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DOES TOURISM AFFECT HOUSE PRICES? SOME EVIDENCE FROM ITALY

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Abstract

The purpose of the present work is to analyze whether – and to what extent – tourism activity affects urban house price dynamics in Italy. Using a system Generalized Method of Moments (GMM-SYS) approach and after controlling for socioeconomic characteristics of the local housing markets as well as amenities and disamenities, we test for the effect of tourism by employing a composite index that enables us to capture the complexity of the tourism market. Data consist of yearly observations on the average house prices of 103 Italian cities over the period of 1996-2007. The results confirmed by several robustness checks demonstrate that tourism activity positively affects house prices. In addition, this work provides several first hints that this relationship might not be the same for all types of cities; hence, further developments of the present work should proceed in the direction of searching for different potential regimes through the use of mixture models.

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Introduction

Tourism destinations worldwide have experienced inflows of national and international recreation capital as the result of increased demand for recreation services and holiday accommodation –the latter both for use and investment purposes. This increase in demand for holiday housing has been the result of socioeconomic changes, such as the expansion of wealth, increase in the lifetime flow of earnings (Müller *et al.* 2004; Müller 2002; Williams *et al.* 2000), longer periods of and greater value given to leisure time and the rising number of retirees with disposable time and income (Norris and Winston 2009). Moreover, and particularly in the case of international tourism, this process has been aided to a great extent by improved access to communication and transportation (Gustafson 2002; Magalhaes 2001; Williams *et al.*, 2000) as well as the formation of a globalized property market facilitating the purchasing process of properties abroad (Williams *et al.*, 1997). In several cases, weak currencies in host communities (Hines 2001) have also played an important role in the increase in demand for recreation accommodation – as this was also viewed as an income-generating/investment opportunity. As a result, local housing markets have felt the pressure of quantitative and qualitative changes following the increased demand for already existing housing stock as well as increasing interest from developers for the provision of new accommodation.

Given the large flow of tourists internationally and the peculiar characteristics of the tourism good, it is not surprising that tourism is becoming a key source for local economic growth – resilient despite the continuing economic uncertainties in markets worldwide. Theoretical and empirical studies on the so-called tourism-led growth hypothesis confirm the positive effect of tourism on local, regional and national economies (Paci and Marrocu, 2013; Brida *et al.* 2014). The bundle of non-traded goods and services (Sinclair and Stabler, 1997) that compose the tourism good (including natural and cultural amenities) determine the impact of tourism on local economies. However, tourism might also simultaneously be the source of various sorts of negative environmental or social externalities that can be a large detriment to local residents or segments of the local population (Biagi and Detotto, 2014; Biagi *et al.*, 2012).

Research both in the fields of tourism economics and housing studies recognizes that tourism and tourist-related activities can affect housing markets directly as well as indirectly: directly, via the 'external' demand generated by tourists that 'competes' whit the local resident communities (and in several cases with each other) for land and housing in tourist destinations; and indirectly via the capitalization of tourism-related amenities and disamenities in the market price and value of housing (see Biagi *et al.*, 2012 for a comprehensive review). However, studies that attempt to 'quantify' the overall effect of tourism activity on the housing market and empirically test the

relationship between tourism and house prices are limited. These studies are mainly based on evidence from the US and focus on a cross-sectional rather than dynamic relationship between tourism activity and house prices.

The present paper adopts the inverted demand approach used in the housing literature (Mankiw and Weil, 1989; Muellbauer and Murphy, 1997; Stevenson, 2008) and examines the effect of tourism activity on local house price dynamics. This paper looks at the case of Italy - the fifth most popular tourist destination country in the world (UNWTO, 2013) - and provides evidence to suggest that property prices in Italian cities might be affected not only by economic and demographic factors but also by each city's tourism activity. In the case of Italy, there is limited research that attempts to measure the effect of tourism on the housing market and house prices in particular. The present paper makes use of a panel dataset at the urban level, with yearly observations for the period 1996-2007, and performs a system Generalized Method of Moment (GMM-SYS) to test the effect of tourism on house price dynamics in Italy. The tourism market is measured by employing a composite index, which encompasses both the tourism supply and tourism demand variables, thus capturing the complexity of the tourism sector.

Our findings suggest that the tourism/house price relationship is positive and significant. This outcome can be considered 'good news' for cities: overall (on average) tourism would represent a positive externality and act in a supplementary way to boost urban economies in Italian cities.

The paper is organized as follows: section 2 reviews the relevant literature on the links between tourist activity and the housing market. Insights are offered from theoretical and empirical literature in the fields of tourism, housing economics and planning. Section 3 illustrates the general model (section 3.1), the statistical characteristics of the dependent variable (section 3.2), the composition and the methodology used to build the tourism index (section 3.3) and the empirical model employed (3.4). Section 4 presents the GMM estimator. Section 5 discusses the econometric results of the baseline model, and the robustness checks performed. Finally, section 6 offers several tentative conclusions and outlines the policy implications of this work.

2. Literature review

Previous research on the relationship between tourism and property prices has focused on tourism–related accommodation such as hotels, apartments, cottages or holiday homes. In the majority of cases, the hedonic method is applied to explore the effect of location amenities on the price of tourism accommodation such as hotels (Espinet *et al.*, 2003; Hamilton, 2007), holiday cottages rented by firms that specialize in tourism accommodation (Le Goffe, 2000; Vanslembrouck *et al.*, 2005; Fleischer and Tchetchik, 2005; Taylor and Smith, 2000; Nelson, 2009), and coastal single–

family houses and small condominiums (Pompe and Rinehart, 1995; Rush and Bruggink, 2000; Conroy and Milosh, 2009)[1].

Other studies apply the hedonic method to evaluate the effect of the presence of open spaces such as public parks, natural areas, golf courses, and other types of amenities on all properties located in close proximity (Bolitzer *et al.*, 2000 for Portland in Oregon) to the metropolitan area as a whole or in suburban areas (Do et al., 1995 for a sample of properties in San Diego, California; Luttik, 2000 for a set of cities located in the Netherlands, Anderson *et al.,* 2006 for property located in Minneapolis – Saint Paul Metropolitan area, Nicholls *et al.*, 2007 for Pebble Creek in Texas).

The main shortcoming of these works is they are case-specific (*i.e.*, they focus on one city, one neighborhood, etc.) or amenity-specific (they examine the impact of beaches, parks, golf courses on hotel or property prices). As such, they do not analyze the effect of tourism activity as a whole (demand and supply factors).

Furthermore, the application of the hedonic approach to property values per se is not without drawbacks including: 1) it requires microeconomic data very difficult to find (*i.e.*, house prices for individual properties); 2) the majority of works use linear specifications, but the linearity of equilibrium in hedonic models is questioned (Ekeland *et al.*, 2004); and 3) all the applications employ cross-sectional analysis rather than time-series or panel analysis.

Looking specifically at the literature on house prices, the effect of various drivers on house prices is empirically tested with equations representing inverted demand or supply. Moreover, given the difficulty to find data on the supply side of the market (such as, for instance, planning regulations and land use) and given the slow response of the housing supply and prices in producing any changes in the market, the majority of applied research focuses on the demand side (Mankiw and Weil, 1989 for US; Muellbauer and Murphy, 1997 for UK; Tsastaronis and Zhu, 2004 for seventeen industrialized countries; Stevenson, 2008, for Ireland). Several studies use reduced equations including demand and supply factors, such as, for instance, the work of Malpezzi (1996) on a cross-section of US cities and Yu (2010) for a set of thirty-five Chinese cities over the time-span of 1998-2007 (see also Kajuth, 2010 for the case of Germany).

Overall, studies mainly focus on the analysis of the effects of economic and demographic factors on house prices. Few works employ panel or similar methods to control for fixed effects at a city or regional level (Capello, 2002, for ninety-five provincial capitals of Italy over the period 1963- 1997; Yu, 2010). Several papers use cointegration analysis (Malpezzi, 1999, for one hundred thirty-three metropolitan areas in the US; Stevenson, 2008, for Ireland), while recently, other applications employ dynamic panel and generalized method of moment analyses (GMM; Sadeghi *et al.*, 2012 for Iran; Browing *et al.*, 2008 for Denmark, Kajuth, 2010 for Germany; Wang *et al.*, 2012, for Taiwan). However, as already stated previously, these studies

do not specifically investigate the effect of place-related amenities or other types of externalities on house prices.

The main purpose of the present paper is to demonstrate the presence of tourism markets (not just a single type of tourist accommodation or tourism-related amenity) affects the price of properties located in metropolitan areas. For example, in the case of Italy, which is the fifth most popular tourist destination in the world (UNWTO, 2013), property prices might be affected not only by economic and demographic factors but also by each city's tourism activity. Only a limited amount of research that attempts to measure the effect of tourism on the housing market and house prices has thus far been conducted for the case of Italy. One of the few studies is that of Biagi *et al.* (2012) on a cross-section of Sardinian municipalities for the year 2001[2]. More recent work includes that of Cannari and Faiella (2008) in which the effect of tourism is explored using a sample of Italian municipalities for the year 2002. In this work, tourism is measured as the share of firms operating in the tourism industry; however, it is unclear which type of tourism-related businesses are included in the sector.

3. Data and empirical model

3.1The general model

The present paper adopts the inverted demand approach used in the housing literature (Mankiw and Weil, 1989; Muellbauer and Murphy, 1997; Stevenson, 2008). In particular, we consider all observations of prices and quantities as equilibrium values, and we use an inverted demand equation where house prices in a municipality i at time t depend on the stock of houses (Q), income per capita (Y), and demographic variables such as resident population (P). Mortgage rates and housing-related taxation are normally included as drivers of housing demand. However, because we focus on a set of Italian municipalities (provincial capitals), we can assume that local housing markets in Italy are subject to the same financial and taxation structure (European Central Bank, 2003).

Furthermore, in the present model, house price depends also on location-specific amenities/disamenities (A) (Do *et al.*, 1995; Luttik, 2000; Anderson *et al.*, 2006; Nicholls *et al.*, 2007), and on tourism-related activities indicated with T (Biagi *et al.*, 2012; Cannari and Faiella, 2008).

Hence, house prices of the *i-th* municipality (for i= 1, 2, …103) at time t (for t= 1, 2,…12) can be formally expressed as:

$$HP_{it} = f(Q_{it}, Y_{it}, D_{it}, A_{it}, T_{it}) \quad (1)$$

where:

HP= real house prices per square meter

Q= house quantity (stock)
Y= local income per capita
D=demographic variables
A= amenities/disamenities
T= tourism-related activities (tourism index)

House prices are expected to be decreasing in Q (*i.e.,* as the price increases, the quantity of houses demanded at a local level decreases) and increasing in Y and D because municipalities with higher incomes and population are expected to be associated with higher house prices. Furthermore, house prices should be increasing in A for amenities (*i.e.,* as the level of public and private services supplied in the city increases, the price increases) and decreasing in A for disamenities (*i.e.,* as the pollution, crime, congestion, and noise increase, the price decreases). Tourism related activities T are understood to affect house prices in two main ways: directly, via the 'external' demand generated by visitors that 'competes' with the local resident communities for land and housing; and indirectly, via the development of tourism-related amenities that affect the market price of all houses located in the city. As such, the tourism-house price relationship is expected to be positive –when tourism acts as a *boost* for the local economy - or negative –when the negative externalities that tourism activity generates predominate.

3.2 House price in Italy

According to the Bank of Italy, the real estate sector in the country (building investments, rent expenses and brokerage services) represents approximately 20% of the national GDP. For the Ministry of Finance, in 2010, the average house price per square meter in Italy was approximately 1,578 euros.

Despite the importance of the housing sector for the national and local economy, the Italian National Institute of Statistics (ISTAT) does not provide any official house price data series. Applied research employing house price data for Italy makes use of data derived from six main sources (see Appendix-TABLE A.1). The source of house price data employed in the present study is 'Annuario Immobiliare,' a property directory published by the Italian financial newspaper, Sole 24Ore. Annuario Immobiliare provides time series data on the average value (per square meter) of new housing and residential buildings located in the center, semi-center and outskirts of one hundred and three cities in Italy[3]. Empirical work that has employed this data set includes that of Capello (2002) in which the determinants of urban development in Italy was analyzed, and the work by Caliman (2008, 2009) and Caliman and Di Bella (2011)[4] in which house price dynamics was investigated with particular emphasis on the effects of the housing market bust on house prices in Italy.

House price data of *Annuario Immobiliare* for the period of 1967-2007 indicate that prices of new dwellings (per square meter) in the one hundred and three Italian cities analyzed increased by 15.6% per year. Overall, four main phases can be identified in the evolution of the real prices of new dwellings[5]. The end of the sixties and the first half of the seventies were characterized by the rise of prices due to the 1973 oil shock, which has increased investment in dwellings. The rise then accelerated starting in 1978, presumably due to the prospective oil shock, and continued until the beginning of the eighties. Since the second half of the eighties, house prices decelerated due to the worsening outlook in household income; however, in the second part of this period, quotations increased quite sharply, peaking in 1992. A prolonged recession started in 1992 and lasted until 1999. Since then, a moderate recovery was observed starting in 2000, which was accelerated in 2001 (+10.5%) and was followed by a moderate slowdown since then.

[FIGURE 1 HERE]

During 1967-2007, the prices of dwellings located in different areas of the cities grew at different paces. More specifically, house prices in city centers increased more than in semi-centers and in outskirts. As Figure 1 shows, house prices in these three locations followed similar trends until the 1970s; after that period, they started to diverge slightly.

MAP 1 shows the distribution of house prices per square meter for the Italian provincial capitals in 2007. As noted in the map, the areas with the highest house prices are concentrated in the northern part of the country.

[MAP 1 HERE]

3.3 The tourism index

Italy ranks fifth in the rankings of the most visited countries in the world (UNWTO, 2013). According to recent analysis, the direct contribution of Travel & Tourism to GDP in Italy in 2012 was approximately sixty-three billion euros (4.1% of GDP; WTTC, 2013); considering also the indirect and induced effects, this amount increases to 161 billion (10.3% of GDP). According to ISTAT in 2012, Italy recorded three hundred and eighty million nights of stay (domestic and international tourists; ISTAT, 2013). This indicator is very important because it measures the length of visitors' stays and represents a further proxy of the impact of tourism on the economy as a whole.

A large number of businesses participate in the provision (supply) of the 'tourist product' – from hotels and recreation to catering businesses and transport services. In providing tourism statistics, ISTAT delivers information about the number of businesses operating in the formal tourist accommodation sector in Italy (hotels,

camp-sites, tourist villages) as well as the number of tourists that choose each type of accommodation and duration of stay (demand). Nights of stay is the most commonly used indicator of tourism demand, as it represents the ability to hold visitors in a tourist destination, while tourist arrival is used as proxy for the capacity to attract people.

Data on the supply of formal tourist accommodation are a good proxy for the tourism 'orientation' of destinations; however, they underestimate the phenomenon because many tourists choose informal tourist accommodation, such as apartments. According to Gambassi (2006), formal tourist accommodation in Italy represents only one-third of actual tourist arrivals. To overcome this limitation, in this paper and following the previous exercise of Biagi *et al.* (2012), the tourism market is measured through a tourism index. The use of a composite measure should provide a continuous indicator that includes demand and supply side aspects. The index is composed of the following four variables (see Table 1):

1. *Total number of formal tourist accommodation (TOTAL ACCOMMODATION).* Other than providing information about the number of businesses operating in the formal tourist accommodation, this *tourism supply* variable works as a proxy for local amenities directly linked to the tourism sector (restaurants, spas, bars, gyms, etc.). This variable is expected to positively affect the price of dwellings because -*ceteris paribus*- municipalities with a higher quantity of tourism-related amenities are expected to have higher house prices. Data on hospitality businesses come from tourism statistics of ISTAT and are provided yearly at the municipality level.

2. *Nights of stay of tourists in formal tourist accommodation (NIGHTS OF STAY).* This variable represents the demand for formal accommodation at a municipality level. The increase in the local demand produces a pressure on house prices; given the supply, after the adjustments, the new equilibrium price tends to be higher. Data on nights of stay come from tourism statistics provided by the National Institute for Statistics (ISTAT); we use yearly data at the provincial level, which is the most detailed geographical level available for this indicator.

3. *Total revenues of museums (TOTAL REVENUES OF MUSEUMS).* This variable can be interpreted as a measure of the importance of cultural amenities in the destination. *Ceteris paribus*- municipalities with higher cultural amenities are expected to have higher house prices. This variable comes from the *Italian Ministry of Cultural Heritage* and is calculated by multiplying the number of sold tickets in public museums, monuments and archaeological areas by the ticket price; it is available at municipality level.

4. *Second homes (SECOND HOMES).* This variable represents a proxy for the quantity of homes owned by the non-resident population that are used as holiday homes. It can also be considered an indicator of the quantity of homes available for tourist rental. We expect that as the demand for second homes increases, the price of all dwellings located in the municipality will increase. Unfortunately, ISTAT does not

provide data on second homes owned or rented to tourists; the data available are the total number of dwellings not used for residential purpose by the resident population. This variable comes from Census data at a municipality level (year 2001).

Intentionally, and to facilitate the interpretation of the empirical results, the index contains a limited number of variables related to both the demand and supply of tourist accommodation.

As in Biagi *et al.* (2012), the methodology used to construct the index is the Van der Waerden (VDW) ranking score, which is a type of fractional rank (FR) defined as:

$$\mathrm{VDW}_{i,t} = \frac{R_{i,t}}{(n+1)} \qquad (2)$$

where:

$\mathrm{VDW}_{i,t}$ = Van der Waerden rank for city *i* at time *t*;
R_{it} = rank of each provincial capital for each year.

The VDW fractional rank is a simple way of standardizing scores so they range from 1/(n+1) to n/(n+1). High scores correspond a higher amount of tourist areas and vice versa. After computing the VDW index for each variable separately, the average of the four scores is calculated to obtain the final index of tourism for each city under analysis:

$$Tourism\ Index_{i,t} = \frac{\sum_{j=1}^{4} VDW_{i,j,t}}{4} \qquad (3)$$

MAP 2 shows the results of the index for the top ten tourist cities in 2007. As shown in the table, seven cities are distributed throughout the North (Venice, Verona, Turin, Milan, Florence, Ravenna, Rimini), two are located in the Centre (Perugia and Rome), and one is located in the South (Naples). Eight out of ten are art-cities (Venice, Verona Turin, Milan, Perugia, Rome and Naples), and five are located along the coast and represent the most popular tourist destinations in Italy (Venice, Ravenna, Rimini, Rome and Naples).

By comparing MAPS 1 and 2, it is observed that areas with the highest house prices are concentrated in the northern part of the country while areas with high tourist orientation are geographically more widely spread.

[MAP 2 HERE]

3.4 Empirical model

This study proposes a panel data approach to investigate the dynamics among tourism and house prices for 103 Italian municipalities (provincial capitals) over the time span of 1996-2007[6]. The empirical model is as follows:

$$HP_{i,t} = \beta_0 + \beta_1 TOURISM_{i,t} + \beta_2 HOUSING\ STOCK_i + \beta_3 CRIME_{i,t} + \beta_4 PED\_AREA_{i,t} + \beta_5 COAST_t + \beta_6 INCOME_{i,t} + \beta_7 GROWTH_{i,t} + \beta_8 POPULATION_{i,t} + \beta_9 NETMIGRATION_{i,t-2} + \beta_{10} DEATH_{i,t} + \beta_{11} EURO_t + \beta_{12} ART_i + \beta_{13} CAPITAL_i + \beta_{14} SOUTH_i + \beta_{15} YEAR_t + \eta_i + \varepsilon_{i,t} \quad (4)$$

A full description of the variables and several descriptive statistics are provided in TABLES 1 and 2. The dependent variable is the annual average of house prices per square meters deflated by the Consumer Price Index (CPI) in level. We also estimate the model for the house prices in the center, in the semi-center and in the outskirts. $HP_{i,t}$ is the average real price of new housing per square meter in the *i*-th municipality for the time span of 1996-2007 (the nominal house price over the consumer price index[7]). As discussed previously, the price of new housing is used as a proxy for the average price of the existing stock of residential houses.

TOURISM is the index used to capture the tourism market at the destination site. The effect of tourism on the house markets is expected to be either positive or negative. In the former case tourism activity generates local economic growth, in the latter case it creates negative externalities at the destination sites (congestion, crime, noise and so on).

HOUSING STOCK is the number of new houses built in 1991. This variable represents a proxy for the local demand of housing; as such, we expect a negative correlation with house prices. It is worth recalling that we assume the equilibrium price; therefore, the housing demand should be equal or close to the stock of houses in the cities under investigation.

CRIME, *COAST*, *PED_AREA* and *ART* are all indicators of the amenities/disamenities in the investigated area. Specifically, *CRIME* is the total crime per capita and represents a local disamenity; *COAST* is a dummy variable that takes the value one if the municipality is located on the coast and zero otherwise. We expect a positive sign for this variable. *PED_AREA* indicates the size of pedestrian areas in the city (square meters per one hundred inhabitants). Usually in Italian cities, the presence of pedestrian areas is associated with well-preserved historical spaces and distinctive neighborhoods; therefore, a positive sign is expected for this variable. *ART* is a dummy variable that takes the value one if the city is an art-city and zero otherwise. Art-cities in Italy have a high-quality historic and cultural urban environment, and the expected sign is positive.

INCOME and *GROWTH* are, respectively, the average income of the resident population in level and in growth rate; variables are proxied with value-added per capita at real prices. Local income is expected to be positively correlated with property prices (Malpezzi, 1996; Leishman and Bramley, 2005; and Kajuth, 2010).

EURO is a dummy variable that controls for the introduction of the euro in 2002 and also for other legislative changes concerning the housing market that occurred specifically in Italy at the end of 2001 (abolition of inheritance tax on October 25, 2001, and the suppression of the so-called INVIM, which is a tax on capital gains on the properties on December 28, 2001; Caliman, 2009). This variable is expected to be highly significant and positive.

POPULATION refers to the resident population and controls for the local demand of housing (Caliman, 2009). As also used in Leishman and Bramley (2005), the model controls for *NET MIGRATION* (total number of in-migrants minus total number of out-migrants) and is expected to be positively correlated with house price. Finally, *DEATH* is the total number of people who died over the living resident population. *CAPITAL* and *SOUTH* are dummy variables that control, respectively, whether the city is the capital of the region (Caliman, 2009) and whether is located in the Southern and poorer part of the country.

All variables are expressed in log-level terms; as such, the coefficients can be interpreted as elasticities. Finally, η_i and $\varepsilon_{i,t}$ are the province fixed effect value and the error term, respectively; we assume that $E(\eta_i)=0$, $E(\eta_i, \varepsilon_{i,t})=0$, $E(\varepsilon_i)=0$.

[TABLE 1 HERE]

[TABLE 2 HERE]

4. Methodology

The purpose of the present work is to analyze whether tourism activity (tourism market) affects urban house price dynamics. Data consist of yearly observations of average house prices in 103 Italian cities over the period of 1996-2007. From a methodological point of view, the key issue at this stage is selecting the most suitable estimator; this crucial choice can be performed only after having addressed various steps. First, possible persistency in house prices that might affect their temporal dynamics should be explored. In other words, it is imperative to investigate whether actual prices are correlated with past prices (serial correlation). Literature on housing shows that house price series are persistent over time (Browing *et al.*, 2008; Demary, 2009; Sadeghi *et al.*, 2012), meaning that the level of house prices at time *t* depends strongly on the house prices at time *t-1*. Therefore, the analysis of the static model is needed to control for serial correlation in the idiosyncratic error term. Hence, we perform the Wooldridge test (Wooldridge, 2002) for serial correlation after regressing

random, fixed and between panel Ordinary Least Squares (OLS). Serial correlation in the residuals was confirmed[8].

The following step is to check whether house price are stationary ($\alpha>1$) or if they have unit roots ($\alpha=1$). As explained by Browing *et al.* (2008), the presence of unit roots would indicate that possible shocks to the housing prices are permanent; in this case, using OLS for estimating our model would provide efficient estimates. Conversely, if the process is stationary, the use of OLS would give biased results. A series of panel unit root tests are then performed to check the stationarity of the dependent variable (Levin *et al.,* 2002; Im *et al.*, 2003; Maddala and Wu, 1999). The obtained results confirm the stationarity of the house price series for the time span under analysis[9].

Both results indicate that using OLS would give biased results. A further element that makes OLS an unsuitable estimator for our purpose is the possibility that some -or even all- explanatory variables are endogenous. In dynamic models, when the process is stationary and the independent variables are not strictly exogenous, the literature suggests using Generalized Method of Moment (GMM), which is considered the most efficient and unbiased estimator for such cases (Baum, 2006; Roodman, 2009). GMM allows economic models to be specified, thus avoiding unnecessary assumptions, such as, for instance, specifying a particular distribution for the errors (Greene, 2007). GMM is a flexible econometric technique developed by Arellano and Bond (1991) and improved by Arellano and Bover (1995) and Blundell and Bond (1998). The estimation of GMM is performed with the STATA routine Arellano-Bond1 (difference: GMM-DIFF) and Arellano-Bond (system: GMM-SYS)[10].

After choosing the estimator based on the criteria outlined above, a further and necessary step is to decide which type of GMM is suitable for our case. In short, we determine whether it is better to perform a GMM in the difference or in the system form (GMM-DIFF or GMM-SYS). In our model, it is also critical to control for time invariant dummies. This possibility is allowed only by the system version of GMM (see also Caliman, 2009). Additionally, following Roodman (2009), GMM-SYS was designed for cases with small panel data sets, when, among others: a) the number of the observations is greater than the time periods ($n>t$); b) the functional relationship is linear; c) the model is dynamic; and d) the independent variables are not strictly exogenous. In addition, for small samples, Blundell *et al.* (2000) suggest the use of one-step GMM-SYS, as the two-step procedure is asymptotically more efficient (*i.e.,* it is more efficient for large samples). In the one-step estimate, the model consists of a system of equations -as many as the t under analysis. In each equation, the endogenous variables in level are instrumented using lags of their first difference.

In this empirical application, the number of observations ($n=103$) is higher than the time period ($t=12$), the dynamic among the dependent and the independent is supposed to be linear; the independent variables (all except the dummies) are

expected to be correlated with their past and with the error, and time-invariant dummies need to be controlled. Given all those characteristics, GMM-SYS is the preferred form and the dynamic version of model 4 becomes:

$$HP_{i,t} = \beta_0 + \beta_1 HP_{t-1} + \beta_2 TOURISM_{i,t} + \beta_3 HOUSING\ STOCK_i + \beta_4 CRIME_{i,t} + \beta_5 PED\_AREA_{i,t} + \beta_6 COAST_t + \beta_7 INCOME_{i,t} + \beta_8 GROWTH_{i,t} + \beta_9 POPULATION_{i,t} + \beta_{10} NETMIGRATION_{i,t-2} + \beta_{11} DEATH_{i,t} + \beta_{12} EURO_t + \beta_{13} ART_i + \beta_{14} CAPITAL_i + \beta_{15} SOUTH_i + \beta_{16} YEAR_t + \eta_i + \varepsilon_{i,t} \quad (5)$$

The GMM approach has been recently applied in empirical studies on the determinants of house prices: Browning *et al.* (2008) use a GMM-SYS to analyze 275 Danish municipalities during the time span of 1985-2001 (4,675 total observations), Kajuth (2010) performs a GMM to investigate German house prices for the time span of 1975-2008, Wang and Chung (2011) apply a micro panel of 8,134 Chinese households for the time span of 2000-2006, and Sadeghi *et al.* (2012) employ a GMM to examine housing price determinants in three cities of Iran for 32 years (96 total observations). For the purposes of the present analysis, the work of Caliman (2009) is particularly relevant as it applies a GMM-SYS to investigate the house price dynamics of a panel of 103 Italian provinces[11] over the period of 1995-2003. The author uses the same data source of the present paper but at a more aggregate level (provinces rather than municipalities). The econometric properties of the panel under analysis are almost the same, and the author concludes that the GMM-SYS is the most suitable estimator.

5. Results

TABLE 3 illustrates the results of System GMM estimates[12]. Using variables in logs allows us to interpret coefficients as elasticities. As demonstrated from the table, the coefficient of the lagged response variable (AVERAGE HOUSE PRICES$_{t-1}$) is positive and highly significant, indicating strong persistence in the series of house prices: the value of 0.49 means that if house prices at time *t-1* increase by 1%, the house prices at time *t* will increase by 0.5%. The persistency is also confirmed in previous work on the Italian housing market. In particular, Caliman (2009) uses a GMM-SYS to investigate a panel of Italian provinces over the period of 1995-2003. The author finds a coefficient of 0.89, which is significantly higher than that determined in the present work. However, in a more recent analysis Caliman and Di Bella (2011), using a time span very similar to that used in the present paper (1995-2008), find a coefficient equal to 0.48; this outcome definitively confirms the robustness of our result. In the case of other countries, it is worth noting that recent GMM applications confirm the persistency of house prices (for instance Browning *et al.*, 2008 for the Danish housing market; Yu, 2010 for a panel of Chinese cities). In

TABLE 3 (see columns 2, 3 and 4), it is worth noting that the persistency of house prices increases for dwellings located in the center and decreases for those sited in the semi-center and the outskirts.

[TABLE 3 HERE]

The variable *TOURISM* is confirmed to be highly significant and positively correlated to house prices: this means that *ceteris paribus* places characterized by higher tourism vocation exhibit higher house prices. Specifically, on average if the tourism index increases by 1%, house prices rise by 0.20%. This result is in line with findings of Biagi *et al.* (2012) – where a similar index is employed in the case of Sardinia – as well as findings of Cannari and Faiella (2008) - where the analysis of a sample of Italian municipalities derives similar results. This positive link needs to be interpreted cautiously because cities in Italy differ significantly as tourism destinations; in addition, another source of caution in the interpretation of this result is the fact that tourism is just one of the various economic activities in cities that generate local growth and hence can explain higher house prices. Notwithstanding, the outcome is very interesting and can be interpreted as a sign that tourism activity activates and increases housing demand and supply at the destination site but also that the presence of tourism amenities generates positive externalities on house prices. As such, on the one hand, this outcome can be considered 'good news' for cities: tourism specialization in Italy, on average, would represent a positive externalities and a supplementary way to boost local economies and local housing markets. On the other hand, the pressure on house prices due to the external housing demand generated by tourists, holiday home/second home owners, retirees and tourist (seasonal) working population, might create problems of affordability and displacement for local communities. Furthermore, tourism specialization might create other negative effects such as, for instance, congestion, crime and noise. Additionally, it is likely that as house prices increase, additional costs are imposed on the resident population due to the rise of property taxes. It is worth recalling that the sample under analysis is characterized by a large variety of cities; hence, this final result can be driven by the role played by several cities or a group of similar cities. The next section is devoted in demonstrating the robustness of this result and in discussing the effect of tourism for cities with different characteristics. Table 3 and columns 3 to 5 in particular suggest that the impact of tourism is higher on average for housing located in central and semi-central locations.

Regarding amenities/disamenities, *CRIME* is significant at 5% only for properties located in the semi-center and has the anticipated negative sign: if total crime per capita increases by 1%, house prices will decrease almost by the same percentage (0.7%). It is likely that the focus of criminal activity is the semi-center rather than the center because in the semi-center, the properties have still high

values, but the security is normally less than those normally employed in the city center. *PED_AREA* and *COAST* are not significant; however, it is worth noting that only 36% of cities in the sample are located on the coast[13].

As emphasized in the housing literature (Malpezzi, 1996; Kajuth *et al.*, 2010; Caliman and Di Bella 2011; and Sadeghi *et al.*, 2012), *INCOME* has a strong positive effect, which means that in wealthy cities, the equilibrium house prices are relatively higher due to the structural quality and quantity of the housing investment. The variable GROWTH is positive and significant at 10% but only for houses located in the outskirts.

POPULATION is observed to have a very high impact on house prices even though it is significant at 5%[14]. Caliman and Di Bella (2011) strongly emphasize that this variable represents a further proxy for housing demand or potential buyers. *NET MIGRATION* is not significant, which is most likely because we use net migration rather than in-migration and outmigration separately. The attended sign was positive rather than negative; however, Leishman and Bromley (2005) analyze housing price in a sample of British districts and observe that in-migration is significant and negatively correlated with house price, while the sign and significance of out-migration is uncertain.

Among the dummy variables, *EURO* is strongly significant (1%) and has the expected positive sign: the introduction of a single currency in the EU generates a revaluation effect on property values in Europe as a whole and in Italy in particular (see also Caliman and Di Bella, 2011). Additionally, it is very likely that the abolition of both inheritance tax and taxes on capital gains on properties, which occurred in Italy in 2001, has reduced housing costs and caused an increase in housing demand and, consequently, the equilibrium prices. Regarding the other dummy variables, the only other significant one is *SOUTH* (1%); as expected, the sign is negative meaning that houses located in the poorer part of the country (the South) have relatively lower prices. This result represents a further confirmation of the effect of local wealth and GDP on house prices.

Finally, the *HOUSING STOCK* variable is not significant; this could most likely indicate a problem with the proxy variably on the total housing stock (which was only available for 1991) due to the lack of stock data for a longer period of time.

5.1 Robustness analysis

This section illustrates the outcomes of a series of robustness tests implemented to check the sensitivity of the obtained results. We perform three types of robustness tests. The first type concerns the sensitivity of the already-created index (Table 4). The second type of test examines the possibility that different regimes of the tourism-house prices relationship occur for different types of cities or groups of cities (Table 5). The third type investigates whether the effect of the tourism index changes when the tourism indicators in the composite index are all adjusted for

population (per 1,000 inhabitants) in addition to whether for this new index, different types of regimes are confirmed (Table 6).

The first step introduces one tourism variable at a time in the final model of Table 3 where the dependent variable is *AVERAGE HOUSE PRICES*. As shown in Table 4 (columns 1, 2, 3, 4), only the variable representing total accommodation has a positive attended sign, and none of the variables are significant. This outcome confirms the complexity of the tourism market and the importance to capture this complexity by means of a composite index. The role of other explanatory variables in the housing market is confirmed because the significance and the signs remain almost unaltered.

[TABLE 4 HERE]

The second step investigates the existence of different potential tourism-house price relationships for groups/types of cities. The clusters of cities are based on recent works on house prices in Italian provinces by Caliman (2008; 2009). The author uses a cluster analysis to define ten groups of cities according to house prices[15]. For simplicity, the present work uses the same clusters found by Caliman (2009). As shown in Table 5, in five out of ten clusters, the tourism-house price relationship is highly significant; however, this variable is positive for clusters 4-5-7 and 10. Among these clusters, a stronger coefficient is determined for cluster 4 (cities located in the region of Emilia Romagna). It is worth noting that among the Italian regions, Emilia Romagna is the one where tourism contributes the most to the GDP (see Caliman, 2008) and is also ranked first for tourism arrivals (Paci and Marrocu, 2013).

Interestingly, in large cities (cluster 1) the relationship is not significant and has a negative sign. It is likely that the tourism presence in such cases can represent a source of negative externality for house prices most likely through the increase of criminal activity (Biagi and Detotto, 2014 and Biagi *et al.*, 2012), noise, congestion and other negative effects.

In summary, this first check provides several hints of the presence of different regimes in the tourism-house price relationship.

[TABLE 5 HERE]

The third step considers whether the effect of the tourism on house prices changes when the tourism indicators in the composite index are all adjusted for population (per 1,000 inhabitants). As shown in Table 6, the presence of different regimes is confirmed.

[TABLE 6 HERE]

The robustness checks overall corroborate the tourism-house price relationship. In addition, they also stress the importance for extending the present work in to further explore whether – and to what extent - this relationship varies according to the type of city (or group of cities). This further analysis requires the use of other types of estimators such as, for instance, the mixture models (McLachlan and Basford, 1988).

6. Concluding remarks

Despite the fact that the role of tourism on local economic growth is widely investigated in the current tourism literature, the effect of tourism on the housing market has been understudied. The majority of existing research is based on US evidence and performs cross-section analysis neglecting the possible dynamics of the tourism-house price relationship. Contrariwise, knowing the average effect of tourism on the housing market at the destination sites is crucial for urban policies and requires careful monitoring. On the one hand, a positive linkage between tourism and house prices can be considered a supplementary way to boost local economies; however, it can generate socio-economic problems of affordability and displacement of the resident population. On the other hand, a negative relationship can be considered as an indication that the presence of tourism activity generates some sort of negative externalities.

The purpose of the present paper is to analyze whether and to what extent tourism activity (the tourism market) affects urban house prices in 103 Italian cities. We make use of a System GMM approach for the time span of 1996-2007. After controlling for characteristics of the local housing markets, amenities, geographical variables and urban size, we test for the effect of tourism by employing a composite index that captures the tourism specialization of each area under analysis.

Our findings are robust and confirm that overall and for the case of Italy, tourism has a positive and significant effect on house price levels. We do not find great variations of these effects when comparing the city center, suburban and peripheral locations. The positive link between tourism and house prices in Italy needs to be interpreted cautiously because cities in Italy are very different. Further investigation on this direction has given several hints on the existence of potential different tourism-house price relationships for group/types of cities.

Our findings induce the possibility for further research on the form of these effects. A possible extension of the present work is to see whether and to what extent this relationship is positive, negative or even not significant for the cities under investigation. This specific analysis requires the use of other types of estimators such as, for instance, the mixture models that search for different regimes in the relationships under analysis. Further development of the present work is to investigate whether and to what extent this relationship holds also for other tourism countries.

In terms of the policy implications, on one side, our results confirm that on average tourism is important for local economic growth of Italian cities; however, on the other side, there is a delicate environmental and social equilibrium in tourist destinations, which can easily be upset. In other words, from a strict economic point of view, the higher value of housing in tourism destinations can be observed as a positive signal of tourism-related local growth and the presence of natural, cultural and man-made amenities. However, to correct evaluate the net overall benefits of the resource allocation in the tourism sector, it is essential to determine *who benefits* and *who pays* (Pearce 1989) for local tourism development (Butler 1980). Problems may arise when the pressure on house prices is such that it creates serious social effects in terms of affordability, displacement, and gentrification.

Notes

1. For more information about these studies, see Biagi *et al.* (2012).
2. The exercise of Biagi et al. (2012) is based on a previous work of Biagi and Faggian (2004), in this context the tourism index is presented for the first time.
3. These cities are all provincial capitals. Italian provinces are the second of the three local government administrative areas in Italy: regions, provinces, municipalities.
4. More precisely, Caliman (2009, 2011) uses data of "Consulente Immobiliare" published by the same source (Sole24ore) that is updated biyearly. In addition, the source and type of data are the same as that of the "Annuario Immobiliare".
5. Using a different data source, Muzzicato *et al.* (2008) observed the same phases.
6. Despite the fact that our independent variable was available for a longer time span, the empirical analysis is conducted for the period of 1996-2007 due to the difficulty in finding data at a city level before 1996 for several of the main independent variables, particularly, the tourism-related variables.
7. To determine whether tourism also affects the consumer price index (CPI), we demonstrate that the tourism coefficient is not significant. This result indicates that tourism does not affect the average prices of goods provided in destinations and that we can deflate house prices for CPI without incurring double computation, which would have biased the final results.
8. Wooldridge test for autocorrelation

F(1,102)=106.51

Prob > F = 0.0000.

9. For the statistic tests, see TABLE A.3 in the Appendix.
10. See command xtabond2 of STATA version 12.
11. Italian provinces correspond to the US counties (see note 2).
12. The Arellano Bond test (1991) indicates that residuals are not serially correlated; the Sargan (1958) and Hansen (1982) tests for the joint validity of the instruments gives inconclusive results; however, as Bowsher (2002) clearly explains, the last two tests are found to have no power in panels of small dimensions.
13. Results do not change considering other geographical control variables such as altimetry.
14. Results do not change considering other demographic variable such as density of population.
15. The cities cluster in the following manner: 1. Large cities: Milan, Venice, Rome and Naples - these provinces have very similar quotations of house price per square meter and are also the most historic cities in Italy (Caliman, 2009); 2. Medium-sized rich provinces located in the North of Italy (Piedmont: Turin; Valle D'Aosta: Aosta; Lombardy: Bergamo, Brescia, Lecco, Como; Triveneto: Trento, Treviso, Vicenza, and Padua); 3. Medium-sized provinces with an older demographic

structure and less economic dynamism compose cluster 2 (Piedmont: Alessandria, Asti, Novara, Vercelli; Lombardi: Pavia, Varese). In the region of Emilia Romagna, 3 main clusters of cities in terms of housing sub-markets are observed: 4. Ferrara, Forlì, and Ravenna; 5. Bologna, Modena and Reggio Emilia; 6. Parma and Piacenza. Sicily is divided into two clusters: 7. Messina and Palermo; 8. Caltanissetta, Enna, Ragusa, Siracusa and Trapani. Sardinia has one cluster: 9. Oristano and Nuoro, cities with low house prices. Finally, the last cluster is represented by provinces of different southern regions but characterized by lagging economies. For further information about these clusters, see Caliman (2008) and Caliman and Di Bella (2011).

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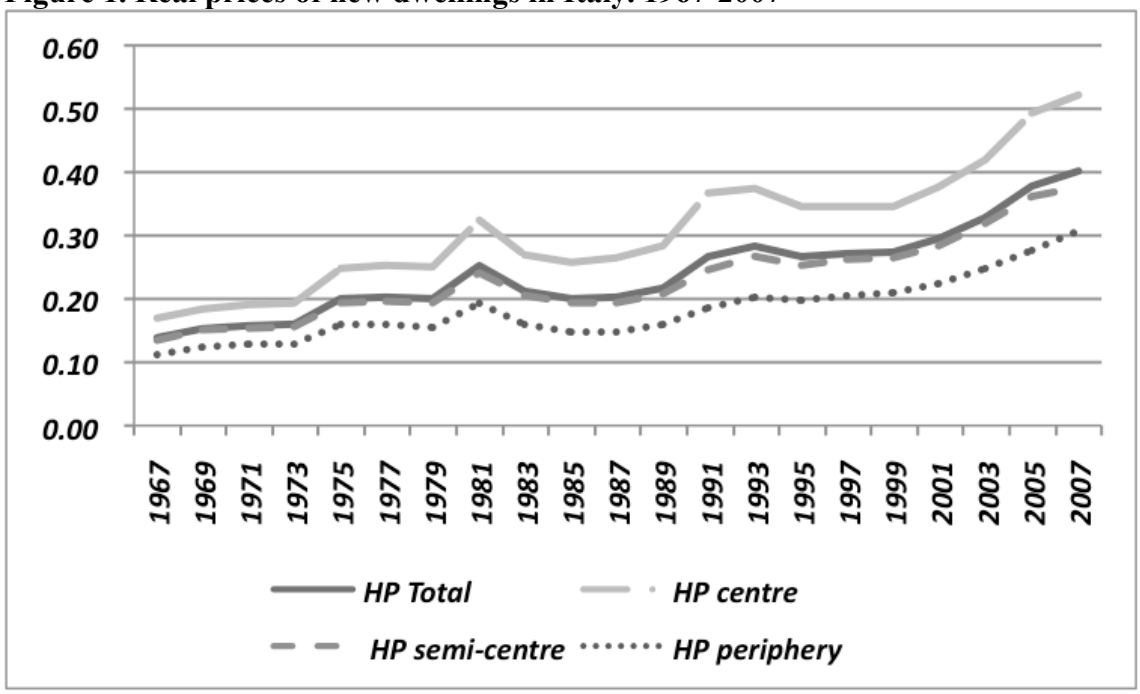
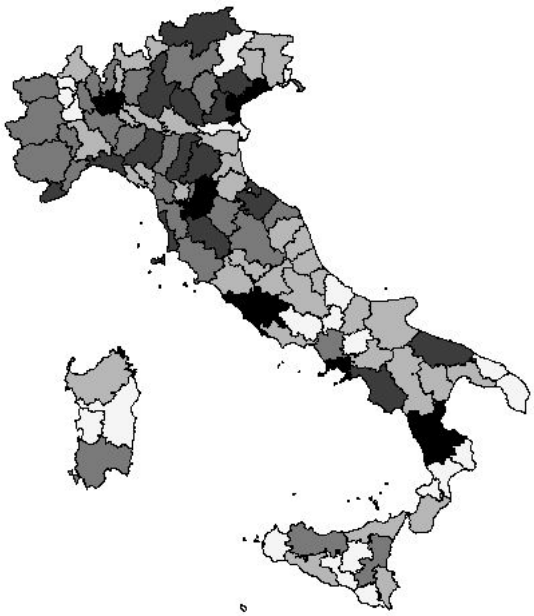
Figure 1. Real prices of new dwellings in Italy. 1967-2007



Source: our elaboration by Annuario Immobilare of Sole 24ore and IPC ISTAT.

Map 1. Prices of housing in Italian provincial capitals. Year 2007



Top ten provincial capitals for prices of housing (Euros per square meters). Year 2007

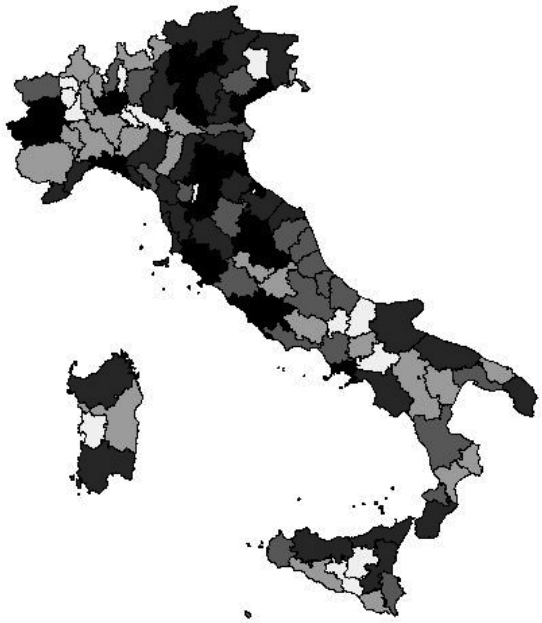
Provinces	*Prices*
1 Milan	7,667
2 Cosenza	7,000
3 Rome	6,600
4 Naples	5,833
5 Venice	5,333
6 Florence	4,933
7 Siena	4,533
8 Salerno	4,200
9 Bologna	4,133
10 Rimini	3,833

Legenda

- 4933.33 - 7666.67
- 3266.67 - 4933.33
- 2533.33 - 3266.67
- 1900 - 2533.33
- 1266.67 - 1900

Note: the ten provinces with the lowest prices of housing are: Ragusa (1,267), Vibo valentia (1,400), Gorizia(1,400), Nuoro (1,433), Enna (1,533), Crotone (1,533), Trapani (1,567), Isernia (1,567), Catanzaro (1,567), Brindisi (1,567).

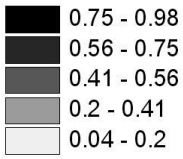
Map 2. Tourism in Italian provincial capitals. Year 2007



Top ten provincial capitals for tourism vocation. Year 2007

Provinces	*Tourist Index*
1 Rome	0.98
2 Venice	0.94
3 Naples	0.92
4 Florence	0.92
5 Milan	0.88
6 Ravenna	0.88
7 Turin	0.88
8 Perugia	0.86
9 Rimini	0.81
10 Verona	0.81

Legenda



Note: higher score of the index corresponds to more tourist areas and vice versa. The ten less tourist provinces are: Lodi (0.04), Biella (0.07), Cremona (0.10), Avellino (0.11) Lecco (0.12), Vercelli (0.13), Enna (0.13), Pordenone (0.13), Campobasso (0.17), Caltanissetta (0.18).

TABLE 1. List of variables

Name	Definition	Geographical scale	Period (years)	Type of variable	Source
AVERAGE HOUSE PRICE	Average HP per square meter (center, semi-center and suburbs) deflated by the Consumer Price Index	Provincial capital	1996-2007	Dependent	The Annuario Immobiliare
HOUSE PRICE IN THE CENTER	HP per square meter for all houses n the city center, deflated by the Consumer Price Index	Provincial capital	1996-2007	Dependent	The Annuario Immobiliare
HOUSE PRICE IN THE SEMI-CENTER	HP per square meter for all houses n the semi-center, deflated by the Consumer Price Index	Provincial capital	1996-2007	Dependent	The Annuario Immobiliare
HOUSE PRICE IN THE OUTSKIRT	HP per square meter for all houses n the outskirt, deflated by the Consumer Price Index	Provincial capital	1996-2007	Dependent	The Annuario Immobiliare
TOTAL ACCOMMODATION (TOURISM)	Total number of accommodation	Provincial capital	1996-2007	In tourist index	ISTAT, Statistiche del turismo
NIGHTS OF STAY (TOURISM)	Tourist nights of stay in the formal accommodation	Province	1996-2007	In tourist index	ISTAT, Statistiche del turismo
TOTAL REVENUES OF MUSEUMS (TOURISM)	Revenue in Euros of public museums tickets	Provincial capital	1996-2007	In tourist index	Ministry of cultural heritage
SECOND HOMES (TOURISM)	Total number of non-occupied houses*	Provincial capital	2001	In tourist index	ISTAT, Population and Housing Census
HOUSING STOCK	Total number of houses built after 1991	Provincial capital	2001	Housing	ISTAT Population and Housing Census
CRIME	Total crime offences per 100,000 inhabitants	Provincial capital	1996-2007	Amenities	ISTAT Statistiche Giudiziarie Penali
PEDESTRIAN AREAS	Pedestrian areas square meters per 100 inhabitants	Provincial capital	1996-2007	Amenities	ISTAT, Indicatori ambientali urbani
COAST	Dummy variable. Values=1 if the municipality is located on the coast and zero otherwise	Provincial capital	time invariant	Amenities	Our elaboration on ISTAT
INCOME	Value added per capita at real price (base year 1995)	Province	1996-2007	Economic	Our elaboration on ISTAT and Tagliacarne Institute.
GROWTH	Growth rate of value added per capita at real prices	Provincial capital	1996-2007	Economic	Our elaboration on ISTAT and Tagliacarne Institute.
POPULATION	Resident population	Provincial capital	1996-2007	Demographic	ISTAT
NET MIGRATION	Total number of in-migrants minus total number of out-migrants	Provincial capital	1996-2007	Demographic	ISTAT, Atlante statistico dei comuni
DEATH	Total number of death over the resident population	Provincial capital	1996-2007	Demographic	ISTAT, Atlante statistico dei comuni
EURO	Dummy variable. Values=1 after 2002 and zero otherwise	Provincial capital		Dummy	Our elaboration
ART	Dummy variable. Values=1 if the province is an art city and zero otherwise	Provincial capital	time invariant	Dummy	Istituto Geografico D'Agostini
CAPITAL	Dummy variable. Values=1 if the municipality is a Regional Capital and zero otherwise	Provincial capital	time invariant	Dummy	ISTAT
SOUTH	Dummy variable. Values=1 if the municipality is located in the south and zero otherwise	Provincial capital	time invariant	Dummy	Our elaboration

* This is a proxy for holiday homes; data for holiday homes are only available at the 1991 Census, where holiday homes are classed as a type of unoccupied housing (non-permanent residency).

TABLE 2. Descriptive statistics of variable

Name	Mean	SD	Min	Max
AVERAGE HOUSE PRICE, Euros per square meter	7.67	0.43	6.63	9.22
HOUSE PRICE IN THE CENTER, Euros per square meter	7.91	0.46	6.67	9.67
HOUSE PRICE IN THE SEMI-CENTER, Euros per square meter	7.63	0.43	6.50	9.13
HOUSE PRICE IN THE OUTSKIRT, Euros per square meter	7.39	0.41	6.21	9.95
TOURISM, composite index	-0.83	0.59	-3.39	-0.02
HOUSING STOCK, total number	7.81	0.82	4.97	10.73
CRIME per 100,000 population	9.59	0.44	7.82	10.81
PEDESTRIAN AREAS per 100 population	1.72	2.60	-4.61	6.15
COAST dummy	0.36	0.48	0.00	1.00
INCOME, real GDP per capita	11.39	0.55	9.83	12.84
GROWTH per capita	0.06	0.03	-0.38	0.44
POPULATION total number	11.49	0.85	9.95	14.82
NET MIGRATION total number	3.13	3.10	0.00	10.48
DEATH per capita	-4.60	0.21	-5.27	-4.10
EURO dummy	0.50	0.50	0.00	1.00
ART dummy	0.31	0.46	0.00	1.00
CAPITAL dummy	0.19	0.40	0.00	1.00
SOUTH dummy	0.35	0.48	0.00	1.00

Notes: all variables are in log.

TABLE 3. GMM-SYS Results

Variables	(1) AVERAGE HOUSE PRICES *per square meter*	(2) HOUSE PRICES IN THE CENTRE *per square meter*	(3) HOUSE PRICES IN THE SEMI-CENTRE *per square meter*	(4) HOUSE PRICES THE IN OUTSKIRT *per square meter*
AVERAGE HOUSE PRICES$_{t-1}$	0.49***			
	(0.048)			
HOUSE PRICES IN THE CENTRE $_{t-1}$		0.53***		
		(0.048)		
HOUSE PRICES IN THE SEMI-CENTRE $_{t-1}$			0.37***	
			(0.047)	
HOUSE PRICES IN THE OUTSKIRT $_{t-1}$				0.34***
				(0.053)
TOURISM$_{i,t}$	0.20**	0.21*	0.21**	0.14**
	(0.082)	(0.11)	(0.083)	(0.057)
HOUSING STOCK$_t$	0.00100	-0.012	0.017	0.011
	(0.025)	(0.026)	(0.033)	(0.030)
CRIME$_{i,t}$	-0.035	-0.035	-0.072**	-0.011
	(0.022)	(0.026)	(0.035)	(0.032)
PEDESTRIAN AREAS$_{i,t}$	0.0058	0.0078	0.0053	0.0044
	(0.0057)	(0.0055)	(0.0073)	(0.0047)
COAST$_i$	0.017	0.027	0.019	-0.015
	(0.044)	(0.044)	(0.053)	(0.054)
INCOME$_{i,t}$	0.16***	0.14***	0.18***	0.17***
	(0.042)	(0.040)	(0.044)	(0.061)
GROWTH$_{i,t}$	0.17	0.073	-0.037	0.33*
	(0.17)	(0.20)	(0.18)	(0.18)
POPULATION$_{i,t}$	0.56**	0.40	0.30	0.80**
	(0.26)	(0.27)	(0.24)	(0.34)
NET MIGRATION $_{t-2}$	-0.00075	-0.0013	-0.00084	-0.00090
	(0.0015)	(0.0018)	(0.0019)	(0.0019)
DEATH$_{i,t}$	0.061	0.023	0.069	0.063
	(0.070)	(0.062)	(0.068)	(0.10)
EURO$_t$	0.17***	0.15***	0.22***	0.25***
	(0.035)	(0.036)	(0.042)	(0.035)
ART$_i$	0.013	0.021	-0.038	0.053
	(0.053)	(0.050)	(0.060)	(0.064)
CAPITAL$_i$	0.057	0.054	0.045	0.071
	(0.058)	(0.061)	(0.065)	(0.076)
SOUTH$_i$	-0.063	-0.066	-0.073	-0.15***
	(0.047)	(0.049)	(0.058)	(0.058)
CONSTANT	0.94	0.93	1.65*	1.60*
	(0.68)	(0.79)	(0.85)	(0.84)
Observations	927	927	927	927
Number of capital provinces	103	103	103	103
Arellano-Bond[1]	0.990	0.126	0.294	0.713
Sargan test[2]	0.897	0.496	1.000	0.917
Hansen test[2]	1.000	1.000	1.000	1.000

Notes: Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10%, 5% and 1%, respectively. All variables are in log.
[1]Arellano-Bond (1991) statistic test under the null hypothesis of no second-order autocorrelation in the residuals.
[2] Sargan (1958) and Hansen (1982) statistic tests under the null hypothesis of the joint validity of the instruments.

Table 4. GMM-SYS Results (first robust check)

VARIABLES	(1) AVERAGE HOUSE PRICES *per square meter*	(2) AVERAGE HOUSE PRICES *per square meter*	(3) AVERAGE HOUSE PRICES *per square meter*	(4) AVERAGE HOUSE PRICES *per square meter*	(5) AVERAGE HOUSE PRICES *per square meter*
AVERAGE HOUSE PRICES$_{t-1}$	0.43***	0.45***	0.47***	0.48***	0.49***
	(0.055)	(0.057)	(0.050)	(0.053)	(0.048)
TOTAL ACCOMODATION$_{i,t}$	0.0097				
	(0.018)				
NIGHTS OF STAY$_{i,t}$		-0.018			
		(0.030)			
TOTAL REVENUES OF MUSEUMS$_{i,t}$			-0.0025		
			(0.0041)		
SECOND HOMES$_i$				-0.055	
				(0.044)	
TOURISM$_{i,t}$					0.20**
					(0.082)
HOUSING STOCK$_t$	-0.042	-0.023	0.012	0.0095	0.00100
	(0.029)	(0.030)	(0.024)	(0.027)	(0.025)
CRIME$_{i,t}$	-0.037	-0.050*	-0.034	-0.019	-0.035
	(0.026)	(0.027)	(0.025)	(0.029)	(0.022)
PEDESTRIAN AREAS$_{,i,t}$	-0.00090	-0.00026	0.0034	-0.00039	0.0058
	(0.0072)	(0.0075)	(0.0076)	(0.0082)	(0.0057)
COAST$_i$	-0.028	-0.041	0.038	0.039	0.017
	(0.046)	(0.049)	(0.045)	(0.052)	(0.044)
INCOME$_{i,t}$	0.19***	0.18***	0.17***	0.18***	0.16***
	(0.053)	(0.061)	(0.049)	(0.053)	(0.042)
GROWTH$_{i,t}$	0.13	0.14	-0.018	0.16	0.17
	(0.16)	(0.16)	(0.15)	(0.16)	(0.17)
POPULATION$_{i,t}$	0.50*	0.58**	0.48*	0.64**	0.56**
	(0.27)	(0.29)	(0.27)	(0.29)	(0.26)
NET MIGRATION$_{t-2}$	-0.00036	0.00030	-0.000061	-0.00036	-0.00075
	(0.0016)	(0.0015)	(0.0014)	(0.0015)	(0.0015)
DEATH$_{i,t}$	-0.0069	0.063	0.098	0.069	0.061
	(0.069)	(0.073)	(0.094)	(0.080)	(0.070)
EURO$_t$	0.18***	0.18***	0.15***	0.16***	0.17***
	(0.035)	(0.037)	(0.038)	(0.036)	(0.035)
ART$_i$	-0.0040	0.0013	0.053	0.034	0.013
	(0.051)	(0.060)	(0.061)	(0.053)	(0.053)
CAPITAL$_i$	0.085	0.013	0.018	0.034	0.057
	(0.055)	(0.057)	(0.061)	(0.058)	(0.058)
SOUTH$_i$	-0.031	0.0019	-0.037	-0.042	-0.063
	(0.050)	(0.044)	(0.049)	(0.046)	(0.047)
Constant	0.91	0.70	1.16	0.65	0.94
	(0.71)	(0.89)	(0.78)	(0.80)	(0.68)
Observations	927	927	927	927	927
Number of capital provinces	103	103	103	103	103

Notes: Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10%, 5% and 1%, respectively. All variables are in log.

Table 5. GMM-SYS Results (second robust check)

VARIABLES	(Cluster 1) AVERAGE HOUSE PRICES *per square meter*	(Cluster 2) AVERAGE HOUSE PRICES *per square meter*	(Cluster 3) AVERAGE HOUSE PRICES *per square meter*	(Cluster 4) AVERAGE HOUSE PRICES *per square meter*	(Cluster 5) AVERAGE HOUSE PRICES *per square meter*	(Cluster 6) AVERAGE HOUSE PRICES *per square meter*	(Cluster 7) AVERAGE HOUSE PRICES *per square meter*	(Cluster 8) AVERAGE HOUSE PRICES *per square meter*	(Cluster 9) AVERAGE HOUSE PRICES *per square meter*	(Cluster 10) AVERAGE HOUSE PRICES *per square meter*
AVERAGE HOUSE PRICES$_{t-1}$	-0.58***	0.56***	0.49***	0.12	-0.23	0.71***	1.14***	0.55***	1.09***	0.61***
	(0.21)	(0.080)	(0.15)	(0.16)	(0.31)	(0.17)	(7.9e-07)	(0.15)	(2.2e-08)	(0.13)
TOURISM$_{i,t}$	-0.45	-0.035	0.12	1.91***	1.24***	0.44	0.68***	0.042	-0.16***	0.11**
	(2.69)	(0.10)	(0.085)	(0.40)	(0.29)	(0.27)	(8.3e-07)	(0.25)	(2.0e-09)	(0.053)
HOUSING STOCK$_t$	-0.016	-0.0074	0.38***	-0.82***	0.89***	-1.07***	1.04***	-0.52**	0	0.023
	(0.14)	(0.0061)	(0.065)	(0.29)	(0.038)	(0.25)	(3.0e-06)	(0.25)	(0)	(0.062)
CRIME$_{i,t}$	-0.42***	0.056	0.31***	0.052	-0.55***	-0.16	-0.26***	-0.39***	0.048***	0.084
	(0.16)	(0.063)	(0.068)	(0.073)	(0.069)	(0.36)	(1.1e-06)	(0.10)	(5.7e-10)	(0.053)
PEDESTRIAN AREAS$_{i,t}$	0.11**	-0.0058	0.023***	-0.036	-0.55***	-0.31**	0.058***	0.010**	-0.0099***	0.0029
	(0.056)	(0.0058)	(0.0035)	(0.060)	(0.13)	(0.14)	(7.8e-09)	(0.0043)	(1.1e-10)	(0.0019)
INCOME$_{i,t}$	0.56	0.012	-0.28**	0.31**	2.98***	-0.23	-0.76***	0.50	-1.20***	-0.12
	(0.51)	(0.038)	(0.12)	(0.14)	(0.35)	(0.85)	(2.4e-06)	(0.35)	(3.8e-08)	(0.087)
GROWTH$_{i,t}$	-2.74***	0.39	0.57*	-1.24***	-4.42***	-0.43	-0.42***	-0.71**	-0.45***	0.14
	(0.68)	(0.24)	(0.30)	(0.35)	(0.61)	(2.14)	(4.7e-06)	(0.36)	(6.1e-09)	(0.19)
POPULATION$_{i,t}$	-3.88*	-0.026	0.35	0.72	-3.27***	0.99***	14.0***	0.81	-2.41***	-0.38
	(2.30)	(1.06)	(0.73)	(0.53)	(0.48)	(0.38)	(9.5e-06)	(1.86)	(4.3e-08)	(0.44)
NET MIGRATION $_{t-2}$	-0.0033	-0.00083	0.0043	0.0071***	-0.0092	-0.018		-0.0026	0.0049***	-0.0022
	(0.0021)	(0.0021)	(0.0028)	(0.00045)	(0.010)	(0.012)		(0.0032)	(3.3e-10)	(0.0022)
DEATH$_{i,t}$	0.33	-0.061	0.47***	0.81***	0.47***	-0.64	-1.02***	-0.16	-0.53***	-0.013
	(0.43)	(0.10)	(0.12)	(0.10)	(0.16)	(0.43)	(2.7e-06)	(0.21)	(1.6e-09)	(0.050)
EURO$_t$	0.68***	0.20***	0.15**	0.035	0.050	0.21***	0.29***	0.17***	0.35***	0.20**
	(0.12)	(0.044)	(0.071)	(0.12)	(0.28)	(0.077)	(1.2e-06)	(0.059)	(4.3e-09)	(0.078)
Constant	-0.14	2.63***	7.88**	10.5***	-22.5***	0	0	0.51	24.8***	3.05***
	(9.21)	(0.79)	(3.16)	(0.87)	(8.48)	(0)	(0)	(7.52)	(8.0e-07)	(0.78)
Observations	36	90	54	27	27	18	18	45	18	81
Number of capital provinces	4	10	6	3	3	2	2	5	2	9

Notes: Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10%, 5% and 1%, respectively. All variables are in log.
Cluster 1: Milan, Venice, Rome, Naples (-); Cluster 2: Turin, Aosta, Como, Bergamo, Brescia, Lecco, Trento, Treviso, Vicenza, Padua (-);
Cluster 3: Vercelli, Novara, Asti, Alessandria, Varese, Pavia (+); Cluster 4: Ferrara, Ravenna, Forlì (+ ***);
Cluster 5: Reggio Emilia, Modena, Bologna (+ ***); Cluster 6: Piacenza, Parma (+);
Cluster 7: Palermo, Messina (+ ***); Cluster 8: Enna, Ragusa, Siracusa, Caltanissetta, Trapani (+);
Cluster 9: Oristano, Nuoro (- ***); Cluster 10: L'Aquila, Chieti, Latina, Frosinone, Campobasso, Caserta, Avellino, Potenza, Matera (+**).
No cluster: positive sign and highly significant.

Table 6. GMM-SYS Results (third robust check)

VARIABLES	(Cluster 1) AVERAGE HOUSE PRICES *per square meter*	(Cluster 2) AVERAGE HOUSE PRICES *per square meter*	(Cluster 3) AVERAGE HOUSE PRICES *per square meter*	(Cluster 4) AVERAGE HOUSE PRICES *per square meter*	(Cluster 5) AVERAGE HOUSE PRICES *per square meter*	(Cluster 6) AVERAGE HOUSE PRICES *per square meter*	(Cluster 7) AVERAGE HOUSE PRICES *per square meter*	(Cluster 8) AVERAGE HOUSE PRICES *per square meter*	(Cluster 9) AVERAGE HOUSE PRICES *per square meter*	(Cluster 10) AVERAGE HOUSE PRICES *per square meter*
AVERAGE HOUSE PRICES$_{t-1}$	-0.46***	0.54***	0.65***	0.17	-0.32	0.63***	3.69***	0.54***	0.56***	0.53***
	(0.058)	(0.086)	(0.13)	(0.18)	(0.23)	(2.4e-10)	(5.9e-07)	(0.12)	(3.1e-09)	(0.14)
TOURISM/POPULATION$_{i,t}$	-0.44***	-0.094	-0.022	0.12***	1.29***	1.68***	8.77***	-0.29**	0.060***	-0.047
	(0.15)	(0.10)	(0.096)	(0.041)	(0.40)	(5.5e-09)	(9.8e-07)	(0.13)	(1.7e-08)	(0.14)
HOUSING STOCK$_t$	0.20***	-0.0053	0.28***	0.19***	-1.30***	-0.38***	12.3***	0.015	-2.18***	0.047
	(0.055)	(0.0064)	(0.062)	(0.030)	(0.27)	(7.1e-09)	(1.5e-06)	(0.032)	(8.9e-08)	(0.045)
CRIME$_{i,t}$	-0.17*	0.087	0.34***	0.12	-1.15***	0.39***	-13.0***	-0.44***	0.14***	0.085
	(0.097)	(0.057)	(0.10)	(0.10)	(0.057)	(2.2e-09)	(1.5e-06)	(0.10)	(1.3e-09)	(0.052)
PEDESTRIAN AREAS$_{i,t}$	0.14***	-0.0036	0.021***	0.055	-0.47***	-0.42***	0.36***	0.0079*	-0.019***	0.0022
	(0.035)	(0.0073)	(0.0054)	(0.038)	(0.11)	(7.9e-10)	(4.7e-08)	(0.0044)	(1.6e-10)	(0.0034)
INCOME$_{i,t}$	0.35**	-0.017	-0.26***	0.72**	-1.11***	-1.62***	5.34***	0.57***	-0.39***	-0.099
	(0.15)	(0.045)	(0.039)	(0.33)	(0.22)	(6.1e-09)	(2.6e-07)	(0.19)	(4.9e-09)	(0.10)
GROWTH$_{i,t}$	-1.31***	0.45*	0.46	-0.96***	2.39**	1.79***	-48.6***	-0.71***	0.67***	0.090
	(0.26)	(0.27)	(0.38)	(0.072)	(1.00)	(1.2e-08)	(5.3e-06)	(0.24)	(5.9e-09)	(0.21)
NET MIGRATION $_{t-2}$	-0.0082**	-0.0016	0.0027	0.011	-0.031***	-0.026***		-0.0011	-0.011***	-0.00051
	(0.0039)	(0.0023)	(0.0021)	(0.0066)	(0.0073)	(6.0e-11)		(0.0030)	(2.1e-10)	(0.0026)
DEATH$_{i,t}$	0.27	-0.10	0.45***	0.53***	0.17	-0.45***	22.0***	-0.21***	-0.70***	0.034
	(0.37)	(0.11)	(0.16)	(0.039)	(0.32)	(2.0e-09)	(2.4e-06)	(0.080)	(4.3e-09)	(0.069)
EURO$_t$	0.71***	0.22***	0.034	-0.059*	1.63***	0.39***	-10.3***	0.18**	0.26***	0.22***
	(0.055)	(0.053)	(0.032)	(0.031)	(0.22)	(6.9e-10)	(1.1e-06)	(0.081)	(9.6e-10)	(0.068)
Constant	0.88	2.39**	3.29**	1.57	52.2***	19.0***	0	2.38	18.9***	4.10***
	(2.70)	(1.02)	(1.28)	(2.68)	(4.31)	(9.0e-08)	(0)	(1.72)	(5.8e-07)	(1.55)
Observations	36	90	54	27	27	18	18	45	18	81
Number of capital provinces	4	10	6	3	3	2	2	5	2	9

Notes: Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10%, 5% and 1%, respectively. All variables are in log.
Cluster 1: Milan, Venice, Rome, Naples (-***); Cluster 2: Turin, Aosta, Como, Bergamo, Brescia, Lecco, Trento, Treviso, Vicenza, Padua (-);
Cluster 3: Vercelli, Novara, Asti, Alessandria, Varese, Pavia (-); Cluster 4: Ferrara, Ravenna, Forlì (+ ***);
Cluster 5: Reggio Emilia, Modena, Bologna (+ ***); Cluster 6: Piacenza, Parma (+ ***);
Cluster 7: Palermo, Messina (+ ***); Cluster 8: Enna, Ragusa, Siracusa, Caltanissetta, Trapani (-**);
Cluster 9: Oristano, Nuoro (+ ***); Cluster 10: L'Aquila, Chieti, Latina, Frosinone, Campobasso, Caserta, Avellino, Potenza, Matera (-).
No cluster: positive sign and not significant

Appendix A Sources of house prices data in Italy

The first source is the Italian Ministry of Finance through a specific agency called *Agenzia del Territorio* (2011) and the publication named *Osservatorio del Mercato Immobiliare (OMI,* translated Real Estate Observatory*)*. The OMI dataset provides house prices for all Italian municipalities (8,100) and is extremely accurate and useful for micro-level analysis. Nevertheless, it has been criticized (see Cannari *et al.*, 2006); first, for under-reporting house prices (as information is based on housing contract data rather than real house prices), and second, for not being available for a sufficient time span (data are only available starting from 2002).

Since 1965, the Bank of Italy has produced a survey called, 'Survey of Household Income and Wealth'. It contains house prices from a small, representative sample of approximately 8,000 households located in 15 Italian municipalities with a population of 250 thousand inhabitants and in 15 surrounding areas. Similar to the OMI dataset, this dataset also has the problem of under-reporting real house prices because dwelling prices are based on the subjective evaluation of the interviewed tenants and homeowners.

Another source is provided by a private research center in economics called Nomisma that, starting in 1988, has collected house price quotations reported by a sample of real estate agencies for a very limited number of urban areas. This database has a very limited geographical coverage; the sample includes 13 large provincial capitals and 13 medium-size provincial capitals. The private research center named 'Scenari Immobiliari' specializes in the real estate market and, since 1999, has published the so-called real value database that provides current house and rent prices at the neighborhood level.

The Italian financial newspaper Il Sole 24ore publishes one biweekly professional newspaper titled 'Consulente Immobiliare', which contains house price quotes from real estate agents. Until 2000, house price quotes were available for the provincial capitals (103 observations). Beginning in 2000, this dataset was expanded to also include quotes for more than 1,200 Italian municipalities. For the provincial capitals, the prices collected refer to "new" or "recently built" (no older than 35 years old) dwellings sited in three types of locations: the town center, the outskirts, and between the outskirts and the town center. However, for the other type of municipalities, data are collected for 'new' or 'completely renewed houses'. The disadvantage of this database is that the series have several breaks.

TABLE A1 Sources of data on house prices in Italy

Source	*Frequency*	*Data collection period*	*Geographical coverage*	*Type of dwelling*	*Begin of the series*
1.Agenzia del territorio	semi-annual	semester average	stratified sample of all municipalities	4: town center, outskirts, between, rural areas. All type of dwellings	2002
2.Banca d'Italia	bi-annual	Interview	representative sample of Italian households	All type of dwellings	1977
3.Nomisma	semi-annual	May-November	8,155 municipalities	4: luxury areas, town center, between outskirts and center, outskirts. New, old, houses to be restructured.	1988
4.Scenari Immobiliari	bimestral	not relevant	provincial capitals and other municipalities	3: town center, between outskirts and center, outskirts. Houses and offices	1999
5.Consulente Immobiliare	semi-annual	semester average	since 2000, all provincial capitals and 1,000 municipalities	3: town center, between outskirts and center, outskirts. New or recently built (for provincial capitals). New or completely renewed (for non provincial capitals).	1965
6.Annuario Immobiliare	annual	yearly	103 provincial capitals	6: center, outskirts, between: houses and shops New dwellings	1967-2010

TABLE A2 House prices at regional level

(Average price per square meter, new dwellings, 2007)

Region	*Price*	*Regional Capital*	*Price*
Piemont	2,329	Tourin	2,867
Valle d'Aosta	2,600	Aosta	2,600
Lombardy	3,127	Milan	7,667
Trentino	3,317	Trento	3,167
Veneto	3,205	Venice	5,333
Friuli	2,129	Trieste	2,533
Liguria	3,158	Genoa	3,533
E. Romagna	3,037	Bologna	4,133
Tuscany	3,243	Florance	4,933
Umbria	2,417	Perugia	2,833
Marche	2,675	Ancona	2,933
Lazio	2,927	Rome	6,600
Abruzzo	2,108	L'Aquila	2,300
Molise	1,933	Campobasso	2,300
Campania	3,340	Naples	5,833
Puglia	2,240	Bari	3,433
Basilicata	2,017	Potenza	2,100
Calabria	2,787	Catanzaro	1,567
Sicily	1,989	Palermo	2,800
Sardinia	2,008	Cagliari	2,900
North-West	2,844		
North-East	2,951		
Center	2,981		
South and Islands	1,995		
Italy	2,717		3,618

Source: our elaboration by Annuario Immobiliare

TABLE A3 Unit Root tests

Variable	*Levin-Lin-Chu*	*Im-Pesaran-Shin*	*Augmented Dickey-Fuller*
	P-value	P-value	P-value
Real house price (average)	0.0000	0.0001	0.0000
Real house price (center)	0.0000	0.0000	0.0000
Real house price (semi-center)	0.0000	0.0000	0.0000
Real house price (outskirt)	0.0000	0.0000	0.0000
Time trend	Included	Included	Included
Number of panels	103	103	103
Number of periods	12	12	12

Levin-Lin-Chu H_0: Panels contain unit roots
Im-Pesaran- Shin H_0: All panel contain unit roots
Augmented Dickey-Fuller H_0: Unit roots

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