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Public Housing Provision and Private Housing Prices: A Causality Analysis for Turkey

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This study aims to investigate whether there is a causal relationship between public housing provision and private housing prices in Turkey. Using the Emirmahmutoglu-Kose approach, a panel data set that covers 26 regions in Turkey is analyzed. The results reveal the presence of a two-way causal relationship between public housing provision and private housing prices for the entire panel. Further investigation reveals that in four of the regions, public housing provision has a causal impact on housing prices, while in three of the regions, housing prices have a causal impact on public housing provision.

Keywords

Turkey, Public housing provision, Social housing policy, Low-income housing, Housing prices

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1. Introduction

Governments frequently implement different social housing programs to address the housing needs of low-income individuals and increase access to affordable housing. However, the scale and focus of these initiatives can also influence the dynamics in the private housing market. These effects are typically manifested through two primary mechanisms: competition and complementary channels, both of which can significantly impact critical aspects of the private housing market, such as pricing and the balance of supply and demand (Jin and Choi, 2019)

The competition channel results in substitution effects, as public and private housing often target similar demographic groups. In cases where public housing units are designed to address the same market segments as private housing, direct competition arises between these two sectors. This competition can lead to a decrease in the demand for private housing, thereby exerting downward pressure on prices. Beyond demand-side dynamics, the public and private housing sectors also compete for scarce resources. For instance, competition over essential resources such as construction labor, materials, and land can drive up costs. This increase in costs may increase production expenses for both public and private housing projects, further complicating the market dynamics.

In contrast, the complementary —or fueling— channel has stimulative effects. Significant government investments in public housing projects can spur economic growth, which subsequently increases demand for private housing. Ultimately, the impact of public housing programs on the private housing market can be either positive or negative, depending on the relative strength of the substitution and stimulative effects.

Over the past two decades, both the local and central governments in Turkey have developed a substantial number of subsidized affordable housing units for low- and middle-income individuals who are seeking homeownership. Between 2003 and 2022, the public sector contributed an average of 7.7% to overall housing production each year, with some regions reaching up to 35% (see Figures 1, 2 and 3). Despite the substantial amount of public housing, there has been a lack of research on its impact on private housing prices. While various studies have explored the factors that drive private housing prices at the national and city levels in Turkey, none have specifically examined the impact of public housing on private housing prices or included public housing as a variable in models that explain private housing prices.

Our study addresses this gap by exploring whether there is a causal relationship between public housing supply and private housing prices in Turkey. To do this, we utilize the Emirmahmutoglu-Kose approach to analyze a panel dataset that covers 26 regions in Turkey. While this method does not allow for a comprehensive examination of the direction and strength of influence, it does

have the potential for improving the predictions of one variable when another is included in the model. We use a simple model to determine whether public housing generally impacts private housing prices without including factors that explain the spillover mechanism. If a causal relationship is established, future studies that wish to account for changes in private housing prices at the regional or national level could integrate public housing supply into their model, in addition to other qualitative, demographic, and economic factors such as location, quality, size, housing inventory, population growth, unemployment rate, home ownership, housing costs, interest rates, gross domestic product (GDP), and inflation and exchange rates. In our study, we define "public housing" as housing units produced by the central and local public sectors, offered for sale at affordable prices and with reasonable terms, and allocated through non-market mechanisms via an administrative process.

This paper is organized as follows: Section 2 reviews the literature on the relationship between public housing supply and market prices. Section 3 provides a brief overview of the provision of housing by the public sector in Turkey. Section 4 outlines the data and methods used in the study and presents the empirical findings. Finally, Section 5 provides the conclusions and policy implications.

2. Literature Review

Previous research has mainly focused on examining the impact of social (rental) housing on house prices and rents in specific neighborhoods or areas with cross-sectional data (Ellen et al., 2007; Kim and Choi, 2009; Ko and Lee, 2017; Ko and Kim, 2022; Schwartz et al., 2006). However, these studies have not reached a definitive consensus on the impact of social housing.

Few studies have explored the impact of social housing on private housing prices at the regional or national level. In China, there is a growing body of literature that examines the effects of public housing due to the large scale production of such housing. For instance, Chen and Chen (2018) conduct a study by using a panel regression model based on survey data from urban Chinese households between 2002 and 2009. Their findings suggest that the expansion of rental housing has a significant lowering effect on house prices, particularly in the eastern cities. Xu et al. (2021) explore the effects of affordable housing supply on the commercial housing market in China by utilizing panel data from 248 prefecture-level cities between 2007 and 2016. Their results show that the provision of affordable housing reduces the supply of commercial housing due to competition in land allocation. However, the availability of affordable housing alone is not sufficient enough to meet demand in a segmented housing market, which ultimately leads to an increase in housing prices. Li et al. (2022) examine the development of the Chinese public rental housing market. They use a threshold regression model to analyze 29 large and

medium-sized cities between 2008 and 2019. Their findings suggest that there is a weak substitution between renting and owning an apartment in the Chinese housing market.

In Singapore, Ong and Sing (2002) find that public housing policies have a significant impact on private housing price dynamics. Hui and Wong (2007) investigate the impact of subsidized sales flats on private housing prices in Hong Kong by using quarterly data from 1978 to 2003. Their findings reveal that private property prices move independently of the supply of subsidized sales flats. In the United Kingdom (UK), Chorley and Liu (2021) find a negative relationship between social housing and house prices in the short term, but no evidence of this relationship in the long term. In addition to these empirical studies, Martin and Westerhoff (2019) develop a housing market model to explore the potential of public housing construction programs in stabilizing housing markets. Their modeling results reveal that while public housing construction programs may reduce house prices, they are not capable of bringing house prices much closer to their fundamental values.

In the context of Turkey, a number of studies have been conducted to provide an understanding of the factors that affect changes in housing prices. These studies can be categorized into two types of studies. The first type focuses on qualitative variables at the city level, such as the type, age, size, and location of houses in cities like Istanbul and Izmir. These studies use a hedonic method to analyze the data, as shown in Selim (2008, 2009), Ebru and Eban (2011), and Özsoy and Şahin (2022). The second type examines the impact of macroeconomic variables on housing prices at the national level, as shown in Gebeşoğlu (2019), Akkay (2021), Akpolat (2022), Akça (2023), and Akkaya (2024). These studies identify the construction cost index, mortgage interest rates, and foreign exchange rates as the most significant factors that influence housing prices in Turkey. It is worth noting that the COVID-19 pandemic is a significant variable that has affected global housing prices, and scholars such as Kartal et al. (2023) and Yaşar and Bulut (2023) have studied its impact within the Turkish context. Additionally, some studies aim to determine the existence of a housing price bubble (Cagli, 2019; Coskun et al., 2020; Akkaya, 2024).

However, to the best of our knowledge, no studies have investigated the effect of public housing supply on private housing prices in Turkey. In other countries like China, where there is substantial public housing development, evidence suggests that public housing provision can influence private housing prices (Chen and Chen, 2018; Li et al., 2022). The magnitude of this impact may differ from country to country, depending on government efficiency in policy formulation. Nevertheless, given the significant production of affordable public housing in Turkey over the past two decades, these public housing units may affect private housing prices. Therefore, our research investigates the presence of this effect.

3. Housing Market and Public Sector Housing Provision

The housing market in Turkey is characterized by a highly competitive environment with few regulations and incentives. Historically, private developers have been the primary actors in housing production, as evidenced by the sectoral distribution data in Figure 1. From 1980 to the early 2000s, housing cooperatives supported by government funds emerged as significant contributors, which primarily served middle-income households. Additionally, municipal companies made modest contributions to housing production. The central government became directly involved in housing provision in the early 2000s, but was largely limited to exceptional circumstances, such as accommodating large-scale migrant populations or responding to major natural disasters (Özdemir, 2011).

Figure 1 Housing Production by Sector based on Occupancy Permits: 1965–2022

***Source*:** TUIK (n.d.).

The Turkish housing sector is predominantly composed of owner-occupied homes and privately owned rental properties, with publicly owned personnel housing units comprising only a small segment of the market. There are no legal restrictions on the ownership of multiple properties, which makes housing investment an appealing option for individual investors. Many individuals opt to invest in additional residential properties to generate rental income and protect their wealth against inflation. As a result, a robust and well-established private rental market has developed across the country.

According to the 2023 Income and Living Conditions Survey conducted by the Turkish Statistical Institute (TUIK, 2024a; 2024b), 56.2% of the population in Turkey own their home, 27.8% reside in rental properties, 0.9% live in public personnel housing, and 15.1% occupy properties rent-free, often owned by family members or close relatives.

The mortgage finance system in Turkey was established in 2007, and housing loans play a vital role in facilitating home purchases in the private market. During periods of low inflation and interest rates, accessibility to these loans increases significantly, resulting in their heightened utilization (Solak, 2023). However, the level of housing finance in Turkey has not yet reached that of developed countries. In addition to loans, many individuals continue to depend on traditional financing methods, such as personal savings and contributions from family members, to fund their home purchases.

Furthermore, there are no legal barriers to the sale of housing to non-citizens. In recent years, housing sales to foreigners have risen significantly, peaking at 67,490 units in 2022, which accounted for 4.5% of total housing sales. Over the past 11 years, these sales have averaged 34,675 units annually (TUIK, 2024b).

Disadvantaged groups in Turkey have historically faced significant barriers in accessing social housing services, including public rental housing, rental subsidies, and financial assistance for homeownership. This lack of access has substantially contributed to the growth of informal settlements, particularly before the early 2000s. The rise to power of the Justice and Development Party (AKP) in 2002 marked a significant turning point in this context. A series of legal regulations were introduced to curb the proliferation of informal housing. The potentially adverse impacts of these regulations on disadvantaged groups were acknowledged so that additional legislative measures were implemented to alleviate these effects. These measures aimed to enhance the development of affordable housing by the public sector at both the central and local government levels. As part of these reforms, the Housing Development Administration of Turkey (HDA) was restructured to focus specifically on developing affordable housing. This restructuring facilitated the creation of numerous housing units for low- and middle-income households. With flexible payment options, these housing units have enabled many individuals to transition into homeownership.

Low-income housing units provided by the HDA typically range from 65 m² to 87 m² in size. Payments commence upon delivery of the units, which requires a 12% down payment and a repayment period of 15 years. Eligibility for these units is determined by household income thresholds, which vary by region and are adjusted annually. The allocation of units is conducted through a lottery system for eligible applicants.

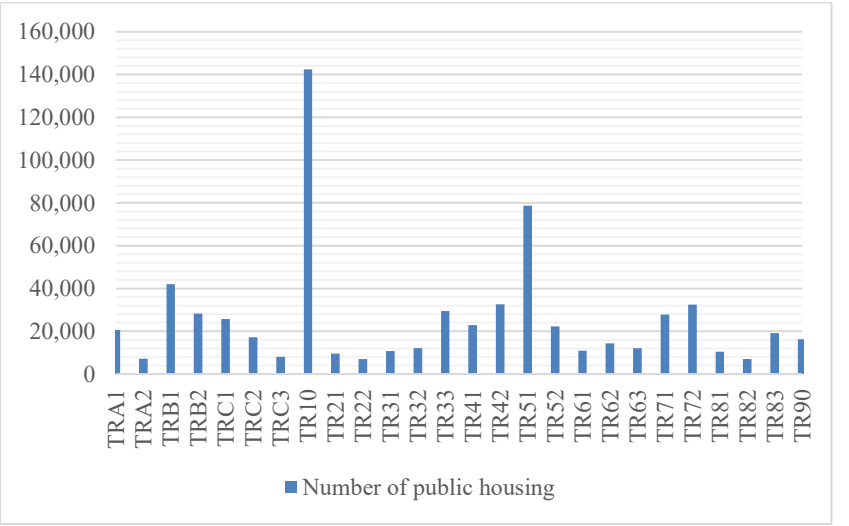
For low to middle-income households, housing units range from 87 m² to 146 m² in size. These units require a down payment of 10% to 25% of the purchase price, with the remaining balance payable over a term of 8 to 10 years. While

most projects do not have specific application requirements, some stipulate that applicants must not own another property, depending on the supply and demand conditions. As with the allocation of low-income housing, allocation of these units is also determined through a lottery system (Housing Development Administration, 2019, p. 37). Typical beneficiaries of these housing projects include workers, civil servants, and middle-class entrepreneurs (Keleş, 2012).

It is important to note that these housing programs are not solely driven by social objectives; economic considerations also play a critical role. Over the past two decades, housing initiatives have been the key drivers of economic growth. Additionally, these programs are integral to stimulus packages designed to mitigate the effects of economic downturns. For instance, during the global financial crisis of 2008–2009, the share of total housing production by the public sector rose sharply to approximately 14% in 2009 – a significant increase compared to the average of 7.7% observed between 2003 and 2022 (Solak, 2023).

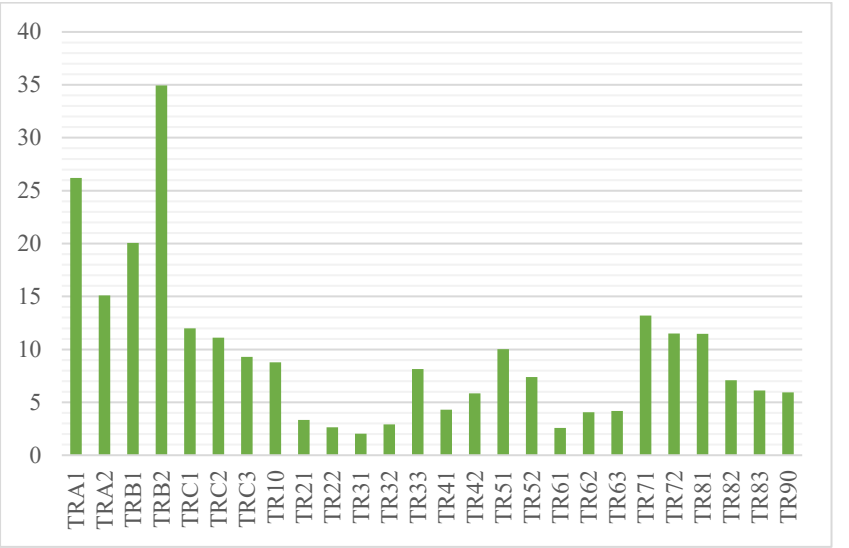
Public housing construction was largely concentrated in the major urban centers such as Istanbul and Ankara, as shown in Figure 2. In some regions such as TRA1, TRB1 and TRB2, public housing construction accounted for more than 20% of the total housing supply between 2010 and 2022. In contrast, public housing accounted for less than 3% of the total housing production in regions such as TR22, TR31, TR32 and TR61, as shown in Figure 3 (see Appendix Table A.1 for information on regional codes and content).

Figure 2 Regional Distribution of Overall Public Housing Construction: 2010 to 2022



Source: TUIK (n.d.)

Figure 3 Share of Public Housing in Total Number of Constructed Housing by Region based on Occupancy Permits: 2010–2022



Source: TUIK (n.d.).

The provision of housing by the public sector has helped many people become homeowners. However, there is an ongoing debate about whether all of these houses can be classified as social housing and whether they are targeted towards those who cannot afford a house in the private market (Akın and Özdemir, 2010; Aslan and Güzey, 2015; Özdemir-Sarı and Aksoy-Khurami, 2023). The lack of or low eligibility requirements has led many individuals who can afford housing from the private market to opt for public housing, thus raising the question of a substitutive relationship between the private and public housing markets. Some scholars argue that public housing programs are primarily aimed at stimulating economic growth rather than serving a social purpose (Ergüven, 2020; Gürkaynak and Böke, 2013; Solak, 2023; Yeşilbağ, 2020). These criticisms and arguments point to the inefficiency of the public housing allocation system.

4. Empirical Analysis

4.1 Data Description and Limitations

To examine the impact of public housing supply on housing prices, a panel data analysis is conducted in this study by using data from 26 geographical regions of Turkey, which are classified at the Nomenclature of Territorial Units for Statistics (NUTS) 2 level. The dataset includes monthly information from April

2010 to December 2022, thus resulting in a total of 153 observations. The NUTS classification system, developed by Eurostat, the statistical office of the European Union, organizes statistical data and has been utilized in Turkey as part of its EU harmonization efforts since 2003. This system comprises three levels of classification based on regional development policies, which identifies 26 regions at the NUTS 2 level in Turkey. These regions consist of provinces that share socioeconomic, cultural, and geographical similarities and face common challenges (Şengül et al., 2013). Statistical analysis is performed by using EViews 12, Gauss 16, and Stata 13 software programs.

In this study, the supply of public housing (PHS) is represented by the size of housing units with occupancy permits, measured in square meters. The data on public housing supply are sourced from the TUIK database.

Housing prices (HP) in this analysis are represented by the Residential Property Price Index (RPPI), which is obtained from the Central Bank of the Republic of Turkey (CBRT) database (CBRT, n.d.a.). To reflect real values, the RPPI is adjusted for inflation using the consumer price index. The CBRT produces the RPPI by employing the hedonic regression method, which tracks price changes by adjusting for quality effects based on observable housing characteristics. This index represents the general housing market in Turkey. In calculating the RPPI, price data for all properties subject to sale, regardless of their construction year, are used. The property values are derived from appraisal reports prepared during the application process for individual housing loans from commercial banks. These appraisal reports, which are essential for housing loans, are issued by real estate appraisal companies. There is no requirement for the sale to be completed and loan to be disbursed; all properties that have been appraised are included in the index. The RPPI has been used since 2010 (CBRT, n.d.b).

However, there are limitations in this study due to the lack of sufficient data. The analysis is restricted to the use of regional data because housing price data for all 81 provinces in Turkey are not available. Furthermore, although the public sector has significantly contributed to housing production since 2002, the dataset only includes information after 2010 due to limitations related to the regional RPPI.

4.2 Methods and Empirical Results

In this study, we conduct a series of tests to examine the data series for cross-sectional dependence. These tests include the Breusch–Pagan Lagrange multiplier (LM) test (Breusch and Pagan, 1980), Pesaran LM-cross-sectional dependence (CD) test (Pesaran, 2004), and refined LM test by Pesaran et al. (2008). The results presented in Table 1 indicate that the null hypothesis of no CD is rejected, thus indicating the presence of CD in the data series. In addition, we test the heterogeneity of the panels by using the delta test in Pesaran and

Yamagata (2008). The null hypothesis of slope homogeneity is not rejected, which indicates that there is no evidence of heterogeneity in the panel series.

Table 1 Cross-sectional Dependence and Slope Homogeneity Tests

Cross-sectional Dependence Test	Statistic	P-value	Conclusion
LM	3.6e+04	0.0000***	Cross-sectional dependency confirmed
LM CD (two-sided test)	187.6	0.0000***	Cross-sectional dependency confirmed
LMadj (two-sided test)	9970	0.0000***	Cross-sectional dependency confirmed
Slope Homogeneity Tests			
Δ	1.253	0.210	Slope heterogeneity not confirmed
Δadj	1.266	0.206	Slope heterogeneity not confirmed

Notes: *** denotes statistical significance at 1% level.

Since CD between the series is confirmed, we next apply the cross-sectionally augmented Im, Pesaran and Shin (CIPS) unit root test. The panel CIPS unit root test developed by Pesaran (2007) considers the CD between panel members. The results presented in Table 2 show that each variable is stationary in different ways.

Table 2 Panel CIPS Unit Root Test Results

	Level	Δ
PHS	-7.822***	-
HP	-2.170	-7.169***

Notes: *** denotes statistical significance at the 1% level. Δ represents the first differences. The option of intercept and trend is used for levels

We employ the method in Emirmahmutoglu and Kose (2011) to test the hypothesis that there is a causal relationship between the public sector housing supply and housing prices. This method takes into account CD and provides consistent and reliable results regardless whether the panel data variables are stationary or non-stationary. In addition, this method makes it possible to examine the causal relationship for each panel member. The Emirmahmutoglu-Kose bootstrap causality test, which is based on the Toda-Yamamoto causality test, considers the following vector autoregression (VAR) model to apply the panel causality test:

$$HP_{i,t} = \alpha_{1i} + \sum_{j=1}^{k_i+d\ \max_i} \beta_{1,ij}\mathrm{HP}_{i,t-j} + \sum_{j=1}^{k_i+d\ max_i} \gamma_{1,ij} PHS_{i,t-j} + \varepsilon_{1i} \quad (1)$$

$$PHS_{i,t} = \alpha_{2i} + \sum_{j=1}^{k_i+d\ \max_i} \beta_{2,ij}\mathrm{PHS}_{i,t-j} + \sum_{j=1}^{k_i+d\ max_i} \gamma_{2,ij} HP_{i,t-j} + \varepsilon_{2i} \quad (2)$$

where i (i = 1, ..., N) denotes individual cross-sectional units and t (t = 1, ..., T) denotes time periods, k_i is the lag structure, and $d\ max_i$ is the maximal order of integration in the system for each i.

The Emirmahmutoglu-Kose causality test extends the lag-augmented (LA)-VAR approach via the meta-analysis statistical procedure in Fisher (1932) in which N separate time series tests are conducted and the significant individual p-values are combined into a single panel test statistic. The Fisher test statistic (λ) is specified as:

$$\lambda = -2\sum_{j=1}^{N} \ln(p_i) \quad i = 1,2, \ldots, N. \quad (3)$$

where p_i denotes the p-value for the Wald statistic of the i th cross section. The test statistic has a chi-square distribution with 2N degrees of freedom.

In Table 3, the Emirmahmutoglu-Kose test results indicate that the null hypothesis "no Granger causality from public housing supply to housing prices" is rejected in TR22 at a significance level of 1%, and in TR10, TR63, and TR82 at a significance level of 10%. Additionally, there is evidence against the null hypothesis "no Granger causality from housing prices to public housing supply" in TR82 and TRC3 at a significance level of 5%, and in TRB2 at a significance level of 10%. Bidirectional causality is observed in TR82. Overall, the results indicate causality from public housing supply to house prices in four regions and from house prices to public housing supply in three regions. For the entire panel, the bootstrap p-values indicate the existence of bidirectional causality between public housing supply and house prices, which is statistically significant at the 1% level. Ong and Sing (2002) also observe similar causal relationships in Singapore. Similarly, Chen and Chen (2018) and Li et al. (2022) find that the provision of public rental housing in China has an impact on house prices. However, it is important to note that the housing markets in Singapore and China have more public sector involvement than that in Turkey.

Table 3 Emirmahmutoglu-Kose Granger Causality Test

		PHS does not cause HP		HP does not cause PHS	
Region	**Lag**	**Wald Stat.**	**P-value**	**Wald Stat.**	**P-value**
TRA1	4	2.442	0.655	0.866	0.929
TRA2	2	4.120	0.127	0.639	0.726
TRB1	4	7.483	0.112	5.015	0.286
TRB2	2	0.309	0.857	5.954	0.051*
TRC1	1	2.111	0.146	0.540	0.462
TRC2	1	0.863	0.353	2.272	0.132
TRC3	3	3.588	0.310	10.004	0.019**
TR10	2	5.427	0.066*	2.311	0.315
TR21	1	0.076	0.783	0.413	0.520
TR22	4	15.740	0.003***	3.354	0.500
TR31	1	0.530	0.467	0.103	0.748
TR32	1	0.057	0.811	0.705	0.401
TR33	4	3.622	0.460	5.695	0.223
TR41	2	1.874	0.392	1.853	0.396
TR42	4	1.953	0.744	3.124	0.537
TR51	4	1.002	0.909	3.263	0.515
TR52	2	2.486	0.288	0.101	0.951
TR61	5	7.442	0.190	3.958	0.555
TR62	6	6.709	0.349	4.619	0.594
TR63	4	8.771	0.067*	2.227	0.694
TR71	4	4.358	0.360	1.056	0.901
TR72	5	2.898	0.716	3.383	0.641
TR81	6	4.494	0.610	3.580	0.733
TR82	2	5.879	0.053*	7.105	0.029**
TR83	1	0.002	0.960	0.046	0.829
TR90	4	0.993	0.911	4.370	0.358
Λ		64.531	0.001***	51.952	0.002***

Notes: (1) ***, **, * denote statistical significance at 1 %, 5 %, and 10 % levels, respectively. (2) Λ represents the Fisher test statistic.

We then investigate whether the correlation in the regions is due to high rates of public housing supply, see Figure 3. The median percentage of public housing construction in the total housing supply across 26 regions is approximately 7.8%. In TR10, TR22, TR63, and TR82, where causality is evident, the percentages are 8.8%, 2.6%, 4.2%, and 7.1% respectively. Interestingly, in regions with notably high percentages of public housing, such as TRA1, TRB1, and TRB2 with percentages of 26.2%, 20.1%, and 34.9%, respectively - the results do not show a clear causal pattern. This suggests that the proportion of public housing alone cannot fully explain the observed causality in these regions. Furthermore, these regions do not show distinct socio-economic characteristics that set them apart from other regions.

It is expected that different micro-level factors related to public housing—such as location, quality, and size which directly compete with private housing—

play a role in influencing this causality. Furthermore, competition between the public and private housing sectors for resources, such as construction materials and labor, may drive up construction costs and possibly affect housing prices. Other factors, such as housing inventory, population growth, homeownership rates, and vacancy rates in private housing markets within these regions, may also impact the relationship between public and private housing prices. Additionally, public housing programs have been instrumental in fostering economic growth, and the stimulating effects of these investments on the private housing market may differ across various regions. However, this study does not extensively explore the full range of these factors.

Understanding the mechanisms through which public housing impacts private housing prices is crucial for informing housing policy development, particularly in areas where private housing markets are well-functioning. Moreover, the diverse characteristics of the housing markets across different regions necessitate more tailored policy interventions. Future research should focus on identifying and analyzing these channels and market characteristics in greater detail to offer more comprehensive insights into this relationship.

5. Conclusion

Since the early 2000s, Turkish central and municipal authorities have made significant efforts to construct affordable housing for low- and middle-income people. The introduction of these new housing units, which are sold at subsidized prices, has substantially increased the housing supply at both the regional and national levels. To investigate the relationship between this new public housing supply and housing prices, we apply the Emirmahmutoglu-Kose approach to a panel dataset that covers 26 regions in Turkey. The results reveal a two-way relationship between public housing supply and housing prices for the entire panel. Furthermore, we identify a causal link from public housing supply to housing prices in four of the regions (TR10, TR22, TR63, and TR82) and housing prices to public housing supply in three of the regions (TRB2, TRC3, and TR82).

The Turkish case highlights that extensive public housing programs have the potential to influence the dynamics of the private housing sector. Whether this influence is positive or negative, and the relative strength of substitutive and stimulative effects, remain uncertain. Further research could provide a more comprehensive analysis, delving into the factors that clarify the spillover mechanisms and their long-term implications for social welfare. Nonetheless, it is evident that to mitigate any adverse impact on the private housing market, establishing clear eligibility criteria and limiting public housing allocation to individuals who are unable to access private housing options is crucial. Failing to implement such measures could undermine the positive outcomes of housing programs and reduce overall social welfare in the long run.

Previous research on housing prices in Turkey has often overlooked the influence of public housing. However, our study shows that public housing is a significant factor that should be considered alongside other qualitative or macroeconomic variables in future investigations of housing prices, both regionally and nationally. This recommendation is relevant not only in the context of Turkey but also for other countries that are implementing large-scale public housing programs.

References

Akça, T. (2023). House Price Dynamics and Relations with the Macroeconomic Indicators in Turkey. *International Journal of Housing Markets and Analysis*, 16(1), 812-827. http://dx.doi.org/10.1108/IJHMA-04-2022-0059

Akın, O., and Özdemir, D. (2010). 'Konut üretim sürecinde Türkiye ve Avrupa Birliği üzerine karşılaştırmalı bir değerlendirme ve TOKİ uygulamaları', in D. Özdemir (Ed.), *Kentsel Dönüşümde Politika, Mevzuat, Uygulama: Avrupa Deneyimi, İstanbul Uygulamaları.* Nobel Yayın, pp. 285–316.

Akkay, R. C. (2021). The Macroeconomic Determinants of The Housing Prices in Turkey. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi,* (58), 241-264. http://dx.doi.org/10.18070/erciyesiibd.801319

Akkaya, M. (2024). Konut fiyat balonu ve konut fiyatını etkileyen faktörlerin analizi: Türkiye uygulaması. *Gazi İktisat ve İşletme Dergisi,* 10(1), 33-45.

Akpolat, A. G. (2022). The Asymmetric Effects of Real Variables on Real Housing Prices: a Nonlinear ARDL Analysis for Turkey. *International Journal of Housing Markets and Analysis,* 17(3), 565-590. https://doi.org/10.1108/IJHMA-09-2022-0143

Aslan, S., and Güzey, O. (2015). Affordable Housing Provision: A Case Study of TOKI Ankara Kusunlar Low-Income Housing. *Ankara Araştırmaları Dergis*i, 3(1), 42–53. http://dx.doi.org/10.5505/jas.2015.32042

Breusch, T. S., and Pagan, A.R. (1980) The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics. *The Review of Economic Studies*, 47(1), 239–253. https://doi.org/10.2307/2297111

Cagli, E. C. (2019). Explosive Behavior in the Real Estate Market of Turkey. *Borsa Istanbul Review,* 19(3), 258-263. https://doi.org/10.1016/j.bir.2018.10.002

CBRT (CENTRAL BANK OF THE REPUBLIC OF TÜRKİYE) (n.d.a). *Residential Property Price Index (RPPI),* Available at: *https://evds2.tcmb.gov.tr/index.php?/evds/DataGroupLink/9/bie_kfe/en*

CBRT (CENTRAL BANK OF THE REPUBLIC OF TÜRKİYE) (n.d.b). Konut Fiyat Endeksi. *Metveri: Kapsam, Dönemsellik ve Zamanlılık*. Available at: https://www.tcmb.gov.tr/wps/wcm/connect/b4628fa9-11a7-4426-aee6-dae67fc56200/KFE-Metaveri.pdf?MOD=AJPERESandCACHEID=ROOTWORKSPACE-b4628fa9-11a7-4426-aee6-dae67fc56200-p5p.7nk

Chen, Z., and Chen, J. (2018). 租住家庭占比、租房供应主体与房价[Tenant Share of Families Supply Structure of Rental Housing and Housing Price]. *统计研究 [Statistical Research],* 35(7), 28–37. https://doi.org/10.19343/j.cnki.11-1302/c.2018.07.003

Chorley, F., and Liu, C. (2021). Does UK Social Housing Affect Housing Prices and Economic Growth? An Application of the ARDL Model. *Economic Issues,* 26(1), 21-43.

Coskun, Y., Seven, U., Ertugrul, H. M., and Alp, A. (2020). Housing Price Dynamics and Bubble Risk: The Case of Turkey. *Housing Studies*, 35(1), 50-86. https://doi.org/10.1080/02673037.2017.1363378

Ebru, Ç., and Eban, A. (2011). Determinants of House Prices in Istanbul: a Quantile Regression Approach. *Quality and Quantity*, 45(2), 305-317. http://dx.doi.org/10.1007/s11135-009-9296-x

Ellen, I. G., Schwartz, A. E., Voicu, I., and Schill, M.H. (2007). Does Federally Subsidized Rental Housing Depress Neighborhood Property Values? *Journal of Policy Analysis and Management*, 26(2), 257–280. https://doi.org/10.1002/pam.20247

Emirmahmutoglu, F. and Kose, N. (2011). Testing for Granger Causality in Heterogeneous Mixed Panels. *Economic Modelling,* 28 (3), 870–876.

Ergüven, E. (2020). The Political Economy of Housing Financialization in Turkey: Links With and Contradictions to the Accumulation Model. *Housing Policy Debate,* 30(4), 559–584. https://doi.org/10.1080/10511482.2019.1681017

Fisher, R. A. (1932). *Statistical Methods for Research Workers (4th ed.)*. Edinburgh: Oliver and Boyd.

Gebeşoğlu, P. F. (2019). Housing Price Index Dynamics in Turkey. Y*aşar Üniversitesi E-Dergisi,* 14, 100-107.

Gürkaynak, R. S., and Böke, S. S. (2013). AKP döneminde Türkiye ekonomisi [Turkish economy during the AKP period]. *Birikim*, 296, 64–69. https://bilimakademisi.org/wp-content/uploads/2014/01/Birikim_2013_gurkaynak_sayek.pdf

Housing Development Administration of Turkey (2019). *Toki Corporate Profile Document*. Available at: https://i.toki.gov.tr/content/entities/main-page-slider/20191011095737969524-pdf.pdf

Hui, E., and Wong, J. (2007). The Impact of Supply of Subsidized Sale Flats on Private Housing Prices in Hong Kong. *Journal of Real Estate Literature*, 15(2), 253-280. https://doi.org/10.1080/10835547.2007.12090206

Jin, C., and Choi, M. J. (2019). The Causal Structure of Land Finance, Commercial Housing, and Social Housing in China. *International Journal of Urban Sciences*, 23(2), 286-299. https://doi.org/10.1080/12265934.2019.1568285

Kartal, M. T., Kılıç Depren, S., and Depren, Ö. (2023). Housing Prices in Emerging Countries During COVID-19: Evidence from Turkey. *International Journal of Housing Markets and Analysis,* 16(3), 598-615. http://dx.doi.org/10.1108/IJHMA-07-2021-0083

Keleş, R. (2012). *Kentleşme politikası* [*Urbanization Policy*]. İmge Kitabevi Yayınları.

Kim, J.J., and Choi, M.J. (2009). External Effects of Public Housing on Neighborhood Housing Prices in Seoul: An Application of Multi-Level Hedonic Price Model with Social Mix Types Included. *Journal of Korea Planning Association*, 44(1), 101–112.

Ko, J., and Kim, C. (2022). The Impacts of Public Housing Program on Housing Prices: The Case of South Korea. *International Journal of Sustainable Building Technology and Urban Development,* 13(4), 398-413.

Ko, J., and Lee, C.M. (2017). 행복주택이 인근 주택가격에 미치는 영향 [Impacts of Happyhouse Development on Neraby Housing Price]. *Housing Studies Review,* 25(2), 153–174. https://doi.org/10.24957/hsr.2017.25.2.153

Li, Y., Qi, Y., Liu, L., Hou, Y., Fu, S., Yao, J., and Zhu, D. (2022). Effect of Increasing the Rental Housing Supply on House Prices: Evidence from China's Large and Medium-Sized Cities. *Land Use Policy*, 123, 106420.

Martin, C. and Westerhoff, F. (2019). Regulating Speculative Housing Markets via Public Housing Construction Programs: Insights from a Heterogeneous Agent Model. *Jahrbücher für Nationalökonomie und Statistik,* 239(4), 627-660. https://doi.org/10.1515/jbnst-2018-0042

Ong, S. E., and Sing, T. F. (2002). Price Discovery Between Private and Public Housing Markets. *Urban Studies,* 39(1), 57-67. http://dx.doi.org/10.1080/00420980220099069

Özdemir, D. (2011). The Role of the Public Sector in the Provision of Housing Supply in Turkey, 1950–2009. *International Journal of Urban and Regional Research*, 35(6), 1099-1117. https://doi.org/10.1111/j.1468-2427.2010.00974.x

Özdemir-Sarı, Ö. B., and Aksoy-Khurami, E. (2023). Housing Affordability Trends and Challenges in the Turkish Case. *Journal of Housing and the Built Environment*, 38(1), 305-324. https://doi.org/10.1007/s10901-018-9617-2

Özsoy, O., and Şahin, H. (2022). Factors Affecting Housing Prices in Izmir, Turkey: A Quantile Regression Approach. *International Journal of Housing Markets and Analysis*, 15(1), 145-164. http://dx.doi.org/10.1108/IJHMA-11-2020-0133

Pesaran, M. H. (2004) *General Diagnostic Tests for Cross Section Dependence in Panels*. Cesifo Working Paper, No.1229, Munich. Available at: https://www.cesifo.org/en/publications/2004/working-paper/general-diagnostic-tests-cross-section-dependence-panels

Pesaran, M. H., and Yamagata, T. (2008). Testing Slope Homogeneity in Large Panels. *Journal of Econometrics,* 142(1), 50-93. https://doi.org/10.1016/j.jeconom.2007.05.010

Pesaran, M.H. (2007). A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence. *Journal of Applied Econometrics,* 22(2):265–312. https://doi.org/10.1002/jae.951

Pesaran, M.H., Ullah, A., and Yamagata, T. (2008). A Bias-Adjusted LM Test of Error Cross-Section Independence. *Econometrics Journal,* 11(1), 105-127. http://www.jstor.org/stable/23116064

Schwartz, A. E., Ellen, I. G., Voicu, I., et al. (2006). The External Effects of Place-Based Subsidized Housing. *Regional Science and Urban Economics,* 36(6), 679–707. https://doi.org/10.1016/j.regsciurbeco.2006.04.002

Selim, H. (2009). Determinants of House Prices in Turkey: Hedonic Regression Versus Artificial Neural Network. *Expert Systems with Applications,* 36(2), 2843–2852. https://doi.org/10.1016/j.eswa.2008.01.044

Selim, S. (2008). Determinants of House Prices in Turkey: A Hedonic Regression Model. *Dogus University Journal*, 1(9), 65–76. https://doi.org/10.31671/dogus.2019.223

Solak, A. O. (2023). Housing Policies in Turkey Post 2002. *International Journal of Housing Policy,* 24(2), 372-287. https://doi.org/10.1080/19491247.2022.2154905

Şengül, Ü., Shiraz, S. E., and Eren, M. (2013). Türkiye'de İstatistiki Bölge Birimleri Sınıflamasına Göre Düzey 2 Bölgelerinin Ekonomik Etkinliklerinin DEA Yöntemi ile Belirlenmesi ve Tobit Model Uygulaması. *Yönetim Bilimleri Dergisi,* 11(21), 75-99.

TUIK (Turkish Statistical Institute) (2024a). *Poverty and Living Conditions Statistics, 2023*, https://data.tuik.gov.tr/Bulten/Index?p=Poverty-and-Living-Conditions-Statistics-2023-53841&dil=2

TUIK (Turkish Statistical Institute) (2024b). *House Sales Statistics, December 2023*, https://data.tuik.gov.tr/Bulten/Index?p=House-Sales-Statistics-December-2023-49516

TUIK (Turkish Statistical Institute) (n.d.). *Building Permits Statistics*. Retrieved from Turkish Statistical Institute https://data.tuik.gov.tr/Kategori/GetKategori?p=insaat-ve-konut-116&dil=1.

Xu, Z., Xianlei, M., and Xiaoping, S. (2021). How does Affordable Housing Supply Affect Commercial Housing Prices: Crowd Out Supply or Divert Demand? *Journal of Finance and Economics,* 47(11), 49-63. DOI:10.16538/j.cnki.jfe.20210813.401

Yaşar, R.Z. and Bulut, E. (2023). Why Did Housing Prices Rise to a Record Level in Turkey? An Empirical Analysis. *Real Estate Management and Valuation*, 31(4), 1-10. https://doi.org/10.2478/remav-2023-0025

Yeşilbağ, M. (2020). The State-Orchestrated Financialization of Housing in Turkey. *Housing Policy Debate,* 30(4), 533–558. https://doi.org/10.1080/10511482.2019.1670715

Appendix A

Table A.1 Regional Codes and Contents

TRA1	Erzurum, Erzincan, Bayburt	**TR41**	Bursa, Eskişehir, Bilecik
TRA2	Ağrı, Ardahan, Kars, Iğdır	**TR42**	Bolu, Kocaeli, Sakarya, Yalova, Düzce
TRB1	Bingöl, Elâzığ, Malatya, Tunceli	**TR51**	Ankara
TRB2	Van, Bitlis, Hakkâri, Muş	**TR52**	Konya, Karaman
TRC1	Kilis, Adıyaman, Gaziantep	**TR61**	Antalya, Burdur, Isparta
TRC2	Diyarbakır, Şanlıurfa	**TR62**	Adana, Mersin
TRC3	Batman, Mardin, Siirt, Şırnak	**TR63**	Hatay, Kahramanmaraş, Osmaniye
TR10	İstanbul	**TR71**	Nevşehir, Niğde, Aksaray, Kırıkkale, Kırşehir
TR21	Edirne, Kırklareli, Tekirdağ	**TR72**	Kayseri, Sivas, Yozgat
TR22	Balıkesir, Çanakkale	**TR81**	Zonguldak, Bartın, Karabük
TR31	İzmir	**TR82**	Çankırı, Kastamonu, Sinop
TR32	Aydın, Denizli, Muğla	**TR83**	Samsun, Çorum, Amasya, Tokat
TR33	Afyonkarahisar, Kütahya, Manisa, Uşak	**TR90**	Artvin, Giresun, Gümüşhane, Ordu, Rize, Trabzon