

# The housing cycle as shaped by prices and transactions: a tentative application of the honeycomb approach for Italy (1927–2019)

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## Abstract

**Purpose** – The purpose of this paper is to provide a dating system for the Italian residential real estate market from 1927 to 2019 and investigate its interaction with credit and business cycles.

**Design/methodology/approach** – To detect the local turning point of the Italian residential real estate market, the authors apply the honeycomb cycle developed by Janssen *et al.* (1994) based on the joint analysis of house prices and the number of transactions. To this end, the authors use a unique historical reconstruction of house price levels by Baffigi and Piselli (2019) in addition to data on transactions.

**Findings** – This study confirms the validity of the honeycomb model for the last four decades of the Italian housing market. In addition, the results show that the severe downsizing of the housing market is largely associated with business and credit contraction, certainly contributing to exacerbating the severity of the recession. Finally, preliminary evidence suggests that whenever a price bubble occurs, it is coincident with the start of phase 2 of the honeycomb cycle.

**Originality/value** – To the best of the authors' knowledge, this is the first time that the honeycomb approach has been tested over such a long historical period and compared to the cyclic features of financial and real aggregates. In addition, even if the honeycomb cycle is not a model for detecting booms and busts in the housing market, the preliminary evidence might suggest a role for volume/transactions in detecting housing market bubbles.

**Keywords** Business fluctuations, Housing, Honeycomb cycle

**Paper type** Research paper

## 1. Introduction

The housing market has important effects on the real economy and the financial side of market transactions. In this article, we investigate the characteristics of the housing cycle in Italy, focusing on private residential properties. This sector can contribute to shaping business and financial cycle fluctuations since housing provides both direct utility and collateral services and represents the most valuable asset in household portfolios.

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Regarding the effect on the business cycle, housing is the most relevant component of durable consumption, and therefore, it shares cyclical features with investment activity. In addition, the building sector is the most responsive to GDP fluctuations, and it is usually modelled as a leading indicator of business cycle turning points. Furthermore, housing plays a crucial role in access to financial markets for credit-constrained individuals.

Regarding the effect on the financial cycle, in Italy, real estate assets account for two-thirds of household wealth (Banca d'Italia, 2018), and credit provided in the form of mortgages, loans to firms in the construction sector and services connected with real estate activities amount to one-third of total bank loans. The considerable share of the portfolios of financial intermediaries linked to real estate value implies that fluctuations in housing prices affect the performance of the financial system and its solidity.

When conducting empirical analyses of the housing cycle, some studies address the contribution of the housing cycle to the business cycle, whereas a different strand of literature examines the housing cycle in connection with the financial cycle. Our research addresses both issues, since we consider the interaction between the housing cycle, on the one hand, and the business and credit cycle, on the other. The innovative contribution relies on the long time span we consider and on the fact that we focus on the joint analysis of two indicators of the housing cycle, i.e., market prices and transactions. Indeed, although housing markets are usually modelled as competitive in the macroeconomic literature (Piazzesi and Schneider, 2016), empirical evidence suggests that important downward rigidities in price adjustment occur, implying, as emphasized by Leamer (2007), that the housing cycle is mostly driven by volume adjustment. Nonetheless, most of the existing contributions focus on a single cycle indicator, such as residential investment or prices. A different stream of research, more focused on the inner functioning of the residential real estate market, has proposed a model of the housing cycle that jointly examines house prices and the volume of transactions. This cycle, referred to as the honeycomb cycle (Janssen *et al.*, 1994, HC hereinafter), is characterized by the fact that the peculiar features of the operators and assets transacted shape the cycle, while other macroeconomic aspects affecting the market from outside trigger cyclical dynamics and modify operators' expectations.

To the best of our knowledge, to date, there have been no investigations of the Italian real estate market based on this approach from a long-run perspective. The aim of this research is to contribute to filling this gap, providing an interpretation of the different housing cycles starting from 1927 by collecting a unique dataset of historical data from various historical statistics.

In summary, our results show that the HC emerges as a regular pattern in the Italian housing market only in the mid-1970s. Before that period, during the 1920s and 1930s, a cyclical pattern was observed, but from 1933, the rotation was the opposite of the standard model (clockwise). Later, in the first two decades after Second World War, a very intense expansion of residential construction dominated, featuring a period of structural change in the market without any cyclical pattern.

The remainder of the article is structured as follows: in Section 2, we present some insights into the relevance of the real estate cycle in the macroeconomic literature, together with some aspects of more recent studies focused on the price-volume relationship in the housing market. In Section 3, we formally retrace the honeycomb approach to date the housing cycle, and in Section 4, we apply this approach to Italian data. In Section 5, we measure the degree of co-movement between the credit and business cycle and the housing cycle. Section 6 concludes the paper and introduces future research extensions.

## 2. The housing cycle and macroeconomics: some insights

The role of housing markets in macroeconomic analysis has been increasingly investigated in recent decades in the aftermath of the bursting of the US housing market bubble. Up to the

last decade of the last century, there was scant evidence of issues related to housing in macroeconomic studies. The appropriate modelling of the housing sector in a macroeconomic setting, either theoretical and/or empirical, requires accounting for the multifaceted role of this sector because it is a large component of household wealth and consumption. In addition, the housing sector largely contributes to business cycle fluctuations, and the interaction between house prices and financial and credit cycles has important implications for monetary policy management. Indeed, real estate prices are usually addressed as one of the major components of the financial cycle, together with credit, since changes in asset prices affect the ability to borrow through the balance sheet effect, originating the so-called leverage cycles (Geanakoplos, 2010), and, as such, have crucial importance in shaping macroprudential policies (Hartmann, 2015).

One of the early studies documenting the real estate cycle is Hoyt (1933), which focused on land value trends in Chicago. Later, Pyhrr *et al.* (1999) summarised a large body of literature on real estate cycles, pointing out that the published literature did not agree to a “standard definition of a cycle as economists have done in the business cycle literature”.

Subsequent studies have examined the interaction between macroeconomic cycles and real estate. Among these studies, Grebler and Burns (1982) and Di Pasquale and Wheaton (1994) analysed the US housing market cycle and documented that it tended to be aligned with macroeconomic fluctuations. In 2007, Leamer highlighted the importance of the real estate sector, claiming that (in the US) “housing is the business cycle”. The author used residential investment time series as a measure of the housing sector cycle and found that it is the most important variable in explaining six of ten documented US recessions.

A distinctive feature of housing compared to other assets is its low tradability/liquidity, and a good measure of the degree of market tightness is the number of transactions, which is, thus far, a less investigated feature of the housing cycle, as is clear from the list of referenced articles above. One exception is the study by Ortalo-Magné and Rady (2004), which, using England and Wales as a case study, focused on drivers of property transactions, finding that the liberalisation of the credit market of early 1980, demographic changes and construction activity influenced and contributed to making the 1980s a period of exceptionally high transaction levels for these countries. Following this line, Oikarinen (2012), using data for the 1988–2008 period from Finland, shows that the response of prices to income, the interest rate and debt shocks is substantially slower than that of sales to demand shocks.

Further studies (Tsai, 2014, 2019) have found consistent evidence that using both housing prices and the volume of transactions leads to greater information about the analysis of the dynamics of housing markets than studying such scenarios with prices alone. This “empirical” claim is indirectly supported by the theoretical analysis proposed in the loss aversion model (Genesove and Mayer, 2001), whose analysis suggests that price information helps to obtain a reliable dynamic of the real estate market during expansionary phases. This is not fully true during recessionary phases, however, because in a bust phase, the seller’s reservation prices show a significant downward rigidity compared to buyers’ offers, and some sellers will be driven out of the market because of the expected nominal losses. In other words, the rigidity of house prices does not always allow us to obtain a reliable dynamic of the real estate market, which instead can be observed by jointly analysing it with the dynamics of house sales volume. An interesting implication of the loss aversion model deals with the price-volume correlation during housing market contractions, which is expected to be positive because of the loss aversion of sellers.

There are two other main theories that describe the price-volume relationship: the down-payment model (Stein, 1995), where asset price volatility is crucial in shaping the affordability of the down-payment, and the search model (Berkovec and Goodman, 1996), according to which frictions in the housing market explain why sales of existing homes respond more quickly than prices to changes in housing demand.

The models described above imply various relationships between prices and volumes in the housing market. For instance, the empirical literature consistent with the search model approach shows a lead-lag relationship where volumes drive prices (Hort, 2000) and a negative correlation between the two variables (Follain and Velz, 1995). In contrast, the empirical literature consistent with the down-payment model shows that house prices tend to drive volumes when there is a decrease in prices that reduces trading volume, whereas increases in prices have no effect on transactions; moreover, trading volume can Granger cause house prices, but only under some market conditions mostly related to the (in)elasticity of the housing supply (Clayton *et al.*, 2010).

Starting from this variegated evidence, our aim is not to add a new estimate of correlation and causality between these two variables but rather to investigate the cyclical movement of the housing market and examine the joint behaviour of house prices and the number of transactions, exploiting the long historical perspective.

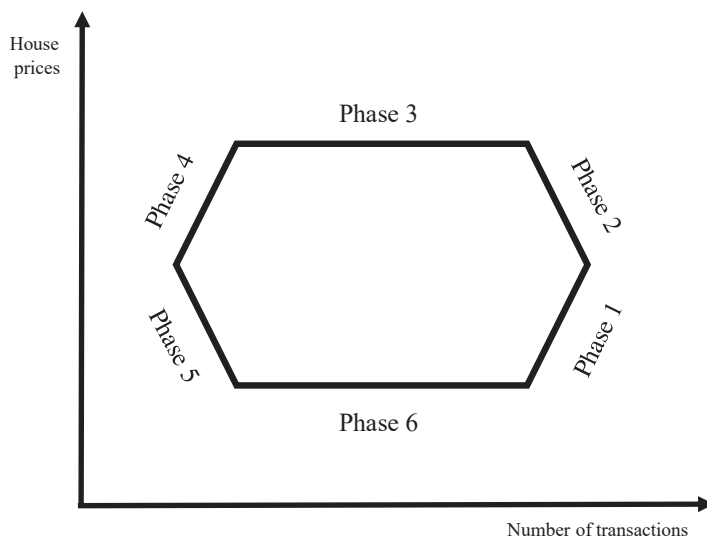
In the scientific literature, the honeycomb approach has found scant application, whereas it seems to be more frequently used by market operators for market assessments intended to identify the cyclical phases of a national or sub-level residential real estate market.

This approach was used to examine the most recent dynamics of Italian real estate cycles. Festa *et al.* (2013) refer to a time span ranging from 2001 to 2010 for national and regional analysis. Rosasco and Sdino (2013) examine the period from 1975 to 2010 in their national analysis, proposing only a brief and descriptive graphical analysis of the three HCs highlighted at the national level, to then focus on the development of a more in-depth analysis of the Genoa residential real estate market through local HCs.

Our analysis differs from theirs, as we propose a detailed descriptive analysis of the joint dynamics of house prices and the number of transactions over a longer historical period. Moreover, we also study the interaction with the business and credit cycles, which approximate those external dynamics able to influence the housing cycle.

### 3. Honeycomb approach to dating the housing cycle

HC phases, as defined by Janssen *et al.* (1994), can be graphically represented as in Figure 1, where on the horizontal axis the number of transactions is shown, whereas the vertical axis



**Figure 1.**  
A stylized representation of the honeycomb cycle, as reported in Janssen *et al.* (1994)

measures the price level. The cycle begins with phase 1, when an excess of demand in the housing market drives up prices and transactions, and is closed by phase 6, when stagnating prices are associated with a recovery in market transactions. As soon as prices start rising again, the new cycle begins.

The height of the cycle and its horizontal extension may of course vary according to the specific cycle characteristics.

According to [Janssen \*et al.\* \(1994\)](#) it is possible to classify the housing market transactions into:

- (1) primary transactions, when the supplier of property is not also a demander and the demander is a first-time occupier;
- (2) secondary transactions, that takes place when the owners move homes, selling one to buy another. In this case, the supplier is also a demander and vice versa.

While changes in primary demand and supply are independent of each other, in the secondary market, a change in demand will affect (and be affected by) the secondary supply, but these variations in market size (the volume of transactions) can occur without affecting prices. Consequently, the largest volume of housing transactions will be observed when secondary agents are most active in the residential real estate market. For these reasons, the volume of transactions will be much more volatile than prices.

The ideal sequence of phases proceeds as follows:

*Phase 1:* the market dynamics, increase in transactions and prices, occur in the presence of an excess of demand partially accommodated by an increase in supply. For instance, a continuous upward shift in housing demand originating from fundamentals, such as population growth or business cycle expansion. This can ingenerate: an increase in residential investment (primary market); an increase in house turnover (secondary market).

This phase assumes that business and credit cycles are in strong expansion, triggering positive expectations for housing market performance.

*Phase 2:* the occurrence of negative supply shocks can determine the joint upswing in prices and decline in transactions. The origin of the supply shock can be originated: in the primary market, where primary supply suffers a change in expectations and negative prospects for housing returns entail a sudden halt in residential investment; in the secondary market, where the high price level discourages house moves.

In this phase, the business and credit cycles are typically still expanding.

*Phase 3:* in this phase, negative prospects regarding market returns entail a slowdown in the housing cycle, leading to a halt in new construction projects and discouraging primary demand. Despite the decline in residential investment and in secondary market transactions, prices remain stable. Stagnation in prices is strictly related to downward price rigidities and strengthened in the presence of highly leveraged housing property.

*Phase 4:* the persistent decline in housing sales produces a decline in house prices. The interaction between recessive demand and supply shocks determines this recessive phase. Furthermore, all exogenous macro variables are in their recession phases, contributing to a declining residential real estate market (in terms of prices and volumes).

*Phase 5:* in this phase, positive expected housing market returns originated by exogenous factors (mortgage rate, consumer confidence, construction costs and housing rents) drive a shift in supply and a recovery of demand in the secondary market, with an increase in transactions associated to declining prices.

*Phase 6:* this pattern is consistent with adjustments in either demand or supply, whose joint expansions keep prices stable, in a macroeconomic frame characterized by a recovery phase. Here, we expect that the business cycle and other exogenous macro variables are expanding, contributing to increased demand in both primary and secondary markets by improving the conditions for a strong resumption of transaction volume. The end of this phase leads a rise in prices and a new cycle.

#### 4. The honeycomb cycle in the Italian housing market

##### 4.1 Data sources

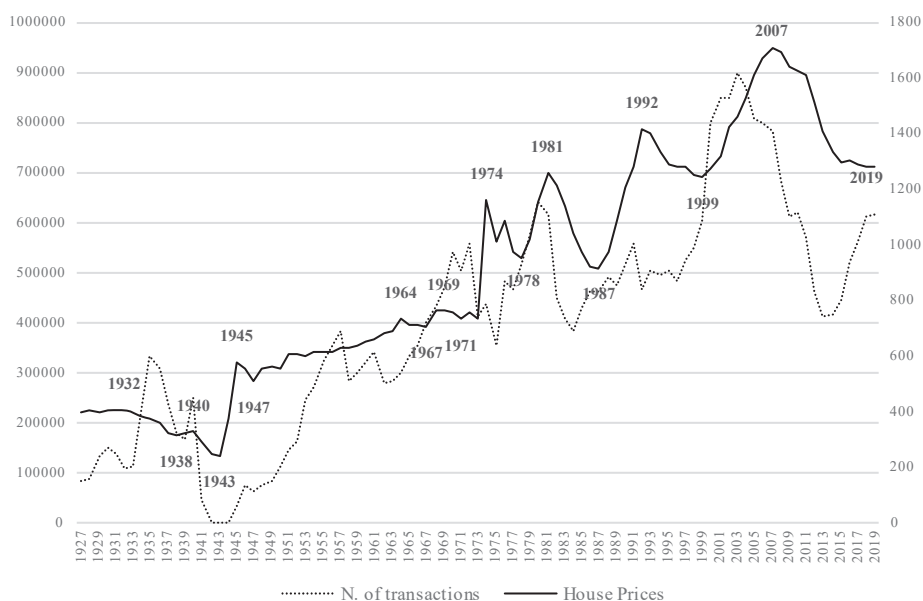
Unlike other financial assets, long-run statistics on the housing market have always been scant. However, the last financial crisis in which the housing market played a crucial role and a wide range of institutions, such as national statistical agencies or central banks, started monitoring developments in the housing market, although they mainly collected house price indices.

In our analysis, the long-run perspective compels us to resort to historical reconstruction of the price and volume time series. To the best of our knowledge, statistics concerning volumes (e.g., building permits, transactions, building land prices) are not regularly collected by official or national institutions but rather by trade associations or market operators.

House prices from 1927 to 2019 are from [Baffigi and Piselli \(2019\)](#); the series is the average price per square metre for the whole country, deflated by the GDP deflator.

Residential transactions are from Scenari Immobiliari, an independent research institute covering property markets, which kindly provided us with their reconstruction beginning at the turn of the last century (1900–2019). To the best of our knowledge, this is the only historical reconstruction of the volume of transactions.

[Figure 2](#) shows that the two series grew substantially over time, prices' turning points seem to lag the volume of sales, and several structural breaks are evident in their patterns. Furthermore, the fluctuations appear to be more pronounced in the last 50 years.



**Figure 2.** Number of transactions (left hand axis) and House prices at constant 2005 prices (right hand axis), Italy, 1927-2019. Turning points are calculated according to the NBER approach revisited by [Bartolotto et al. \(2019\)](#)

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The other historical Italian statistics are drawn: GDP data from [Baffigi \(2013\)](#) and total credit from [De Bonis et al. \(2012\)](#), updated using national account data.

#### *4.2 A short narrative of the Italian housing market in the long run*

After the First World War, a long period of regulation and control of the residential housing market began, which continued through the Fascist period, with only temporary interruptions. Two measures were taken: rent control and the blocking of evictions. On the supply side, construction was favoured with a tax exemption for newly built homes. On the credit side, a public-law bank was established (Istituto Nazionale di Credito Edilizio), and the state intervened directly in the construction with the creation of the Institute for the Houses of State Employees (INCIS). State intervention was justified as an attempt to meet the growing demand by the mass of Italian households for whom the housing supply was too scarce and too expensive.

During the crisis of 1929, prices and rents decreased, but transactions did not. The purchase of a house was seen as a safe investment against economic uncertainty caused, among other things, by Italy's recent involvement in wars (in Ethiopia in 1936 and later Second World War).

The number and quality of available houses, already inadequate before the war, were worsened by the Second World War. Until 1948, the productive capacity of the Italian construction industry was very low ([Preite, 1979](#)), and investments in housing were barely above 1% of nominal GDP. The Ministry of Public Works estimated a gap of 4.5 million rooms ([Sapori, 1962](#)).

The state intervened with contributions of up to 50% of the cost of construction for individuals and entities devoted to the construction of social housing. In 1962, a central entity, "Ina-Casa", was created with the purpose of both raising funds and assigning construction contracts for new dwellings for the working class ([Dalmazzo et al., 2021](#)).

Overall, the state intervention on the market during the 1950s and 1960s was massive and the government gave a vigorous stimulus to private initiatives for new constructions by providing a 25-year tax exemption. In addition, urban development was vigorous and uncontrolled. In fact, urban growth in Italy was much less controlled by public authorities compared to what took place in the same decades in other European countries, where urban development was systematically planned ([Preite, 1979](#)).

Finally, the growth of the construction sector was also backed by a growing credit market. In 1936, a crucial banking reform established a distinction between short-term and long-term credit institutions as a consequence of the financial and economic crisis of the early 1930s. Special credit institutions (Istituti di credito speciale, ICS, according to 1936 Banking Act), provided fixed long-term credit to firms and entities in land and building and other sectors. Their growth was greater than ordinary banks throughout the 1960s and was favoured by monetary authorities, which sustained the price of securities issued by ICS ("cartelle fondiarie") to collect loanable funds and which were allowed by banks to use to meet reserve requirements ([Nardi et al., 1975](#)).

However, this increasing supply met only a small fraction of the mass demand for new houses because market prices were beyond the reach of the majority of households ([Baffigi and Piselli, 2019](#)).

The housing problem was very serious over the post-war decades, mainly due to population growth and internal migration, which boosted urbanization, in particular to the main Northern industrial town such as Milan and Turin, and to the Capital town Rome, in central Italy. Housing service needs and raising affordability issues grew dramatically until the end of the Sixties, with explosive increase of rents, notwithstanding some rent control legislation always formally in force ([Bortolotti, 1978](#)).

In these years of elastic supply, house prices grew regularly and slowly in real terms, while Italy was going through the longest period of stable growth in its post-unification history, with few short-term negative cyclical shocks ([Bartolotto et al., 2019](#)).



Market conditions changed dramatically during the 1970s, with a striking 90% nominal increase in house prices occurring in 1974 (+59% in real terms), just after the oil crisis. This was mainly attributable to a change in the macroeconomic context and the connected change in monetary policy (Baffigi and Piselli, 2019). In fact, just after the oil crisis, the mechanism underlying the housing market that had nurtured housing investments since the early fifties came to an end, and the financing system that had supported the housing industry for a couple of decades went through a deep crisis. In the new macroeconomic setting, with growing inflation expectations, the policy that had been implemented by the Bank of Italy until then could not be carried out. On the other hand, the strong deterioration of the purchasing power of the Italian Lira raised the household propensity to buy safe real assets, favoured by fixed-rate mortgages at quite low interest rates in real terms. The combination of a strongly rising demand and a lagging supply reaction caused house prices to skyrocket in 1974.

During the 1970s, a radical change, both political and financial, occurred, which concluded the post-war period of the housing industry. The already small direct public contributions to housing development declined, as did the incentives for housing investments; the residential investments/GDP ratio started declining after 1969 (Figure 3).

As a result, the housing market and real estate sector have gradually become more integrated into the general business cycle with ups and downs, which have characterised the last four decades of the Italian economy.

At the beginning of the 80s Italy had a low development of the mortgage market. In a recent cross-country analysis covering a time horizon from the 1980s, in terms of its linkages with the financial market, Italy is classified in the ranking of mortgage market development indicators by Calza *et al.* (2013) [1] as a “low-growth” country relative to the mortgage debt/GDP ratio and LTV ratio and with a prevalence of fixed interest rate contracts (Tsatsaronis and Haibin, 2004). In the 2000s the share of fixed rate contracts fell to one-third and the remainder was made up of both flexible and mixed rate contracts.

Moreover, Italy is historically included in the countries where borrowers are dissuaded from refinancing their loan contracts (withdrawal of mortgage capital), an aspect that could be caused by the low level of development and innovation in the mortgage market. Nevertheless, Italy has historically positioned itself as having one of the highest homeownership rates among OECD countries.



**Figure 3.**  
Residential  
investments/GDP ratio  
for Italy, 1927-2019

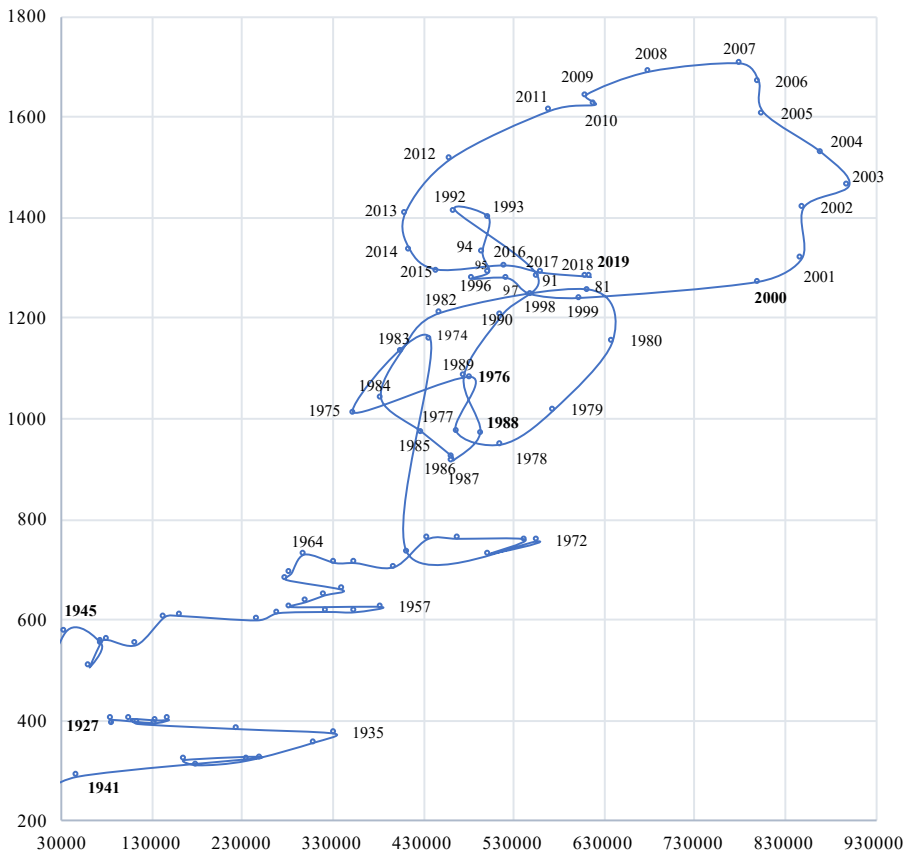


4.3 The turning points of the Italian honeycomb cycle

From an empirical perspective, the dating of the turning points of the different honeycomb phases requires two censoring rules.

For the first censoring rule, it is necessary to define stagnant price phases. Obviously, a 0% change in prices is never observed in our sample, so we have to define a range of variation for prices within which to identify the stagnant price phases (namely, phases 3 and 6). Recently, the Bank for International Settlements (BIS, 2020) defined real residential property prices as broadly stable and flat for variations in the range of  $\pm 1.00\%$ , that we find appropriate for our analysis and consistent with the statistical properties (i.e. standard deviation) of our series. A second censoring rule that we adopt is that when an isolated (temporary) slowdown in prices is observed in the middle of phase one, the phase one will include this single (two) year(s) within it. Similarly, when an isolated variation in prices is out of  $\pm 1.00\%$  range in the middle of the stagnation phase, the phase is not interrupted as well.

Initially, to obtain a picture of the complete dynamics between the two variables, we rely on a graphical inspection (Figure 4) of the scatter plot referring to the complete annual sample (1927–2019). Figure 3 shows that real house prices in Italy have grown over time, but only



**Figure 4.**  
Full sample: 1927–  
2019, house prices at  
constant 2005 prices  
(vertical axis) and the  
number of transactions  
(horizontal axis)

**Note(s):** Data not available for transactions 1942–1944

since the mid-1970s, at the national level, we can highlight three complete cycles consistent with honeycomb housing cycle dating.

In the first part of our sample, 1927–1941, the graph shows an inverted honeycomb sequence, in which the phases follow one another backwards (specifically, from 1933).

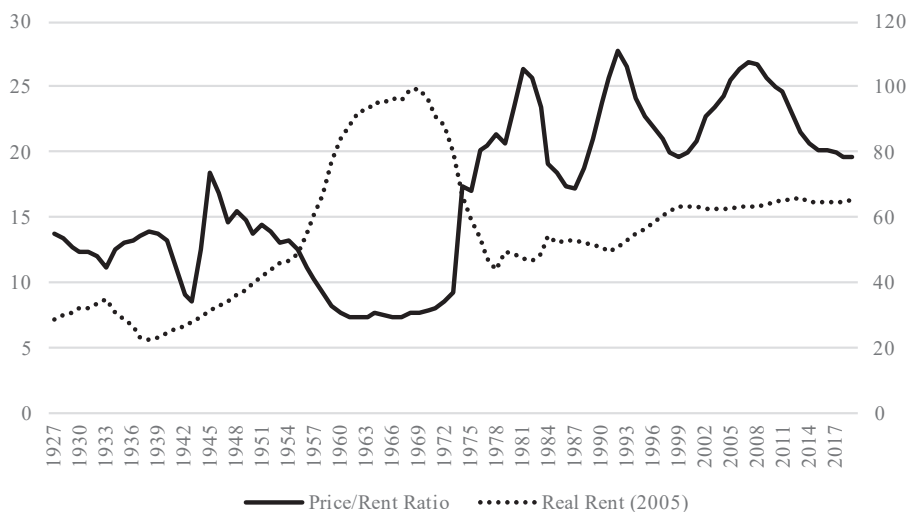
From 1945, we notice general growth in the prices and volume of transactions. While no cyclical pattern emerges, there is a stable growth trend in prices and transactions for the following 30 years as a result of a booming construction sector fuelled by a strong economic recovery, culminating in the “economic miracle” of the 1960s. Overall, in the period 1945–1975, transactions gradually moved to the top-right area of [Figure 4](#), while prices moved constantly upward.

After an exceptional price increase in 1974 (and a subsequent collapse in 1975), from 1976, we can finally observe two clear cycles, namely, 1976–1988 and 2000–2019, while an intermediate cycle of thirteen years (1988–2000) does not accurately respect the expected sequences.

The lack of regular cyclical fluctuations before 1970 merits further investigation. Over such a long historical period, the other available indicator of housing market fluctuations is the price-to-rent ratio, a measure of housing valuation, whose dynamics reflects housing market conditions ([Himmelberg et al., 2005](#)). The ratio for Italy is reconstructed in [Baffigi and Piselli \(2019\)](#) and plotted below ([Figure 5](#)) along with the series of real rents. Both series confirm that the Italian housing market during 50s and 60s experienced significant structural shocks, all but cyclical. As recalled in [Section 4.2](#) and told more in detail in [Baffigi and Piselli \(2019\)](#), notwithstanding an intense construction activity ([Figure 3](#)), new houses were out of reach of the majority of increasing population in more and more urbanized main industrial cities, which attracted huge flows of immigrants. As a result, demand pushed rents to very high level. This phenomenon was very persistent and lasted about two decades until urbanization slowed down.

Afterwards, from the mid-1970s, a regular cyclical fluctuation in the price-to-rent ratio arises, thus suggesting that only since then the Italian housing market is characterized by cyclical features whose regularities can be investigated.

Therefore, the price-to-rent ratio provides further support to the intuition we get from [Figure 4](#), as to the existence of a structural change in the housing market in the mid-1970s of



**Figure 5.** Price to rent ratio (left hand axis) and Real Rent at constant 2005 prices (right hand axis), Italy, 1927–2019

Source(s): Our elaboration upon Baffigi and Piselli (2019)

the last century. After this period, interestingly we observe regular cyclical fluctuations in the price-to-rent ratio and the hexagonal dynamics of the HC approach.

Focusing our attention on the last three cycles, identified from 1976 to 2019, we report in [Table 1](#) some descriptive statistics; in addition, for each HC cycle, we also show the bubble dating provided by [Baffigi and Piselli \(2019\)](#).

What the three cycles have in common is the fact that during phase 6, i.e., the closing of an HC and the eve of a new one, a moderate negative change in prices occurs (obviously, the intensity is lower than the threshold established). Therefore, the first regularity we can draw from our long-run analysis of the HC in Italy is that during phase 6, on average, the stagnation proceeds downwards.

However, several differences arise, highlighting that the last cycle, HC cycle 3, is noteworthy for its unusual characteristics. First, it is long lasting; second, phase 3 is present only in the last cycle; third, prices in phase 2 grew significantly and for a longer period compared to the other two cycles. Finally, we note that the bubble period detected in [Baffigi and Piselli \(2019\)](#) perfectly covers the beginning and end of phases 2 and 4 (2004–2013).

This overlap is also observed for the HC cycle 1, when the beginning of the price bubble is coincident with phase 2 and ends within phase 4 (1981–1983). Some differences arise with regard to the HC cycle 2. Indeed, the beginning of the bubble detected by [Baffigi and Piselli \(2019\)](#) in 1989 is characterized by rising prices and declining transactions (i.e., phase 2). However, 1989, consistent with our censoring rule, is included within phase 1. The end of the bubble, 1997, coincides with the first year of phase 6, but it is contiguous with the last year of phase 4 because the second cycle does not include phase 5.

Therefore, [Table 1](#) suggests that the beginning of the price bubble period always coincides with a year characterized by rising prices and declining transactions, i.e., phase 2 dynamics, and ends close to the end of phase 4, when prices and transaction volumes decline.

Nevertheless, discussions and models of bubbles often concentrate solely on the behaviour of prices with notable recent exceptions (e.g., [Liao and Peng, 2019](#)). However, in financial markets, asset price bubbles coincide with increases in prices and trading volumes, and when

Sequential Honeycomb cycles	Turning points					
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
<i>HC Cycle 1 (12 years)</i>	1976– 1980	1981	<i>not detected</i>	1982– 1984	1985– 1986	1987
Duration (years)	5	1	0	3	2	1
Transaction growth	32.4%	–4.0%	–	–37.5%	20.7%	0%
House price growth	6.6%	8.8%	–	–17.3%	–11.1%	–0.7%
Price bubble (initial/final year)	S	1981		1983		
<i>HC Cycle 2 (12 years)</i>	1988– 1991	1992	<i>not detected</i>	1993– 1996	<i>not detected</i>	1997– 1999
Duration (years)	4	1	0	4	0	3
Transaction growth	20.2%	–16.3%	–	–5.3%	–	24.8%
House price growth	40.0%	10.1%	–	–9.6%	–	–1.0%
Price bubble (initial/final year)	1989					1997
<i>HC Cycle 3 (20 years)</i>	2000– 2003	2004– 2007	2008– 2011	2012– 2013	2014– 2015	2016– 2019
Duration (years)	4	4	4	2	2	4
Transaction growth	49.0%	–13.3%	–26.9%	–28.1%	8.5%	38.2%
House price growth	18.0%	16.6%	–1.4%	–12.6%	–8.0%	–0.3%
Price bubble (initial/final year)		2004		2013		

**Table 1.** Amplitude and duration of the six phases of the three sequential honeycomb cycles (1976–1988; 1988–2001; 2001–2019)

bubbles burst, volumes drop sharply, sometimes more than prices, albeit with recent exceptions. The preliminary evidence in Table 1 suggests a different role for volumes/transactions in detecting bubbles in the housing market. Indeed, phases 2–4 of the HC are characterized by a declining volume of transactions associated with a bell-shaped pattern for prices.

Starting from the three HCs defined above, we propose an aggregation of the six phases into two main macro phases, upturn and downturn. When dealing with upturns, by definition we have that HCs are interconnected: the expansive phase for transactions starts in the first year of phase 5 (of the previous cycle, p.c.) and ends in the last year of phase 1 of the current cycle (c.c); the house price expansion lasts from the year when the minimum peak is registered in phase 6 of the previous cycle (p.c) until the last year of phase 2 of the current cycle (c.c).

The reshaping described in Table 2 adds some insights to the information on the HC reported in Table 1.

Regarding the duration of the upturns and downturns in the reshaped HC cycles, consistent with what usually occurs in business cycle analysis, Table 2 shows that a mild asymmetry occurs towards the expansionary phases of prices, which are on average two years longer than aggregate downturns. With regard to transactions, the apparent identical average duration (6.3 for either upturns or downturns) is affected by the long-lasting decline in transactions observed in the last cycle, 2004–2013, a period corresponding to the price bubble period detected by Baffigi and Piselli (2019). In fact, the reshaped HC cycle 3 is the only one characterized by a longer duration of the downturn, albeit only for transactions.

The duration of the transactions and price upturns/downturns are quite similar for the first two reshaped HC cycles. However, in the last one, the price upturn is longer lasting than the transaction upturn; in contrast, the transaction downturn is two years longer than the price decline.

Regarding intensity, namely, the net variation between upturns and downturns, three issues are worth noting. First, for both transactions and prices, the first reshaped HC cycle is the only one that has a recession phase longer than its expansion phase. Second, remarkable variation in transaction volume is evident in the last cycle, which, compared to the previous cycles, shows a very intense dynamic of transactions in both the upturn (+72%) and in the downturn (–53%). Finally, the second reshaped HC cycle has a very mild downsizing of

	House prices		Transactions	
	Upturn: 6(p.c.) + 1(c.c.) + 2(c.c.)	Downturn 3(c.c.) + 4(c.c.) + 5 (c.c)	Upturn 5(p.c.) + 6(p.c.) + 1(c.c.)	Downturn 2(c.c.) + 3(c.c.) + 4(c.c)
<i>Reshaped HC Cycle 1</i>	1976–1981	1982–1986	1976–1980	1981–1984
Duration (years)	6	5	5	4
Intensity of variation (%)	16.0%	–23.7%	32.4%	–37%
<i>Reshaped HC Cycle 2</i>	1987–1992	1993–1996	1985–1991	1992–1996
Duration (years)	6	4	7	5
Intensity of variation (%)	54.1%	–8.7%	23%	–5.3%
<i>Reshaped HC Cycle 3</i>	1997–2007	2008–2015	1997–2003	2004–2013
Duration (years)	11	8	7	10
Intensity of variation (%)	37.5%	–23.3%	71.9%	–52.9%
Average duration	7.6	5.6	6.3	6.3
Average variation	35.9%	–18.6%	42.4%	–31.6%

**Note(s):** p.c. = previous cycle; c.c. = current cycle

**Table 2.**  
Amplitude of aggregate duration and growth for the reshaped HCs (1976–2019)

prices during the downturn compared to its heightened expansionary variation of  $-8.7\%$  and  $+54\%$ . This latter fact might explain why for the second HC cycle of [Table 1](#), we do not observe a perfect match with the bubble period. Although [Baffigi and Piselli's \(2019\)](#) analysis shows that a bubble occurred during the period 1989–1997, HC dating and the slight decline in prices would instead suggest that the period 1988–2001 was characterized by a “structural” change in house price values.

Overall, we obtain the impression that housing cycles are not all alike and that the shape of the HC can be a complement to the analysis of housing market bubbles. This impression is further supported by the fact that we observe, as reported in [Figure 6](#), an almost perfect overlap between the build-up phase of the price-to-rent ratio and the upturn phase of prices in honeycomb dating.

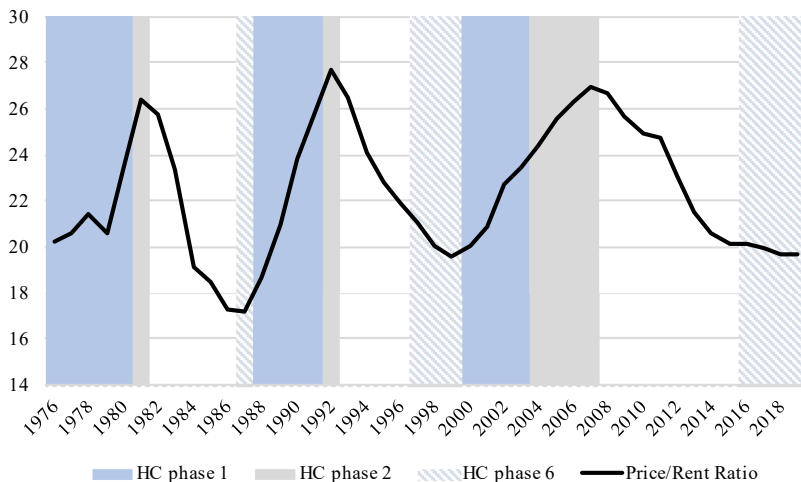
In addition, comparing the bubble periods dated by [Baffigi and Piselli \(2019\)](#) with our HC dating, there is some preliminary evidence that whenever a price bubble occurs, it is coincident with the start of phase 2 of the honeycomb cycle.

### 5. A measure of concordance between the honeycomb cycle and the business and credit cycles

In this section, we check whether the honeycomb phases observed in the Italian housing cycle match the expected dynamics in GDP and credit conditions. Regarding credit aggregates, we focus on total loans. The historical perspective adopted here allows us to refer to a variety of cyclical phases, providing a robustness check over a variegated time horizon.

Our test is tantamount to building a concordance index for each honeycomb phase, measuring the share of time during which GDP (credit) is experiencing the expected cyclical phase. For instance, in honeycomb phase 1, the growth of prices and transactions is fuelled by economic expansion. For this reason, it is plausible to expect that either GDP or credit are in an expansionary cyclical phase, fuelling primary and secondary housing markets. In contrast, in phases 3 and 4 of the HC, it is plausible to expect that most macroeconomic variables are experiencing a slowdown and a recession, respectively.

During the honeycomb phases characterized by opposite dynamics for prices and volumes (i.e., phase 2 and phase 5), a crucial role is played by the change in expectations of



**Figure 6.**  
A comparison between the price to rent ratio and the HC dating, Italy, 1976–2019

market returns, which anticipate the market decline (phase 2) and ascent (phase 5) in transactions. Since we employ yearly data, we are not able to model these phases with GDP and credit cycles. Finally, the last phase of the honeycomb cycle is expected to be characterized by a recovery for all variables.

Comparing the cycle of a macro variable with the 6 phases of HC requires an ad hoc approach. First, we define a 4-phase cycle for the business and credit cycle based on a standard decomposition of the growth cycle (GC hereinafter) around a trend: 1) expansion, positive growth above the trend; 2) slowdown, decline above trend; 3) recession, decline below the trend; and 4) recovery, positive growth below the trend. Second, we use an appropriately adapted version of the concordance index developed by [Harding and Pagan \(2002, 2006\)](#) to measure the co-movement between two HCs and GCs within each HC phase. To this end, we build a dummy variable for each HC and GC phase,  $S_{HC,j}$  and  $S_{GC,j}$ , taking value 1 when the involved series is, in a given year, in that specific phase  $j$ . We rule out phases 2 and 5 in the HC because they are related to expectations about future prospects in the economy, and we do not have historical data for economic forecasts. Therefore, we have four possible matches consistent with [Janssen \*et al.\*'s \(1994\)](#) assumptions:

Match 1: HC phase 1 ( $S_{HC,1} = 1$ ) and GC phase 1 ( $S_{GC,1} = 1$ ).

Match 2: HC phase 3 ( $S_{HC,3} = 1$ ) and GC phase 2 ( $S_{GC,2} = 1$ ).

Match 3: HC phase 4 ( $S_{HC,4} = 1$ ) and GC phase 3 ( $S_{GC,3} = 1$ ).

Match 4: HC phase 6 ( $S_{HC,6} = 1$ ) and GC phase 4 ( $S_{GC,4} = 1$ ).

The phase-adjusted concordance index, referring to the phase ( $j = 1, 3, 4, 6$ ) of the HC, is:

$$CI(j) = \frac{1}{n(j)} \left( \sum_{t=1}^{n(j)} S_{GC,t} S_{HC,t} \right)$$

where  $S_{GC,t}$  times  $S_{HC,t}$  takes value 1 when the GC and HC exhibit the matches listed above and 0 otherwise. The four phase-adjusted concordances are summarized in [Table 3](#).

[Table 3](#) shows that the adjusted concordance between the business cycle and the housing cycle reaches a peak in honeycomb phase 4 (approximately 67%) and declines to 54% in honeycomb phase 1. Interestingly, the highest concordance is observed during the two honeycomb phases characterized by the same direction of movement in prices and transactions. The evidence is especially troublesome if we consider that when the housing market is experiencing a recessionary phase (honeycomb phase 4), the business cycle is in recession in 67% of the time and is below trend in the remaining years.

Somewhat similar evidence is observed for the adjusted concordance between the housing and credit cycles, which reaches its high during phase 4 of the honeycomb cycle, approximately 56%, and then declines to 50% in phase 3 of the housing cycle, i.e., the largest concordance is observed when credit is declining.

Interestingly, during honeycomb phase 6, the concordance between external macro cycles and the housing cycle is quite low, although there is a substantial increase in concordance with the business cycle, reaching 75%, if we include both the recovery and expansion years of the GDP cycle, whereas for credit, the concordance increases slightly (37%).

In general, we must recall that the duration of the HC is not necessarily the same as that of the business or credit cycle, as clearly illustrated by the two panel of [Figure 7](#).

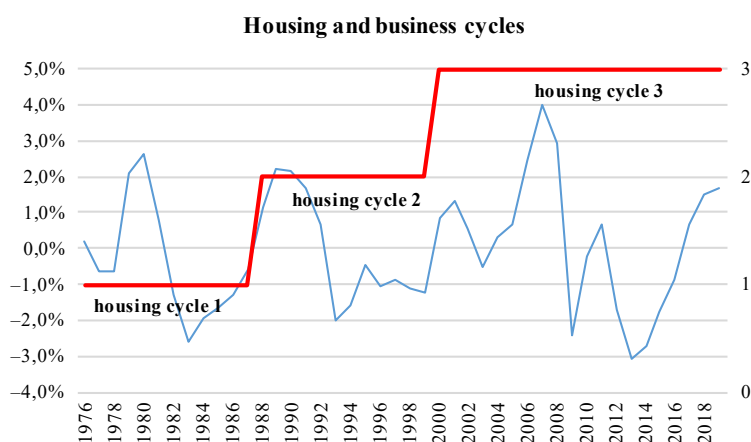
Regarding the business cycle, there is some overlap with the first two honeycomb housing cycles, especially with the second one, whereas for credit, the overlap is only limited to the second housing cycle. The most recent housing cycle (2000–2019) includes several business and credit cycles. This might be related to changes in the macroeconomic regimes that have taken place in recent decades, not only for Italy but also for many European countries, starting from the Economic and Monetary Union (EMU) and the

**Table 3.**  
Adjusted concordance index between the housing cycle and business cycle/credit cycle (1976–2019)

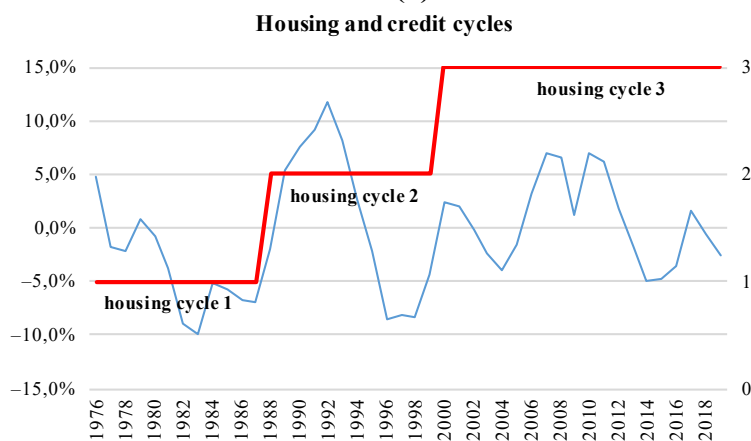
Honeycomb phases	Phase 1 Expansion	Phase 2 Negative change in expectations	Phase 3 Clear negative prospects	Phase 4 Crisis and recession	Phase 5 Positive change in expectations	Phase 6 Recovery
<i>Expected phases for GDP and CREDIT</i>	<i>expansion</i>	<i>around a peak/turning point</i>	<i>sloudown</i>	<i>contraction</i>	<i>around a trough/turning point</i>	<i>recovery</i>
Adjusted concordance business and housing cycle	54.0%	NA	25.0%	66.7%	NA	37.5%
Adjusted concordance credit and housing cycle	46.2%	NA	50.0%	55.6%	NA	25.0%

**Note(s):** Business and credit cycles are dated with the growth cycle approach (HP filter)





(a)



(b)

**Figure 7.** Housing cycle (honeycomb dating) compared to the business (a) and credit cycles (b)

spread of the second great recession. After the outbreak of the financial crisis, interest rate reductions have become one of the most important macroeconomic tools to mitigate the effects of the crisis. In fact, after the housing bubble burst, the EMU gradually reduced interest rates until rates became negative in most recent years. This may contribute to changing the relation between the business and credit cycles, on the one hand, and housing cycles, on the other. For instance, the last HC cycle is characterised by a long-lasting phase 3 (2008–2011, stagnant prices and declining volumes), which could be related to the low interest rate regime. This latter may have favoured price downward rigidity in a phase where transactions, which, as already pointed out by Oikarinen (2012) are relatively more sensitive to negative shocks, were negatively affected by the business cycle decline (GDP was in contraction).

Hence, from the values shown in Table 3, for the first time, we attempt to explain how house prices and transactions might respond jointly to external macroeconomic fluctuations by observing a sort of asymmetric concordance: macroeconomic drivers related to business

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and financial cycles display a cyclical pattern consistent with the housing cycle mostly during the contractionary phase of the honeycomb cycle. In contrast, the phase-adjusted CI shows that during the expansionary phase of the honeycomb cycle, the business and credit cycles show milder comovement with the housing cycle.

## 6. Discussion and conclusion

By including the housing market in models of business cycle fluctuations, the macroeconomic literature emphasises the interactions between the real estate sector and the economy as a whole. Among the empirical analyses aiming to date the housing cycle, the honeycomb approach by [Janssen \*et al.\* \(1994\)](#) provides a simple scheme based on the joint analysis of housing prices and transactions. This allows to define a dating of the housing cycle where transactions are typically leading for the housing price dynamics.

In this article, we employed this approach to investigate housing cycles in Italy from 1927. The analysis highlights that the shape of the honeycomb varies considerably with the historical period under consideration and the dynamics of exogenous macro factors.

We found that housing market dynamics have been consistent with honeycomb dating only since the second half of the 1970s. Interestingly, also the price to rent ratio shows a very regular pattern from this same date. In contrast, the first (1927–1941) and second subsamples (1946–1973) show, respectively, an exogenous event (Second World War) and some structural changes, i.e. the post-war outstanding economic boom and an unprecedented urbanization, which resulted in anomalous housing market dynamics not featuring the six sequential phases of HC.

Based on this evidence, to better investigate the relationship between the external dynamics and honeycomb phases, we focused only on the second half of the 1970s.

Interactions between the housing cycle and the business and credit cycle have been stronger in the contraction phase of the last three HC. Our results show that severe downsizing of the housing market, (HC phase 4), is to a large extent associated with business and credit contraction, certainly contributing to exacerbating the severity of the recession.

However, contrary to what is expected from the literature, the Italian housing cycle dated by the HC approach tends not to necessarily be contained within the time scale of a single business and credit cycle. This happens in particular for the last HC dating from 2000 in which the presence of multiple business and credit cycles is evident, signalling how the Italian housing market was able to cushion (at least in terms of the rate of fall in asset value) the blow of the great recession caused by the bursting of the US housing bubble.

In addition, for the last subsample, preliminary evidence suggests that whenever a price bubble occurs, it is coincident with the start of phase 2 of the honeycomb cycle. Since the present empirical study focused on Italy only, an analysis considering a wider set of countries could help support this evidence. In this respect, one of the most promising extensions might be investigating whether the phases of the honeycomb can be used as an indicator of boom-bust phases in the housing sector, jointly with other well-known indicators (e.g., price-to-rent ratio).

Furthermore, the analysis conducted since 1927 has highlighted the fact that HC only emerges after a certain historical period (the mid-1970s), suggesting that further research to validate this model should focus only from a certain period onwards. Not surprisingly, this period coincides with the period of change in the financial structure of many OECD countries where the different characteristics and levels in terms of flexibility/development of the residential mortgage markets are relevant for the impact of monetary policy shocks to residential investment and house prices, as demonstrated in [Calza \*et al.\* \(2013\)](#). Future research may consider assessing the impact of these shocks on the number of transactions. Indeed, the fluctuations of residential transactions have leading features with regard to the

phase change of prices in all the three HC cycles here investigated. Therefore, our study opens a new path of analysis: the existence of a transmission channel of monetary policy that operates through housing market volumes.

Regardless, the honeycomb approach is far from the perfect tool for highlighting the phases of the housing cycle. There are various limitations of our studies to be taken into account: first, the unavailability of historical data that could separate the primary market from the secondary market; second, the frequency of data for which annual data is appropriate for honeycomb dating but greater data frequency would be more suitable for studies of different cycle concordances; and third, since there is no true national real estate market, this analysis should be accompanied by local studies or at least of regional macro areas to more precisely grasp the heterogeneous aspects that are present in the Italian residential real estate sector.

#### Note

1. See [Table 1](#) in [Calza et al. \(2013\)](#) for detailed institutional characteristics of national mortgage systems between 19 OECD countries.

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