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# The Dynamic Behaviour of Italian Real Estate Market

**Keywords:** Housing price; Fundamental factors; Land price; Land policy

**Abstract** The aim of this study is to investigate the fundamental factors on housing prices in Italy. We have examined how quickly and strongly housing prices react to changes in these fundamentals. Knowledge of the most important variables that can affect housing prices is a good starting point for land policy or allocation of property rights. The integration of the information in public databases represents a clear goal but we can not ignore the under-utilization of the Italian available data. In the present study we have used a Vector Autoregressive (VAR) model on a sample at a regional level related to the period between 2004 and 2009, to allow analysis of the determinants underlying the housing values. This technique also allows to estimate, by introducing appropriate dummy variables in the model, the impact of a particular legislation focused to increasing the market transparency. This study, innovative on the Italian scene, showed a powerful impact on the real estate prices in the short run and no statistically significant effect of the interest mortgage rate. We especially tried to test whether these reactions changed after Italy adopted a new fiscal transparency system in 2006. We found that the main fundamental explanatory variables are household disposable income, new-build supply, housing units sold, unemployment rate and, according to literature, land prices. Among these factors, the most important one is land price, especially enhanced after the adoption of the new fiscal system in 2006.

## INTRODUCTION

One of the most important topics in the land policy, development projects and real estate investment is to know the factors underlying the variations in housing prices. This analysis is particularly interesting in booming markets such as the Far Eastern ones, but is similarly important in the Italian market. In this respect mechanisms for allocation of rights on the building areas and techniques of marketing and urban development are obviously influential. The knowledge of the economic fundamentals related to the real estate price variation can provide some important information for both the policy makers and the real estate investors. Therefore it should be noted that in recent years Italian market has undertaken a remarkable transition from opacity to transparency. In fact, with paragraph 497 of Act number 266 of December 23, 2005 (2006 Budget rule), in the transaction of residential property rights between individuals the amount of the real estate transfer tax, a tax imposed by the state on the privilege of transferring real property, is calculated on the basis of the revalued cadastral value. Taxpayers may wonder whether items such as equipment used on

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a property are included in the lump-sum sale of the property. Finally, the rule number 223 of July 4, 2006, converted by Act 248 of August 4, 2006, statutes the obligation to declare the amount of the payment. A large number of studies, such as Case and Shiller (1990) or Giaccotto and Clapp (1994), use several variables to explain the housing price variation. Among others the most important factors are: the real disposable income, the population dynamics, the construction costs, the mortgage interest rates, the land prices, the unemployment rate and, of course, property taxes. We are interested to know how and if these factors have the same explanatory power on the Italian housing prices. Are the fundamentals of the Italian real estate market the same or at least similar to American, Japanese, Chinese or other European countries? And how quickly do prices react to changes in underlying factors? To answer to these questions, we use a sample at a regional level related to the period 2004-2009. This study, partial according to the literature, shows that house prices are significantly influenced by real disposable income, land prices, construction costs, new buildings supply, number of transactions, unemployment rate and stock market return. Disaccording to previous literature we found that interest rates and population growth do not explain the variation in prices, in analogy with Deng *et al.* (2009) and according to what is assumed in the model construction due to the low Italian population growth rate. In this study we used a VAR (vector auto regression) model to explain the dynamics of housing prices. In particular, we used an owner dataset derived from the main national data sources of the Italian real estate market. We used the data provided by the Omi-Agenzia del Territorio, Istat, Bank of Italy and The Real Estate Consultant Magazine, for the 18 major regional cities, with regard to the fact that these data do not have discontinuities in the time series. Theoretical assumption suggests that the main factors that affect housing prices are disposable income, the land prices and the number of new buildings. According to Mayer (2011) we focused particular interest on the influence of the interest rate changes on the real estate price dynamics. Empirical evidence suggests that a lower interest rate could lead to higher housing prices, even according to a multiplier. In our study we will try to analyze the effect on the dynamics of the land prices, having regard to the number of available expansion areas, taken as a reference in the main towns. In this sense we would expect a positive influence even if limited to that variable on price dynamics. Finally we will try to estimate the impact on market transparency of the special legislation cited above, by using a time dummy variable in the model. Our results may be used by government to implement land policies. In particular, knowledge of the factors that influence the housing prices is relevant at different levels of territorial government. The effect of interest rate is the result of complex assessments at international level and therefore not easy to manage by a local institution. Similarly the disposable income is a factor exogenous to the model. On the other hand, on the supply side, the government intervention is often decisive. It is a fact that decisions on building new land are public choices. In this context it is also not sure that the recent legislative innovations regarding the possibility of exchanging the building rights can create a competitive and efficient market. Therefore the knowledge of the major factors underlying the dynamics of prices, in addition to allowing the public not myopic choices, should be the basis of urban planning. The rest of the study is structured as follows: the second section contains an analysis of literature and the third section gives a brief description of the Italian housing market and describes the VAR model, the fourth section discusses in detail the data used in the model and shows the relationship between house prices and fundamentals. The last section contains some brief conclusions.

## LITERATURE REVIEW AND ITALIAN REAL ESTATE MARKET

### Literature review

Case and Shiller (1990) showed that the house prices variation is positively correlated with the variation in construction costs, population growth rate and disposable income. Poterba (1991) showed that the real income and the construction costs can explain the variation in housing prices, but population growth rate has no explanatory power. Giaccotto and Clapp (1994), using data on three cities in the period 1981-'89, showed that population and unemployment rate can adequately explain the variance in the prices of the residential market. Potepan (1996) subsequently tested a large number of variables, especially social ones, including the quality of public services, crime rates, the degree of air pollution, the rate of inflation, in addition to variables already analyzed. Empirical evidence suggests that income and construction costs are the main factors influencing the variability of prices. Some variables have explanatory power in the short term, while others in the long run. Quigley (1999), using data on 41 cities in the period 1986-1994, tested the variation in average prices and found that some factors such as unemployment, the level of vacancies, the supply of new construction and building permits, cannot fully explain the variations in property prices in the short term, but are able to adequately explain a long-term perspective. The impact of these key factors in housing prices may also vary as a function of structural segmentation of the market. Jud and Winkler (2002) have analyzed the dynamics of property prices in 130 U.S. metropolitan areas. The results showed that the prices are strongly influenced by the population growth rates, income, construction costs, interest rates and stock.

Moreover, the monetary policies adopted by the central government can influence the variation in house prices in the long run. Jacobsen (2005) noted that the interest rates, construction costs, the unemployment rate and income are the most important explanatory factors related to the Norwegian market, noting that prices are overestimated compared to the values determined using the intrinsic fundamentals. Miller and Peng (2006), using data on 277 metropolitan areas during the period between 1990 and 2002, analyzed with a Var model the impact of fundamental factors on the volatility of prices for single-family houses. This study has shown that volatility is closely related to the change in the population growth rate. Hannah, Kim and Mills (1993) similarly concluded that the most important explanatory factor of the rapid growth of prices on the Korean market for 80 years is attributable to an underutilization of the building areas for residential use. Peng and William (1994) showed that house prices and supply of building land is inversely proportional to the market in Hong Kong during the period 1965-1990. The literature summarized in the Chinese market with the studies of Shen and LiY (2004) and Deng (2009) is particularly rich, and confirms that residential prices are influenced by expectations of price and construction costs. In conclusion, the analyzed literature has identified the range of factors that affect house prices. However, few studies have analyzed the dynamics of change in prices and the writers are not aware of the existence of studies on the Italian market that analyse the structural effects of fundamentals on the volatility of prices.

### Italian real estate market

The Italian real estate market continues to be stagnant, unlike other developed countries where it is falling. Real estate prices in 2009 grew 3% over 2008, according to Bank of Italy and Istat, which corresponds to the real 1.9%. Agenzia del Territorio in the real estate report "Rapporto Immobiliare" shows a decrease of -0.8%. The peak of the Italian growth occurred in 2002, 12% (9.2% in real terms) over the previous year. The strength of the Italian property market is linked to what is formally considered a weakness, underdevelopment of the mortgage market. Therefore, Italy

represents the fourth European economy, the mortgage market represents 20% of GDP against 50% of EU average (Eurostat 2011). The Italian property market has been spared by the global credit crunch that has afflicted most countries. The prudence of Italian investors made it possible to avoid real estate bubbles, as happened in Spain, Ireland and the UK. This was also helped by continued growth in the Italian property market transparency, as a result of legislation introduced in recent years that have placed Italy to 21 position in the world for transparency, just after Switzerland, according to the Transparency Index, Jones Lang LaSalle (2010).
Figure 1 shows an elaboration of worldwide transparency index of the real estate market in an intuitive way that shows the path taken on issues of transparency of the market. One purpose of this study was to evaluate the impact of regulation on the industry market.
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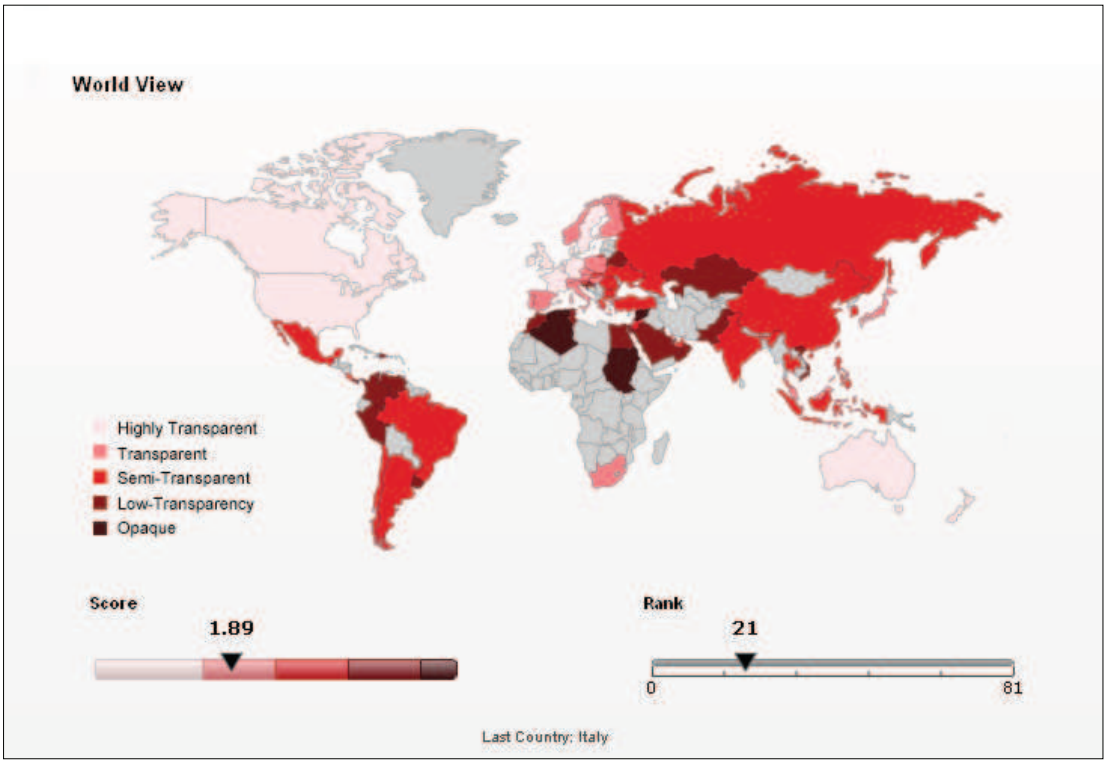
**Figure 1:** Global real estate Transparency Index Italia (Jones Lang LaSalle)



## THE PANEL VAR AND DATA

### The panel VAR model

In equilibrium, the real estate prices ensure that housing demand is equal to housing supply. The demand for dwelling in any metropolitan market (i) at time (t) is assumed by the following equation:

$$Q^{D}_{it} = f[P_{it},R_{it},Y_{it},NTN_{it},POP_{it},INT_{it,}UR_{it,}STOCK_{it,}u_{it}]$$

Equation 1

Where:
$p_{it}$ is real dwelling price;
$R_{it}$ is the real rent after tax;
$Y_{it}$ is real disposable income;
$NTN_{it}$ is housing unit sold;
$POP_{it}$ is the population growth rate;
$INT_{it}$ is the real mortgage interest rate;
$UR_{it}$ is the unemployment rate;
$STOCK_{it}$ is the real stock market return;
$u_{it}$ is a random error term;

and on the supply side the quantity is defined by the following equation:

$$Q^{S}_{it} = f[P_{it},C_{it},L_{it},NC_{it},v_{it}]$$

Equation 2

Where:
$P_{it}$ is the nominal dwelling price;
$C_{it}$ is the real construction cost;
$L_{it}$ is the real units land price;
$NC_{it}$ is the number of new-build units;
$v_{it}$ is a random error term;

In equilibrium:

$$Q^{D}_{it} = Q^{S}_{it}$$

Equation 3

Substituting Equation (1) and (2) in Equation (3) we obtain the VAR reduced form:

$$P_{it} = f[R_{it},Y_{it},NTN_{it},POP_{it},INT_{it,}UR_{it,}STOCK_{it}C_{it},L_{it},NC_{it},\varepsilon_{it,}]$$

Equation 4

Or formally:

$$P_{it} = \beta_0 + \beta_i \Sigma^{n}_{i=0} X_{it-i} + \varepsilon_{it}$$

Equation 4.1

where $X_{it}$ is characteristics vector and $\beta_i$ is the estimated matrix of coefficients.

The percentage change in prices during any time period is measured by $(P_{it} - P_{it}\text{-}1)/(P_{it}\text{-}1) = \Delta_i P_{it}$. We estimated the panel VAR model using a sample of 18 cities during the period of 2004 to 2009 (n=180).

$$\Delta P_{it} = \beta_0 + \beta_i \Sigma^{n}_{i=0} \Delta X_{it-i} + \varepsilon_{it}$$

Equation 4.2

Our goal is to explain the most important factors that can affect the real housing prices in Italy and how quickly a change in depending variables is related to the dwelling prices. How the new fiscal system adopted on 2006 can affect real estate prices? To estimate the impact of the policy we used a time dummy variable in the panel data.

$$\Delta P_{it} = \beta_0 + \gamma_1 D_2 + \gamma_2 D_1 + \beta i \Sigma^{n}_{i=0} \Delta X_{i,t-i} + \varepsilon_{it}$$

Equation 5

Where $D_1$=1 if the dwelling is sold before at 2006, assuming a one year of latency time after the adoption of the new transparency fiscal system on 2006 and $D_2 \equiv \Delta G_{it} * D_1$ where $G_{it}$ is the total amount of real estate transfer taxes. For specification problems of VAR model we follow the original work of Sims (1980). Estimations were undertaken using the Eviews 5.0 software package from Quantitative Micro Software and software Stata 11.0.

**Data and explanatory variables**

Data come from reports of Osservatorio del Mercato Immobiliare (OMI) of Agenzia del Territorio. Since 2002 OMI has collected semester data in more than 1,500 Italian municipalities using standardized housing information data. The data span from 2004 to 2009 and the survey is a task of Agenzia del Territorio. OMI has collected several prices: the selling price, the estimated price and the offer price. The collected data has the advantage of being unbiased in that it is not influenced by the individual owner as in the Inquiry of National Income Gross of Bank of Italy. The main problem is the possibility of selection bias. Data used in this paper includes 18 Italian cities from 2004 to 2009. They are: Torino, Aosta, Milano, Venezia, Trieste, Bologna, Genova, Firenze, Ancona, Campobasso, Pescara, Roma, Bari, Potenza, Napoli, Reggio Calabria, Palermo and Cagliari. Explanatory variables used in this study include data from Omi-Agenzia of Territorio, Istat, Bank of Italy and The Real Estate Consultant Magazine. The following list gives a description of original data and the process of variable construction:

- $P_{it}$ , real dwelling price (€), Omi Agenzia del Territorio
- $R_{it}$ , real rent after tax (€/sm-year), The Real Estate Consultant Magazine
- $Y_{it}$ , real disposable income (Mg €), Istat
- $NTN_{it}$ , housing unit sold, Omi Agenzia del Territorio
- $POP_{it}$ , population (M), Istat
- $INT_{it}$ , real mortgage interest rate, Bank of Italy
- $UR_{it}$ , unemployment rate, Istat
- $STOCK_{it}$ , number of housing unit, Agenzia del Territorio
- $C_{it}$ , construction costs, Istat
- $L_{it}$ , land prices (€/mq) Agenzia del Territorio
- $NC_{it}$ , number of new-build units, Omi Agenzia del Territorio

We use data of employment income as a proxy of real disposable income. For the rent after tax we don't use official data but we use data published, without interruption, by The Real Estate Consultant

Magazine according to Panetta *et al.*. (2008). Table 1 shows summary statistics for a six month housing prices and the other independent variables.

**Table 1** Summary statistics

| | mean | median | max | min | std dev |
|---|---|---|---|---|---|
| Income | 3.29% | 3.91% | 4.77% | -0.59% | 0.02 |
| Land prices | 4.95% | 6.90% | 8.41% | -0.78% | 0.04 |
| Construction Costs | 3.04% | 3.60% | 4.06% | 0.90% | 0.01 |
| Housing unit solds | -5.13% | -4.26% | 3.61% | -15.08% | 0.08 |
| Stock | 1.97% | 2.17% | 2.76% | 0.84% | 0.01 |
| New-built units | 2.54% | 5.00% | 11.11% | -6.67% | 0.08 |
| Polpulation growth rate | 0.71% | 0.74% | 0.77% | 0.57% | 0.00 |
| Unemployment rate | -0.38% | -1.47% | 14.71% | -11.69% | 0.10 |
| Rent | 2.83% | 2.68% | 4.90% | -0.09% | 0.02 |
| Interest rate | 3.12% | -4.14% | 50.82% | -15.98% | 0.28 |

We estimated the panel VAR model using a sample of 18 cities during the period from 2004 to 2009. Theoretical assumption suggests that disposable income, land prices, new built units, number of housing units sold, unemployment rate and stock can explain the real estate price variation. We think that the interest rate and population growth cannot be able to explain the real estate price variation due to stability of interest mortgage rate and population. With regard to the land prices, according to the theoretical assumption, we allow to conclude Granger causality from real estate market to land market. The supply of new built units can reduce housing prices and to reduce supply can help to control property prices. As expected, the land price is a key factor in the real estate price dynamics. Interestingly, the interest rate has an impact on property prices. Regarding the analysis of prices following the adoption of legislation in 2007, we found a substantial invariance with regard to the number of transactions, whereas we noted an overall positive impact on total revenues of real estate transaction taxes.

## RESULTS

Table 2 shows Im, Pesaran and Shin (2003) test. We use this statistics for testing unit roots in heterogeneous panel. The unit root test (IPS) is used to confirm the stationarity of all variables. Im, Pesaran and Shin IPS proposed a test for the presence of unit roots in panels that combines information from the time series dimension with that from the cross section dimension, such that fewer time observations are required for the test to have power. The null hypothesis is that each individual time series contains a unit root while the alternative allows for some but not all of the individual series to have unit roots under hypothesis of cross sectional independence. The results of the panel unit root tests confirm the hypothesis of stationarity at level.

**Table 2** Results Im Pesaran and Shin W-statistics on 11 variables in percentages

| variables | On the level | p-value |
|---|---|---|
| Housing prices | -7.28 | 0.00 |
| Income | -15.12 | 0.00 |
| Land prices | -3.22 | 0.00 |
| Construction Costs | -4.03 | 0.00 |
| Housing unit solds | -40.00 | 0.00 |
| Polpulation growth rate | -32.38 | 0.00 |
| Unemployment rate | -133.92 | 0.00 |
| Stock | -27.19 | 0.00 |
| Rent | -4.70 | 0.00 |
| Interest rate | -4.26 | 0.00 |
| New-built units | -21.45 | 0.00 |

Table 3 shows estimation results of model 4. The null hypothesis is the zero of estimated coefficients. Most of the coefficients are statistically significant at 1% of the levels, except for the intercept and rent (-1), which is statistically significant at 5%. The sign of all variables is positive, except for sign of NC, NC(-1), rent (-1), unemployment rate (-2) and stock, which are negative. Most of the effects of autocorrelation have been removed according to the results of the Durbin-Watson statistics. The adjusted R-squared is 81.37% which could explain the dwelling price variation. Robust standard errors of the estimated coefficients accounting for heteroskedasticity are obtained according to the results of Breusch-Pagan test.

**Table 3** Estimation results of model 4[1]

| Variables | coefficient | std error | t-statistics | p-value |
|---|---|---|---|---|
| Intercept | -0.0724 | 0.0408 | -2.3758** | 3.92% |
| Land prices (-2) | 0.3459 | 0.0771 | 4.1222*** | 0.02% |
| New-built units | -0.00662 | 0.0004 | -2.0498*** | 0.12% |
| New-built units (-1) | -0.1544 | 0.0257 | -5.9989*** | 0.00% |
| Housing unit sold | 0.0538 | 0.0223 | 4.6567*** | 0.00% |
| Housing unit sold (-1) | 0.0424 | 0.0319 | 2.8986*** | 0.00% |
| Income | 0.6629 | 0.1560 | 8.1806*** | 0.00% |
| Income (-2) | 1.0768 | 0.1467 | 6.3430*** | 0.00% |
| Construction Costs | 0.1510 | 0.00467 | 2.9829*** | 0.09% |
| Rent (-1) | -0.3012 | 0.1192 | -2.294** | 2.33% |
| Unemployment rate (-2) | -2.6159 | 0.8967 | -3.0021*** | 0.51% |
| Stock | -2.4331 | 0.3916 | -8.1067*** | 0.00% |
| Adjusted R squared | (81.37%) | Prob (F-statistic) | | 0.00% |
| F statistic | (9.8761) | Durbin- Watson statistic | | 2.1537 |

The estimated coefficients show that a 10% change in household disposable income is related with a statistically 6.63% change in real housing prices, and a 10% change in household disposable income (-2) is associated with a 10.76% in real housing prices. Household disposable income is the key factor to explain the increases in dwelling prices. A 10% increase in land prices is associated with a 34.9% change in real housing prices. The result is consistent with Eve (1992), who examined real estate prices in UK during the period from 1970 to 1990 and founded that up to 40% of prices increase can be explained with change in land supply. This result needs to be discussed in future, research due to the lack of transparency in Italian land market. A 10% change in new built units is related to a statistically reduction of 0.66% in real housing prices and a 10% change in new built units(-1) is related to a 1.54% negative change in real dwelling prices. The new built unit supply can affect the stock and increase the total housing supply and obviously the dwelling prices. According to the literature we found that the impact have a lag. The new-built units coefficient (-1) is greater than the new-built units coefficient. This result is consistent with Grigson (1986), who argues that the new built supply is only a small amount of total supply and cannot explain the price variation. Our findings show that a 10% change in housing unit sold increase real housing prices of 5% while a 10% change in housing unit sold (-1) is related with a 4.24% increase.

Table 3 shows that unemployment rate can explain the real household price variation. A 10% change in the unemployment is related with 26. 5% change in real price. Similarly, construction costs push

1 ***,**,* indicates significance at the 1%, 5% and 10% respectively

up property prices; a 10% change in construction cost is associated with 15.10% variation in dwelling prices. The sign on housing rent is not consistent with theoretical assumption and also we show that t statistics of population growth rate and interest rate is near to zero. So these factors cannot be able to explain the variation of housing prices.
We can conclude that the most important factors explaining dwelling prices are real disposable income, land prices (-2), new built units, new built units (-1), number of housing units sold, number of housing units sold (-1) and unemployment rate. Other factors, such as interest rate and stock, cannot explain the real estate price variation.
Table 4 shows the estimated results of equation 5. Durbin-Watson test results show that most of the effects of autocorrelation are removed. The adjusted R-squared is 82.13% and coefficient of D1 is 0.047, statistically significant at the 1% level. The coefficient of D2 is not statistically significant.

**Table 4** Estimation results of model 5

| variables | coefficient | std error | t-statistics | p-value |
|---|---|---|---|---|
| Intercept | -0.0650 | 0.0355 | -1.0382 | 56.79% |
| D1 | 0.0470 | 0.0106 | 7.7725*** | 0.00% |
| D2 | 0.0034 | 0.0206 | -1.099 | 23.40% |
| Land prices (-2) | 0.3606 | 0.0779 | 3.0784*** | 0.28% |
| New-build units (-1) | -0.1811 | 0.0211 | -6.4538*** | 0.00% |
| Housing unit solds | 0.0911 | 0.0191 | 4.5574*** | 0.00% |
| Housing unit solds (-1) | 0.0714 | 0.0331 | 1.7822* | 8.22% |
| Income | 0.6232 | 0.1228 | 8.8810*** | 0.00% |
| Income (-2) | 1.0001 | 0.1271 | 5.5930*** | 0.00% |
| Construction Costs | 0.0516 | 0.0365 | 2.1147** | 4.20% |
| Rent (-1) | -0.1174 | 0.1156 | -1.9145* | 6.80% |
| Unemployment rate (-2) | -3.0149 | 0.9354 | -4.7692*** | 0.005 |
| Stock | -3.3004 | 0.3583 | -24.1111*** | 0.00% |
| Adjusted R squared | (82.13%) | Prob(F-statistic) | | 0.00% |
| F statistic | (12.8888) | Durbin-Watson stat | | 2.2990 |

## CONCLUSIONS

This study examines the determinants of real estate prices in Italy using the vector autoregression approach. The unit root test (IPS) is used to confirm the stationarity of all variables before the cointegration test can be performed. After confirming that all variables are stationary at level, the VAR approach is applied. A number of studies have examined housing price change by metropolitan area; among others Case and Shiller (1990), Clapp and Giaccotto (1994) and Quigley (1999). The studies

reveal that housing appreciation is directly influenced by population, employment rate, construction costs, interest rate, and also land prices can adequately explain the variance in the prices of the residential market. The objective of this paper is to investigate the dynamic effects of fundamental factors on housing prices in Italy. This paper investigates the determinants that influence Italian real housing price variations using a sample of 18 cities during the period from 2004 to 2009. We used data from Omi-Agenzia del Territorio, Istat, Bank of Italy. For income rent we used data from the Real Estate Consultant Magazine. In comparison to prior researches, this research offers a much broader sample. Factors that can strongly affect real housing price are, according to previous literature: household disposable income, land price, new built supply and its lag two, interest rate, unemployment rate and stock return. According to Deng and al. (2009) but inconsistently with previous literature, our results show that population growth rate cannot explain the variation of dwelling price. New built supply and its lag have negative effects on housing prices. According to literature, land prices are the most important factor on dwelling prices and we found no impact of interest rate on housing price in Italy.

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