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Abstract

Purpose – The study looks at the characteristics of upswings and downswings for UK housing cycles. Specifically, the purpose of this paper is to empirically analyse cycles in house prices and housing affordability on the characteristics of persistence, magnitude and severity.

Design/methodology/approach – The paper draws upon the triangular methodology of cycles and utilises housing data from the last three decades.

Findings – From an empirical perspective, the study obtained four main results. First, the graphical trajectory of cycles in house price and housing affordability is highly synchronized. Second, upturns in both cycles tend to be longer than downturns on average. Third, the recent upturn in house prices and housing affordability is characterised by larger duration, magnitude and severity than the earlier case. Fourth, the latest downturn in both cycles is highly synchronised in terms of time occurrence, persistence, magnitude and severity; in addition, in both cases, the latest downturn is considerably smaller than the previous one. The study additionally indicates that on average the length of a complete house price and housing affordability cycle is 19 years on a peak-to-peak basis.

Research limitations/implications – This paper is essentially exploratory and raises a number of questions for further investigation. Future research should, first, arrive at a more nuanced definition of affordability and, second, examine causality. The fact that two phenomena appear to have some significant synchronicity is not an indication that they are interdependent, although logic would suggest they might be.

Originality/value – This is among the few papers that analyses cycles in UK house prices. It is the first study that draws attention to the housing affordability cycle and the first to compare cycles in house prices with cycles in housing affordability.

Keywords Housing cycles, Housing affordability cycles, Property cycles, Real house prices

Paper type Research paper

1. Introduction

Recently, the UK housing market along with other western housing markets went through an unprecedented and synchronised rise in house prices that later reversed. These events have been repeatedly explained in the literature as phases of an autonomous price cyclical movement. Most of the existing literature on UK property cycles focusses on property investment cycles and commercial cycles in prices and building output (McGough and Tsolacos, 1995; RICS, 1994, 1999; Barras, 2005; Ball and Grilli, 1997). Several studies, however, have investigated the residential price cycle for different countries, including the UK, but such conclusions are not country specific (Bracke, 2013; Angello and Schuknecht, 2011; Jaeger and Schuknecht, 2007); rather, they reflect generalised findings of cyclical characteristics in house prices.

In parallel, the existing theory of cycles implies that housing affordability decreases during house price upturns while affordability increases in periods of price downturns, and vice versa (Case and Shiller, 2003; Himmelberg *et al.*, 2005; Campbell *et al.*, 2011; McCarthy and Peach, 2004). However, there is still no consensus in existing studies regarding the size or even the existence of a housing affordability cycle. By reviewing the literature we found

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that the work of Tsai (2013) reveals an interesting house price self-correction pattern (SCP) that is related to the housing affordability cycle.

Initially, the purpose of this paper is limited to providing a comprehensive cycle analysis of UK house prices in terms of the duration of cycle phases, amplitude and severity. Moreover, it also aims to examine the asymmetrical behaviour of the phases and the cumulative movements within the phases. Thereafter, this paper focusses on modifying the SCP of Tsai (2013) to explain and propose a pattern for the housing affordability cycle. On this basis the study looks to investigate housing affordability cycles in the aforementioned spectrums. Finally, the study aims to compare the characteristics of housing price and affordability cycles and their time occurrence with a view to examining any cyclical regularity between them. Identifying co-movements of the housing cycles requires the detection of their cyclical components and turning points. To that extent, this study adopts the triangular methodology and utilises data from UK housing national sources. This paper is organised as follows. The second and third section briefly reviews the definitions and the literature of house price cycles. The fourth section analyses the history of property cycles in the UK. The next section presents the methodology and the data sets used in the study. Section 6 presents the empirical results of UK house price cycles. The next section proposes the suggested pattern of the housing affordability cycle and evidence to support it. Section 8 compares and analyse the two types of cycles. Finally, the last section presents the study's conclusions.

2. Defining and describing the property cycle

The theory of cycles is one of the basic human observations of the natural world. Events, economics and political systems move through cycles similar to the natural lifecycles of living beings Bothamley (2002). An early definition of a cycle as an economic phenomenon was suggested by Burns and Mitchell (1941): "cycles consist of expansions occurring at about the same time in many activities, followed by similarly general recessions, contractions and revivals". One of the few concise definitions of the property cycle is offered by the Royal Institution of Chartered Surveyors (RICS, 1994): "Property cycles are recurrent but irregular fluctuations in the rate of all-property total return, which are also apparent in many other indicators of property activity, but with varying leads and lags against the all-property cycle". They further clarify that the property cycle is not necessarily regular in length, speed or severity.

Baum (2000) attempts to simplify it by describing property cycles as a tendency for property demand, supply, prices and returns to fluctuate around their long-term trends or averages. He further suggests, "prices in all markets go up and down. Inefficiency in real estate markets makes these up and down movements look like a repeatable, cyclical, pattern". Another observer, Wheaton (1999), suggests that a property cycle involves repeated oscillations of a market, as it continually overshoots and then undershoots its own steady state. Jadevicius and Huston (2014) conducted a comprehensive literature review of the types of property and business cycles, with emphasis given to the context of length-duration. They uncovered that the "family of cycles" consists of four major and eight auxiliary types of cycles. As to the technical side of the types of property cycles, Pugh and Dehesh (2001) distinguish two types of property cycles: endogenous and exogenous. The endogenous type results from long lead times between the commissioning of a project and the work being contracted (Pugh and Dehesh, 2001; Reed and Wu, 2010). Kummerow and Lun (2005) add that endogenous real estate cycles are mainly caused by information problems: asymmetric information, forecasting difficulties and strategic uncertainty. In contrast, exogenous cycles have an external transmission mechanism and are caused mainly by macroeconomic and property trends. This type is sensitive to incomes, flows of funds, policies, interest rates and exchange rates (Pugh and Dehesh, 2001).

Among popular explanations of the property cycle, with reference to the UK market, is developed by Barras (1983, 1994, 2005, 2009). He proposes that property markets behave cyclically in the long run, primarily because of building lags in relation to demand changes for space that are mainly determined by the fluctuations of business activity. An alternative explanation regarding boom-bust cycles is provided by Stoken (1993) and Shiller (2005). They suggest that boom and bust cycle theories are not theories in their own right because major events serve to trigger major cycles in property markets; which in turn are often explained by irrational human or crowd behaviour.

Several studies have revealed different phases making up the property cycle. An early study made by Hoyt (1933) recognised four distinct phases of market behaviour in the property cycle, i.e., a boom in demand, rising prices, a boom in construction and finally, a bust. Mueller and Laposa (1994) suggest that there are four phases in property cycles: recession, recovery, expansion and contraction (oversupply). Campbell *et al.* (2011) simplify these phases as boom, slump and recovery. An alternative approach to the conceptualisation of property cycle phases is proposed by (Pyhrr *et al.*, 1990; cited in Pyhrr *et al.*, 1999). They suggest that a cycle consists of peak, declining, trough and rising phases. Baen (1994) developed a generalised risk analysis model and decision matrix for global property investments. His study advanced the theory that there is one generalised, theoretical property cycle and that each property market within each country is located separately on this "conceptual" cycle, in the context of five market phases: recovering, improving, maturing, overbuilding and falling.

3. Overview of the literature

Roulac (1996) argued that the domain of real estate cycles has been used in professional practice more so than in the academic literature and that it has therefore received very limited attention in real estate education. Until the early 1970s, the only significant contribution to the "field" in UK were a very few studies, notably Cairncross (1934), Bowen (1940), Lewis (1965) and Marriott (1969).

So far, most of the modern research into UK property cycles has been limited to the commercial property market sector (McGough and Tsolacos, 1995; RICS, 1994, 1999; Barras, 2005; Ball and Grilli, 1997; Scott and Judge, 2000; Krystalogianni *et al.*, 2004). Bracke (2013), among the few studies that concentrates on housing cycles, analysed data for 19 countries, including the UK. The data stretch from 1970 to 2010. Bracke's (2013) findings reveal that upturns in international cycles are longer than downturns on average. Other related studies include the work of Angello and Schuknecht (2011). This study utilised data from 18 industrialised countries, including the UK, over the period 1980-2007. Their analysis is based on real housing prices annual data as provided by the Bank of International Settlement (BIS). Similarly, Jaeger and Schuknecht (2007) examined the duration of boom and bust phases in the context of fiscal policy for 20 industrialised countries. They also utilise data from BIS. It is noteworthy that these studies' findings are not elusive at a country-specific level, as the conclusions related to the characteristics of the house price cycle are drawn at the international level. However, a notable country-specific UK study is the one conducted by Harrison (2007). Harrison investigated the relationship between housing and business cycles from the 1970s to the 2000s. To examine this the author linked a detailed chronology of the main political decisions with the occurrence of house price peaks and business cycles.

In contrast, Muellbauer and Murphy (1997) and Reed and Wu (2010) highlight the importance of housing affordability in the context of cyclical markets. The existing theory of cycles implies that housing affordability decreases during house price upturns, while in periods of price downturn affordability increases, and vice versa (Case and Shiller, 2003; Himmelberg *et al.*, 2005; Campbell *et al.*, 2011; McCarthy and Peach, 2004). Nevertheless, the

existing literature does not offer a consensus estimate in relation to the size or even the existence of a housing affordability cycle. However, Tsai (2013) provides a way to gain initial understanding on this topic. His study addresses how affordability causes a driving force for self-occupancy demand and how this influences the direction of price.

The length of a property cycle has been examined on the basis of two phases, upswing and downswing (Case and Shiller, 1994; Bry and Boschan, 1971; Angello and Schuknecht, 2011; Harding and Pagan, 2002; Bracke, 2013; RICS, 1994). The identification in the co-movements of cycles requires detection of cyclical components and turning points. The previous literature advises us that the triangular methodology as proposed by Harding and Pagan (2002) is among the most widely used approaches (Bracke, 2013; Jaeger and Schuknecht, 2007; Angello and Schuknecht, 2011). Over the past several years, there have been a number of studies and publications on the characteristics of house price cycles. Such studies have investigated house price cycles in different countries, including the UK (Bracke, 2013; Angello and Schuknecht, 2011; Jaeger and Schuknecht, 2007); however, the conclusions drawn do not concern a specific country. In addition, consideration of cyclical behaviour of UK housing affordability has been overlooked.

4. Cyclicity in the UK property market

4.1 The 1950s and 1960s (1954-1964)

According to Solomou (1998), the 1950s and 1960s were a period of economic stability. RICS (1999) argues that the property market was less volatile during that period. In support of this, Wellings (2006) reports that throughout the 1960s the growth of house prices was stable with an average rate between 5 and 10 per cent. The average performance of property assets during the development boom of 1955-1964 was less profitable than ordinary shares, but better than government bonds. Returns were 7 per cent for property, 0.7 per cent for bonds and 10.2 per cent for ordinary shares, respectively (Scott, 1996). In 1951 there were 23,000 housing completions in the UK. By 1954 (following the abolition of the Town and County Planning Act 1947 and the switch to "1953"), the housing completions went to 91,000 and this totalled a 295 per cent increase (Wellings, 2006). This boom was supported by the Town and Country Planning Act changes of 1953 and 1954, by high occupation demand, as well as by the large funds and low interest rates that were available (Fraser, 1993). By the early 1960s the top ten house-builders in the UK constructed about 15,000 houses per year. Five years later, in the mid-1960s the top ten builders were producing 17,000-18,000 houses per year, reaching the industry peak of 222,000 in total in 1968. By 1960, only 35 per cent of new building was by local authorities instead of the 89 per cent between 1945 and 1951 (Wellings, 2006). Scott (1996) and Fraser (1993) mention that on 4 November in 1964 George Brown, the new Minister of Economic Affairs under Harold Wilson PM, announced the "Brown Ban". The introduction of the Brown Ban in 1964 was "announced" the end of the development boom that had lasted for ten years (Scott, 1996; Fraser, 1993; Porter, 2000).

4.2 The 1970s

Due to the strict credit conditions introduced by the Labour Government in 1968, the 1970s started with a small decline in property values. In June 1970, the conservatives took control under Edward Heath. The main goal of the new government was to curb inflation, as well as to regenerate the industrial sector and productivity. Initially, they adopted a strict monetary and fiscal policy. Soon the government switched their policy to an all-out expansion using all available resources to beat inflation by increasing production (Fraser, 1993). Under such conditions, industries were encouraged to reinvest and expand their businesses in the belief that economic growth would be sustained without deflationary measures (Fraser, 1993). Although the government's strategy was to encourage investment in manufacturing industries to improve the export balance, many of the available funds found their way into property and

speculation (Cadman, 1984). The fall of the bank rate on 1 April 1971, the relaxation of bank requirements for lending and the expansion of the country's budget in March 1971 was the inflected point (Fraser, 1993). In particular, the competition and credit control agreement operated by the Bank of England in 1971 marked the beginning of the deregulation process between banking institutions (Matthews *et al.*, 2007). The increased money supply gave rise to a "strong" but brief increase in economic activity during 1971-1973, the so so-called "Barber Boom" (Perez and Westrup, 2008; Brett, 1997; Scott, 1996).

In the early 1970s, property lending jumped from £362 million in February 1971, to over £2.5 billion in February 1974 (Scott, 1996; Panagopoulos and Vlamis, 2009). Inflows of capital rose and policies in favour of income allowances became more frequent during this period (Scott, 1996). During the 1965-1973 period, property returns performed well. The average rate of return was 15.1 per cent compared to 9 per cent for ordinary shares and 3.2 per cent for bonds. From 1968 to 1970, property returns exceeded the inflation rate by 10.65 per cent and in 1971-1973, the return rose by 14.20 per cent (Scott, 1996). In terms of the scale of this increase, Wellings (2006) and Fraser (1993) described these changes as unprecedentedly high. In parallel, between 1967 and 1973 landlords for first time realised the influence of inflation in rental values; consequently, the rent review period began to decline to 14 years and then to seven years and finally to today's five years (Brett, 1997). Mortgage interest relief at source (MIRAS) was another core policy (tax regime) that had a profound impact on the UK property market. This tax regime was introduced in 1969 and eliminated in April 2000 (Pirounakis, 2013). Specifically, MIRAS was a UK tax allowance by which payers of mortgage interest were allowed to claim part or all of their mortgage interest payments as a deduction in calculating their taxable income (Black *et al.*, 2012). The tax incentives offered by the MIRAS regime lowered the effective user cost of housing for owner-occupiers (i.e. it subsidised the cost of buying over renting). Moreover, because relief was given on nominal interest payments, the effective extent of this tax relief rose with inflation, further lowering the user cost (Feldstein, 1999). As to the market effects of MIRAS, Lund (2011) claimed that it was unfair since it gave more assistance to high-rate taxpayers and those with the largest mortgages and that it artificially stimulated house prices by encouraging people to consume more accommodation than they actually required. Similarly, Balchin and Rhoden (2006) mentioned that MIRAS failed to help the low-income people since it pushed up demand and thus house prices beyond their means. With the supply of housing in the UK being relatively inelastic, this boost to demand inevitably resulted in house prices being much higher than would otherwise have been the case.

Beginning in 1971, imports from foreign manufactures increased dramatically and an imbalance of payments occurred (Fraser, 1993). The first check on optimism occurred in November 1972 when, as part of its strategy to combat inflation, the conservative government froze commercial rents. As to the housing supply from the private sector, Wellings (2006) states that during the period of the early 1970s-boom, and particularly in 1972, private housing completions were at 191,000 whereas in 1974 private housing completions totalled 140,000. As to the housing supply prospects in 1974, there was a 50 per cent decline in the amount of housing projects begun during 1974. Another important element that had a profound impact on the market, on the supply side, was that of public sector housing. Housing built by local authorities and new towns grew steadily, both numerically and as a proportion of the housing market, in the UK. Between 1919 and 1979 it accounted for almost one in three of all dwellings in the housing stock (6.5 million dwellings) (Gruis *et al.*, 2009).

In October 1973, the oil crisis[1] started, and the effects were immediate. As such, in November 1973 the Bank of England raised the minimum-lending rate to 13 per cent (Wellings, 2006). In December, the government announced the proposals of capital gains tax rates. The new taxes, together with the sudden increase in interest rates, acted as a threat for the liquidity of the property companies (Fraser, 1993). The government measures on

17 December 1973 to impose a restriction on personal loans, public expenditure cuts and a 10 per cent surtax (Scott, 1996) caused demand for investment in the property sector to disappear "overnight" (Fraser, 1993).

On this new parameter of a property market slump, a crisis in secondary banking erupted (Cadman, 1984). In 1974, a secondary bank "London and Country Securities" collapsed, which led to the collapse of two others (Cadman, 1984; Scott, 1996). The secondary bank collapse in 1974 created fears of a generalised financial system crisis (Panagopoulos and Vlamis, 2009). This led the Bank of England to announce a rescue plan called "Lifeboat". In total, 26 secondary banks were supported with a grant up to £1.3 billion in loans. In exchange, the financial system was prevented from the subsequent consequences. However, that came with a cost for both the Bank of England and the clearing banks that took part in this rescue plan (Balchin *et al.*, 1995). In March 1974 a new Labour Government came to power and imposed further rent controls on residential units. The problems worsened when the rent freeze was renewed (Jowsey, 2011). According to Fraser (1993) and Balchin *et al.* (1995) the fall in property values continued throughout 1974 under the influence of the huge supply of existing investments and the rising yields required by the institutions (the main purchasers). The high yield reflected the rent freeze, the fear of further property taxation, rising yields on long-dated gilts, and the high short-term interest rate.

In 1974, the first property boom collapsed. The end of the property boom that had lasted almost uninterrupted since 1945 served as reminder that property prices are cyclical (Balchin *et al.*, 1995; Scott, 1996). By 1974, private housing orders had declined by 50 per cent (Wellings, 2006) while from 1974 to 1980 both shares and bonds outperformed property returns for the first time since the end of the Second World War (Scott, 1996). Investment and recovery started in the UK property market at the end of 1974 due to the government's assurance that the "rent freeze" would be terminated in February 1975. On 19 December 1974, the government announced that the rent freeze would end on 1 February 1975, and that rents would be allowed to rise starting from 19 March 1975. (Fraser, 1993). This seemed to mark a turning point in the Labour Government's attitude towards the property sector. In this regard, financial institutions and pension funds were attracted to investing in the property market, mainly due to the abolishment of the rent freeze. Furthermore, with liquid cash available, they found themselves in a good position to take advantage of the low market prices to build up their property portfolios (Fraser, 1993; Scott, 1996). By 1977 the UK property market showed signs of recovery following a brief price expansion until 1981 (Scott, 1996).

4.3 The 1980s to the mid-1990s

The early 1980s can be characterised as one of the worst periods of industrial disinvestment, unemployment and uncertainty for the property sector (Rydin, 1998; Brett, 1997; Clara, 1993). By 1983, unemployment in the UK had risen to approximately 3 million. During this period, the government introduced two major policies, enterprise zones and urban development corporations with the view to reorganise development control and planning in accordance with a more market oriented and entrepreneurial approach (Reitan, 2003). The economic background between 1982 and 1986 saw low inflation and steady growth of the UK economy together with rising confidence. In the mid-1980s, banking deregulation together with the abolishment of lending constraints encouraged competition among UK banks. Traditionally, mortgages were predominately in the form of first advances for the purchase of a house. In the mid-1980s, second mortgages and further advances were given relatively freely to owner-occupiers via the introduction of house equity withdrawal (Buckle and Thompson, 2004; Dolphin and Griffith, 2011). The equity withdrawal supported a consumption boom in the latter half of the decade (Buckle and Thompson, 2004). In parallel with this during the early 1980s the government introduced the Right To Buy scheme to help council and housing association tenants to buy their home at a discount. This measure

has been contributed to increased in home ownership and investment in the UK housing sector (Kay, 2006). Fraser (1993) noted that between 1982 and 1986 bank lending to property firms grew at over 25 per cent per annum. During this time frame a property recovery began in London's real estate market and thereafter literally spared out like a "ripple". Vacancy rates in the City of London fell from 8 per cent in 1984 to 2.25 per cent in 1987. Market rents increased by over 50 per cent in real terms between 1985 and 1989 (Scott, 1996). Between 1986 and 1989, UK house prices almost doubled, whereas between 1983 and 1987, house prices grew 12 per cent per annum on average (Balchin *et al.*, 1995; Wellings, 2006). The UK private residential construction industry also saw a massive expansion, with 200,000 completions in 1988 compared to 115,000 in 1981 (Wellings, 2006). In light of these conditions, deregulation of the private rented sector was one of the central pillars of the conservative government's housing policy. This resulted in the formation of the Housing Act 1988, which has been claimed as having played a key role in re-energising the private rental sector. The Housing Act 1988 provided a legal framework that was satisfactory for private rental housing since its intention was to free the rental market (Davis, 2013).

The 1980s revealed that property cycles had become a truly global phenomenon (Barras, 2005). In the wake of this, the integration of real estate markets and capital markets after the 1980s has created a new situation where financial and macroeconomic impacts on property were greater (Barras, 2009). During the boom years, Japanese, Scandinavian, American and Middle Eastern investors, among others, showed great interest in the UK property market. According to Fraser (1993), the main reasons that led to that massive expansion of credit by foreign banks were the removal of exchange controls and the deregulation in the UK, European and other banking systems leading to a globalisation of the financial markets. In addition, major overseas banks sought to establish a well-diversified portfolio of loans worldwide. European banks sought a European Union (Community) diversification and Britain was one place for this. In addition, London became the European financial centre. Between Black Monday and 4 December 1987 property shares fell by almost 30 per cent in absolute terms. Balchin *et al.* (1995) highlight that the stock market collapse in October 1987 had surprisingly little immediate influence on property values in the UK as values continued to increase and reach a peak in the first quarter of 1990.

In the early 1990s, the UK economy went into recession and interest rates began moving up to squeeze inflation out of the system (Fraser, 1993). Fraser (1993), Scott (1996) and Brett (1997) agree that the peak of housing completions coincided with a downturn in tenant demand, and as the economy moved into recession, a fall in property values inevitably occurred (early 1990s). Following these conditions the mortgage rate in the UK in March 1990 climbed to 15.4 per cent (Wellings, 2006). The ray of hope that the British economy would avoid a deep recession was dismissed as Saddam Husain invaded Kuwait in July 1990, which brought about the same result as in the Yom Kippur War. The oil price increased dramatically and there was a loss of business confidence (Fraser, 1993). According to Vlamis (2007) and Roy and Clarke (2005) the entrance of the UK's currency into the European Rate Mechanism on 8 October 1990 triggered the overall failure of the UK economy. Meanwhile, lending institutions were becoming highly concerned regarding their non-preforming loans; before 1991, few property companies had gone into receivership, while in 1992, Olympia and York were placed into administration (Scott, 1996; Pugh and Dehesh, 2001). Regarding the impact of the recession on housing supply, from the perspective of public sector, Oxley and Smith (1996) have asserted that during the 1980s the role of the local authorities was greatly reduced. New construction of council housing fell dramatically from a high point in 1967 of 204,000 homes to a total of only 11,000 completions in 1991. This decline was a direct result of the conservative government and its ideology towards public expenditures. Similarly, the output of private housing completions fell to 141,000 in 1992 from 200,000 in 1988, a decrease of almost 30 per cent (Wellings, 2006).

The exit of UK sterling from exchange rate mechanism in 1992 caused interest rates to fall. In light of this, the property market began to stabilise. By 1993, foreign investors began to invest in the UK property market (Scott, 1996; Brett, 1997). Outstanding bank loans to real estate companies, which had peaked over £41 billion in May 1991, eventually fell to £33.5 billion by March 1994. The year 1996 signalled the end of the recession and the beginning of recovery for the national housing market.

4.4 The mid-1990s-2008

Following the recovery year of 1996, the UK housing market went into a price expansion phase, which became profound in the mid- to late-2000s. Low interest rates, strong levels of employment, investment euphoria and the availability of credit caused residential values in the UK to escalate further. Between 2001 and 2003, the Bank of England base rate fell from 6 to 4 per cent. Between 2005 and 2007, it was observed that global borrowing access had increased due to global credit availability. Lending criteria became less strict for borrowers and new mortgage techniques emerged to satisfy market demand. In such economic conditions, the average UK house price grew by £107,000 between 1999 and 2007. In the wake of the global financial crisis, 2008 signalled the end of the expansion phase and the beginning of the recession phase for the UK housing market (Adair *et al.*, 2009).

5. Methodology and data

5.1 Methodology

The paper adopts the "triangular methodology" as proposed by Harding and Pagan (2002), which extends the BB algorithm developed by Bry and Boschan (1971). The triangular methodology describes the cyclical turning points as follows. Locations corresponding to turning points in the original series are determined by identifying shifts in the level of rate of change. The sequence $[\Delta x_t > 0,\ \Delta x_{t+1} < 0]$ signals a local peak in the series occurring at time t, while the sequence $[\Delta x_t < 0,\ \Delta x_{t+1} > 0]$ identifies a local trough occurring at time t. The length of cycle is computed on both peak-to-peak (PP) and trough-to-trough (TT). The cyclical peaks and trough are placed at the highest and lowest points of the cyclical fluctuation (Bry and Boschan, 1971) using the above sequence.

Based on the "triangular methodology" we apply the approach of Angello and Schuknecht (2011) to define the characteristics of the cyclical phases of upswing and downswing in terms of magnitude, persistence and severity. The persistence (i.e. duration) of each phase is calculated as the temporal distance within the beginning and the end of each phase. The magnitude is defined as the size of percentage price change within the beginning and the end of each turning point. Finally, the severity is computed by combining persistence and magnitude for each phase i via a triangle where the base represents persistence (D_i) and height the magnitude (A_i). Hence, the severity is computed as $C_i = (D_i \times A_i) \times 0.5$.

5.2 Data description

This paper utilises data on real average house prices as provided by Nationwide statistics over the period 1980-2014 for the UK. In this data set real house prices refer to the inflation adjusted prices. This uses the Office for National Statistics Retail Price Index to convert nominal average house prices to current prices. Nationwide average house price represents the average price of all-property types (i.e. new houses, modern houses, older houses). This data set spans from the Q1 of 1980 to the Q4 of 2014. In this paper, real average house price series have been converted to annual figures to reduce noise from short term "interruptions" of long-term trends.

This paper also uses data on the house price to earnings (HPE) ratio to reflect the cyclical pattern of housing affordability over the period 1984-2014 for the UK. The Halifax house price earnings ratio is calculated by dividing the Halifax seasonally adjusted standardised average

house price by average earnings. Data on Halifax earnings is a calculation based on the average earnings for male full time employees from the annual survey of hours and earnings at April each year. Subsequent quarters are estimated using the national average weekly earnings (KAI7) published by the Office for National statistics. Data for HPE ratio is provided by the Halifax statistics on a quarterly basis. The data stretch out between the Q2 1983 and Q4 of 2014. HPE ratios have been converted to annual parentage figures on the basis of the average ratio per annum to reduce noise from short term "interruptions" of long-term trends. Data of HPE ratio is analysed using triangular methodology. The justification for using the HPE ratio variable in this analysis relies on the argument that HPE takes no account of interest rate policies and does not depend on government monetary or non-monetary initiatives to increase home ownership, which have often been found to misrepresent the true affordability of homes, thereby misrepresenting the true market instability (Holcombe and Powel, 2009; Case and Shiller, 2003; Adair *et al.*, 2009; Barras, 2009; White, 2008; Pirounakis, 2013; Farlow, 2004; Barrel and Davis, 2008). However, the HPE ratio variable comes with its own limitations, as it is a "generic" affordability measurement tool. In particular, the HPE variable, in its current form, is not adequate for describing and classifying the social setting of homebuyers, their location, and the types of dwellings. Despite these limitations, given the purpose of this study, which is essentially explanatory on a national level, the HPE ratio appears to be an ideal variable for addressing the aim of the study.

6. House price cycle empirical results

The empirical analysis is applied by the methodology discussed above. The results reveal episodes of upswings and downswings for the UK housing market over the period 1980-2014. The identified upswing and downswing episodes and their characteristics in terms of persistence, magnitude and severity are reported in Tables I and II. The upswings and downswing phases over the selected time are indicated in Figure 1. Upswings are indicated with a solid line and downswings are indicated with a broken line. Table III indicates the length of the house price cycle.

6.1 House price cycle

Empirical analysis of house price data over the period 1980-2014 reveals two upswing and two downswing phases for the UK housing market. The upswings include 1983-1989 and 1996-2007. The downswings were found to be 1990-1995, 2008-2009 and 2011-2012. The downswing period in the latter case was interrupted by the middle year in 2010.

Years	Persistence[a]	Magnitude (%)	Severity
1983-1989	7	58.4	204.4
1996-2007	12	98.9	593.4

Note: [a]Years

Table I. Upswing in UK real house prices

Years	Persistence	Magnitude (%)	Severity
1990-1995	6	−41.7	−125.1
2008-2009 and 2011-2012[a]	4	−26.5	−53.0

Notes: [a]The downswing period was interrupted in the year of 2010. In 2010, UK real house prices rose slightly by 1.1 per cent

Table II. Downswing in UK real house prices

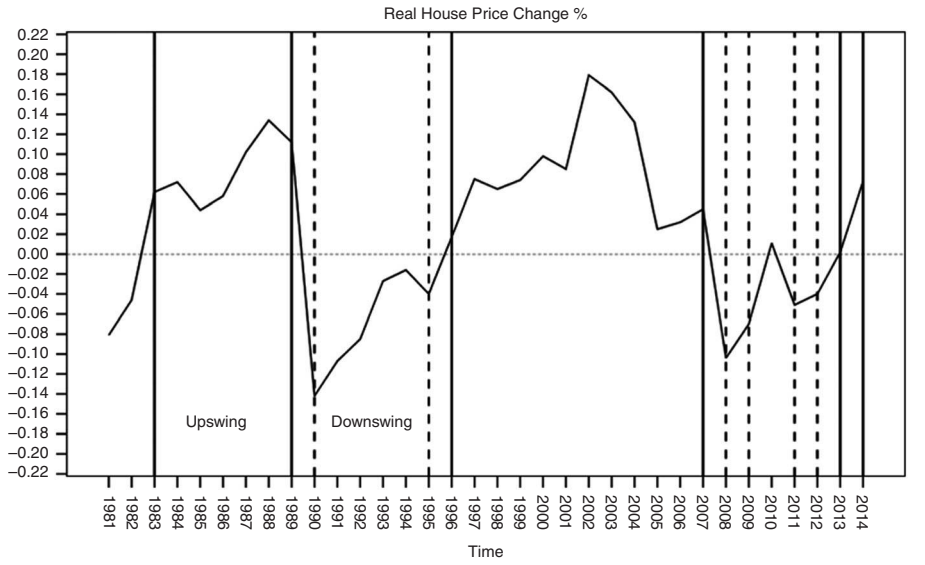

Figure 1.
UK real house price changes between 1980 and 2014

Turning points[a]	Years	Length
Peak-to-peak	1989-2007	19
Trough-to-trough[b]	1995-2012	18
Trough-to-trough	1995-2009	15

Table III.
Duration of UK housing cycles in years

Notes: [a]Peaks and troughs are identified by the triangular methodology (sequence) as provided by Harding and Pagan (2002); [b]excluding the interrupted year of 2010, the trough point is the year 2012

On average, upturns tend to be longer than downswings, lasting 9.5 years, whereas downswings last for five years. The latest upturn[2] in UK house prices was characterised by an extraordinarily long duration, magnitude and large severity. The persistence, magnitude and severity of the latest upturn had increased almost twice compared to the 1980s upturn. Regarding the downturn phases the analogy is not the same. The persistence of the downturn of 1990-1995 lasted for two years longer than that of the earlier case (2008-2009, 2011-2012). The price magnitude and severity declined almost twice as much as the first slump of the new millennium. By comparing the magnitude differentiation between each upswing period with its following downswing, we yield some further interesting results. The total price decline for the downswing period of 1990-1995 was circa 70 per cent as a proportion of its prior price appreciation of the 1980s upswing[3]. While one would have plausibly expected that the level of price decline for the followed downswing period of the later upturn case[4] would have followed a similar analogy, the results are vastly different. The followed downturn phase (2008, 2009, 2011 and 2012) of the later upswing (i.e. 1996-2007) accounts for about 25 per cent as a proportion of its previous upturn. A plausible explanation for this variation could be explained by the argument that in the wake of the latest price decline the government has been responded faster compared to the earlier episode. An example is the introduction of the Help to Buy scheme in 2013[5] (Bergstein, 2014). Help to Buy scheme can be considered as one of the biggest government intervention in the housing market since the Right to Buy scheme in 1980, MIRAS in 1969, Control Rent 1970s, and Housing Act 1988.

Table III reports the full length for the recent completed house price cycle. Regarding the PP turning points, the length is 19 years, spanning from the peak years of 1989-2007. For a complete cycle on a pure TT level, the length is 15 years (i.e. 1995-2009). Excluding the interrupted year of 2010, the length of the TT cycle is 18 years as it spans until 2012.

7. Housing affordability cycle

7.1 Defining and describing affordability

Housing affordability implies the ability to afford housing, but any attempt to define it precisely beyond this point becomes slippery (Linneman and Megbolugbe, 1992). The vague nature of affordability is well captured by Quigley and Raphael (2004): "Affordability […] jumbles together in a single term a number of disparate issues: the distribution of housing prices, the distribution of housing quality, the distribution of income, the ability of households to borrow […] and the choices that people make about how much housing to consume relative to other goods. This mixture of issues raises difficulties in interpreting even basic facts about housing affordability". However, MacLennan and Williams (1990) offer a clear definition of housing affordability as being "concerned with securing some given standard of housing (or different standard) at a price or a rent which does not impose, in the eyes of some third party (usually the government) an unreasonable burden on household incomes". Alternatively put, affordability implies the ability of households to meet the costs of housing without imposing limitations on living costs (Stone, 1993). Freeman *et al.* (1997) state that "housing affordability concentrates on the relationship between housing expenditure and household income and defines a relative or absolute standard in terms of that income above which housing is regarded as unaffordable".

Affordability is a core element for detecting critical points within property markets (Himmelberg *et al.*, 2005; Dolphin and Griffith, 2011). Messah and Kigige (2011) highlights the important role of affordability to the performance of the housing market by stating that "when the (affordability) ratio gets too high, households become increasingly dependent on rising property values to service their debt", thus affecting the stability of housing prices. To expand on this further, Black *et al.* (2006), Glaeser *et al.* (2008) and Case and Shiller (1994) have described unaffordable price levels as a situation when prices do not fit with societal fundamentals. As Yan (2011) put it in describing the stability of housing prices on the framework of affordability, "think of a ruler held up vertically on your finger: this very unstable position will lead eventually to its collapse as a result of a small (or an absence of adequate) motion of your hand or due to any tiny whiff of air. The collapse is fundamentally due to the unstable position; the instantaneous cause of the collapse is secondary". Affordability helps to uncover that unstable position. The expression of affordability in housing can be captured chiefly by two measures: the house-price-to-income and the mortgage-payment-to-income ratio.

The house-price-to-income ratio is the basic affordability measure for housing in a given region or country. It is the ratio of median or average house prices to the median or average familial disposable income and can be expressed as a percentage or as years of income (Messah and Kigige, 2011). House-price-to-income ratio can be used as tool for measuring whether housing prices are too high or too low (McCarthy and Peach, 2004; Keep, 2012). The relationship of the house-price-to-income ratio to house prices is key since the ability of households' to purchase houses is in large part dependent on their earnings (Dolphin and Griffith, 2011). On this basis, such an affordability metric can be effectively used to monitor the self-occupancy demand rather than the investment-motivated demand. According to Flood (2001), ratios of 3:5 are regarded as normal, and are therefore the "best measure of pressure on the housing market", while Reed and Wu (2010) note that the accepted affordability standard itself is normally 3.0. Nevertheless, for each market there are different rules of thumb (Hancock, 1993; Freeman *et al.*, 1997; Lerman and Reeder, 1987; Ndubueze, 2009).

7.2 Affordability cycle in housing

Does housing affordability have a cycle? Is such a cycle comparable to the housing cycle? An examination of the existing literature relating to property cycles does not offer a consensus estimate of the size or even existence of the housing affordability cycle as a phenomenon. Not surprisingly, a comparative analysis between the house price cycle and housing affordability cycle has not been previously reported. In an attempt to observe whether housing demand explains house price dynamics Tsai (2013) hypothesised an interesting SCP concerning housing demand in the context of affordability. His proposed pattern provides a good starting point for describing the cyclical stages of what can be defined as a housing affordability cycle.

Figure 2 reveals the house price SCP of Tsai (2013), which illustrates the cyclical pattern that house prices follow during the self-correction process. It also describes how affordability causes a driving force (in the SCP) and its effects on both self-occupancy and investment-motivated demand.

The remaining part of this section hypothesises the cyclical pattern of housing affordability, which parallels that in the house prices but is also subject to its own autonomous influences. Initially, it is worth clarifying that the proposed hypothesis focusses on the one side of Tsai's (2013) demand structure, i.e. the self-occupancy demand. The rationality behind this choice relies on the fact that most housing affordability indices are made to illustrate the ability of first-time buyers or typical households to purchase a house. Therefore, it implies that most affordability indices estimate the demand from the perspective of self-occupancy.

In light of this, we modify the house price SCP of Tsai (2013) to shape the pattern of a housing affordability cycle. The modification is done by excluding the investment-motivated demand and hence by isolating self-occupancy demand. Self-occupancy demand is used to explain the pattern of a housing affordability cycle:

(1) The starting point is a drop in house prices, which causes higher housing affordability[6] and a rise in self-occupancy demand.

(2) As affordability and self-occupancy demand increase, the risk of price dropping decreases, which implies that a new upturn in house prices is underway.

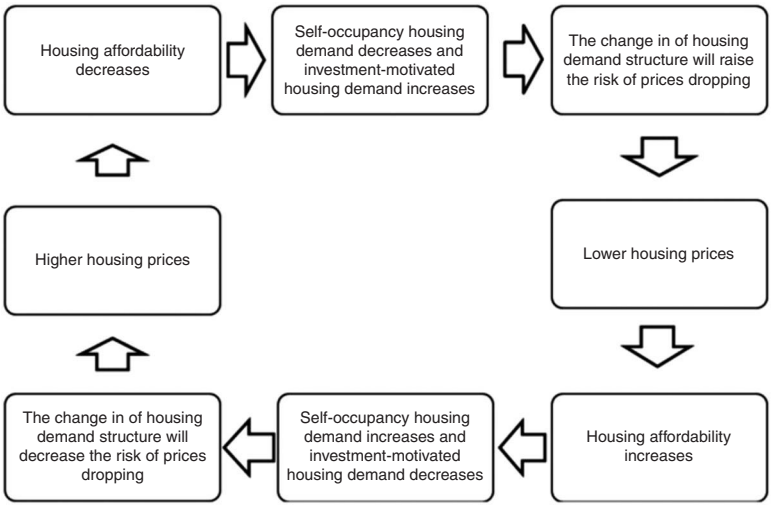

Figure 2.
Tsai (2013) self-correction pattern in housing prices

(3) Strengthening of demand increases house prices. An increase in house prices reduces[7] housing affordability and self-occupancy demand decreases.

(4) The deterioration of housing affordability and the reduction in self-occupancy demand increases the risk of price dropping. By that time the price cycle is moving into its downswing phase.

The above-mentioned sequence describes the pattern of the affordability cycle, which parallels those in house prices but is also subject to its own autonomous influences.

7.3 Housing affordability cycle empirical results

The analysis of the UK housing affordability cycle concentrates on issues of persistence, magnitude and severity in both the upswings and downswings. It also concerns total cycle length. Figure 3 provides a visual representation of the cyclical performance of housing affordability in the UK. Tables IV and V report the upswings and downswings of HPE regarding the persistence, magnitude and severity. In Table VI, we report the length of the complete UK housing affordability cycle on both PP and TT.

Before reporting the results, it is necessary to clarify that upswings in the HPE ratio show worsening housing affordability while downswings reveal improving housing affordability levels. Over the study term, we found two upswing and two downswing phases

Figure 3.
UK HP to earnings ratio, changes in per cent, between 1980 and 2014

Years	Persistence	Magnitude (%)	Severity
1985-1989	5	34.0	85.0
1999-2007	9	65.0	292.5

Table IV.
Upswing in HPE

Years	Persistence	Magnitude (%)	Severity
1990-1996	7	−42.0	−147.0
2008-2009 and 2011-2012	4	−28.0	−56.0

Table V.
Downswing in HPE

for the UK housing affordability. The upswings include 1985-1989 and 1999-2007, and the downswings comprise 1990-1996, 2008-2009 and 2011-2012. As with the UK house price cycle, the downswing period of affordability in the latter case was interrupted in 2010 before it ends in 2012. The interval period 1997-1998 has not been attached to a phase as it involves an unchanged situation. On average, upturns in HPE are longer than downswings. Upswings tend to last for seven years where downswings last for 5.5 years on average.

The mid- to late-1980s upturn in HPE lasted for five years, whereas the latter upturn lasted for nine years. By comparing these two upswings in the cycle's magnitude and severity characteristics, we found that the 1999-2007 upturn was almost twice as large as that of the 1985-1989 upturn. When comparing the two downturn phases, the results are the opposite. In particular, our study found that the earlier downswing (i.e. 1990-1996) lasted three years longer than the most recent affordability downturn (i.e. 2008-2009, 2011, 2012). Following the above comparison, the magnitude was 1.5 times larger, whereas the severity was almost 2.5 times higher.

By associating the magnitude differentiation between each upswing period with its following downswing, we yield interesting descriptive conclusions. The total decline of HPE in the downswing period of 1990-1996 was approximately 120 per cent as a proportion to its prior upswing. However, the followed downswing phase of the later upswing (i.e. 1999-2007) accounts for only approximately 40 per cent. Regarding the length of a complete housing affordability cycle, this study found that the length is 19 years on a PP basis and 17 years when measured on a TT basis.

8. Price cycle vs affordability cycle in housing

The purpose of this section is to provide a descriptive comparative analysis between the cycles of house prices and housing affordability. Initially, the analysis concentrates on the graphical trajectory of these two cycles. It then seeks to investigate their characteristics at both cycle and phase level. To this end, Table VII contains the results for the house price and housing affordability cycles.

Figure 4 illustrates a comparison of the changes in the house price and housing affordability indicators. The change in housing prices fluctuates around the shift in housing affordability. Evidently, the shift in house prices was in near perfect cyclical synchronisation with that of housing affordability indicator. In terms of the magnitude, it seems that the harmonisation was slightly violated in the period 1996-2001; however, their direction was approximately consistent.

Table VII matches the total length for both types of cycles by measuring them on a PP and TT duration. Their identified upswings and downswings and their features in terms of persistence, magnitude and severity are also reported in Table VII.

When looking on the length of each cycle, it is worth noting that their total length is the same on a PP basis. This is explained by the simultaneous occurrence of both cycle's peak points. On a TT level, their length is separated by one year. Examining the results in Table VII in greater detail, we found that the upswing for both cycles in the latter case was more prolonged in terms of persistence. The study also reveals that the latter case of upswing

Table VI.
Duration of the UK housing affordability cycle

Turning points[a]	Years	Length
Peak-to-peak	1989-2007	19
Trough-to-trough[b]	1996-2012	17
Trough-to-trough	1996-2009	14

Notes: [a]Peaks and Troughs are identified by the triangular methodology (sequence) as provided by Harding and Pagan (2002); [b]Excluding the interrupted year of 2010, the trough point is the year 2012

Cycle	Upswings			Downswings			Length of Cycle in years	
Time-Phases	Persistence	Magnitude	Severity	Persistence	Magnitude	Severity	Peak-to-peak	Trough-to-trough
House price							19	18
1983-1989	7	58.4	204.4	–	–	–	–	–
1996-2007	12	98.9	593.4	–	–	–	–	–
1990-1995	–	–	–	6	−41.7	−125.1	–	–
2008-2009, 2011-2012	–	–	–	4	−26.5	−53.0	–	–
Housing affordability							19	17
1985-1989	5	34.0	85.0	–	–	–	–	–
1999-2007	9	65.0	292.5	–	–	–	–	–
1990-1996	–	–	–	7	−42.0	−147.0	–	–
2008-2009, 2011-2012	–	–	–	4	−28.0	−56.0	–	–

Table VII.
House price cycle vs Housing affordability cycle – a large-scale comparison

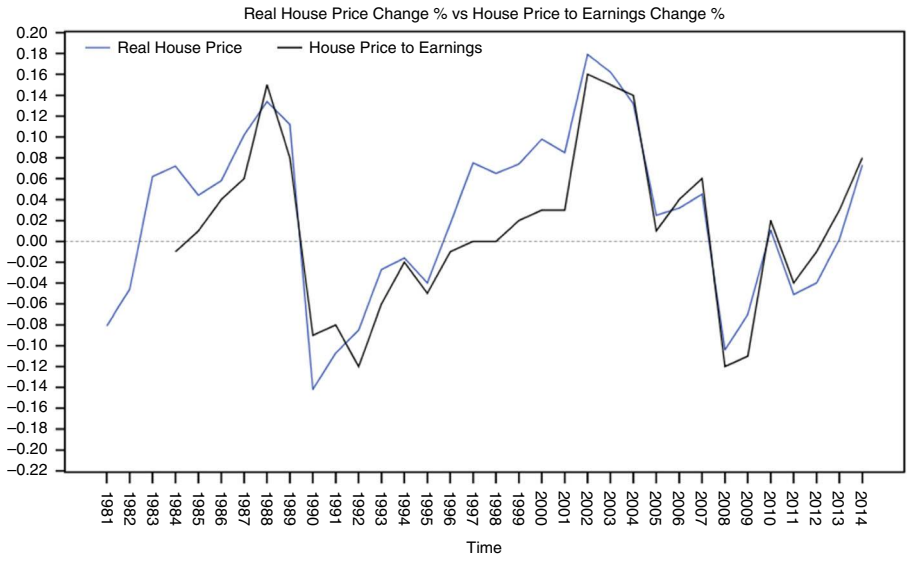

Figure 4.
House price and housing affordability: cycle comparison

for both cycles was characterised by extraordinary magnitude and severity. For both cases, the latest downswing had lower persistence, magnitude and severity when compared with the earlier downswing. It is also worth noting that the downswings of both cycles had similar performance when they were compared for persistence, magnitude and severity.

9. Conclusion

This study examines cycles in UK real house prices and housing affordability in the 1980s-2000s. The analysis focusses on the duration of the cycle and its phases, amplitude and severity. It also aims to examine the asymmetrical behaviour of the phases and the co-movements between the two types of cycles. Analysis of these episodes from a historical perspective leads to some interesting conclusions.

For the UK house price cycle, upturns tend to be longer than downswings on average. On average, upswings last for 9.5 years, whereas downswings last for five years. The latest upturn in UK house prices was almost twice as strong as the 1980s upturn in terms of persistence, magnitude and severity. Regarding the downturn phases, the analogy is the opposite. The persistence of the price downturn of 1990-1995 lasted for two years longer than that of the most recent case (2008-2009, 2011-2012). The price magnitude and severity declined almost twice as much as the first downswing of the new millennium. By comparing the magnitude of differentiation between each upswing period with its subsequent downswing, we yield some further interesting results. The total price decline for the downswing period of 1990-1995 was approximately 70 per cent as a proportion to its prior price appreciation of the 1980s upswing. While one would have plausibly expected that the level of the price decline for the following downswing period would have followed a similar analogy, the results are vastly different from that. The following downturn phase (2008/2009/2011/2012) of the later upswing (i.e. 1995-2007) accounts for about 25 per cent as a proportion of its previous upturn.

Regarding the UK housing affordability cycle, our findings reveal similar results with house price cycle. On average, upturns are longer than downswings. Upswings tend to last for seven years, whereas downswings last for 5.5 years on average. By comparing the latest two upturns of HPE on the basis of magnitude and severity we found that the 1999-2007 upturn was almost twice as large that of the 1985-1989 upturn. When comparing the two downturn phases the results are the opposite. In particular, our study found that the earlier downswing (i.e. 1990-1996) lasted three years longer compared to the latest affordability downturn (i.e. 2008-2009, 2011, 2012). Following the above comparison, the magnitude (per cent) was 1.5 times larger, whereas the severity was almost 2.5 times higher. The total decline of HPE in the downswing period of 1990-1996 was approximately 120 per cent as a proportion of its prior upswing. However, the following downswing phase of the later upswing (i.e. 1999-2007) accounts for only approximately 40 per cent.

By comparing the two cycles our study found four interesting results. First, the graphical trajectory of cycles in house price and housing affordability is highly synchronised. Second, upturns in both cycles tend to be longer than the downturns on average. Third, the recent upturn in house prices and housing affordability cycle is characterised by a larger duration, magnitude and severity than the earlier case. Fourth, the latest downturn in both cycles is highly synchronised in terms of time occurrence, persistence, magnitude and severity and was lower than the previous downturn. Additional results indicate that on average the length of a complete house price and housing affordability cycle is 19 years on a PP basis. This evidence suggests that high regularity exists between the two types of cycles.

This paper is essentially exploratory and raises a number of questions for further investigation. There is an opportunity for future research with the aim of arriving at a more nuanced definition of affordability and of examining causality. The fact that two phenomena appear to have some significant synchronicity is no indication that they are interdependent, although logic would suggest they might be. This is among the few papers that analyses cycles in house prices in the UK and the first study that draws attention to the housing affordability cycle.

Notes

1. On 6 October 1973, "Yom-Kippur war" started. On 17 October in 1973, Arab countries decided to apply an oil export embargo and cuts in production.
2. 1996-2007.
3. 1980s upswing, 1983-1989.

4. Upswing period of 1996-2007.
5. Help to Buy mortgage guarantees scheme: Seeks to help first-time buyers as well as existing property owners to purchase a house by providing them access to 95 per cent Loan to value mortgage ratio for a house up to £600,000 Bergstein (2014).
6. Higher or increased affordability is translated as a decrease in the housing affordability benchmarks (i.e. house price to income ratio).
7. Decrease in affordability implies an increase in the housing affordability index (i.e. on a house price to income ratio basis).

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