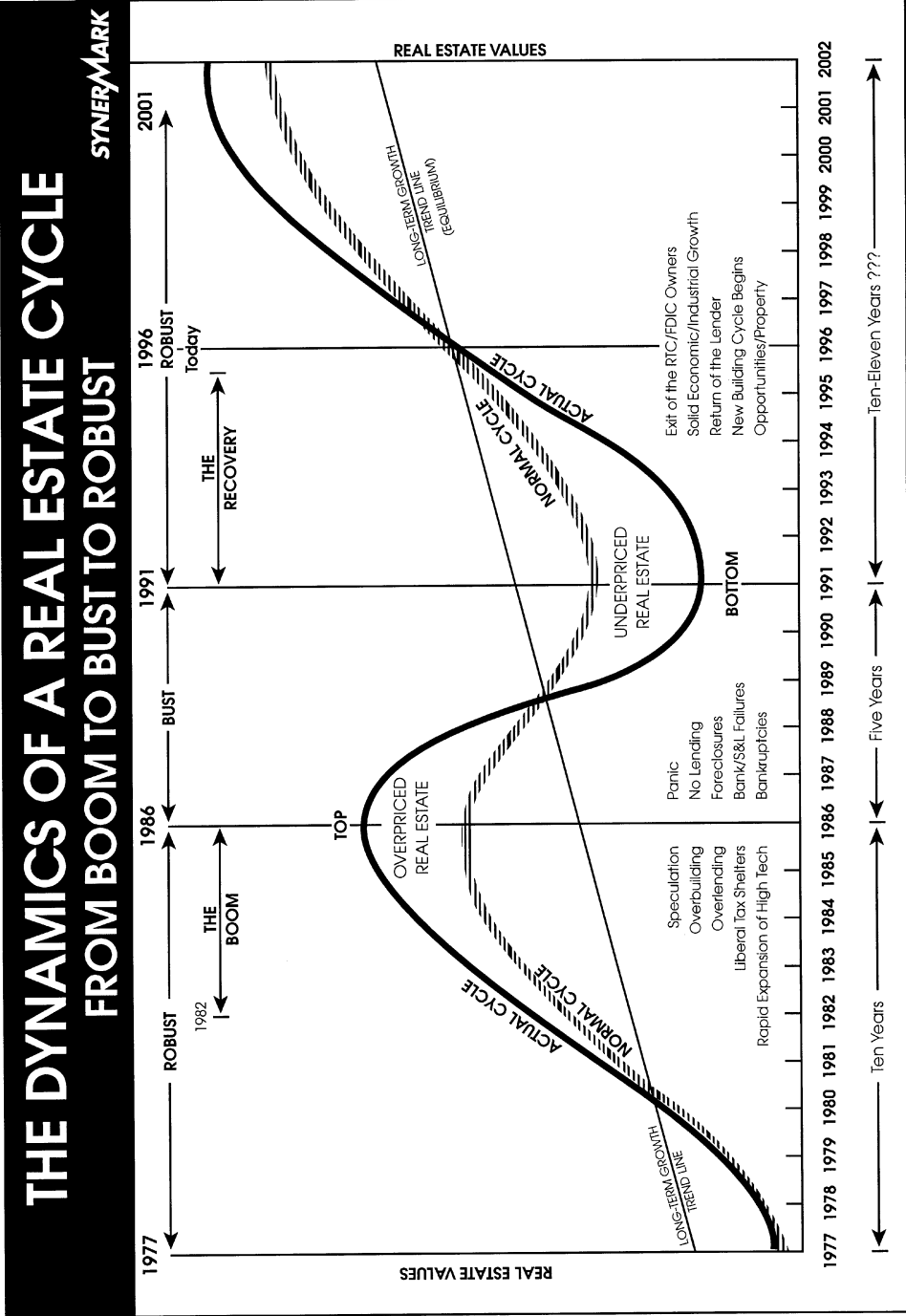
Real estate cycles have been proven to be volatile, complex and persistent. Perhaps most importantly, they have pervasive effects on people’s livelihoods, wealth and health. What causes real estate cycles? One behavioral economist explains that the culprit is crowd behavior and mass psychology (Stoken, 1993). Stoken argues that we are not economic individuals who act in our own rational self-interest. Rather, we are *psychological beings*, conditioned by our experiences, especially those experiences that serve as important lessons of pain and/or pleasure. Because of this, cycles are created:

“Following an extended period of prosperity, men and women adopt the psychology of affluence and its byproduct, economic optimism, wherein they enjoy life, have fun, and become economic risk takers. This mass psychology of optimism, once set off, takes on a life of its own and continues until people become excessively optimistic... They rationalize that what has happened will continue to happen, and thus come to see less risk than actually exists. Consequently, too many people become risk takers, which in turn creates the conditions for a big bust. This bust, or depression, then sets off a psychology of pessimism which continues until people see more risk than really exists. At that point too many people become risk averters, and this lays the foundation for a long period of economic expansion,” (Stoken, 1993: 83–84).

A traditional real estate economist might alternatively explain that real estate cycles are caused by structural and behavioral supply and demand forces in the economy that can be studied, measured and forecasted with some degree of accuracy. The strategic implication for investors is that it is possible to anticipate cycles and respond proactively to increase investment returns and reduce risks—thereby increasing wealth at a significantly greater rate than typical investors who make decisions based on trends and anecdotal evidence that has not been validated.

A composite real estate cycle of all property types in Austin, Texas for the 1972–2000 period is depicted in Exhibit 11. This graphic illustration provides an interesting story of two decades of cycle impacts on profits and losses in Austin real estate. Real estate values (on the vertical axis) are the benchmark for determining the stage of the cycle being experienced.⁸ The long-term growth trend-line slopes upward the entire time and represents the “average” nominal dollar increase of real estate values over time, assuming cycles are ignored. The “actual cycle” solid line shows actual changes in the value of property based on transaction prices during the boom and bust periods. This cycle is contrasted with the “normal cycle” that would have been experienced if excessive optimism, greed and irrationality had not overtaken the behavior of investors, developers and the federal government beginning in 1982. This period

Exhibit 11
The Dynamics of a Real Estate Cycle: From Boom to Bust to Robust



Source: Pyhrr, Synermark Investments, Inc.

marked the implementation of: (1) the Garn–St. Germain Act (financial deregulation) which provided thrift institutions with broad-based power for real estate investment; and (2) the Tax Reform Act of 1981, which provided liberal shelter benefits for real estate investors. This illustration of the Austin real estate cycle over two decades can be augmented by three important observations.

Observation 1: Many real estate professionals ignore cycles during the expansion phase (boom period), because they are making extraordinary income from commissions, fees, points and profits. They act as if the boom will never end, because it is in their economic self-interest to do so by promoting the idea that prices and rents will continue to rise in the future, thus maximizing expected commissions, fees, points and profits. These same individuals often preach the cycle recovery concept during the recession phase (bust period), because again, it is in their economic self-interest to do so. One might hear such statements as, “Don’t be pessimistic...occupancy will improve...Rents will bottom out and rise as employment growth continues...The market has hit the bottom...Prices are a fraction of replacement costs...Now is the time to invest!”

Observation 2: On the upside (recovery and expansion phases), the cycle usually goes up faster and higher than is anticipated by market participants. The market produces “overpriced” real estate. For example, values in Texas cities in the mid–1980s rose 25% to 50% higher than were expected; unfortunately, market participants acted as if the trend would continue forever. On the downside (contraction and recession phases), the cycle usually goes down faster and lower than is expected. This results in “underpriced” real estate. During the downcycle in Texas (1987–1991) it was common to see values of commercial real estate values drop by 60 to 80 percent from previous highs. Office properties that sold for \$100 to \$120 per square foot in 1985 were sold for \$25 to \$35 per square foot in 1992. Apartment buildings that sold for \$25,000 to \$30,000 per unit in 1985 were sold for \$7,000 to \$10,000 per unit in 1991. Zoned office land that sold in 1985 for \$25 to \$30 per building square foot (with approved site development permits) sold for only \$4 to \$5 per square foot in 1992–1993. Again on the upside of the Texas real estate cycle, beginning in 1992, values increased rapidly through 1998 and were approaching their mid–1980s values in some growing cities and submarkets.

Observation 3: Timing is the key element to successful investing. Investors must be willing to make significant changes in their portfolios to take advantage of constantly changing property and market conditions. Different assets will perform differently during the various phases of a real estate cycle. For example, there is a property-type lead-lag sequence over the composite real estate cycle. In the Austin real estate cycle experience (Exhibit 11), the recovery was led by apartments and single family subdivisions (1989–1990), followed by suburban office and industrial properties (1991–1992), then by retail properties (1992–1993), raw land (zoned and platted) for new apartments and office developments (1993–1994), and finally CBD office buildings (1995–1996). There was a six-year time period during which different property types passed through the trough (bottom) of the cycle and started up the recovery phase of the cycle. One lesson learned is that, although there is no real estate asset for all seasons, there is a season for all real estate assets.

Different Types of Real Estate Cycles

Although real estate investors often refer to “THE” real estate or market cycle, there are actually many different types of interdependent cycles that affect real estate performance and the success of a cycle strategy. The authors of one advanced real estate investment textbook identify some fourteen different cycles that affect real estate investors (Pyhrr et al. 1989). More recently, Pyhrr and Born (1999) have developed a subject classification system for real estate cycles that identifies a wide variety of cycles organized into eight general categories, as shown in Exhibit 12.

Tracking, comprehending and acting upon these multiple interrelated cycles is a daunting undertaking. To respond to this challenge, a few basic principles are recommended by one group of authors:⁹

1. *Identify the critical cycles.* Focus on those that will have the greatest impact on rents, vacancies, capitalization rates and property values.
2. *Research their effects on investment variables.* Analyze the relationship between these key cycles and cash flow variables that affect rates of return and risk parameters, paying careful attention to the leads and lags that characterize these relationships.
3. *Develop an investment strategy to take advantage of cycles.* Measure their impact on cash flows, IRRs, and risk parameters under different acquisition/disposition and market/economic scenarios, then act accordingly to maximize long term wealth in a portfolio context.

It should be recognized that, over the real estate cycle, most average investors guess wrong a large percentage of the time because they “gallop with the herd” and follow “conventional crowd wisdom.” In contrast, successful investors that consistently outperform the market average are willing to follow a path contrary to that of the masses. Thus, good timing and a degree of contrarianism are key ingredients to successful investing that achieve above-market returns over a long period of time. Investments must be bought and sold before cyclical trends are fully reflected in real estate prices and activity. An investor must forecast cycles and act ahead of popular opinion—buying when popular opinion is still negative and most investors are trying to sell; and selling when popular opinion says the boom is on and speculative investor buying causes asset prices to increase beyond economic reason.

Modeling Real Estate Cycles

Most of the existing cycle literature at the micro decision-making level focuses on descriptive models of cycles, analysis of historical cycles, and general formulas and strategies for buying low and selling high. Few studies have sought to model cycles on an ex ante basis and measure their resultant impact on cash flows, rates of return and risk, not to mention their financial implications for property and portfolio decisions. In this section, we review eight models that have been developed in the 1990s. Each presents an analytical definition of cycles, seeks to measure cyclical

Exhibit 12
Types of Real Estate and Related Cycles

- I. Economic and Business Cycles: National/Regional Levels
 - A. General business cycles
 - B. Inflation cycles
 - C. Population and employment cycles
 - D. Inter-industry cycles
 - E. Intra-industry cycles
 - F. Business focus cycle
 - G. Weather cycles
 - H. Technology cycles
 - II. Economic and Business Cycles: MSA/Submarket Levels
 - A. Urban area/city cycles
 - B. Urban/rural cycles
 - C. Neighborhood cycles
 - D. Planning theory cycles
 - III. Political/Social/Cultural/Behavioral Cycles
 - A. Political change cycles
 - B. Government subsidy/incentive cycles
 - C. Regulation cycles
 - D. Household formation cycles
 - E. Social change cycles
 - F. Popularity cycles
 - G. Residential regional preference cycles
 - H. Fashion design cycles
 - IV. Physical Market Cycles
 - A. Demand cycles (absorption cycles)
 - B. Supply cycles (construction/building cycles)
 - C. Occupancy cycles
 - D. Seasonal cycles
 - E. Property-specific cycles
 - F. Long real estate cycles
 - G. Short real estate cycles
 - V. Financial Market Cycles
 - A. Capital flow cycles
 - B. Mortgage term (interest rate/amortization) cycles
 - C. Debt/equity cycles
 - D. Mortgage underwriting stringency cycles
 - E. Securitization/direct investing cycles
 - VI. Specific Investment Variables: Project/Portfolio
 - A. Property physical life cycles
 - B. Property ownership life cycles
 - C. Rent rate cycles
 - D. Occupancy cycles
 - E. Operating expense cycles
 - F. Capital expenditure cycles
 - G. Capitalization rate cycles
 - H. Portfolio mix cycles (timing)
 - VII. International Real Estate cycles
 - A. Macro real estate cycles
 - B. Property specific cycles
 - C. Currency cycles
 - D. Trade cycles
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impacts on key investment variables in an ex ante framework and provides insight into some aspect of investment timing or other property/portfolio decisions.

Pyhrr/Born/Webb Inflation Cycle Model

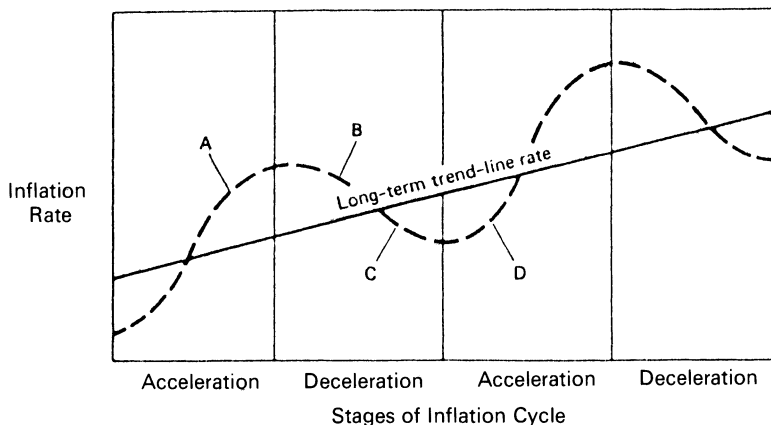
In an inflation cycles study, Pyhrr, Born and Webb (1990) presented a decision framework and operational model for projecting investment returns for alternative inflation cycle scenarios and demonstrate their application for developing a dynamic real estate investment strategy. The strategy developed provides insight into portfolio revisions during different stages of the inflation cycle. A probabilistic DCF model is designed and used to inflation-adjust each cash flow variable affected. Mathematical relationships are developed for specifying unique cash flow variable linkages and sensitivities, including lead and lag periods, that are consistent with the empirical evidence of inflation impacts on these variables. The authors engaged in several empirical studies of two MSA markets, using regression analysis to identify the lead/lag periods and sensitivity coefficients between inflation and various cash flow variables such as rents, operating expenses, capitalization rates, reinvestment rates and required equity IRRs.

The Pyhrr, Born and Webb (PBW) model was based on the earlier work of Klein and Wolman (1975) and their generalized model of an inflation cycle strategy that illustrates how an investor should shift a portfolio between real and financial assets over the inflation cycle in order to maximize wealth over the long run. An adaptation of the Klein/Wolman (K/W) model (not originally designed to include real estate) and the general criteria and buy/sell rules for investments, both real and financial assets, over a hypothetical inflation cycle, is presented in Exhibit 13. Born (1984) builds on the K/W generalized inflation cycle model and develops the mathematical framework and algorithms for the later publications discussed here.

An inflation cycle model must be complex and dynamic to be compatible with the "real world" markets they seek to measure. The key inflation linkages that are in the PBW model, each of which allows for a lead/lag period and inflation sensitivity relationship to each effected cash flow variable and investor return requirement, are summarized in Exhibit 14. The key output criteria in the model is the "real IRR," not the "nominal IRR," which is posited as the proper measure of return for evaluating acquisition strategy and timing, optimal holding period and portfolio revision strategies.

PBW concluded that inflation cycles have very pronounced effects on returns and risks, but there are some conclusion (*e.g.*, optimal holding period) surprises along the way due to the dynamic interaction between the inflation and cash flow variables, which results are neither intuitive or predictable a priori.¹⁰ The authors further observe that there are different optimal portfolio, project acquisition and holding period strategies that depend on several factors: (1) the slope of the long-term inflation trend-line; (2) the acquisition period, which defines the position on the trend-line that a project is acquired; (3) which short-term cycle is forecasted (positive vs. negative sine

Exhibit 13
Generalized Model of Inflation Strategy



General Criteria

- Rising inflation rates: real assets, like commodities, gold and real estate, perform best.
- Falling inflation rates: financial assets like stocks, bonds, and mortgages perform best.

General Rules

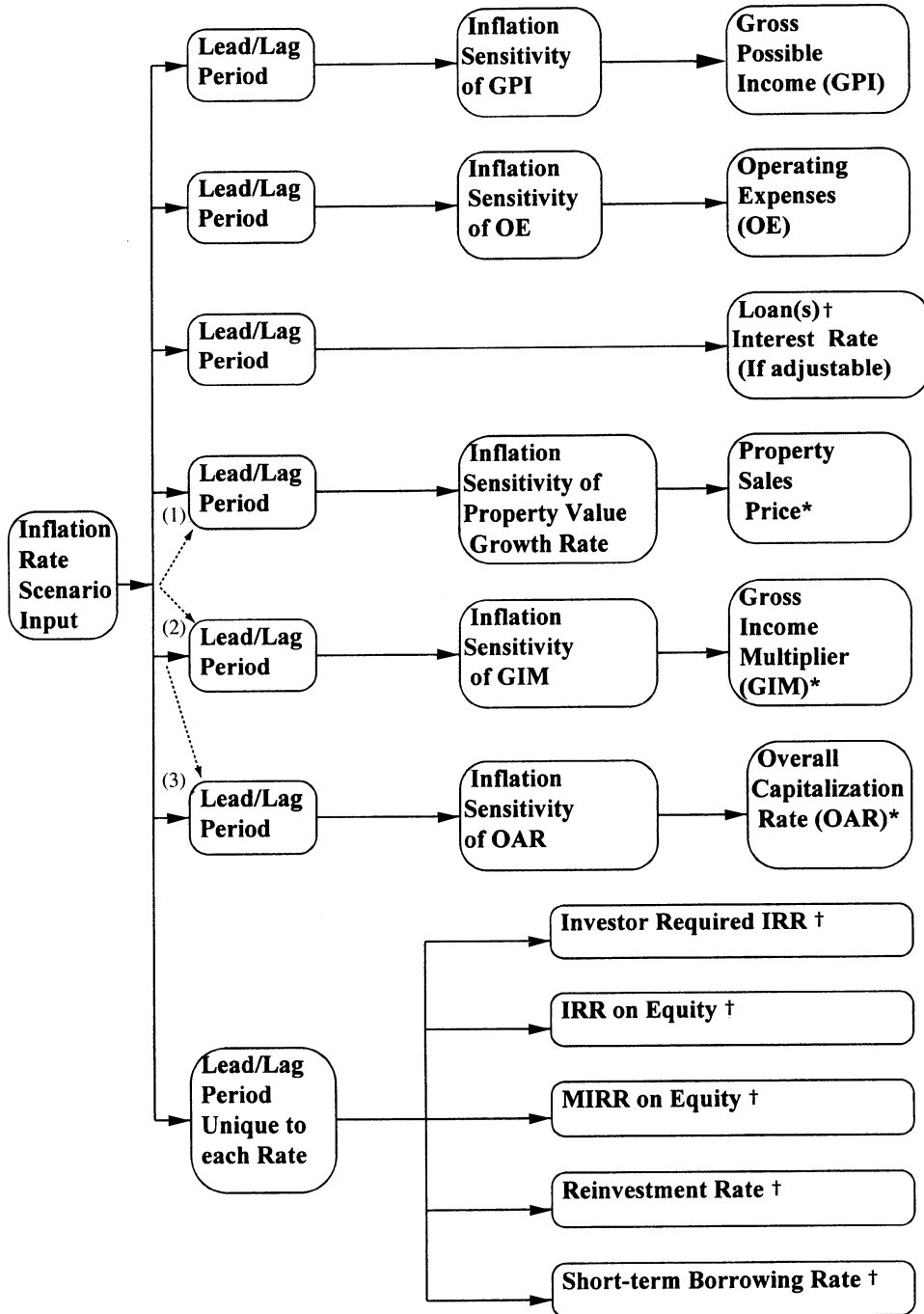
- Concentrate on investments, the prices of which are out of line with the expected long-term inflation trend (expected IRR higher than or lower than comparable investments).
- Point A: inflation rate well above long-term trend and before peak; sell real assets and buy short-term money market instruments (lock in high interest rates if possible).
- Point B: inflation rate above long-term trend but decreasing; real assets liquidated, selling short-term money market instruments and investing in stocks and bonds.
- Point C: inflation rate below trend but before trough; sell stocks and bonds and invest in liquid assets.
- Point D: inflation rate at initial stage of acceleration; liquidated all stocks and bonds, convert liquid assets to real assets.

*The cycle is idealized for demonstration purposes.

Source: Pyhrr, Born, Webb (1990), page 180.

wave); and (4) the type of portfolio being managed and the ability of the investor to reposition or shift its portfolio assets quickly to take advantage of short-term (four to six year) cycles. This type of analysis establishes upper and lower bounds of expected asset/portfolio performance and the level of investment risk attributable to inflation.

**Exhibit 14
Model of Key Inflation Linkages**



*Analyst selects one of three options available for reversion calculation.

†Minimum rate may be specified to avoid Keynesian liquidity trap.

Source: Pyhrr, Born and Webb (1990), p. 182.

The authors also conclude that, because of inflation's fundamental importance as a determinant of investment returns and risks, cash flow modeling should begin with an analysis of alternative inflation cycle scenarios, which should be included as explicit variables in a cash flow model. The investor's "assumption base analysis" should include an analysis of inflation linkages to each of the critical cash flow variables, and final output measures of return and risk should always be converted from "nominal" to "real" terms. Additional research needs to be undertaken to better theoretically define and empirically test these inflation scenarios and linkages in the ex ante framework developed, and their impact on investment strategies.

PWB Market Disequilibrium Cycle Model

A year after the PBW inflation cycle study was completed, Pyhrr, Webb and Born (1990) completed the development of an expanded cash flow model (PWB) that explicitly incorporates and integrates four types of cycles: (1) property demand and supply cycles (macro- and micro-market cycles); (2) inflation rate cycles; (3) property life cycles; and (4) ownership life cycles. In this article, *Analyzing Real Estate Asset Performance During Periods of Market Disequilibrium Under Cyclical Economic Conditions: A Framework For Analysis*, the authors also broaden the types of strategic decisions addressed by the model, which are categorized into five decision areas: alternative measures of wealth for evaluating acquisitions, optimal holding period, solvency and other risk factors, mortgage debt structure, and asset diversification.

The development of this expanded model incorporating four interrelated cycles presented a unique communication problem. The cycle interrelationships and their multidimensional impacts on a property's NOI and value over time could not be explained with existing terminology. New explanations and cycle terminology had to be developed, including the following six terms:

1. *Equilibrium price cycle.* Assuming aggregate supply and demand are in balance, the average market rent that can be achieved on new construction over time.
2. *New construction market rents.* The required market rent rate necessary to justify new construction and provide a competitive cash flow return to investors.
3. *Property "relative rents."* When the market is in equilibrium, the ratio of the rent rate that an existing property can achieve relative to a new property. This ratio declines over time as a property ages (property life cycle).
4. *Equilibrium property rents.* Forecast of actual rent rates an existing property will achieve over time assuming market equilibrium and aging impacts.
5. *Market and property relative occupancy rates.* Forecast of occupancy rates for a specific property being analyzed relative to market occupancy rates. This factor adjusts the subject property's competitive position in the market.
6. *Rent rate catch-up cycle.* The period of time over which actual rent rates achieved by a specific property increase to equilibrium property rents,

assuming a market recovery cycle. This cycle is controlled by changing market demand and introduction of competing new construction.

One unique attribute of every cycle model is the presence of an “equilibrium” concept. It is a dynamic and elusive concept that is conveniently ignored, at least explicitly, by most DCF models. But it becomes a critical benchmark in every cycle model, against which an investor or analyst must measure a project’s position and direction in a cycle. As a practical matter, in a cyclical world the market is never in equilibrium—it is below it, above it, or just passing through it for a fleeting moment. In essence, the market tends to be in perpetual disequilibrium. This presents a dynamic modeling challenge for the analyst who seeks to capture “reality” in a decision model.

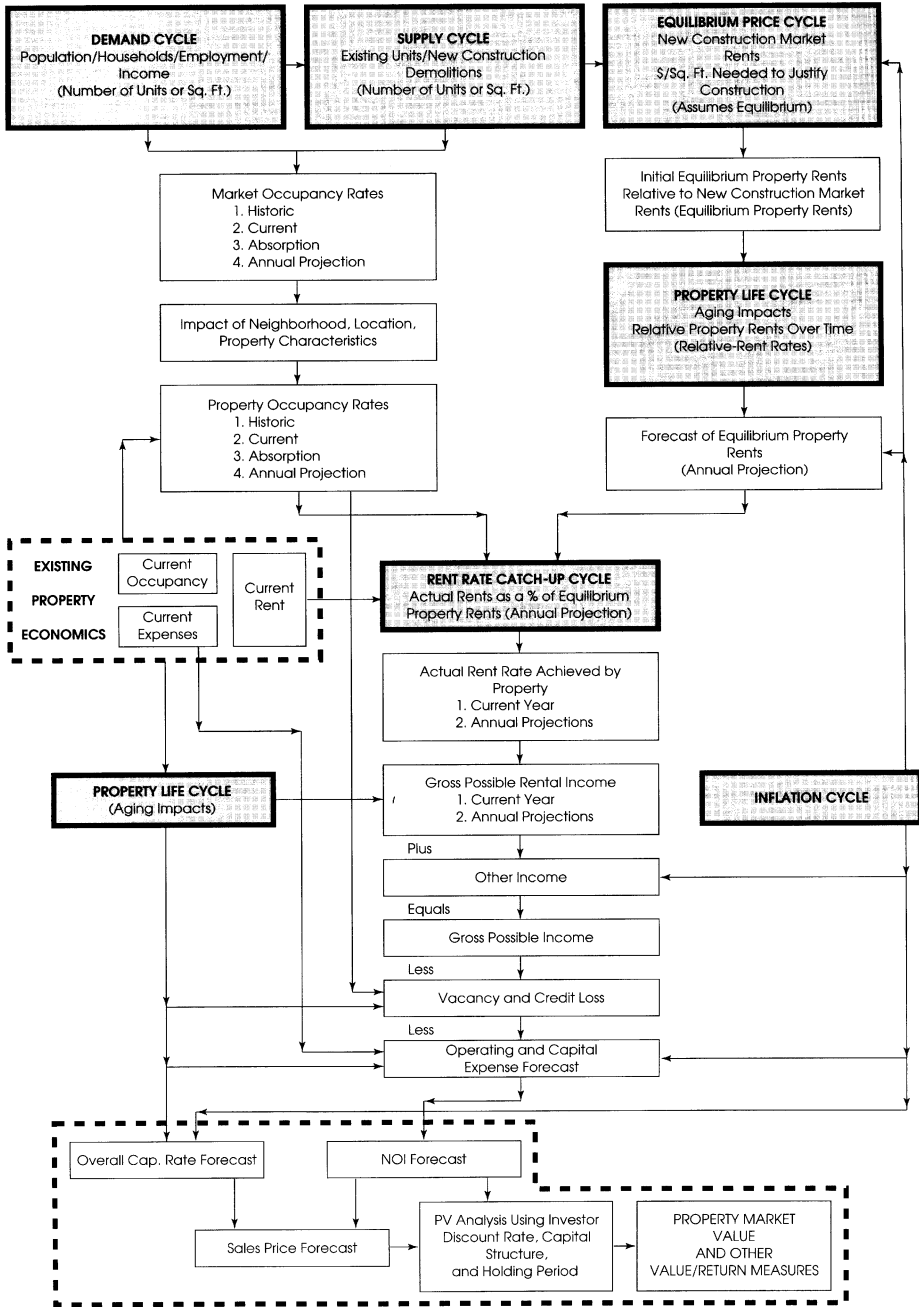
In two articles (see Born and Pyhrr, 1994; and Pyhrr, Born, Robinson and Lucas, 1996), the PBW and PWB cycle models are further refined and integrated for use in a valuation context, as shown in Exhibit 15. The cycle model valuation results are compared to those produced from traditional borrower and lender “trend-driven” valuation models. These studies conclude that market cycle effects are significant and can dramatically alter valuation conclusions, especially at the peak or trough of the market supply/demand cycle. Further, the entire market research process must be redefined and reorganized to produce information and data for use in cycle models.

Witten Market Cycle Models

Witten (1987) first presented a generalized model of the real estate cycle and identified characteristics and appropriate strategies to take advantage of the four distinct phases of the real estate cycle: (1) development; (2) overbuilding; (3) adjustment; and (4) acquisition. He illustrates that every city has its own cycles, which are unique in length of time (cycle period) and degree of change (cycle amplitude). Also, local real estate market conditions do not necessarily reflect national or even regional trends, but rather are usually unique to the local market. Thus, the soundest indicators of what the future holds for a given market are the internal dynamics of supply and demand in the local market. Finally, Witten notes that cycles within different sections and neighborhoods of a city will vary from the city’s overall cycles, as well as be different for different property types.

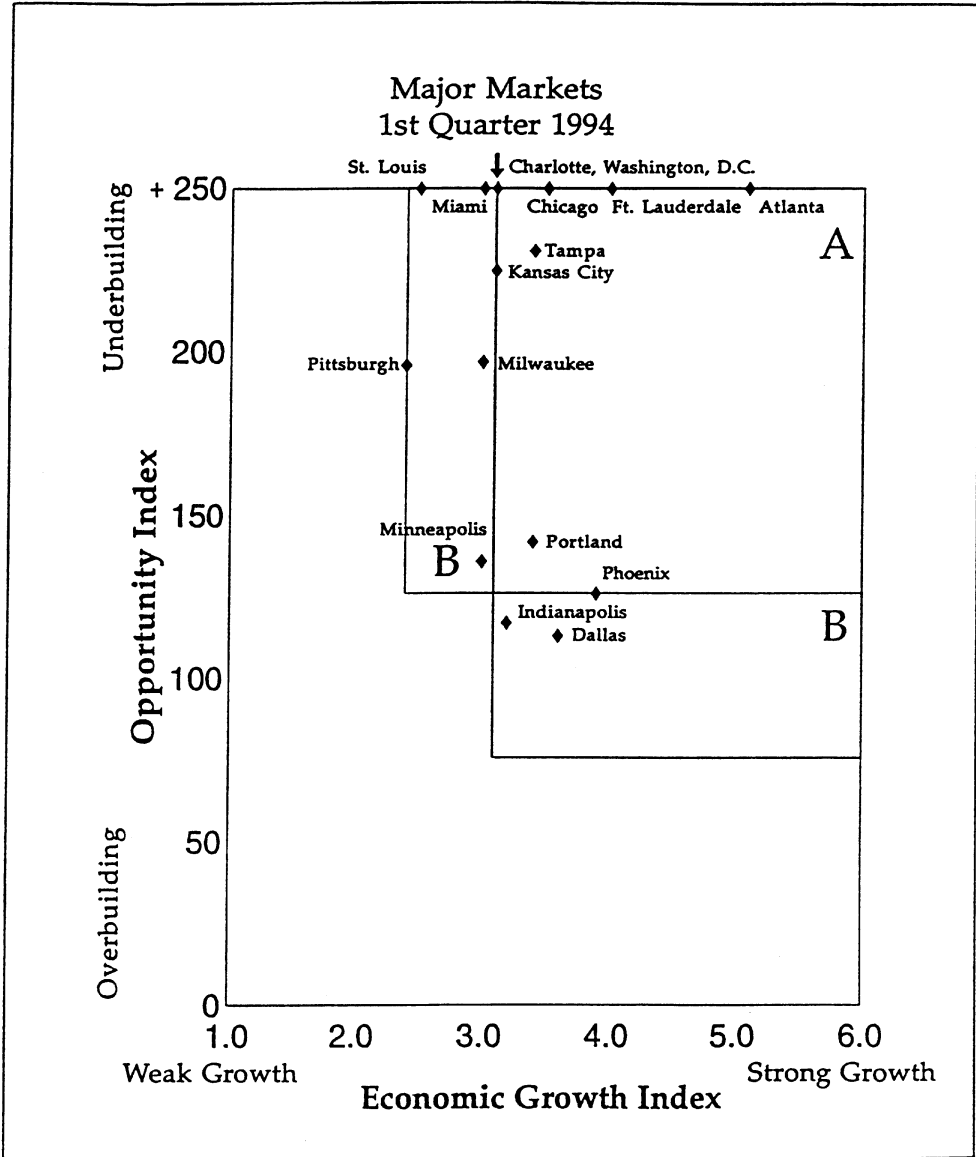
The Witten model measures the supply cycle using local building permit and construction data, and the demand cycle with employment growth and absorption data. By indexing each city’s supply side data according to relative degree of overbuilding/underbuilding (Opportunity Index), and its demand side data according to the relative degree of weak growth/strong growth (Economic Growth Index), each potential city that is being considered for investment or development can be graded, ranked and compared for each property type (apartment, office, retail, industrial). In 1994, he illustrated the application of his model for grading multifamily opportunities in major- and mid-markets in the U.S. in 1993/1994, as shown in Exhibit 16 for major markets (Witten, 1994).

Exhibit 15
Cycle Model Framework and Linkages



Source: Born and Pyhrr (1994), PA.

**Exhibit 16
Multifamily Opportunity Grades**



Source: Witten, 1994, MPF Research, Dallas, with permission.

In contrast with the PBW and PWB models that focus on project decisions with portfolio level implications, the Witten model focuses on portfolio decisions with project level implications. The Witten model focuses on macro supply and demand cycles in each city, without explicit consideration of project specific variables such as rent rates, operating expenses and capitalization rates, which together affect project performance. The model is used to rank cities according to what might be considered a macro return/risk profile, which then can be used by investors and portfolio managers as a screening device for determining which cities should be targeted for implementing acquisition, disposition, or development strategies.

Mueller/Laposa Market and Submarket Vacancy Cycle Models

Mueller and Laposa (1994) developed models for analyzing cyclical vacancy rate movements in major metropolitan markets and submarkets in the U.S. The Torto Wheaton database, compiled from the historical records of CB Commercial brokers in fifty-two markets around the country, is used to track cyclical movements from 1967 to 1993 for thirty-one office markets that make up a majority of the markets of interest to institutional investors. These data include semi-annual estimates of new office completions, absorption, total stock, non-farm employment growth, office employment, vacancy, rent and rent inflation.

The model is based on an equilibrium concept that defines a vacancy rate average (equilibrium rate) that differentiates positioning and direction for markets (as previously described and illustrated in Exhibit 7), and a set of decision rules that become the benchmark for the mathematical model developed. Areas of investment risk and opportunity, based on the cycle patterns in the twenty-nine of the thirty-one cities studied, are analyzed using cluster analysis in conjunction with a multiple discriminate analysis procedure.

The study results show that a majority of the twenty-nine markets experienced a similar cycle pattern—an upcycle in the late 1960s and early 1970s, a downcycle in the mid 1970s, and an upcycle in the late 1970s and early 1980s followed by a prolonged downcycle in the late 1980s and early 1990s with some minor amount of recovery in 1993–1994. However, many cities do not experience the general pattern and some are counter cyclical to the general pattern. Also, the timing and amplitude of each cycle varies from city to city, and successive cycles do not necessarily follow the pattern of previous cycles. Some cities are clearly more risky than others (higher peaks and deeper troughs, or greater amplitude). The authors conclude that timing acquisitions and dispositions, and setting leasing strategy should be easier after a city's cyclical pattern is identified. Since market cycles are not similar to previous cycles in either period (length) or amplitude (magnitude), however, investors and portfolio managers should look for underlying factors that cause variations in cyclical period and amplitude as an aid to predicting future cycles. From a strategic portfolio viewpoint, markets should be targeted that will be at the most advantageous part of their cycles for the holding period projected.

The Laposa and Mueller (1994) submarket cycle model, an adaptation of the MSA market model described earlier, was developed to study the cyclical behavior of

submarkets relative to the overall market as a whole. Office markets and submarkets in Philadelphia, Seattle and Salt Lake City were compared by investigating the correlation of rental rate, completions, absorption and vacancy rate movements, using multiple discriminate analysis on the correlation matrices of these variables. Exhibit 17 shows the positioning of markets from 1989 to 1993 relative to market equilibrium. Only Salt Lake City achieved a position above the market equilibrium line during this period, and led both Seattle and Philadelphia out of the recession phase of the cycle.

The study concludes that different cities and submarkets exhibit different behavior, and to the extent that cycle phases, amplitudes and periods are different or counter cyclical, the returns and risks are also different. Thus, the timing of acquisitions and dispositions, and the portfolio mix of different market/submarket areas can be optimized to enhance investment performance over time. Although this analysis is based on historical data (ex post rather than ex ante) and is limited to office properties, the strategy implications of utilizing this type of analysis in an expectations (ex ante) framework are significant.

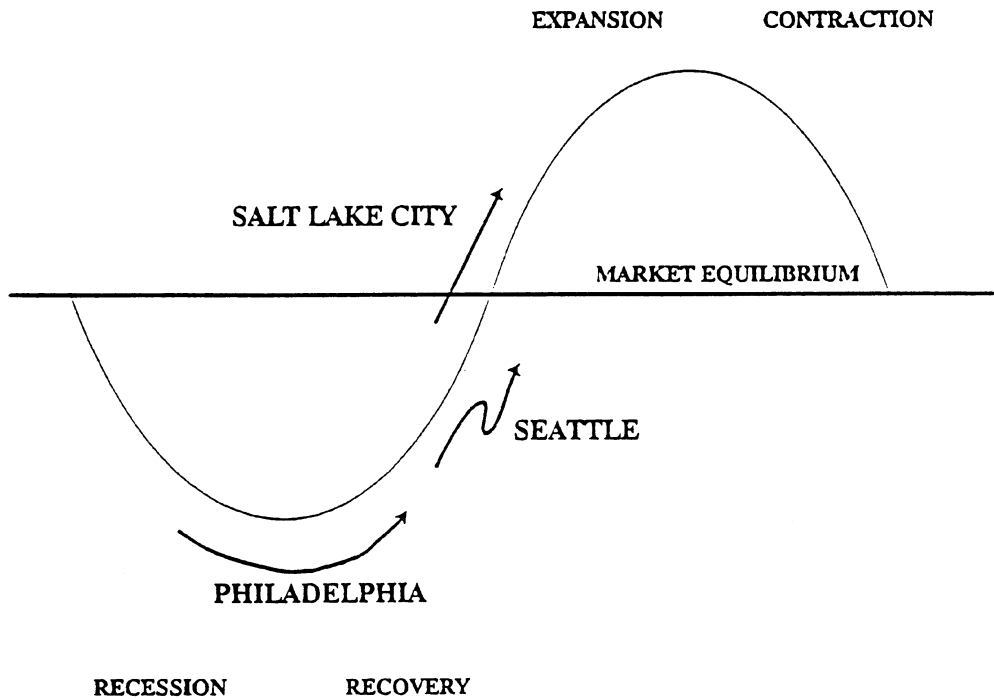
Mueller/Laposa Rent Growth Rate and Rent Distribution Models

In 1996 and 1997, Mueller and Laposa built on their earlier vacancy cycle modeling work by adding a rent growth rate and rent distribution variable. The Mueller and Laposa (1996), and Mueller and Pevnev (1997) studies test the relationship between different market cycle phases (as measured by the vacancy rate) and their impact on rent growth rates and the distribution of rent growth rates for fifty-four office and industrial markets in the U.S. (from 1967 through 1995). The model results confirm that rental growth rates are quite different during different physical market cycle positions—increasing during an upcycle and declining during a downcycle. Further, the distribution of rent growth rates varies by cycle position, with distributions narrowing during an upcycle and widening during a downcycle.

Exhibit 18 illustrates the model results for office rent growth distributions and average rent growth rates for sixteen different positions on the occupancy cycle. The methodology used to arrive at these results involved three steps that were completed for each market studied. First, an equilibrium vacancy rate was calculated according to the Mueller/Laposa methodology (1994); actual vacancy rates for the market were then compared to the equilibrium vacancy rate in order to identify specific points along the cycle for each time period. Second, the market cycle was segmented into sixteen points and each year for each market was assigned to a market cycle point one through sixteen. Third, market cycle points were connected to the growth rates for each year and for each market; then the aggregate growth rate for each cycle position was calculated and the distributions examined. The same procedure was followed for fifty-four industrial markets.

The Mueller and Laposa model and results are valuable to investment decision makers because it provides them with a new empirical tool for estimating more accurate rental growth rates over a forecasted market cycle, which are needed for inputs into the discounted cash flow programs used by real estate investors. As noted in the PBW

Exhibit 17
Positioning of Three Markets and Their Submarkets From 1989 to 1993



Source: Laposo and Mueller (1994).

and PWB cycle models, the relationship between occupancy rates and rent growth rates over time must be specified and forecasted correctly if accurate return and risk measures are to be estimated by the cycle model.

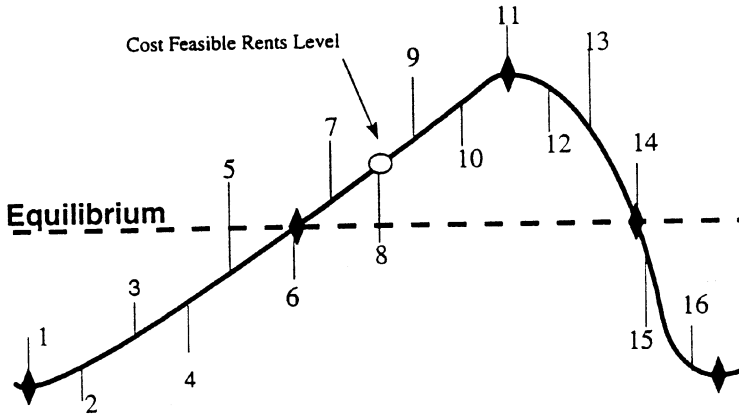
Roulac/Sobolik Tax Policy Model

In 1985, there was considerable debate about tax reform proposals. This debate was ultimately consummated in the 1986 tax reform act that had extremely adverse implications on the historic favored tax treatment of real estate. During this time period, Roulac and Sobolik (1985) presented a long-cycle historical perspective on real estate tax policy. By considering the interdependency of the relative impacts of tax rates, depreciation and tax structuring elections over time, the relationship between tax-related benefits and economic (non-tax) benefits of owning real estate over the ten major tax acts from 1939 through 1984, including the 1985 proposal (that became law in 1986), were quantified. The long-cycle real estate tax relationships are illustrated in Exhibit 19.

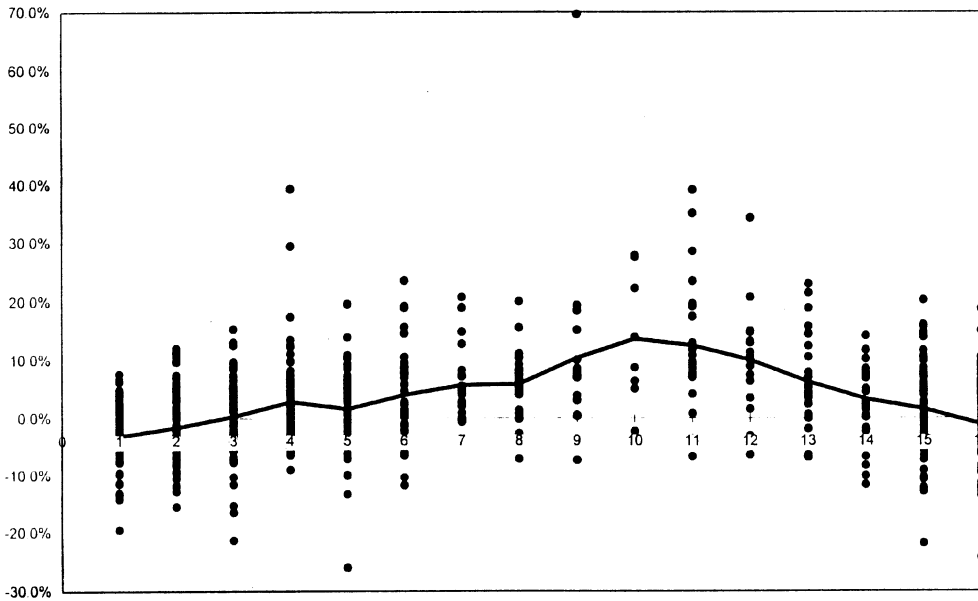
Roulac and Sobolik asserted that the mid-1980s were characterized by an “ever-changing tax environment.” Investors should understand that “although new tax laws

Exhibit 18 Cycle Positions and Rental Growth

Cycle Position Labels

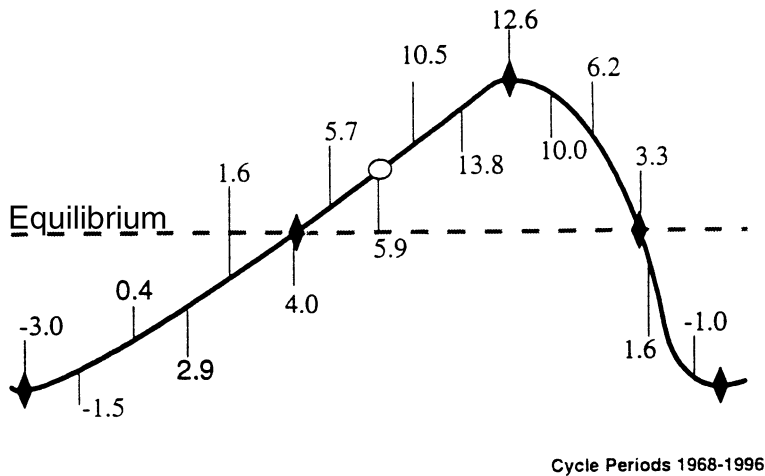


Office Rental Growth Distributions



Source: Mueller and Laposa (1996).

Exhibit 18 (Cont'd.)
Cycle Positions and Rental Growth
 National Office Historic Rental Growth



Source: Mueller and Laposa (1996).

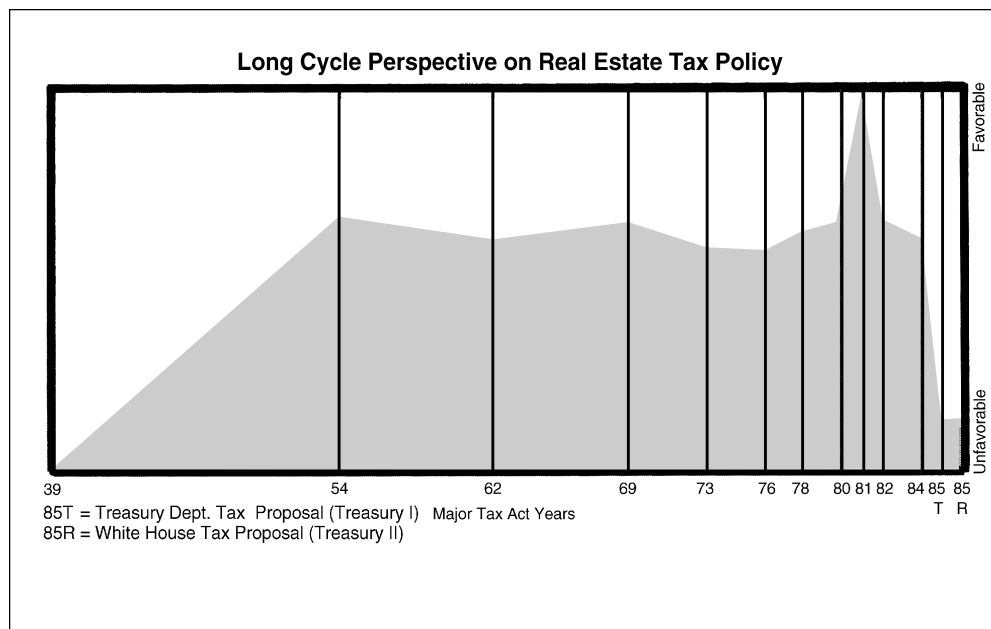
influence investment decisions, they neither impose penalties nor confer benefits on new investors. Those who win or lose as a result of tax changes are those who own assets when a new tax law is passed.” As previously discussed, short and long cycles involving tax law changes are cycles that must be carefully evaluated and weighed in terms of their potential impact on investment returns and risks.

Roulac Market Forces Model

Roulac (1993) advanced a model to promote understanding of the interconnectedness of the multiple cyclical forces that determine real estate market results. For each of six four-year periods, from 1972 through 1995, eight basic measures of real estate markets, including the overall economy, office demand, construction, property values, volume of transactions, debt capital available for speculative real estate, equity investor interest and tax incentives, were addressed. The interaction of these eight factors for the commercial real estate market is depicted in Exhibit 20.

The Roulac market forces model vividly illustrates that “the condition, activity and direction of change of the multiple and divergent real estate markets are influenced by a multitude of cyclical forces. Sometimes many market segments move in a common direction, while at other times, some market segments thrive at the expense of others.” Additional assessments for the major capital sources, including pension funds, financial institutions, foreign investors, securities and corporate investment,

Exhibit 19
Long-Cycle Perspective on Real Estate Tax Policy



Source: Roulac, Stephen E. and Douglas E. Sobolik, Real Estate Tax Reform: Historic Perspectives and Economic Implications, *Real Estate Finance* (Summer 1985), p. 19.

were provided. Further, the implications of these market cycles were addressed for space users, real estate services providers, developers and the public sector.

Global Real Estate Cycle Models

The past decade has been a period of globalization in the world's financial and investment markets. Not only has access to international investment data broadened, and barriers to cross-border investment been eased, but the highest rates of return have been achieved through investments in emerging markets (Goetzmann and Wachter, 1994). While these statements were made in the context of non-real estate types of investments, these trends are generally considered to be true for real estate as well. Real estate investors and portfolio managers can no longer ignore the implications of global business and real estate cycles and their impact on real estate returns and risks.

The opportunities for developing global real estate cycle investment models are enhanced as more and better quality data are becoming available from such international research firms as Jones Lang LaSalle Research, CB Richard Ellis Research, the Prudential Realty Group and the International Property Bulletin (Baen,

Exhibit 20
Commercial real Estate Market Cycle Factors

	1972-1975	1976-1979	1980-1983	1984-1987	1988-1991	1992-1995
Economy	Begins with stall, ends with recession	Recovery	Strong recovery, followed by recession in 3 rd Q 1992	Strong expansion	Growing sense of fragility, followed by recession 1991	Constraints imposed by surplus of capital goods and excess debt
Office Demand	Weak	Strongly growing	Strong (relative to construction)	Very strong	Sharply Declining	Stagnant
Office Construction	Strong	Limited	Strong upsurge	Extraordinary boom	Starts strong because of pipeline projects, then sharply declines	Sharp slowdown
Property Values	Sharp decline	Prices surge	Strong appreciation	Price escalation stalls in 1986 and reverses in 1987	Prices decline	Declines continue, then stabilize
Volume of Transactions	Begins brisk, ends restrained	Moderate	Brisk	Very brisk	Substantially reduced	Moderate
Capital for Real Estate	Begins fairly accessible, ends difficult to come by	Begins difficult to come by, ends fairly accessible	Readily accessible	Extremely easily accessible	Not readily accessible	Extremely difficult to come by
Investor Interest	Begins strong, ends weak	Beings restrained, ends moderate	Strong and growing	Softens in 1986	Begins cautious, ends nonexistent	Begins reluctant, ends selective
Tax Climate	Uncertainty about tax reform	Elimination of favorable capital gains treatment (1976)	Extraordinary stimulus from 1981 tax reform	End of real estate stimulus in 1986 tax reform	Lack of tax incentives felt	Reintroduction of incentives to stimulate economic recovery

Source: Roulac, *Urban Land*, August 1993.

1994, 1995). Although the risks of investing in properties in foreign countries can be substantial, the potential returns can also be higher on a risk-adjusted basis than available in U.S. property, and depend substantially on the differences between cycles of each country.

Following the completion of the “first global real estate cycle” of 1985–1994, which includes the worldwide real estate crash of 1992, the academic community and the commercial real estate industry has renewed and increased their interest in international real estate investing. Renaud (1997) suggests that closer links between real estate and capital markets and less restricted flow of capital spread the value cycle of real estate to a global dimension. Dehesh, Egan and Pugh (1995) in their extensive examination of world markets, study the causes of modern property cycles from three perspectives: endogenous causes and processes, exogenous instabilities and structural economic change. They conclude that cycle causes are varied, including interaction between deregulated finance, increasing internationalization of finance and economic relationships, and fundamental economic conditions such as varied rates of savings, interest rates and uncertainties about currency exchange risk.

An early work by Baen (1994) develops a generalized risk analysis model and decision matrix for global property investments presented in Exhibit 21. His research advanced the theory that there is one generalized, theoretical property cycle and that each country, and each property market, is located discretely on this “conceptual” cycle. Through a combination of interview techniques with participants in the World Congress Assembly, along with objective study of each country’s economic data, Baen developed a generalized world real estate cycle model and located each country on that cycle (1994) in the context of five market phases: (1) recovering markets; (2) improving markets; (3) maturing markets; (4) overbuilt markets; and (5) falling markets, as illustrated in Exhibit 22. In a subsequent related paper, Baen (1995), advocates the development of a world property index and standard data collection methodology and reporting system for systematizing the study of market cycles throughout the world.

Although global real estate cycle modeling is in its infancy, additional research and development of global cycle models and strategies will be accelerated in the future and promises to produce high returns to those investors who learn how to utilize the information in structuring their global investment portfolios.

Strategic Implications

Given the state of the art of cycle theory, analysis and modeling, and the few empirical studies that are based on limited and often flawed data, what can one conclude about the strategic implications of cycles for investors and portfolio managers? First, we have noted that “cycles and their predictability” is one of the key subjects that investors and portfolio managers (worldwide) are interested in, as indicated by 685 plan sponsors who control over \$500 billion of assets. Second, it is clear that individual and institutional investors will be placing greater emphasis in the future on strategies that explicitly consider real estate cycles and their underlying determinants.

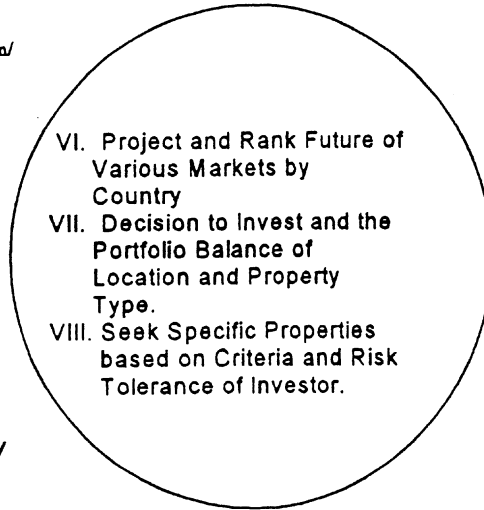
Exhibit 21
A Theoretical Approach to Global Property Investments, Decision Matrix and Risk Analysis

I. Political Uncertainty

- Terrorism
- War
- Civil War
- Risk of Confiscation/ Nationalization
- Local Government Bribes
- Changes in Government

IV. Business Cycle Uncertainty

- Diversification Risk
- Linkages to Other Countries
- Trends in the Economy
- Supply/Demand of labor, land and capital



II. Financial Uncertainty

- Devaluation Risk/ Opportunities
- Inflation Risks/Opportunities
- Exchange Rate Risks/ Opportunities
- Tax Change Risks/ Opportunities
- Present/Future Investors
- Restrictions on Flow of Capital In/Out of Country
- Foreclosure Risk/ Opportunities
- Bankruptcy Risk/ Opportunities
- Ownership Form Risk/ Opportunities

V. Real Estate Cycle Uncertainty

- Macro Market Risk
- Micro Market Risk
- Quality of Information Risk
- Supply and Demand Risk
- Alternative Investment Risk (stocks, bonds, etc.)
- Availability of Financing Risk
- Liquidity Risk

III. Environmental Uncertainty

- Quality of Life
- Environmental Risk/ Opportunities
- Business Attitude/ Climate
- Weather, Earthquakes, etc.
- Crime

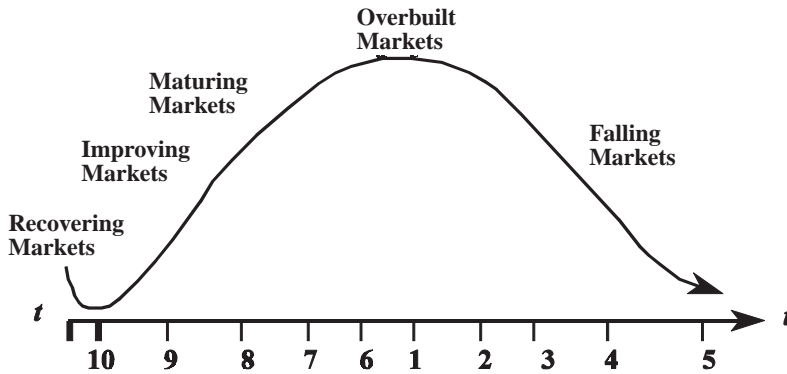
Source: Baen (1996:74).

In the following two sections, strategy implications for investors and portfolio managers are addressed and discussed.

Strategic Implications for Investors

The strategic implications of cycles for investors has been discussed throughout this study, and can be summarized in the following eight points:

Exhibit 22
Synchronicity of Various Real Estate Markets



Note: Assumes *each* country is somewhere on the same conceptual property cycle. Real Estate Cycles at each location may vary in amplitude and velocity (time) as each market is unique.
Source: Baen (1996:78).

- *The impact of cycles on real estate performance and wealth is dramatic.* It may be the most important strategic concept to deal with in the investment world for investors who seeks to maximize wealth, outperform the competition and beat the market average—or even for investors who are happy to be “average.”
- *The basic strategy is to buy at the bottom of the cycle and sell at the top.* But, that achievement is not easy given the number of different types of interrelated cycles that must be dealt with, the lack of good data, models, forecasting techniques, and the dynamic and complex nature of most markets and submarkets.
- *Cycles affect an investor’s acquisition and disposition strategies, and the optimal holding period of each investment.* These strategies will change depending on which city, submarket and property types are targeted by the investor.
- *Depending on the cycle projections made, the investor will develop different optimal strategies for leverage, lease structures, capital expenditure plans, and operating policies.* For example, if an industrial market is “hot” today but a downturn is expected in two years, leases can be structured on seven–to ten–year terms and designed to attract credit tenants who are not likely to default during the downturn. Using this strategy, current high rent rates at the top of the cycle can be locked in, allowing the investor to “leapfrog” the market downcycle and recovery period. In addition, the investor might also refinance this low-risk property at its “top of the market” value with a 75% non-recourse loan with a ten–year term, then use the refinancing proceeds to establish

a substantial liquidity fund for use during the downturn when distress properties can be purchased at distressed prices.

- *Analysts must alter the nature and scope of their market research and types of data that needs to be collected and analyzed.* Cycles affect the direction of market research and the questions that need to be answered by researchers. Market researchers must collect information and market data that enable investors to identify economic scenarios that better reflect cyclical economic realities in real estate markets, then translate those economic scenarios into input values and assumptions for investment analysis.
- *Analysts must restructure their cash flow models used to evaluate projects and portfolios.* Investors must model the dynamic linkages between investment variables, lead/lag periods, rent-rate catch-up cycles, equilibrium benchmarks, etc., in order to estimate rate of return and risk parameters that reflect the economic cycle scenarios forecasted, and which form the basis for property and portfolio decisions.
- *Cycles affect the types of properties purchased and the countries, states, cities and submarkets where investments are made.* The investor must now be more mobile and cognizant of constantly shifting returns and risks associated with different geographical locations and property types.
- *Investors must change their view of the world.* The view must be away from trends, herd mentality and perpetuity capitalization models, and toward a cycle view of the world—one that is dynamic, constantly changing, never in equilibrium (except perhaps for an instant), and where flexibility and a degree of contrarianism is important for investment success.

Strategic Implications for Portfolio Managers

With regard to strategic implications for portfolio managers, eight points should be stressed:

- *All of the above eight conclusions apply.* Portfolio managers are fiduciaries for investors, and although they have many more constraints than entrepreneur investors, they should adopt the same cycle framework and strategic viewpoint.
- *New paradigm for portfolio diversification.* In order to enhance return performance and/or reduce risk, portfolio managers should develop strategies to diversify by countries, cities and submarkets that have different macro cycles and micro cycles. Acquisitions and dispositions should be timed to capture the upsides of cycles of different property types and locations, and avoid or minimize downcycle impacts.
- *More dynamic portfolio revision strategy.* Portfolio managers must be willing to develop a more fluid and dynamic portfolio. They must be willing to shift from real assets to financial assets in a declining inflation

rate market, and vice versa. They must reorganize their staffs to eliminate some of the bureaucracies and turf battles that frequently occur between departments and specialists who are product type and geographical location advocates.

- *More future oriented.* Decisions should be based on forecasts of things to come, rather than historical data that provides an optimal portfolio mix on the “efficient frontier” for a cycle phase that is history, and which results in buying high and selling low.
- *Further development of theories and models.* Cycle theories and models must be developed and adapted to a portfolio management system.
- *Adaptation of new technologies.* Portfolio managers must introduce new technologies and software systems that exist so that cycles can be analyzed in a portfolio context. To be successful, these technologies and systems must adapt to existing on-site property management and accounting systems, reporting procedures and portfolio management organizations. Specifically, integrative technologies that link individual properties and local financial analysis and reporting systems, to the main frame portfolio model in the corporate office, are needed. An Austin-based high-tech software company, Express Star Systems has pioneered such an integrative technology, which is based on artificial intelligence systems developed at MCC (Microelectronics and Computer Consortium, a joint research effort funded by the federal government and the major high-tech companies in the U.S.), and which has been field tested with a number of major real estate firms.
- *Better forecasting models, techniques and data.* Most of the cycle research being undertaken in the industry is typically based on historical data. For example, the latest work by Mueller/Laposa is constrained by an ex post framework and historical data, without a definitive strategy for converting to an ex ante framework and model that uses forecast data. Further, their cycle strategy conclusions are based on a cycle construct that defines the vacancy rate as the key measure of the real estate cycle, as contrasted with property value (as Pyhrr and Born suggest) or more sophisticated total return and risk measures.
- *Allocation of more time and money for research.* Portfolio managers and investment advisors must spend more time and money on research of cycles, models, databases, forecasting technologies and applications, and strategic implications, and should focus on property value as the most critical indicator of the cycle and component of property return.

Another suggestion for researchers who seek to better understand the dynamics of real estate cycles and strategies that take advantage of cycles, is to turn some attention to behavioral studies of individuals and entities who have utilized successful cycle strategies in the past. Much can be learned from successful entrepreneurial investors who have lived through numerous cycles and who understand the dynamics of their

local marketplaces. Other behavioral considerations are addressed in the following section.

Implementing Real Estate Cycle Strategies: Behavioral Considerations

While the strategic implications of real estate cycles for investors and portfolio managers are straightforward, implementation of the concept of real estate cycles into investment decisions can be very complex, because of the interdependency of multiple cycle phenomena. Notwithstanding this implementation complexity, three crucial interdependent themes need to be considered by investors and portfolio managers who would incorporate the lessons of real estate cycles into their investing strategies—detachment, persuasion and flexibility.

Detachment. Detachment is needed to have the independence of perspective to perceive how real estate cycles influence a specific real estate decision. Because real estate cycles are much more readily recognized on a posteriori rather than a priori basis, inevitably the detachment to recognize real estate cycles parallels contrarian thinking concerning market conditions and future outlooks.

Persuasion. Once one has determined the applicability of real estate cycles to justify a particular decision, the next challenge is the persuasion to motivate those who must decide amongst alternative resource allocation opportunities to act. This persuasion challenge can be daunting, since the action sought will often be directly contrary to consensus thinking and what is perceived to be consistent with the collective ideas of the majority of market participants. Those who possess the detachment to perceive the implications of cycles are in the minority, and those who can combine that detachment with the persuasion skills to motivate senior executive and board decisions as well as to attract institutional investors' capital commitments are a still smaller minority.

Flexibility. The real estate investors and portfolio managers who would incorporate real estate cycles insights into their business must be both flexible in how they pursue certain fundamental tasks, such as leasing, and also in the relative priority and emphasis directed to different real estate business activities. Flexibility concerning leasing takes the form of customized leasing rates and terms, tenant selection criteria and duration. The role of flexibility follows from assessment of market conditions. In particular, in markets that are perceived to be moving strongly upwards (recovery or expansion phases), lease terms might be less stringent, leases might be of shorter duration and tenant assessment criteria more relaxed. In softening markets (contraction phase), by contrast lease terms would tend to be more demanding and of longer duration; stronger tenant quality and credit strength would be emphasized.

Depending on market cycle conditions, investors and portfolio managers might move between an emphasis on buying troubled existing properties, land investment and development opportunities, as markets move from very weak (trough of cycle) to strengthening (recovery) to strongest (expansion) levels. Similarly, as markets are weakening (contraction phase), development involvements would be reduced, land

positions sold, both to mitigate downside exposure and also to free resources to respond to future opportunities to purchase properties on advantageous terms.

Effectively implementing the shift of emphasis between opportunistic purchase of problem properties, asset management, land acquisition, development and building may strain the orientations and capabilities of many investors and their advisors. Although a common collection of market knowledge and research expertise is needed for such decision making, from the implementation and operations perspective many investors and portfolio managers would be challenged to redirect the organization's resources from the extremes of highly creative and entrepreneurial activities to those that are more managerial operations-oriented. The organizations that can effectively marshal such realignment of capability are many fewer than those that possess particular distinctive competence in the specialized domains of investment in troubled properties, implementing, acquiring and managing existing income property portfolios, engaging in land acquisition and development, or pursuing new development projects through construction and lease out.

For those individuals and organizations who have multiple capabilities, pursuing different types of involvements in multiple real estate investment markets, the reality of cycles offers the opportunity to have certain parts of their business perform better in certain market conditions than in other market conditions. Beyond the recognition that some parts of the business will prosper relatively while others are suffering relatively, those investors and portfolio managers that have the capability to shift their mix and emphasis over time should enjoy superior results over those who do not.

Conclusion

Real estate cycles have a significant impact on the financial successes and failures of real estate investments because of their pervasive and dynamic impacts on real estate returns, risks and investment values. Because of this recognition, investors and portfolio managers are placing increased emphasis on the identification, analysis and decision-making implications of real estate cycles. In one recent study of 685 real estate plan sponsors, the results show that approximately 40% of the sponsors rated Real Estate Cycles and Their Predictability as the most important research topic that should be studied, and 80% rated it among the top three. Despite recent interest in the subject, there remains a group of academics and industry practitioners who believe that real estate cycles are not relevant and therefore can be ignored.

The purpose of this study is to synthesize relevant research and commentary on real estate cycles in a micro-decision-making context and to discuss their strategic implications for investors and portfolio managers. The study includes an extensive review of the macroeconomic, microeconomic and practitioner literature on cycles, which evidences the growing interest in real estate cycles at all levels of decision making. While in the past, the concept of market cycles has been oversimplified and used more to support self-serving assertions about market recovery than as a guide to investment decisions, increasing numbers of decision makers appear to understand the dynamics and complexity of real estate cycles and their strategic implications.

Also, there is a growing recognition of the importance of global real estate cycles, which is given special emphasis in the study.

The second major section of the study presents the basic theory of cycles, including a discussion on cycle definitions, the basic mathematical sine-wave construct, cycle phase nomenclature and economic characteristics, and cycle concepts. The nature and dynamics of real estate cycles are examined, and the many different types of interdependent cycles that affect real estate performance are identified, and strategies for dealing with these multiple interrelated cycles are presented. Successful cycle strategies that achieve above-market risk-adjusted returns are said to be dependent on the key ingredients of good market timing and a degree of contrarianism—a willingness to follow a path contrary to that of the masses. Investments must be bought and sold before cyclical impacts are fully reflected in real estate prices and activity.

Few studies have sought to model cycles on an *ex ante* basis and measure their resultant impact on cash flows, rates of return, risk, and investment and portfolio decisions. The following section of the study reviews eight such models that have been developed in the 1990s. Each presents an analytical definition of cycles, seeks to measure cyclical impacts on key investment variables in an *ex ante* framework and provides insight into some aspect of investment timing or other property/portfolio decisions. The modeling studies highlight the need for: (1) beginning each investment analysis by identifying alternative economic scenarios that represent cyclical market realities; then (2) developing an “assumption base analysis” that identifies and quantifies the important linkages between cyclical economic variables at the macro level with supply and demand factors at the market and submarket levels, and finally with specific cash flow variables in a DCF model. Empirical studies, using regression analysis and factor analyses to identify lead/lag periods and sensitivity coefficients between variables (such as price inflation, rents, vacancies and capitalization rates), can be conducted for developing these key linkages in a cycle model. Global real estate cycle modeling, while in its infancy, is another important subject addressed in this section of the study.

The final major cycle topic addressed in the study is strategic implications for investors and portfolio managers. Among the key implications for investors are: (1) cycles affect acquisition and disposition strategies, and the optimal holding period of each investment; (2) different optimal strategies for leverage, lease structures, capital expenditure plans and operating policies will depend on the cycle projection made; and (3) the nature and scope of market research, the types of data collected and analyzed and the structure of cash flow models need to be redesigned to accommodate cycle analysis. Among the key implications for portfolio managers are: (1) a new paradigm for portfolio diversification is required to correctly time acquisitions and dispositions in different countries, cities, submarkets and for different property types; (2) adaptation of new integrative technologies and software systems is needed so that cycles can be analyzed in a portfolio context that links together individual properties and local reporting systems to the main frame portfolio model; and (3) investment managers need to understand the behavioral considerations for successfully implementing real estate cycle strategies in institutional organizations that do not

readily accept “out of the box” thinking and flexible strategies that require decisive action on a timely basis.

Agenda for Future Research

The body of knowledge on real estate cycles and cycle strategies, as presented throughout this study, provides some insight regarding the focus of previous efforts to study real estate cycles. The preponderance of research has clearly focused on macro issues and cycles, (inflation, long and short real estate cycles, business cycles, etc.) with the more micro issues and cycles (occupancy and rent growth, investment decision modeling, portfolio strategies) gaining momentum and popularity in recent years. Continued emphasis on the latter micro subjects and cycle issues will produce the greatest rewards for researchers in the near term future, in our opinion. Specific applications to property and portfolio decisions in an ex ante decision framework should especially be emphasized.

A cycles research agenda for the future should emphasize the following seven subject areas:

1. *Theory*. Cycles are dynamic, complex and interrelated, thus are difficult to study. To date, the theory of real estate cycles is not well developed. Research emphasis should be placed on all aspects of cycle theory, especially on the integration of macro and micro cycle theory in a decision-making framework.
2. *Empirical research*. Very little empirical research has been published to guide the study of cycles in a micro-decision-making context. Extensive research is needed on the critical linkages between economic factors and cash flow variables, including properly specified empirical models to determine the mathematical relationships between critical variables.
3. *Market information and data*. Available market data is generally of poor quality and often unreliable. In addition, market information is not readily available for modeling alternative economic scenarios or for performing the empirical research described above. There is a critical need for systematic collection and standardization of real estate market data for cycle analysis.
4. *Forecasting techniques*. Shifting analysis to an ex ante cycle framework requires the development of forecasting and estimation techniques not commonly used in real estate analysis today. Since all exogenous factors cannot be quantitatively measured, qualitative variables also need to be integrated into realistic frameworks for evaluation of future economic and market scenarios.
5. *Project and portfolio modeling*. Project and portfolio models that incorporate cycles and their impact on returns and risks need substantial development to be useful to decision makers. Models should include linkages between macroeconomic factors and investment cash flow variables, and explicitly provide for sensitivities and lead/lag relationships.

6. *Strategic frameworks.* Strategic and analytical frameworks for investment decisions that incorporate cycle concepts and strategies need to integrate all of the above considerations, in addition to other investment alternatives such as stocks and bonds in a mixed-asset portfolio, as well as global real estate alternatives.
7. *International/global cycles.* Further studies of global cycles and property-specific cycles (office, retail, industrial, etc.) among countries are needed to better understand the relationships between physical market and capital market cycles in those countries. The impact of international portfolio diversification on portfolio returns and risks is another productive area for research.

Concluding Comment

We consider this study to be a pioneering attempt to synthesize the body of knowledge on real estate cycles (primarily in North America) and to develop a strategic framework for thinking about real estate cycles in a micro-decision-making context. Clearly, the development of an analytical framework and models for cycle analysis involves numerous interrelated and unresolved theoretical and analytical problems. Nevertheless, we hope that it is obvious what the benefits will be of further research in the seven areas described, both to real estate academicians and practitioners.

It is important to explicitly and systematically incorporate real estate cycles into the investment and portfolio management framework so that the mathematics of cycles is not left to the four horsemen of the implicit decision-making apparatus: judgment, hunch, instinct and intuition. Further, it is hoped that such explicit and systematic study of cycles will result in *cycle relevancy*—making better decisions that result in greater wealth over the long run.

Endnotes

¹ In 1998, Equitable and Yarmouth were merged, this time with the Australian-based firm Lend Lease Real Estate Investments, Inc., which became the surviving entity.

² This study draws primarily from published literature in the U.S., although a growing body of cycles research is also available in European, Asian, and Pacific Rim journals, conference proceedings and industry publications. The authors are developing a database and bibliography on real estate cycles by authors who publish their research outside the U.S.

³ The seminal work on *efficient capital markets* was presented by Fama (1976). The underlying assumption is that price fully reflects information at each point in time and that all information is freely available to everyone and, thus can be known by all market participants (Fama and Miller, 1972).

⁴ For a discussion on the three types of long cycles identified, see Downs (1993).

⁵ “Standard procedures” for modeling of office markets refer to models developed by Rosen (1984), Wheaton (1987) and Wheaton and Torto (1988).

⁶ The Royal Institution of Chartered Surveyors (1994:7), quote by Howard J. Sherman on “The Business Cycle.”

⁷ These are the basic physics and engineering cycle characteristics definitions. There are a few others that come from mathematics and economics. The slope of the path of the wave changes over time. In Exhibit 6, this is measured by the first derivative of the sine with respect to time or the angle of rotation; this mathematically is $d(\text{sine})/dt$, where t is in radians of rotation. Note that at $\pi/2$ radians or 90 degrees, the slope is zero, which in this case, is the maximum or peak. A minimum or trough occurs at $3\pi/2$ radians, or 270 degrees (there are 2π radians in one rotation or one cycle). In physics this is referred to as the speed or velocity. Note that the speed of excursion from the abscissa is zero at the peak and trough; the direction is being reversed. From the zero radian point the slope gradually decreases from some positive slope to zero at the peak, continuing to some maximum negative slope, then begins to return toward zero slope at the trough. The point at which the rate of change of slope is zero is the inflection point; and $d^2(\text{sine})/d^2t$ equals zero at that point and the absolute value of $d(\text{sine})/dt$ is maximum positive on the path to a peak and maximum negative on the path to a trough. Also note that when $d(\text{sine})/dt$ is minimum, $d^2(\text{sine})/d^2t$ is maximum. $D^2(\text{sine})/d^2t$ is the acceleration (change in velocity) in physics. In the sine plot in Exhibit 6, the second derivative is zero as the path crosses the abscissa either rising or falling. This can be likened to a piston in an automobile engine in which acceleration forces are maximum at top and bottom dead center; that is where the direction of piston movement has to be stopped and reversed. Other types of waves may have inflection points that occur at some point other than where the path crosses the abscissa. Now, this physical and mathematical explanation needs to be translated to real estate economics. We may view that portion of the path between trough and subsequent peak as a real estate upcycle (recovery and expansion phases) and that portion between peak and subsequent trough as a real estate downcycle (contraction and recession phases).

⁸ Note that other researchers use rates of return, vacancy rates, absorption, construction starts and other measures for identifying various phases of the cycle, depending on the focus of the study.

⁹ See Pyhrr et al. (1989:498).

¹⁰ An example is disposition timing during a period of disinflation (declining inflation). "Caught in a downside inflation cycle, an investor might feel that cutting losses short and disposing of a property quickly is the best strategy. However, the analysis indicates just the opposite strategy can result in a higher real IRR," (Pyhrr, Born and Webb, 1990).

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