“The role of news in the fluctuations of housing price”

AUTHORS	Nazar Dahmardeh Reza Khaki Marziyeh Esfandiari https://orcid.org/0000-0003-3704-6240

ARTICLE INFO	Nazar Dahmardeh, Reza Khaki and Marziyeh Esfandiari (2018). The role of news in the fluctuations of housing price. *Investment Management and Financial Innovations*, *15*(3), 294-303. doi:10.21511/imfi.15(3).2018.24
DOI	http://dx.doi.org/10.21511/imfi.15(3).2018.24
RELEASED ON	Wednesday, 19 September 2018
RECEIVED ON	Saturday, 04 November 2017
ACCEPTED ON	Tuesday, 24 July 2018

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10, Sumy,
40022, Ukraine

www.businessperspectives.org

Nazar Dahmardeh (Iran), **Reza Khaki** (Iran), **Marziyeh Esfandiari** (Iran)

THE ROLE OF NEWS IN THE FLUCTUATIONS OF HOUSING PRICE

Abstract

The main purpose of this paper is to evaluate the impact of the news on the housing price volatility in Iran. To do so, symmetric and asymmetric models such as GARCH, T-ARCH, EGARCH and APGARCH are applied by using annual data for the period 1971–2013. The empirical results confirm the asymmetric and leverage effects of news in Iran housing market. Also the impact of shocks indicates that negative news affect the housing price fluctuations further more than positive news with the same size.

Keywords housing price volatility, news, GARCH model, T-ARCH model, EGARCH model, APGARCH model, Iran

JEL Classification C49, D89, E30, R31

Received on: 4th of November, 2017
Accepted on: 24th of July, 2018

Nazar Dahmardeh, Ph.D., Professor, Economic Department, Faculty of Economics and Management, University of Sistan and Baluchestan, Zahedan, Iran.

Reza Khaki, M.A. in Economics, Economic Department, Faculty of Economics and Management University of Sistan and Baluchestan, Zahedan, Iran.

Marziyeh Esfandiari, Ph.D., Corresponding Author, Assistant Professor, Economic Department, Faculty of Economics and Management, University of Sistan and Baluchestan, Zahedan, Iran.

INTRODUCTION

Fluctuations on financial time series clustering and random perturbations are accompanied by more substantial fluctuations in the small amplitude fluctuations associated with smaller amplitude fluctuations. Early volatility model requires random disturbance with variance can not explain this phenomenon, Engle (1982)[1] proposed the ARCH model, Bollerslev (1986) [2]to promote the formation of GARCH model. Since the ARCH and GARCH model, the impact of the variance on the different directions symmetrically to react [3], because only the square of the impact conditional variance mapped to the information contained in the result on a change in price of symbols to be lost. (Li and Wang, 2013).

Engle's theory suggests the asymmetric effects of shocks on price fluctuations in financial asset markets and the positive news than negative news lead to higher returns and less volatility with the same size.

Black (1976) noted that the negative impact on the positive impact than the same degree of volatility is higher, the first time he uses the term "leverage effect" to describe this phenomenon, referring to the stock price movements and volatility negatively correlated with the same intensity bad news than good news led to greater market volatility (Li et al., 2013).

Housing is one of the most important sectors in Iran's economy. It has a large share in household's expenditures, on the one hand, and has substantial share in GDP, on the other hand. Due to the fact that financial markets are under development in Iran, housing, gold, currency and stock markets attract people's savings. Therefore, the housing demand is affected by another asset demand. So, it is natural that news of future changes in the housing market and the country's macro and micro variables are thereby affecting the housing price. According to World Bank reports, about 40 percent of investment in Iran is devoted to housing market. The ratio of investment to GDP is 8 percent and in average it grows by about 1.12 percent every year. 30 percent of household's expenditures are dedicated to housing. Housing sector relates to 134 fields of occupational activity in Iran.

There is no empirical study assessing the relationship between housing news and the fluctuations of housing price according to Iran economy's data. So the aim of this study is to examine how the shocks of the housing news impact on the prices. The paper proceeds as follows: literature review is presented in section 1, section 2 introduces the theoretical model, section 3 turns to the results and last section concludes.

1. LITERATURE REVIEW

In recent decades, the evidence for predictability has led to variety of approaches, some of which are theoretically motivated, while others are simply empirical suggestions. The most interesting of these approaches are asymmetric and leverage volatility models, in which good news and bad news have different predictability for future volatility. These models are motivated by the empirical work of Black (1976), Christie (1982), French et al. (1987), Nelson (1990), Schwert (1990), Engle et al. (1993). Asymmetry of news for asset price has been confirmed in many studies. Henry (1995), Engle and NG (1993), Henry (1995), Friedman et al. (2002) find the asymmetric effects of shocks on price fluctuations in financial asset markets and that the negative shocks introduce more volatility than positive shocks. Li et al. (2013, p. 306) study the representative industries, such as industrial, financial, real estate, medical and health industries to learn more about the changes in the characteristics of different industries volatility. The empirical results indicate that the GARCH (1,1) model can explain the fluctuations in theAs mentioned before It has been copied from Li, et al., 2013 so i'm not going to change it TARCH (1,1) and EGARCH (1,1) models examined the impact of fluctuations in the various sectors of the leverage effect and information asymmetry, the results show that the negative impact generates greater volatility than the same amount of positive impact in various industries. Heidari et al. (2012) investigate the relationship between inflation uncertainty and economic growth through GARCH_M model for Iranian economy during the period 1988–2007 by using quarterly data. Their empirical results show that inflation uncertainty does not affect the level of growth rate and positive inflationary shocks have more effect than negative ones. Tsai and Chen (2011), in their paper, reviewed the fluctuations in housing market prices in the two markets of total houses of England and new houses using non-conditional variance models ARCH and GARCH and for seasonal data for the period 1995–2005. The results indicate that the size of the fluctuations over the price is 4.89 times bigger than the fluctuations under the price for the total housing market and 2.78 times bigger than the fluctuations under the price in the new houses market. Miles (2008) using ARCH model and given seasonal prices for the period from 1979 to 2006 for American States, showed that in over half the states (18 states), the effects of clustered fluctuations of housing prices were revealed. Therefore, the application of the GARCH models is useful. In addition, the study has found evidence of asymmetric effects on the U.S. housing market so that the sensitiveness to negative news about the housing price is more than positive news shocks. Andersen et al. (2002) explore the relationship between macroeconomic news and the U.S. dollar exchange rate against six major currencies. They confirm that macroeconomic news generally have a statistically significant correlation with intra-day movements of the U.S. dollar, with "bad" news, for example, data indicating weaker-than-expected growth having larger impact than "good" news. Zhang et al. (2016) prove the impact of the strategies of the market participants on the price volatility, which is reflected in the fact that different expectation of the two types of investors on the future prices will cause price volatility. The results show that the change of fundamentalists' expectation on the house price will influence the frequency of the house price volatility, while the change of chartists' expectations, which increases with the acceleration of beliefs in evolution, will influence the range of the volatility. Zhang et al. (2016) study the impact of information disclosure on housing market efficiency. The results show that as information disclosure increases, the volatility of housing price reduces significantly. The likelihood of experiencing a residential pricing bubble was reduced by 57.4%, as information disclosure increased. Therefore, information disclosure and price transparency in residential real estate are necessary to stabilize the housing market. Lambertini et al. (2017) explore the transmission of "news shocks" in a model of the housing market and show that beliefs of future macroeconomic developments can lead to business cycle fluctuations. The model includes financial frictions in the form of collateralized household debts. Expectations related to different sectors of the economy can generate booms in the housing market. Only news shocks related to the behavior of nominal variables also cause a burst.

As in the literature, the impact of news on fluctuations of housing prices has been less studied. Considering that housing is regarded as an important asset in Iran and because of speculative motives, the present study examines the impact of good and bad news on housing price fluctuations.

2. THEORETICAL BASIS

2.1. The news shock in the model

In traditional econometric models, constant variance of the residual terms has always been the main and classical econometric assumption to account for. Robert Engle laid a new approach called ARCH to escape this restrictive assumption. One of the reasons to use ARCH models are big and small predicting errors in economic clusters in a way that the mentioned series may have reacted differently over the years, in other words, in some years with a lot of fluctuations and in some with a little. Under such circumstances, it is expected that the variance is not fixed over the random time series and is a function of error term's behavior. In fact, the advantage of the ARCH model is that it can explain the conditional variance's trend according to its past information.

Let us suppose that housing returns over the period $t-1$ to t, and the information available to investors during the time that they make their decisions is Ω_{t-1}. Expected return and return fluctuations conditioned on available information at time t, (Ω_{t-1}) will be symbolized as follows:

$$h_t = Var(r_t|\Omega_{t-1}),\ y_t = E(r_t|\Omega_{t-1}), \tag{1}$$

Unpredictable return at time t, ε_t is the result of reducing real turnover from the expected return:

$$\varepsilon_t = r_t - y_t. \tag{2}$$

According to Engle and NG, unpredictable return (ε_t) can be introduced as a measure for news, while an unpredictable increase in return $(\varepsilon_t > 0)$ is introduced as a measure for good news (excess return greater than expected return). According to Engle (1982), ARCH (q) is defined as a function with lag from ε_t, which is the predictable fluctuations of a function of past news, meaning:

$$h_t = \omega + a_i \sum_{i=1}^{p} \varepsilon_{t-i}^2. \tag{3}$$

This means that predictable instabilities are a function of previous news. According to Engle (1982), older news have less impact on instability than newer ones.

After Engle, Bollerslev introduces the generalized autoregressive conditionally heteroscedastic GARCH (p, q) model as follows:

$$h_t = \omega + \sum_{i=1}^{p} a_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j h_{t-j}^2. \tag{4}$$

For positivity of conditional variance, it is necessary to have:

$$\forall i = 1,2,...p,\ a_j > 0,\ \forall j = 1,2,...q,\ \beta_j > 0,$$

as well as $\omega > 0$.

The process of GARCH (p, q) would be a weak stationary process.

If $$\sum_{i=1}^{p} a_i + \sum_{j=1}^{q} \beta_j < 1,$$

then most shocks are not stationary in the model. GARCH (*p*, *q*) models implicitly imply the symmetric effect of the news on fluctuations meaning that good and bad news (of similar size) have symmetric effects on fluctuations. This implicit assumption of simple GARCH models is not aligning with the assumption of this research that asymmetric effect exists on fluctuations of housing prices. According to Nelson, simple GARCH models can't consider such roles, since they suppose that only the value and not the sign of past returns are involved in the future fluctuations.

2.2. EGARCH model

To control the asymmetric effect of the news on fluctuations, Nelson (1991) defines the EGARCH model in which the effect of asymmetric news is as follows:

$$Log\left(\sigma_t^2\right) = \omega + \beta \log\left(\sigma_{t-1}^2\right) + a\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right). \quad (5)$$

The left side of 5 is brought in a logarithmic way and guarantees that the variance is a positive condition and there is no need to generate constrains in coefficients. The asymmetric effect is tested by assumption $\gamma < 0$. If $\gamma \neq 0$, then the effect of the news is asymmetric. The model presented by Nelson is a special case of the given model below:

$$Log\left(\sigma_t^2\right) = \omega + \sum_{j=1}^{q} \beta_j \log\left(\sigma_{t-j}^2\right) + \sum_{i=1}^{p} a\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| - E\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) + \sum_{t=k}^{\tau} \gamma_k\left(\frac{\varepsilon_{t-k}}{\sigma_{t-k}}\right). \quad (6)$$

If ε_t is assumed normal, then EGARCH model will be like:

$$Log\left(\sigma_t^2\right) = \omega + \sum_{j=1}^{q} \beta_j \log\left(\sigma_{t-j}^2\right) + \sum_{i=1}^{p} a_i\left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| - \sqrt{\frac{2}{\pi}} + \sum_{t=k}^{\tau} \frac{\varepsilon_{t-k}}{\sigma_{t-k}}. \quad (7)$$

Figure 1 indicates that bad news cause more fluctuations than good news with the same size. The graph also indicates the asymmetric effect of the news on fluctuations.

The news

$$\sigma_t^2 = \omega + a\varepsilon_{t-1} + \gamma\varepsilon_{t-1}^2 d_{t-1} + \beta\sigma_{t-1}^2.$$

2.3. T-ARCH model

The GARCH model is the threshold of another asymmetric model, which was introduced by Zakoian (1994) and Glosten et al. (1993) as below:

$$\sigma_t^2 = \omega + a\varepsilon_{t-1} + \gamma\varepsilon_{t-1}^2 d_{t-1} + \beta, \quad (8)$$

where $d_{t-1} = 1$ if $\varepsilon_{t-1} < 0$ and otherwise $d_{t-1} = 0$. In this state, α measures the effect of good news on fluctuations, while bad news have an effect as $\alpha + \gamma$. Also, if $\gamma \neq 0$, the effect of news on fluctuations will be asymmetric, meaning that good and bad news will have the same asymmetric effect on fluctuations. GARCH model is a special case of T-ARCH in which $\gamma = 0$.

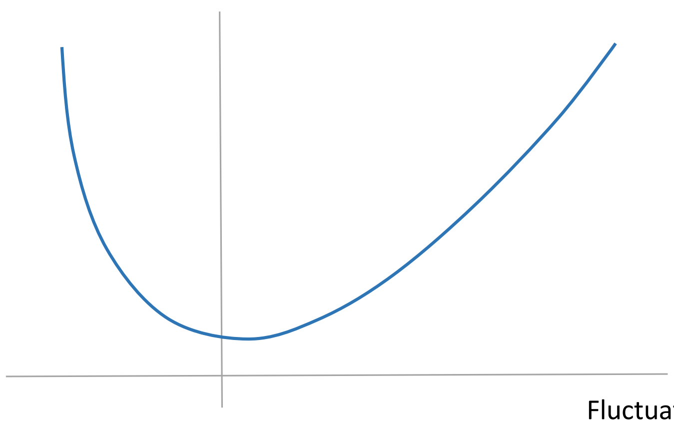

Figure 1. The asymmetric effect of the news on fluctuations

2.4. APGARCH model

Taylor and Schwartz introduced GARCH model based on standard deviation. In this model, instead of variance, standard deviation is modeled. This model was generalized in 1993 with the feature of strong component. In the APGARCH model, the power σ parameter is estimable from standard deviation and the selective γ parameters were added to the model to obtain higher asymmetry of the r.

$$\sigma_t^2 = \omega + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 + \sum_{i=1}^{p} a_i \left(\left| \varepsilon_{t-1} \right| - \gamma_i \varepsilon_{t-i} \right)^{\delta}, \quad (9)$$

where $\delta > 0$ and for $|\gamma_i| \leq 1,\ i = 1,2,\ldots,r$ and for all $i \geq r$ and $r \leq p$ we have $\gamma_i = 0.$

In an asymmetric model, γ_i will be zero for all the $(i)s.$ According to approach of Ding Granger and Engle and Hentschel, different models are considered implicitly in APGARCH model giving the possible values $\alpha, \beta, \gamma, \delta.$ If $\beta, \gamma = 0,\ \delta = 2,$ then APGARCH model turns into simple Engle's ARCH model. In the next case, if $\gamma = 0,\ \delta = 2,$ then APGARCH model turns into Bollerslev's GARCH model. Taylor and Schwarz are of the belief that it is better to focus on conditioned standard deviation than on variance. In their model, which is asymmetric, we have: $\gamma = 0,\ \delta = 1.$ Non-linear ARCH models are also considered in APGARCH model. The non-linear model introduced by Higgings and Bera (1992) is resulted by the assumption $\beta = \gamma = 0.$ In the asymmetric model called GJR-GARCH, which was introduced by Glosten et al. (1994) with $\gamma = 2,$ ARCH coefficient is $\alpha_i (1+\gamma_i)^2$ and asymmetric sentence coefficient is $-4\alpha_i\gamma_i.$ Table 1 gives an abstract of the implied constraints on APGARCH and production of different models. Like previous models, in case $\gamma_i \neq 0,$ then asymmetric effects will apply (Abunouri et al., 2009).

3. RESULTS

The data used in this research are annual and related to period 1971–2013 that has been obtained from Statistical Yearbook of the Central Bank of Iran and building Office of Ministry of Housing. The study is limited to 2013 due to the fact that since then, to control speculative activities, the government has been preparing a housing market policy package and application of the system of real estate transactions registration. The price index of housing has been 43,723, 41,417, 41,760, 39,546 (thousands Rials) respectively, during the period 2014–2017. Therefore, housing market hasn't faced the price fluctuations.

3.1. Estimation and hypothesis testing

For using ARCH family models, it is required to use a conditional mean equation for housing prices index. It is necessary to examine the stability of housing price index before time series modeling with

Table 1. Different models of ARCH family in APGARCH model with implied constraints

$$APGARCH(p,q,\gamma):\ \sigma_t^{\delta} = \omega + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^{\delta} + \sum_{i=1}^{p} \alpha_i \left(\left| \varepsilon_{t-i} \right| - \gamma_i \varepsilon_{t-i} \right)^{\delta}$$

Source: Abunouri et al. (2009).

γ_i	β_j	α_i	δ	**Model**
0	0	**	2	ARCH
0	**	**	2	GARCH
$-4\alpha_i\gamma_i$	**	$\alpha_i(1+\gamma_i)^2$	2	GJR-GARCH
$\lvert\alpha_i\rvert \leq 0$	0	**	1	T-ARCH
$-4\alpha_i\gamma_i$	0	$\alpha_i(1+\gamma_i)^2$	2	GJR-ARCH

Note: There is no limitation for the coefficient.

Table 2. Stationary test of housing price index

Source: Research findings.

Test	Dickey-Fuller's generalized				Philips-Perron			
Variable	Without intercept and trend	With intercept and trend	Wit intercept	Test result	Without intercept and trend	With intercept and trend	Wit intercept	Test result
LHP	3.73	–1.75	1.69	Non-stationary	5.29	–3.13	1.60	Non-stationary
D(LHP)	–1.56	–7.490	–7.43	Stationary	–2.78	–4.60	–4.39	Stationary

Table 3. Statistical features of DLHP time series

Source: Research findings.

Mean	Median	Non-conditional variance	Skewness	Kurtosis	Bera and Jarque	Probability
0.143	0.1700	0.1227	–2.502	12.510	187.69	0.000

Box – Jenkins method. Results based on generalized Dickey-Fuller and Philips-Perron methods are presented in summary in Table 2. As Table 2 shows, the difference of housing price index is stationary.

To determine *p*, *m*, *q* in ARIMA (*p*, *m*, *q*), various models are estimated using OLS method and then according to determination measures of AIC, SBC and R^2, the best model is recognized. Results show that ARIMA (2, 1, 3) model has the least AIC and SBC statistics and the most R^2 statistics among other models.

The state of DLHP series is analyzed in Table 3 to survey the defining statistical measures.

It can be inferred from Table 3 that DLHP time series have negative skewness or the left and it shows that most of data mass is piled on the right side of the mean and stating that the probability of positive return taking place in housing market is more than the negative. In other words, likelihood of price increases this year and more is than the last year, unlike the occurrence, it's complimentarily, i.e., market information shows market tendency to prices increase.

DLHP kurtosis is 12.51, which is a high kurtosis compared with normal distribution, which is 3. Therefore, compared with normal distribution of housing returns, extreme values of the range are more likely to happen. Bera and Jarque statistic reject the normality assumption of DLHP. Accordingly, series graph's kurtosis is a prove that cluster phenomenon exists and there are skewness coefficient points to leverage effects of positive and negative news in conditional mean model of DLHP.

Table 4. ARCH-LM test for DLHP

Source: Research findings.

Statistic type	Calculative statistics	Sig. level
F-statistic	4.18	0.0138
Obs-R-squared	10.02	0.0183

Table 4 shows the results of ARCH-LM test for time series conditional mean model of DLHP, ARIMA (2, 1, 3). According to the statistics, it is

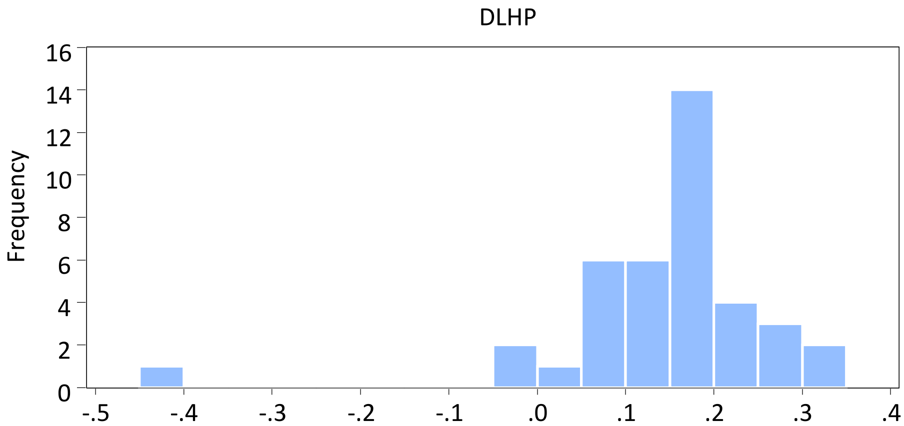

Figure 2. Distribution of DLHP time series

Table 5. Estimation results of news effects models

Source: Research findings.

Model	GARCH	EGARCH	T-ARCH	APGARCH
ω	0.00013 [0.09]	–8.28 [0.00]	0.0003 [0.26]	0.007 [0.72]
α	0.13 [0.0003]	…	0.96 [0.09]	0.48 [0.10]
β	1.04 [0.00]	–0.073 [0.0002]	–0.08 [0.48]	…
γ	…	3.51 [0.000]	0.264 [0.82]	–0.98 [0.0001]
δ	…	…	…	0.98 [0.18]
R^2	0.75	0.76	0.56	0.78
AIC	–2.91	–3.78	–2.72	–3.03
SBC	–2.52	–3.34	–2.24	–2.55
$ARCH\ test$	0.334 [0.80]	0.385 [0.76]	0.99 [0.41]	0.87 [0.46]
Ske	–0.28	–0.57	–0.15	–0.33
Kur	3.00	3.39	2.22	2.93
$J-B$	0.49 [0.78]	2.29 [0.30]	1.07 [0.58]	0.68 [0.71]

Note: The number in brackets indicate significance level.

confirmed that there is conditional heteroscedasticity of 5% level of significance, which makes it necessary to use ARCH models.

3.2. Leverage effects of the news

After surveys to determine the best delays for asymmetric models using diagnostic measures AIC and SBC and significance of model components, the best models were GARCH (1, 1), T-ARCH (1, 1, 2), EGARCH (0, 1, 2) and PARCH (2, 1, 0). Estimation results and test statistics of news effects on housing prices' fluctuations is summarized in Table 5 for these models.

According to Table 5, (α, β) in estimated GARCH, EGARCH and APGARCH models is of high significant level and reconfirms cluster effects in the series. The asymmetric coefficient in APGARCH and EGARCH is significant, which implies that shock effects on housing prices resulting from news have been asymmetric in Iran.

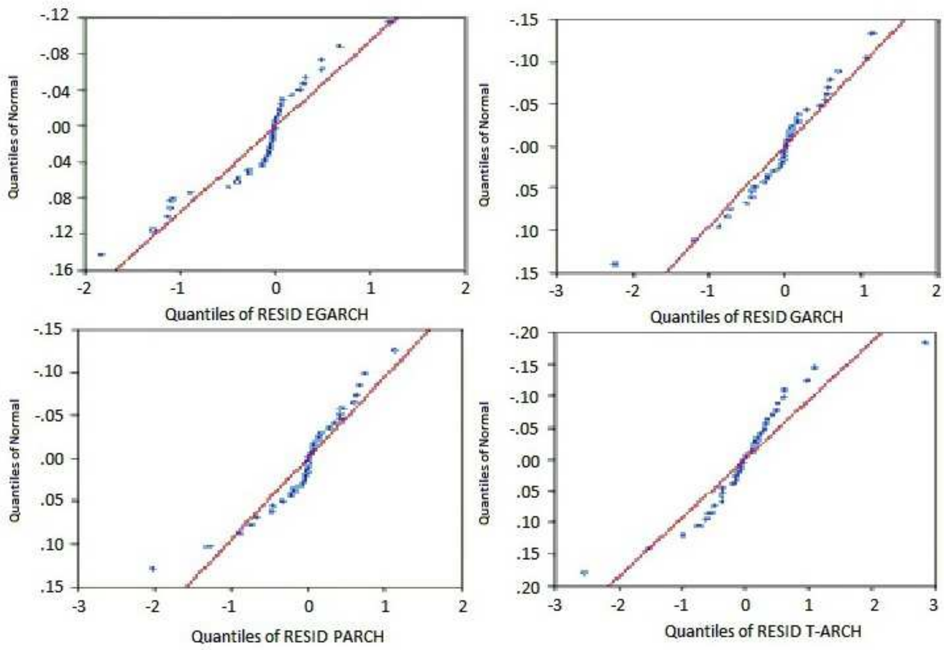

Figure 3. Q-Q for disturbing components of selected models of dissimilar conditioned estimated variance

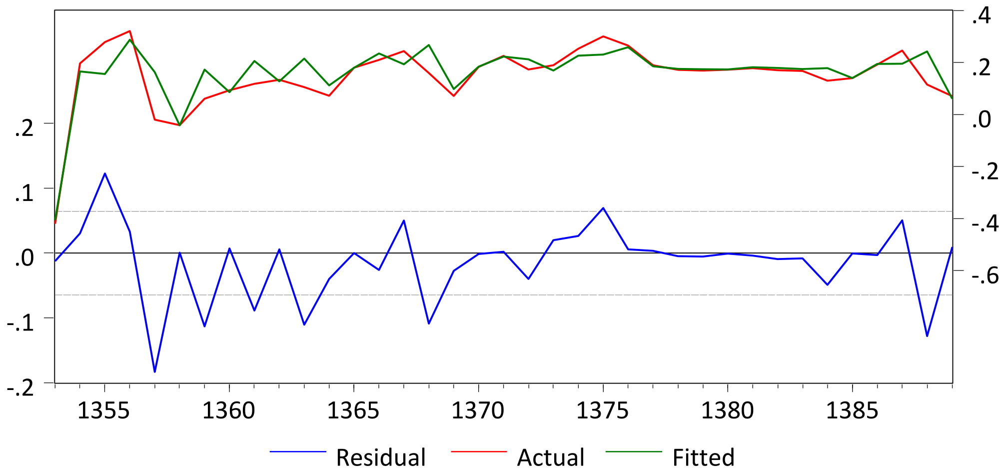

Figure 4. Actual and estimated values and disruption components in EGARCH model

Diagnostic measures of AIC, SBC and R^2 and significance of model components confirm that EGARCH model is preferable to others for modeling. According to the positive sign of γ in EGARCH model, the effects resulting from positive news (with the same size) have been more in Iran's housing market. In Table 5, LM-ARCH test was again taken for error term of all the 4 models, which indicate removal of ARCH effects and confirmation of models' rectitude. The statistics of kurtosis, skewness and Bera and Jarque show good fitness and a normal distribution of error term. This can also be seen in Figure 3, which shows quartiles related to the four models.

In Figure 4, actual and estimated and residual values of the EGARCH model are drawn besides each other for intuitive understanding of the fitness of the model.

3.3. Convergence or divergence test of the estimated parameters from non-conditional dissimilar variance models

To analyze the subject that whether the implied EGARCH model to investigate news effects is cumulative in variance or a IGARCH[1] type model and in order to survey the convergence of estimated parameters that show news effects, Wald test is used to the following assumptions:

$$\sum_{i=1}^{p}\alpha_i+\sum_{j=1}^{q}\beta_j=1,\ 0.5\cdot\gamma+\alpha+\beta=1.$$

Results in Table 6 indicate that the assumption of cumulativeness of EGARCH model is rejected.

This shows that variance returns to its mean value in the long term.

Table 6. Wald test to recognize IGARCH

Wald test:
Equation: Untitled

Test statistic	Value	df	Probability
t-statistic	6.711788	27	0.0000
F-statistic	45.04810	(1, 27)	0.0000
Chi-square	45.04810	1	0.0000

Null hypothesis: $0.5\cdot C(8)+C(10)=1$
Null hypothesis summary:

Normalized restriction (= 0)	Value	Std. err.
$-1+0.5\cdot C(8)+C(9)+C(10)$	0.519310	0.077373

Restriction are linear in coefficients

Source: Research findings.

1 Integrated GARCH (IGARCH).

Table 7. News effects curve

Source: Research findings.

APGARCH	EGARCH	T-ARCH	GARCH	U_{t-1}
0.01	0.0086	0.0089	0.0075	–0.13
0.0083	1.75	0.075	0.0082	+0.12
9.1E-5	0.00015	0.0030	0.001	–0.10
0.0066	0.0030	0.0098	0.0008	+0.08
0.00018	3.92E-5	0.00045	0.0017	–0.07
0.0049	0.0071	0.0031	0.0017	+0.07
0.0051	0.074	0.0014	0.0015	–0.06
0.00016	0.00043	0.00048	0.0014	+0.06
0.00035	0.00036	0.0005	0.0016	–0/057
0.0040	0.00016	0.0004	0.0017	+0.064
0.0041	0.00021	0.0002	0.0009	–0.04
0.0066	1.07E-6	0.0021	0.0009	+0.04
0.0047	4.08E-8	0.0047	0.0016	–0.03
0.0041	0.0046	0.0119	0.0015	+0.03
6.3E-5	0.00080	0.00087	0.0006	–0.02
0.013	0.069	0.0017	0.0002	+0.02
0.0051	0.00086	0.00127	0.0004	–0.01
0.0036	0.0092	0.0029	0.001	+0.01
0.00042	0.00019	0.0040	0.0015	–0.009
0.031	0.016	0.00028	0.0015	+0.009
0.001	0.0028	0.0014	0.0019	–0.003
6.52E-5	1.06E-6	0.028	0.0014	+0/003

3.4. News effects curves estimation

Table 7 shows news effects for GARCH (1, 1), EGARCH (0, 1, 2), T-ARCH (1, 1, 2) and APGARCH (2, 1, 0) models for different values of U_{t-1} and assuming $\sigma^2 = h_t = 0.1227$ (which is non-conditional housing price index). Non-conditional heteroscedasticity variance values of U_{t-1} resulting from asymmetric T-ARCH, EGARCH and APGARCH models have significant differences in negative and positive news shocks. However, GARCH model is not sensitive to sign and value of the shocks, this issue indicates that GARCH model has symmetric news effects and is not suitable for measuring news effects in housing market in Iran.

CONCLUDING REMARKS

This research's main objective is to describe the theoretical model of how fluctuations in housing prices are affected from the news that spread through market, according to asymmetric and non-conditional heteroscedasticity variance models over the period 1971–2013, because these models have considerable talents to estimate positive and negative shocks that result from the presented news in economic clusters and have also been used in recent years in Iran to evaluate the influence of the news on variables such as exchange rates, stock market indices and stocks. Among the conditioned dissimilar variance models, most important asymmetric and symmetric models, including GARCH, T-ARCH, EGARCH and APGARCH, were used to estimate news effects on housing price fluctuations. The results from this research indicate the existence of asymmetric effect of the news during the studied period and show that the effects by shocks from bad news (negative) are more than good news (positive) on housing price fluctuations. This result is in line with Engle and NG (1993), Henry (1995), Friedman et al. (2002) and Miels (2008). Also the EGARCH model is the best when fitted to the data during the period 1971–2013 to explain news effects on housing price fluctuations in Iran.

REFERENCES

1. Abunouri, E., Khanalipour, A., & Jafari, A. (2009). The Effect of News on Exchange Rate Volatilities in Iran: An Application of ARCH Family. *Iranian Journal of Trade Studies, 50,* 101-120.
2. Anderson, K., & NG, V. (2002). *A Comparison of Predictable Volatility Models Using Option Data* (Working Paper). International Monetary Fund.
3. Black, F. (1976). Studies of Stock Price Volatility Changes. In *Proceedings of the 1976 Meetings of the American Statistical Association, Business and Economic Statistics Section* (pp. 177-181). Retrieved from http://www.scirp.org/(S(czeh2tfqyw2orz553k1w0r45))/reference/ReferencesPapers.aspx?ReferenceID=1969803
4. Chun, Tsai, I., & Chi Chen, M. (2010). Modeling House Price Volatility States in the UK by Switching ARCH Models. *Journal Title Applied Economics, 42*(9), 1145-1153. https://doi.org/10.1080/00036840701721133
5. Christi, A. (1982). The Stochastic Behavior of Common Stock Variance Value, Leverage and Interest Rate Effect. *Journal of Financial Economics, 10,* 407-432. https://doi.org/10.1016/0304-405X(82)90018-6
6. Bollerslev, T. P. (1986). Generalized Autoregressive Conditional Heteroscedasticity. *Journal of Econometrics, 31*(3), 307-327. Retrieved from https://ideas.repec.org/a/eee/econom/v31y1986i3p307-327.html
7. Engle, R. F. (1982). Autoregressive Conditional Heteroscedasticity with Estimates for the Variance of United Kingdom Inflation. *Econometrica, 50,* 987-1007. https://doi.org/10.2307/1912773
8. Engle, R., & NG, V. (1993). Measuring and Testing the Impact of News in Volatility. *Journal of Finance, 43,* 1749-1778. http://doi.org/10.1111/j.1540-6261.1993.tb05127.x
9. Engle, R. (2004). Risk and Volatility: Econometric Models and Financial Practice. *American Economic Review, 94*(3), 405-420. Retrieved from http://www.jstore.org/stable/3592935
10. French, K. R., Schwert, G. W., & Stambaugh, R. (1987). Expected Stock Returns and Volatility. *Journal of Financial Economics, 19*(1), 3-29. https://doi.org/10.1016/0304-405X(87)90026-2
11. Friedmann, R., & Sanddorf-Kohle, W. G. (2002). Volatility Clusterring and Nontrading Days in Chinese Stock Markets. *Journal of Economics and Business, 54,* 193-217.
12. Glosten, L. R., Jagannathan, R., & Runkle, D. E. (1993). On the relation between the expected value and the volatility of the nominal excess return on stocks. *Journal of Finance, 48,* 1779-1801. https://doi.org/10.1111/j.1540-6261.1993.tb05128.x
13. Henry, O. (1998). Modeling the Asymmetry of Stock Market Volatility. *Applied Financial Economics, 8,* 145-153. https://doi.org/10.1080/096031098333122
14. Heidari, H., Feiziyengjeh, S, & Bashiri, S. (2012). An Empirical Investigation of the Effects of Inflation Uncertainty on Economic Growth in Iran. *Actual Problems of Economics, 8,* 510-520.
15. Higgins, M. L., & Bera, A. K. (1992). A Class of Nonlinear ARCH Models. *International Economic Review, 33*(1), 137-158. https://doi.org/10.2307/2526988
16. Hu, J., Su, L., Jin, S., & Jiang, W. (2007). The Rise in House Prices in China: Bubbles or Fundamentals? *Economics Bulletin, 3*(7), 1-8. Retrieved from http://www.accessecon.com/pubs/EB/2006/Volume3/EB-06C20006A.pdf
17. Li, W., & Wang, S. (2013). Empirical Studies of the effect of Leverage Industry Characteristics. *WSEAS Transactions on Business and Economics, 4*(10), 306-315.
18. Lambertini, L., Mendicino, C., & Punzi, M. T. (2017). Expectations-driven cycles in the housing market. *Economic Modelling, 60,* 297-312.
19. Miles, W. (2008). Volatility Clustering in U.S. Home Prices. *American Real Estate Society, 30*(1), 73-90. Retrieved from http://pages.jh.edu/jrer/papers/pdf/past/vol30n01/04.73_90.pdf
20. Neunkirchen, M., & Lang, H. (2005*). Characteristics and Macroeconomic Drivers of House Price Changes in Australia* (U21 Global Working Paper).
21. Nelson, D. B. (1991). Conditional Heteroscedasticity in Asset Returns: A New Approach. *Econometrica, 59*(2), 347-370. https://doi.org/10.2307/2938260
22. Schwert, G. W. (1989). Why Does Stock Market Volatility Change Over Time? *Journal of Finance, 44*(5), 1115-1153. https://doi.org/10.1111/j.1540-6261.1989.tb02647.x
23. Zakoian, J. M. (1994). Threshold heteroskedastic models. *Journal of Economic Dynamics and Control, 18*(5), 931-955. https://doi.org/10.1016/0165-1889(94)90039-6
24. Zhang, H., Huang, H., & Hao, H. (2016). Heterogeneous expectation, beliefs evolution and house price volatility. *Economic Modelling, 53,* 409-418.
25. Zhang, Y., Zhang, H., & Seiler, M. J. (2016). The Impact of Information Disclosure on Price Fluctuations and Housing Bubbles: An Experimental Study. *Journal of Housing Research, 25*(2), 171-193.