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Financial and Macroeconomic Impacts on Real Estate Prices of Turkiye: 2013 to 2023

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The period between 2013 and 2023 was extraordinary for the economy of Türkiye. The citizens felt that all of the negativities resulted from the 2023 Kahramanmaras earthquake, the attempt of a military coup in 2016 and COVID-19 pandemic. During these events, sustaining economic policies with healthy dynamics is not easy in terms of micro, macro and international dimensions. It is indispensable for multi-layered real estate markets to exist normally in such unpredictable times. This research mainly focuses on these situations and investigates the relationship between the macroeconomic variables and housing price index changes, which has been accepted as an important variable of price in the real estate market as a price indicator. Using the Markov switching regression model, it is found that inflation and unemployment impact the housing price index changes. On the other hand, another important finding of this research work is the statistical, negative and positive-sided (asymmetric) relationship between gross domestic product growth and housing price index changes. It can be concluded from these findings that the government, investors and consumers of the real estate markets have been subjected to challenging and difficult macro-periods; these extraordinary events have also been so destructive that the expectations, wishes and desires of the market participants are not easily met.

Keywords

Real estate markets, Housing price index, GDP growth, Unemployment, Inflation

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1. Introduction

The real estate industry of Turkiye is often a subject of interest. According to the many interpretations, this industry is the triggering force behind the industrial development of Turkiye. On the other hand, the industrial structure and behaviours of investors, consumers and regulators in the market are open to discussion. First, real estate is a good industrial activity whereby the steel and cement industries are financially nourished. Secondly, a well-organised and robust real estate industry is a good indicator that the country can rebound to healthy economic and financial states such as that witnessed after the mortgage crisis of 2007 in the United States. Carrasco-Gallego (2020) emphasises the ultimate determinative force of housing prices with other important shocks, such as technology and financial shocks, in a general equilibrium model for a macroeconomic environment.

The indicator of real estate prices is the housing price index (HPI) in Turkiye and all around the world. This analysis focuses on the development of the macroeconomic environment with the HPI. To do so, the study analyses the period of January 2013 to December 2024, with the use of quarterly data of the gross domestic product (GDP) and monthly data of changes in the HPI, inflation and unemployment. A research question of the impacts of the macroeconomic environment on real estate prices will be investigated. In other words, the research will fill a knowledge gap on the macroeconomic environment in Turkiye with the HPI by answering this question for likely the most critical period of Turkiye since its establishment. On the other hand, there have been many analyses on the relationships between the real estate market and macroeconomic variables in the literature. For instance, Grum and Govekar (2016) confirm that there is a relationship between real estate prices and unemployment in France, Greece, Norway and Poland. Also, Nithyakarpagam and Mathiraj (2023) find that residential investments are an important indicator of the GDP growth of India. On the other hand, according to De Wit and Van Dijk (2003), GDP, inflation, unemployment, vacancy rate, and the amount of available stock are significant variables that determine real estate returns in Asia, Europe and the United States. Moreover, the analysis in Aizenman and Jinjarak (2009) clearly shows that GDP, inflation and domestic credit are statistically directive and descriptive components in real estate valuation support these arguments. Another important finding in Aizenman and Jinjarak (2009) is the increasing impact of globalization on the national real estate markets. Franses and De Groot (2013) show that greater economic growth is predictable from more new buildings being rented, more variation in the price levels and a larger size of the low-price segment, while less economic growth emerges when the differences in prices between the high-end and low-end segments increase and the average price level in the low-price segment increases. Xu (2017) underlines the importance of interest rate, income, and GDP growth as a determining mechanism over house prices. Marsel et al. (2022) maintain that the exchange and interest rates and GDP growth have a

significantly negative effect on the property and real estate stock price index; on the other hand, inflation has no significant effect on the property and real estate stock price index in Indonesia.

In light of these arguments, it can be said that real estate prices are in a rigid, strong, and persistent relationship with macroeconomic conditions. Meanwhile, this analysis focuses on this environment, by analysing the relationships among GDP growth, inflation, unemployment and the HPI. A Markov switching regression analysis (MSRA) is utilised to evaluate the relationships among inflation, unemployment and the HPI; on the other hand, a mixed data sampling methodology (MDSM) is utilised to determine the relationship between GDP growth and the HPI depending on frequency limitations.

The paper is structured as follows. Section 2 is the literature review. Section 3 provides a short description and definition of two econometric models and the data characteristics. Section 4 are the findings, and Section 5 offers the discussion, conclusion and recommendations for future work.

2. Literature Review

The GDP is a fundamental indicator of economic growth. If GDP is the focus in its relationship with dependent economic cycles and real estate markets, it can be observed that country-specific or worldwide GDP changes have impacts on the real estate markets. Another important finding is that GDP is only affected contemporaneously by its shocks, but shocks in GDP influence all the variables simultaneously, including the real estate markets (Hoesli and Oikarinen, 2021). According to Case et al. (2000), changes in the global economic context, including GDP, are the starting point of globalisation in real estate markets. Xu and Chen (2012: 62) validate this relationship for China by stating that an expansionary monetary policy tends to accelerate subsequent home price growth, while a restrictive monetary policy tends to decelerate the subsequent home price growth. Ghysels et al. (2013) design an analysis for the United States that emphasises the importance of government policies; as such, tightening government policies have negative impacts on GDP growth and real estate prices. Conversely, increasing the breadth of government policies has no impacts. In GDP growth related research, Hong (2014) finds that housing investment is an important factor for short-term economic fluctuations and leads to downside risk in the long term. Besides this, Cunha and Lobao (2021) emphasise the significance of GDP, interest rates, housing starts and tourism in determining real estate price. However, good GDP growth not only contributes to the development of real estate prices but is also a triggering force of the economic and financial states of real estate, industrial construction and infrastructure firms (Cyril and Singla, 2020). Countries that witness large GDP (economic) growth rates, such as China, often try to balance urbanisation by controlling real estate industries throughout the history of their economic

development. Nevertheless, real estate bubbles are a reality, such as the 2007 Global Financial Crisis (Valadez, 2011). If a balance between real estate and urbanisation cannot be realised, destructive impacts can be observed (Liu and Xiong, 2018). These impacts are due to housing reforms, which can negatively affect the supply and demand chains of investors and consumers, bank loans and lending capacity of banks (Huang et al., 2021). Besides these, income distribution or the homogeneous distribution of income frames the real estate markets and their extension, that is, the mortgage markets (Case et al, 2000). On the other hand, Li et al. (2023) point out the possibility that the real estate market is not fully dependent on GDP growth. The main reason is that total fixed asset investment has a positive impact in the perspective of investors. Moreover, Feng and Wu (2021) conclude that local economic (GDP) growth has positive impacts on the regional development of real estate markets. Belke and Keil (2018) and Mueller (1999) support this idea by stating that a supply and demand analysis, construction activities, and housing stock take place on the supply side, and apartment rents, market size, age structure, local infrastructure, and rental prices are on the demand side.

Inflation is another important variable of our analysis. In particular, the prices can show an increasing trend under inflationary pressure that is strict, strong and comprehensive in every type of economy. Conversely, Wolski (2023) rejects this notion for the Polish real estate market and maintains that there is no statistical relationship between real estate prices and inflation during 2009Q1 and 2021Q4. According to **Fehrle (2023),** investment in the real estate market is relatively more advantageous than stock market investment in an inflationary context or conditions. Muckenhaupt et al. (2023) maintain that listed real estate protects against inflation. In the long term, listed real estate offers a good hedge against expected inflation and shows a better inflation hedging ability than stocks. Sümer (2023) supports this idea for Turkiye and lauds the hedging ability of the real estate financial market. Mpofu et al. (2023) reach a similar conclusion for South Africa. Besides these, Hoesli (1994) makes a similar inference for the Swiss financial market and considers real estate portfolios as a shield against inflation. In measuring the impact of the risk-return relationship between the United States and Japan, Nguyen (2023) shows that a risk-return tradeoff is found in the housing market in Japan but not in the United States. Any signal of a high inflation rate – *bad news* – may cause a drop in housing returns in Japan and a rise in the United States. Moreover, Essafi Zouari and Nasreddine (2022) underline the importance of housing strategies as a hedging strategy in the financial markets of France during times of unexpected inflation. However, when inflation is expected, there are no significant findings. Meanwhile, Rubens et al. (1989) find that financial portfolios from 1960 to 1986 that are formed with residential real estate, farmland and commercial real estate investments have the same financial intensity impacts. Wurtzebach et al. (1991) examine real estate returns with two major types of properties (office and industrial) to determine if differences between each type of property exist and show that real estate does provide an inflation hedge. A major difference is found in the inflation-hedging effectiveness of the two types of properties. In

another analysis, Lee (2013) shows that the relationship between real estate returns and inflation is cointegrated. Chu and Sing (2004) indicate that there is a significant unidirectional causality from inflation to real estate returns in the Chinese economy. On the other hand, inflationary pressure can cause a change in public perceptions of real estate, and for this reason, a housing boom can be an indispensable reality (Hill et al., 2023). Anari and Kolari (2002: 67) state that house prices are a stable inflation hedge in the long run. Bond and Seiler (1998) show that in times of unexpected high inflation, hedging strategies in real estate may not be an optimal choice.

Unemployment can be one of the prevalent indicators of housing value, particularly in crisis times (Zhang and Yang, 2023). Ajeeb and Lai (2022) state that employment and investment have a positive impact on the GDP of the real estate market. On the other hand, Bahmani-Oskooee and Ghodsi (2018) affirm that there is an asymmetric cointegration between unemployment and house prices. Dogan and Topuz (2020) show that changes in residential real estate prices do not have a causal effect on unemployment rates in the same quarter. However, it takes 9-12 months for an increase (decrease) in real estate prices to reduce (increase) unemployment rates. This effect is significant during both pre- and post-financial crisis periods and needs to be robust to control for the economic characteristics of the metropolitan statistical areas (MSAs). According to Sun (2021), the effect of housing prices on the unemployment rate is negatively correlated in the short run and positively correlated in the long run; the effects of house prices on stock prices tend to be positively correlated in China. On the other hand, Geerolf and Grjebine (2014) state that If house prices directly impact employment in construction, job volatility in the construction sector results in large employment fluctuations. These fluctuations also impact also total employment through their effects on non-residential investment and consumption, which are two determinants of labour demand.

3. Data and Methodology

The research data are taken from the Turkish Statistical Institute and Central Bank of Turkiye from 2013 to 2023. The descriptive features of the HPI, inflation changes, unemployment and GDP growth are given in Table 1.

Note that the HPI is one of the key instruments among the different model variables in terms of housing affordability (Suhaida et al., 2011). The HPI is a specific indicator designed for a piece of land and shows the changes in the real estate value for this specific land. The efficiency and effectiveness of the HPI have been however a subject of debate by many researchers. Zhang and Yang (2023) point out its increasing importance throughout the COVID-19 pandemic in the United States. Li et al. (2018) find that land supply, GDP, disposable income, money supply, interest rates, demand and income level have impacts

on HPIs. In large states such as China, an HPI is utilised to describe the changes in house values from one province to another (Xu and Zhang, 2022).

Table 1 Descriptive Features of Data

Statistical Feature	HPI changes (Monthly)	Inflation Change (Monthly)	Unemployment Rate (Monthly)	GDP growth (quarterly)
Mean	0.023	1.676	9.754	0.013
Median	0.012	1.070	9.250	0.014
Maximum	0.136	13.580	14.600	0.164
Minimum	-0.010	-1.440	6.700	-0.107
Std. Dev.	0.028	2.176	1.796	0.033
Skewness	2.092	2.834	0.588	1.015
Kurtosis	7.138	12.921	2.420	14.346
Jarque-Bera	190.553	718.162	9.461	243.576
Probability	0.000	0.000	0.000	0.000
Observation	132	132	132	44

There are two important methods used in this paper. One of them is the Markov switching regression model (MSRM), and the other one is the mixed data sampling method (MDSM).

The MSRM was first introduced in Hamilton (1989) to offer a solution for analysis possibilities of time series in various conditions such as capturing fragility, kurtosis, volatility clusters and long memory (Şenol, 2020). In different periods of time, the structure of the financial time series changes and deviates from linearity depending on the conditions. In the end, time variation is introduced and called a regime. In this way, we measure the different features of the regimes, that is, identifying the periods in time series (Evci et al., 2016). However, the utilisation of the MSRA in housing and real estate markets is not novel. Chiang et al. (2020) determine the interaction between housing and stock markets from 1987 and 2017 by using the Markov-switching vector autoregression (VAR) model. Similarly, Gibilaro and Mattarocci (2018) discuss real estate investment trusts in Italy with Markov-switches. Evans and Mueller (2016) analyse the staying time of office, industrial, retail, apartment and hotel properties with Markov chains, which are basic steps of the MSRM. The MSRM can be evaluated with the following equation:

$$X_t = s_t\mu_1 + (1 - s_t)\mu_2 + \varepsilon_t \quad (1)$$

In this equation, the situation, s_t is very important. If s_t takes 1, 0 and other values, the structure of the equation changes into the following:

$$X_t = \mu_1 + \varepsilon_t \tag{2}$$

as $s_t = 1$, and

$$X_t = \mu_2 + \varepsilon_t \tag{3}$$

as $s_t = 0$, and

$$X_t = \mu_1 + \varepsilon_t \tag{4}$$

if $s_t = 1,2,3, \dots, n$.

Today, data frequency has great significance for analyses. As such, investors focus on daily, monthly and annual profits since the beginning of the financial markets. On the other hand, there are different opportunities to make profit, which would benefit from having timely data, such as data for each hour, minute or even second. On the theoretical side, the arrangements and analyses of time series data are real problems for researchers because of the differences in frequency. To overcome these problems, mixed-data sampling (MIDAS) regression is introduced.

In conventional time series, both the dependent and independent variables have the same frequency. This is a necessity. To solve frequency problems, alignment methods are utilised on the time series and financial time series (Armesto et al., 2010; Guliyev, 2018; Khan and Raza, 2023). According to Ghysels (2004; 2018) and Ghysels et al. (2007; 2020), the frequency of the dependent variable can be less than that of the independent variable. According to the data features in Table 3, the MIDAS approach is necessary to determine the relationship between GDP growth and the HPI. Khan and Raza (2023) explain the MIDAS model as follows:

$$y_t = \beta_0 + \beta_1 B\left(L^{\frac{1}{m}}; \theta\right) x_t^{(m)} + \epsilon_t^{(m)} \tag{5}$$

for $t = 1,2,3, \dots, T$, where y_t is a lower frequency variable, $x_t^{(m)}$ is the high-frequency variable, $\beta_1 B(L^{\frac{1}{m}}; \theta) x_t^{(m)}$ is a lag operator and $\varepsilon_t^{(m)}$ is the error term.

4. Findings

To understand the stationary feature of the data, augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are applied to the time series; see Table 2 and Table 3.

Table 2 Augmented Dickey-Fuller Unit Root Test

Variable	Test Statistics	1%	5%	10%
HPI [1]	-6.133	-3.482	-2.884	-2.578
Inflation	-3.364	-3.481	-2.883	-2.578
Unemployment [1]	-2.544	-3.486	-2.885	-2.579
GDP	-7.125	-3.605	-2.936	-2.606

Notes: [1] refers to the first order difference.

Table 3 Phillips Perron Unit Root Test

Variable	Test Statistics	1%	5%	10%
HPI [1]	-13.334	-3.482	-2.884	-2.578
Inflation	-5.025	-3.481	-2.883	-2.578
Unemployment [1]	-11.628	-3.486	-2.885	-2.579
GDP	-10.684	-3.592	-2.931	-2.603

Notes: [1] refers to the first order difference.

According to the results, the HPI changes and unemployment series are stationary in the first difference. However, GDP growth and the inflation series are stationary in the level in both series. The results of the MSRM of the HPI, unemployment and inflation are provided in Table 4.

The transition parameters and duration are given in Table 5.

Table 4 Markov Switching Regression Model of HPI

Regime	Variable	Coefficient	Standard Error	Z-statistic	Prob.
Regime 1	HPI(-1)	0.604	0.058	10.399	0.000
	LOG(SIGMA)	-5.651	0.101	-55.860	0.000
Regime 2	HPI(-1)	0.857	0.061	13.871	0.000
	LOG(SIGMA)	-3.942	0.124	-31.549	0.000
Common	Unemployment (-1)	0.000	0.000	5.759	0.000
	Inflation	0.000	0.000	1.869	0.062
Transition Matrix Parameters	P11-C	3.234	0.653	4.951	0.000
	P21-C	-2.396	0.729	-3.288	0.001

Note: The transition parameters and duration are given in Table 5.

Table 5 Transition Parameters and Duration of Markov Switching Regression Model

	Regime 1	Regime 2
Regime 1	0.962	0.038
Regime 2	0.083	0.917
Duration	26.382 months	11.988 months

According to the results in Tables 4 and 5, there are two regimes in the analysis because the major events occur very close to each other (July 2016 for the attempted military coup, 2019 and 2020 for the COVID-19 pandemic and 2023 for the Kahramanmaras earthquake). During this period of time, it can be said that there are two regimes, one of which is the normal period, and the other is the event-dense period. HPI is statistically impacted by both unemployment (0.000387) and inflation (0.0008932) in two persistent regimes. On the other hand, when looking at the variance structure in the transition matrix parameters, it can be observed that Regime 1 is a high variance regime while Regime 2 is a low variance regime. The transition probability from Regime 1 to Regime 1 (month to month) is 0.96, Regime 1 to Regime 2 (month to month) is 0.03, Regime 2 to Regime 2 (month to month) is 0.08, and Regime 2 to Regime 1 (month to month) is 0.91. Regime 1 continues for 26.382 months; however, Regime 2 continues for 11.988 months.

The results of the MIDAS regression for GDP growth and HPI are given in Table 6.

Table 6 MIDAS Regression results

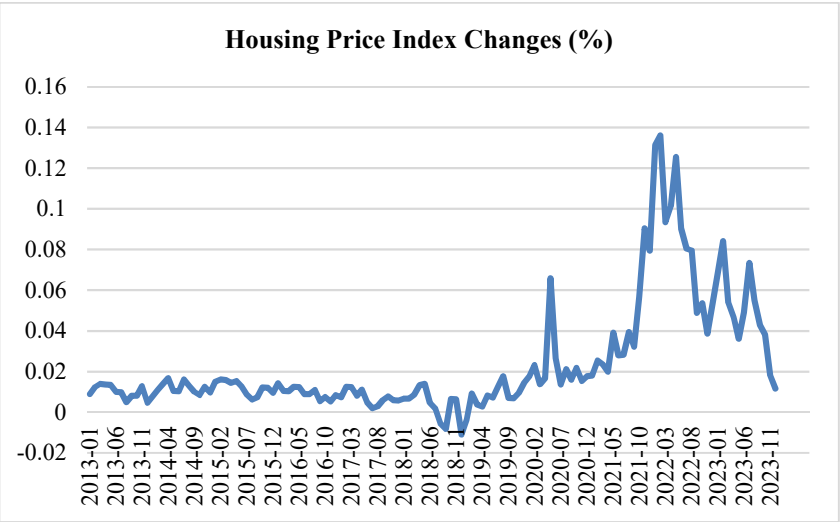
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012	0.006	1.900	0.064
STEP 1	-0.337	0.116	-2.909	0.005
STEP 1	0.927	0.295	3.132	0.003
Lag 0	-0.338			
Lag 1	-0.338			
Lag 2	-0.338			
Lag 3	0.927			
R^2	0.190			
SIC	-3.931			
AIC	-4.054			

According to the data structure, an analysis of the MIDAS regression (step functions)[1] shows that there is a regressive relationship between GDP growth and HPI changes. According to the model, the monthly HDI has an explanatory impact on the quarterly GDP growth. This relationship is two-sided (negative and positive), strong and persistent.

5. Discussion

In the research period, different extraordinary events in Turkiye including the Kahramanmaras earthquake, an attempted military coup and the COVID-19 pandemic had negative impacts on the macroeconomic analysis of Turkiye. The economy of Turkiye based on the research variables in this study is illustrated in Figures 1, 2, 3 and 4.

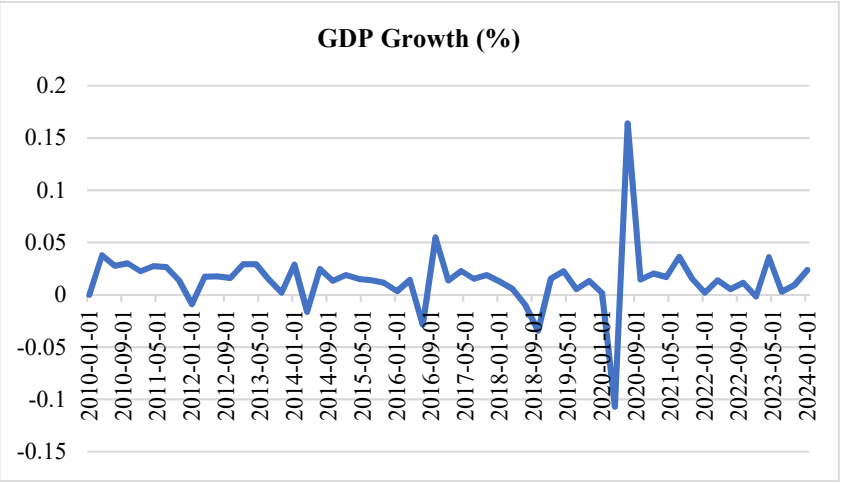
Figure 1 Housing Price Index in Turkiye between 2013M1 and 2023M12



Source: Turkish Statistical Institute Database (2025)

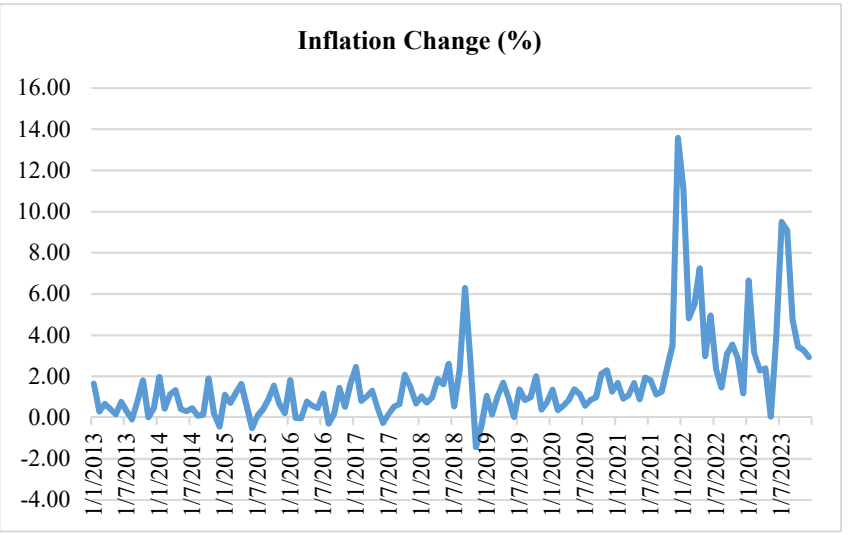
[1] Forsberg and Ghysels (2007) introduce a MIDAS regression with step functions, where the distributed lag pattern is approximated by some discrete steps.

Figure 2 **GDP Growth Change in Turkiye between 2013Q1 and 2023Q4**



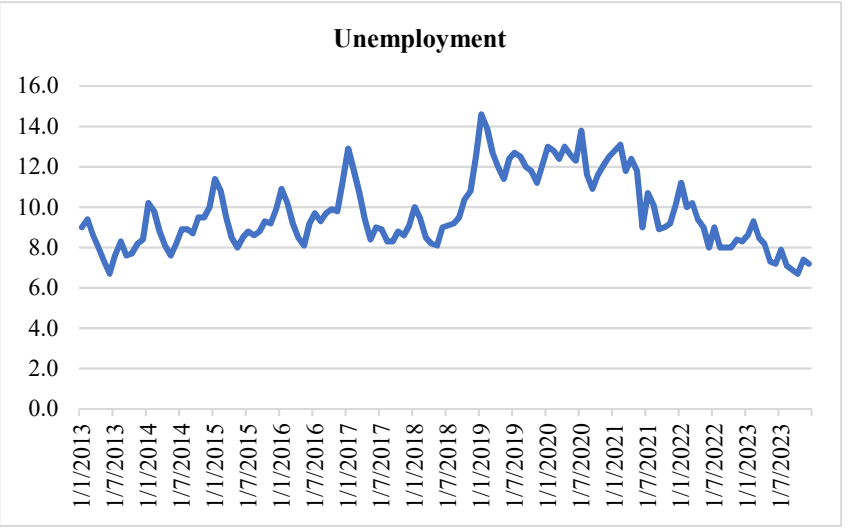
Source: Turkish Statistical Institute Database (2025)

Figure 3 **Inflation in Turkiye between 2013M1 and 2023M12**



Source: Turkish Statistical Institute Database (2025)

Figure 4 Unemployment in Turkiye between 2013M1 and 2023M12



Source: Turkish Statistical Institute Database (2025)

Three important events in these graphs can be found: 15 July 2016 for the attempted military coup, 2019 and 2020 for the COVID-19 pandemic, and the great earthquake of Kahramanmaras on 06 February 2023. Each event caused economic devastation, both for the short and long terms. Therefore, it can be said that all three regimes have persistent impacts on the macroeconomic variables. The persistence of these events can be seen in the works of Alam and Ali (2023) and Aksoy et al. (2024) for earthquakes, Moses (2024) and Bove and Nisticò (2014) for military coups, and the impacts of COVID-19 are the subjects of many research studies. According to the figures, there is high volatility in all of the time series beginning in 2018 (mainly two events).

6. Conclusion

This research answers the main question. The macroeconomic variables have an impact on the financial series for this determined period. Thus, the research gap of analysing the HPI and its macroeconomic environment is addressed.

If these events are the focus, the industry can be affected in similar ways. For instance, the COVID-19 pandemic has had dramatic impacts on the triangle of the real estate financial markets, including housing, commercial real estate and the mortgage market (Balemi et al., 2021). Besides this, the impacts of COVID-19 felt by the real estate financial market include changing the values of unemployment, personal and household incomes, real estate judicial execution, and real estate dynamics (Del Giudice et al., 2020). However, the findings of Hoesli and Malle (2021) are interesting in that they underline that office

buildings have been affected the most by COVID-19, while the residential and industrial sectors have been less affected by the pandemic. On the other hand, Alam and Ali (2023) conclude that the real estate industry in Turkiye is affected by earthquakes in terms of the risks of their sectors, recovery time, and adaptability. At the same time, the investment characteristics of the investors have changed (Güneş et al., 2023).

Therefore, extraordinary times require extraordinary measures and also for financial and economic practices. For this reason, the affirmation of the crisis management of the government will give positive or negative results in the short, middle and long term.

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