

IS 100 YEARS OF RESEARCH ON PROPERTY CYCLES ENOUGH TO PREDICT THE FUTURE OF UK PROPERTY MARKET PERFORMANCE WITH ACCURACY?

Arvydas Jadevicius¹, Brian Sloan² and Andrew Brown³

School of Engineering and the Built Environment, Edinburgh Napier University, Edinburgh EH10 5DT, UK

In light of recent events in the world economy it is becoming extremely difficult to ignore the existence of cycles in the general business sector, as well as in building and property. Moreover, this issue has grown to have significant importance in the UK, as the UK property market has been characterized by boom and bust cycles with a negative impact on the overall British economy. Hence, a better understanding of property cycles can be a determinant of success for anyone working in the property industry. The paper reviews chronological research on the subject, which stretches over one hundred years, characterizes the major publications and commentary on the subject, and discusses their major implications. The particular emphasis is on research methodologies and methods, data and data analysis techniques employed, and outcomes of these studies. The review also considers the literature on how regular the cycles are. It identifies four major and four auxiliary cycles, discusses their general characteristics, and key forces that produce them. The concluding remarks summarize the discussion and present key findings. Future planned research will discuss whether analysis of historical data and identification of the key external and internal forces in commercial property that produced the sequence of cycles, enables extrapolation from this historic data to reliably predict the future of the UK property market performance with accuracy.

Keywords: business, cycle, data analysis, economy, property, UK.

INTRODUCION: WHY A LONG-RUN HISTORICAL PERSPECTIVE IS ESSENTIAL

According to Solomou (1998, p.1), a long-run “historical perspective is essential if we are to understand how cycles are generated and evolve”. As Solomou observed, economists who used inter-war economic data as a benchmark for their forecasting, expected the future to be highly volatile and prone to recessions. The researchers in the 1960s, including Abramowitz (1968), wrongly predicted the “end of the cycle” because of the stable economic growth of the post-war UK economy. In contrast, scholars, such as Borts (1960), who were looking at the economy from the 1913 benchmark, considered cycles to be long in duration and moderate in amplitude

¹ a.jadevicius@napier.ac.uk

² b.sloan@napier.ac.uk

³ a.brown3@napier.ac.uk

(Solomou, 1998). RICS (1999) research findings into historical analysis of property cycles in the UK have been consistent with Solomou (1998). RICS spectral data analysis of property returns of a period from 1921 to 1997 suggested existence of three separate UK property epochs, i.e. highly volatile, but with particularly high returns on property interwar period between 1920s and 1930s; less volatile post-war period through the 1950s and 1960s; and highly volatile, but with high property returns post 1970s period.

As it is apparent from these findings, the limited time period analysis cannot capture important changes over time. Therefore, only a long-run historical perspective, extensive data analysis, and ongoing market monitoring can explain the evolution of the nature of cycles and major factors, which generated these changes. A better understanding of these changes (behavioural, institutional, structural, policy, and other) can help to understand the behaviour of the cycles, translate their implications into operational forecasting models, and thus provide a background for any reasonable and accurate forecasting (Solomou, 1998; RICS, 1999).

EXPLORING STUDIES ON THE SUBJECT

Early studies

In reviewing the literature it was found that building cycles have been recorded throughout history (Barras, 2009). However, serious discussions and analyses on the subject emerged only during the early twentieth century. Even though, as Cairncross (1934, p.1) observed, “building has been neglected by economists, its statistics unassembled, its history unwritten, its organization practically unknown”, the situation changed after the Great Depression, when academics and professionals determined to find ways to prevent the recurrence of such dramatic events in the future. Therefore, they began to focus attention on investment and building, as the most volatile elements of aggregate activity (Barras, 2009).

The first serious discussions and analyses of building cycles emerged during the late nineteenth and early twentieth century. As Gottlieb (1976) indicated, German scholars were pioneers of building cycle research. The major object of their investigations was urban growth of German cities and its impact on residential construction, property market activity and land values. In his general work, Mangoldt (1907) demonstrated the tendency for urban growth to run in long waves in the city of Freiberg, Germany. Reich (1912, cited in Barras, 2009) investigated the building of Berlin between 1840 and 1910. Eychmüller (1915) studied the economic development, urban land and building policies of the city of Ulm between 1850 and 1919, and Eisenlohr (1921) in his study discussed urban and housing conditions of the city of Mannheim. These studies were subsequently followed by the researchers from other metropolitan areas.

In the US research on the subject started in 1933 with Hoyt’s publication where he demonstrated cyclical fluctuations of the Chicago property market. Results of the statistical analysis suggested that business conditions, commodity price level, value of money, and particularly rapid increases in population within short periods of time were major causes for real estate cycles to occur, in average every 18 years.

In the aftermath of the Great Depression, Newman (1935) further investigated the importance of the subject. The building industry was chosen due to its size and importance to the US economy and the number of people employed. Identification of so called “major cycles” lasting 15-21 years was an outstanding characteristic of this

research. A constant correlation between the building and population was the other central finding, which coincided with the findings of other contemporary researchers.

A significant contribution towards the research and understanding of building cycles was made by the American economist Clarence D. Long, Jr. In 1940, Long published a second major study on the subject after Hoyt's Chicago case study. Long's statistical analysis of the monthly index of building of a period between 1868 and 1940 identified short around 4 years and long around 20 years of duration building cycles.

In the UK, Cairncross (1934) published one of the first studies on the subject. In the analysis of a the Glasgow building industry for the period from 1870 to 1914, he identified that housing "naturally fluctuate with the number and incomes of potential tenants" every 20 years (*ibid.*, p.4). The same year, Shannon (1934) produced a building index (index of brick production) for England for the period between 1785 and 1850. Statistical analysis of the data led him to identify 16 year long building cycles, which were closely correlated with population growth. In 1937, Bowley investigated fluctuations in house-building between 1924 and 1936 for England and Wales. A more robust discussion on building cycles was presented by Bowen (1940). His national investment analysis covered the 1924-1938 period for all the UK, where a correlation between building activity and the general trade cycle was identified.

Three key post-war studies: Abramowitz (1964), Lewis (1965) and Gottlieb (1976)

After a flourish of studies and publications on the building cycles during the 1930s, a decline in the volume of research on the subject during the post-war period was observed. As Lewis (1960) and currently Barras (2009) noted, individual studies such as Grebler (1954) or Cairncross and Weber (1956) were published, which resumed the major studies of the 1930s only by adding newer data or expanding statistics of their predecessors.

Following the tradition originated from the National Bureau of Economic Research (NBER), Abramowitz (1964) published one of the major post-war studies on the subject in the US. Statistical analysis of the 37 annual time series identified long waves of 15 to 25 years of duration in the level of aggregate construction.

In 1965, Lewis published his major historic survey of British economic growth from 1700 to 1950. Identification of the building cycles of 18 to 20 years of length was one of the central findings of the book. Lewis argued that building cycles were generated by a number of factors, such as production, income, population structure, migration, supply of credit, and rent level, their interconnection as well as upon the economic context in which they occur. However, two key factors – population and credit conditions – were particularly emphasized.

The study by Gottlieb (1976) offered probably the most comprehensive empirical analysis of the subject at that time. The researcher employed over 200 long time series including building, finance, demographic and real estate activities of different countries, such as US, UK, Sweden, France, Australia, the Netherlands, Germany, Canada, Italy, and Japan. Statistical data analysis identified that both local and national building cycles were virtually of the same duration, i.e. around 20 years. The clear correlation between building cycles and demographic changes was another major finding.

Modern studies

As Solomou (1998), RICS (1999), and Barras (2009) observed, the 1950s and 1960s was a period of apparently greater economic stability. It let some commentators, including Abramowitz (1968), to question whether cycles were still relevant. However, the UK property crash of the mid 1970s triggered a renewed wave of research on property cycles. As Barras (1994) noted, his own personal interest on the subject was first prompted by this slump, which led to the publication of several papers, including Barras (1983; 1984; 1987) as well as series of papers commissioned from the Economic and Social Research Council (ESRC) on building cycles in Britain (Barras and Ferguson, 1985; 1987a; 1987b).

Barras (1983, p.1) proposed “a simple theoretical model of the office development cycle” for Britain. He employed an accelerator type model (second-order difference equation) and, by incorporating the long term production period between building order and its completion, explained how cycles are generated around their equilibrium growth path. Subsequently, Barras (1984) examined the major characteristics of the London office market and assessed the 1970s development cycle. In 1987, Barras made investigation into “urban development cycles” in Britain, and their correlation with technological changes. First, he identified long swings of 20-30 years. Then, he examined the possible trajectory of the British urban development with relation to technological changes. Finally, he assessed “the likely characteristics and timing of the next wave of urban development in the UK” (*ibid.*, p.24).

A significant analysis and discussion on the subject was presented by R. Barras and D. Ferguson in their three stage research commissioned from the ESRC. In the first paper, Barras and Ferguson (1985) investigated the detailed chronology of five major building sectors including private industrial, private commercial, private housing, public housing, and other public building. The authors employed spectral data analysis as well as informal turning point analysis to examine the major characteristics of each time series. Consequently, they demonstrated that UK post-war building experienced “strong cycles”, i.e. “short cycles” of 4 – 5 years, and “major cycles” of 7 – 9 years of duration (*ibid.*, p.1389). In the second paper Barras and Ferguson (1987a, p. 353) designed a theoretical dynamic model “suitable for dynamic modelling of these cycles”. The framework incorporated both endogenous and exogenous conditions of the UK building cycles. In the concluding paper Barras and Ferguson (1987b) presented empirical results of their research – the best possible time-series model for each property cycle (private sector industrial, commercial and residential).

In the US modern studies continued to be influenced by the NBER. Therefore, Grebler and Burns (1982) researched short-term post-war cycles for the period from 1950 to 1978 in major US construction sectors following established NBER methodology. This empirical analysis of duration, amplitude and number of cycles led them to identify cycles in private residential construction of 18 quarters on average, in private non-residential construction of 29 quarters on average, and in state and local construction of 28 quarters on average. What is more, US property cycle researchers in the 1980s paid particular attention to the office market. According to Wheaton (1987), it was because of greater expansion of the US office market and its high volatility.

Post 1990s property crash studies

The 1990s property crash, which Barras (1994) and RICS (1994) considered as far greater than that of the 1970s, led to renewed discussion on property cycles. Property

professionals and scholars blamed inaccurate data, its analysis and interpretation, and anticipated that things would improve next time. Subsequently, it prompted a number of important publications on the subject, including Barras (1994), RICS (1994; 1999), Grenadier (1995), McGough and Tsolacos (1995), Renaud (1995), and others. What is more, both late 1980s and late 1990s property cycles were truly global phenomena, which affected most markets internationally. The growing integration between property and capital markets also created a greater volatility and its translation into different dimensions of the sector. As a result, property professionals and scholars attempted to research cycles as an international phenomenon, as well as their correlation with capital markets. According to Barras (2009, p.71) “the inevitable result was the launch of a new and more extensive phase of research on real estate cycles during the 1990s”. An international phenomenon of the property cycles was discussed in Renaud (1995), Dehesh and Pugh (2000), Pugh and Dehesh (2001), and amongst other papers. Links between property cycles and capital markets were investigated by Fergus and Goodman (1994), Davis and Zhu (2004), and other researchers.

RICS (1994) investigated fundamentals of the property cycles and both endogenous and exogenous forces that have produced these cycles. Visual and statistical UK property data analysis of a period between 1962 and 1992 identified short 4-5 years “recurrent but irregular fluctuations in the rate of total return” (ibid., p.27). The other findings suggested close timing between economic and property cycles. What is more, the development cycle and construction lag were identified as subsets of the property market which give most of its idiosyncratic features to the property cycle. In their second study, the RICS (1999) extended the period of the research back to 1921. Visual data analysis confirmed the existence of recurrent, but irregular, property cycles in the UK. Spectral analysis showed evidence of cycles ranging from 4 to 12 years. As the authors indicated, some fuller statistical tests suggested the existence of a major cycle of 9 years duration, and a minor cycle of 5 years duration.

In 1994, Barras aimed to re-examine his conceptual model of the building cycle, and assess whether this model could explain the 1990s property crash. The empirical analysis identified that both 1970s and 1980s property cycles “were triggered by the same particular combination of conditions in the real economy, the money economy and the property market” (ibid., p.195). Therefore, he suggested that a better knowledge of the interaction of these underlying forces could lead to a greater understanding of the property cycle.

McGough and Tsolacos (1995) researched forces generating UK property development cycles. The methodology they used was adopted from the business cycle modelling, which succeeded in establishing patterns or so called “stylized facts” in the co-movements between macroeconomy and aggregate output, and successfully replicated dynamics of the business cycles. In their statistical analysis McGough and Tsolacos examined various economic variables, including GDP, employment, consumer expenditure, short-term and long-term interest rates, for the period between 1980 Q1 and 1994 Q4. Their findings indicated correlation between certain types of commercial property and economic indicators. Establishment of “stylized facts” was the other major finding.

In the US, a significant discussion on the subject was presented by Grenadier (1995). The author investigated underlying causes of prolonged real estate cycles, and identified why some types of property are more prone to wave-like movements than

others. Subsequently, Grenadier developed a leasing and construction model to explain the recurrence of over-building and stickiness of vacancy rates.

Renaud (1995) investigated the global property cycle for the period between 1985 and 1994 and identified four domestic and three international factors which were responsible for an unusual volatility of this cycle. Dehesh and Pugh (2000) examined post Bretton-Woods “Property Cycles in the Global Economy”. As the authors identified, the breakdown of Bretton-Woods system has placed property in a wider context, and thus it became international business. In their successive paper on the subject, Pugh and Dehesh (2001) investigated post-1980s property cycles, the role of institutional conditions, and the international interdependence between property and finance. Case *et al.* (1999) was amongst other researchers who also investigated internationalization of the property market.

As it was noted, the internalization of property markets and global transmission of cyclical instability since the 1990s triggered property professionals and scholars to investigate apparent links between property and financial markets (Barras, 2009). In their empirical historical analysis Fergus and Goodman (1994, p.1) assessed “a broad range of evidence about the degree to which a “credit crunch” decreased real estate lending and construction activity in the 1989-92 period”. Davis and Zhu (2004) investigated the interconnection between the commercial property market and bank lending from the macroeconomic perspective.

Classification of cycles

The results of the literature review on wavelike movements indicated the existence of four major and four auxiliary types of cycles. The major cycles include (i) 3 to 4 years cycles (Kitchin cycle), which are related to changes in inventory investment; (ii) 7 to 10 years cycles (Juglar cycle), related to changes in equipment investment; (iii) around 20 years of length cycles (Kuznets cycle), typically observed in building and transport investments; (iv) and long waves of around 50 years (Kondratieff cycle), which are related to major technological changes. Over the years, however, there have been also discussions on other types of fluctuations, i.e. commodity or cobweb cycles analysed by Kaldor (1934), which length is determined by the time lag between the actual increase in output and production decisions; hegemony cycles, originating from hegemonic dominance and lasting around 100 years, proposed by Modelski (1978); long wave capital cycles of approximately 50 years of duration analysed by Forester (1977); and “Elliott Waves”, proposed by Elliot (1939, cited in Frost and Prechter, 1998), ranging from Grand Super Cycle of approximately 100 years to Minute Cycle of length between 1 to 2 years.

DISCUSSION: RESEARCH UNDERTAKEN TO-DATE

The major part of the research undertaken to-date has been the chronological literature review. The study presents an overview of the subject, characterizes the relevant research and commentary, and discusses their major implications. The particular emphasis is on research methodologies and methods, data and techniques employed, and the outcomes of these studies. Then it considers the literature on how regular cycles are. The review identifies four major and four auxiliary cycles, and assesses their general characteristics, and key forces that produce these cycles.

Table 1: Scheme of Major and Auxiliary Cycles

Researcher	Length (years)	Driving Factors	Periodicity
Kitchin (1923)	3 – 5	Investment in inventories	Minor cycle
Juglar (1862)	7 – 11	Investment in machinery	Major cycle
Kuznets (1930)	15 – 20	Investment in building	Long swing
Kondratieff and Stopler (1935)	48 – 50	Investment in innovations	Long wave
Modelski (1978)	100 – 150	World Power	Hegemony Cycle
Forrester (1977)	50	Capital Investment	Long Cycle
Kaldor (1934)	2 – 6	Wrong anticipations	Commodity/Cobweb
Elliott (1939)	1 – 2	-----	Minute Cycle

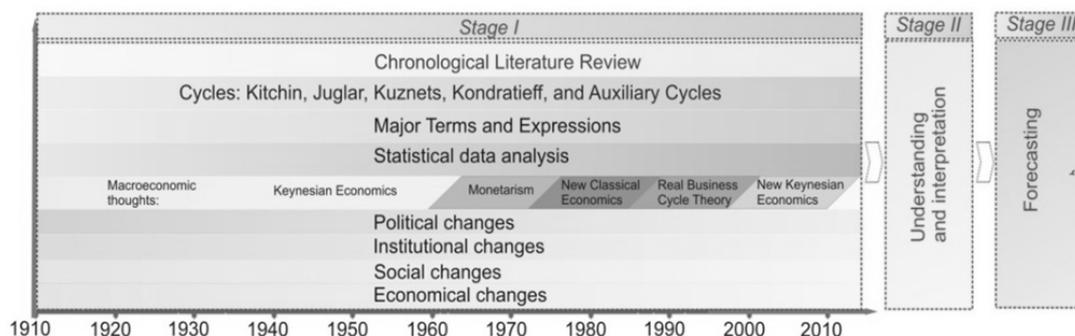


Figure 1: Structure of research

In reviewing the literature, it was found that property cycles have been recorded throughout history. The pioneering studies on the subject were particularly concerned with fluctuations in building (especially in residential), which was identified as the largest and probably the most volatile component of aggregate investment. These studies were highly inclined into statistical data analysis and its interpretation, as there was an obvious lack of robust and consistent data. Consequently, early researchers identified both short (around 5 years) and long (around 20 years) building cycles. The prime explanation for the existence of these cycles was relationship between population growth and state of the economy. Moreover, building cycles were seen as local phenomena, independent from fluctuations in business. The experience of the 1990s brought new perspectives into property cycles research. These studies underlined a need for a global perspective on property cycles and particularly their correlation with capital markets. As Davis and Zhu (2004) and Barras (2009) observed, ever closer integration of property and financial markets mean that instability in one market can be easily transmitted to another local or national market. Financial engineering and international flows of capital connect both markets. Moreover, an increasing internalization of the property market and the same macroeconomic environment translate cycles between countries. Consequently, this contagion effect is creating a greater volatility within markets. Subsequently, as Barras (2009) indicated, research into property cycles began to be conducted in private sector consultancies rather than in academia with the purpose of commercial forecasting.

FURTHER RESEARCH

The research plan for the future is as follows: (i) complete the chronological literature review; (ii) discuss major terms and expressions on the subject; (iii) research major

schools of macroeconomic thought; (iv) assess how the political, institutional, social and economic environment in the UK have changed over time; (v) expand statistical analysis of major UK economic indicators; (vi) present evidence of cycles in the UK property market; (vii) and pave the way for further research on forecasting accuracy. The general structure of the research is illustrated in Figure 1.

Discussion on general terms and expressions of the subject is considered as an aid to have a better understanding of what is meant by each major concept used for the research. By knowing and understanding the key concepts of the subject, one can thus use them authoritatively. A greater understanding of the major business cycle theories is also essential. Whereas business cycle theory is identified as a wide and disparate field, and different schools of macroeconomic thought suggest different explanations for cycles, it is thus necessary to assess and understand the major implications behind each theory. Effective research on property cycles also depends to a very large extent on understanding political, institutional, social, and economical changes which shaped the British property market, as well as on robust statistical data. Moreover, it is necessary to have a solid body of knowledge on the subject, which is derived from the extensive literature review, thereby giving an understanding of major and auxiliary cycles, their general characteristics, and key forces that produce them. What is more, by understanding major business cycle theories, political, institutional, social, and economical changes of the UK economy, and by interpreting all this data, a background for any reasonable forecasting can be provided. Therefore, it should be possible to assess whether extrapolation from historic data can predict the future of UK property market performance with accuracy.

REFERENCES

- Abramowitz, M. (1964) *Evidences of Long Swings in Aggregate Construction since the Civil War*. National Bureau of Economic Research, New York), 252.
- Abramowitz, M. (1968) The Passing of the Kuznets Cycle. *Economica, New Series*, **35**(140), 349-367.
- Barras, R. (1983) A simple theoretical model of the office development cycle. *Environment and Planning*, **15**(10), 1381-1394.
- Barras, R. (1984) The office development cycle in London. *Land Development Studies*, **1**(1), 35-50.
- Barras, R. (1987) Technical change and the urban development cycle. *Urban Studies*, **24**(1), 5-30.
- Barras, R. (1994) Property and the economic cycle: Building cycles revisited. *Journal of Property Research*, **11**(3), 183-197.
- Barras, R. (2009) *Building Cycles: Growth and Instability (Real Estate Issues)*. Wiley-Blackwell, London, UK), 448.
- Barras, R. and Ferguson, D. (1985) A spectral analysis of building cycles in Britain. *Environment and Planning A*, **17**(10), 1369-1391.
- Barras, R. and Ferguson, D. (1987a) Dynamic modelling of the building cycle: 1. Theoretical framework. *Environment and Planning A*, **19**(3), 353-367.
- Barras, R. and Ferguson, D. (1987b) Dynamic modelling of the building cycle: 2. Empirical results. *Environment and Planning A*, **19**(4), 493-520.
- Borts, G. H. (1960) *Regional Cycles of Manufacturing Employment in The United States, 1914-1953*. National Bureau of Economic Research, New York), 61.

- Bowen, I. (1940) Building Output and the Trade Cycle (U.K. 1924-38). *Oxford Economic Papers*(3), 110-130.
- Bowley, M. (1937) Fluctuations in House-Building and the Trade Cycle. *The Review of Economic Studies*, 4(3), 167-181.
- Cairncross, A. K. (1934) The Glasgow Building Industry (1870-1914). *The Review of Economic Studies*, 2(1), 1-17.
- Cairncross, A. K. and Weber, B. (1956) Fluctuations in Building in Great Britain, 1785-1849. *The Economic History Review, New Series*, 9(2), 283-297.
- Case, B., Goetzmann, W. and Rouwenhorst, K. G. (1999) *Global real estate markets: Cycles and Fundamentals*. Yale School of Management Working Papers No.99-03, 23.
- Davis, E. P and Zhu, H. (2004) *Bank lending and commercial property cycles: some cross-country evidence*. BIS Working Papers No.150, 45.
- Dehesh, A. and Pugh, C. (2000) Property Cycles in a Global Economy. *Urban Studies*, 37(13), 2581-2602.
- Eisenlohr, R. (1921) *Das Arbeiter-Siedlungswesen der Stadt Mannheim*. Karlsruhe.
- Elliott (1939) *The Wave Principle*. Cited In: Frost, A. J. and Prechter, R. R. (1998) *Elliott wave principle: key to market behaviour*. New Classics Library Publications, US), 244.
- Eychmüller, F. (1915) *Grundstücksmarkt und städtische Bodenpolitik in Ulm von 1870-1910*. Stuttgart, Tübingen, 87.
- Fergus, J. and Goodman, J. (1994) The 1989-92 Credit Crunch for Real Estate: A Retrospective. *Real Estate Economics*, 22(1), 5-32.
- Forrester, J.W. (1973) *World Dynamics*. 2nd. ed. Wright-Allen Press, Cambridge, Massachusetts), 142.
- Gottlieb, M. (1976) *Long Swings in Urban Development*. National Bureau of Economic Research, New York, 360.
- Grebler, L. (1954) Real Estate Investment Experience in New York City. *The Journal of Finance*, 9(2), 216-218.
- Grebler, L. and Burns, L. S. (1982) Construction Cycles in the United States Since World War II. *Journal of American Real Estate and Urban Economics Association*, 10(2), 123-151.
- Grenadier, S. R. (1995) The Persistence of Real Estate Cycles. *Journal of Real Estate Finance and Economics*, 10(2), 95-119.
- Hoyt, H. (1933) *One hundred years of land values in Chicago. The relationship of the growth of Chicago to the rise in its land values, 1830-1933*. The University of Chicago, US, 452.
- Juglar, C. (1862) *Des crises commerciales et de leur retour périodique en France, en Angleterre et aux états-Unis*. Cited in: Besomi, D. (2005) *Clément Juglar and the transition from crises theory to business cycle theories*. Paper prepared for a conference on the occasion of the centenary of the death of Clément Juglar.
- Kaldor, N. (1934) A Classificatory Note on the Determinateness of Equilibrium. *The Review of Economic Studies*, 1(2), 122-136.
- Kitchin, J. (1923) Cycles and Trends in Economic Factors. *The Review of Economics and Statistics*, 5(1), 10-16.

- Kondratieff, N. D. and Stolper, W. F. (1935) The Long Waves in Economic Life. *The Review of Economics and Statistics*, **17**(6), 105-115.
- Kuznets, S. (1930) Equilibrium Economics and Business-Cycle Theory. *The Quarterly Journal of Economics*, **44**(3), 381-415.
- Lewis, P. J. (1960) Building Cycles: A Regional Model and its National Setting. *The Economic Journal*, **70**(279), 519-535.
- Lewis, P. J. (1965) *Building Cycles and Britain's Growth*. Macmillan, London, 396.
- Long, C. D., Jr. (1940) *Building Cycles and the Theory of Investment*. Princeton University Press, NJ, 239.
- Mangoldt, R. V. (1907) *Die Städtische Bodenfrage Eine Untersuchung über die Tatsachen, Ursachen, und Abhilfe*. Vanderhoeck and Ruprecht, 745.
- McGough, T. and Tsolacos, S. (1995) Property cycles in the UK: an empirical investigation of the stylized facts. *Journal of Property Finance*, **6**(4), 45-62.
- Modelski, G. (1978) The Long Cycle of Global Politics and the Nation-State. *Comparative Studies in Society and History*, **20**(2), 214-235.
- Newman, W. H. (1935) *The building industry and business cycles*. University of Chicago Press, Chicago, 72.
- Pugh, C. and Dehesh, A. (2001) Theory and explanation in international property cycles since 1980. *Property Management*, **19**(4), 265-297.
- Reich, E. (1912) *Der Wohnungsinarkt in Berlin von 1840-1910*. Cited in: Barras, R. (2009) *Building Cycles: Growth and Instability (Real Estate Issues)*. Wiley-Blackwell, UK, 448.
- Renaud, B. (1995) *The 1985-94 Global Real Estate Cycle: Its Causes and Consequences*. Policy Research Working Paper Series No.1452, The World Bank, 44.
- RICS (1994). *Understanding the property cycle: Economic Cycles and Property Cycles*. The Royal Institution of Chartered Surveyors, London, 97.
- RICS (1999) *The UK Property Cycle – a History From 1991 to 1997*. The Royal Institution of Chartered Surveyors, London, 57.
- Shannon, H. A. (1934) Bricks – A Trade Index, 1785-1849. *Economica, New Series*, **1**(3), 300-318.
- Solomou, S. (1998) *Economic cycles: Long cycles and business cycles since 1870*. Manchester University Press, Manchester, 112.
- Wheaton, C. W. (1987) The cyclical behaviour of the national office market. *Journal of American Real Estate and Urban Economics Association*, **15**(4), 281-299.