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Exuberant behaviour in the Istanbul housing market before and during the time of the COVID-19 pandemic: evidence from the aggregate and disaggregate levels

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ABSTRACT

We study mildly explosive behaviour in house prices in Istanbul at both aggregate and disaggregate levels via GSADF tests. In contrast to previous studies, our results suggest multiple episodes of price exuberance in Istanbul and most districts. Most boroughs synchronically experienced explosive house prices in 2014–2015; and more powerfully during the last episodes of COVID-19. We also show that financial variables, including low mortgage interest rates and high stock prices, increased the probability of explosiveness.

KEYWORDS

Exuberance; GSADF test; house prices; Istanbul; COVID-19

JEL CLASSIFICATION

C12; C22; R31

I. Introduction

Istanbul, Europe's largest city with a population of 15 million, leads the Turkish housing market (Gunduz and Yilmaz 2021). As the commercial, cultural, and historical capital, Istanbul generates 30% to Turkey's GDP, and employs 20% of its industrial workforce. Over the past decade, Istanbul's real estate market experienced remarkable growth (Figure 1),¹ particularly in the first half of the previous decade when it outpaced national averages by nearly threefold and exceeded the IMF's global real house price index by tenfold. It is rated among the top five European markets for several years.² During the COVID-19 pandemic, house prices in Istanbul again surged, although much of this increase was driven by rampant inflation rates.³ In response, the government passed a law in Summer 2022 capping rental price increases at a maximum of 25% of the previous year's rent.

Also motivated by calls to study city-level housing bubbles (Coskun et al. 2020), this study investigates mildly explosive behaviour in house prices in Istanbul at both aggregate and disaggregate levels via the

generalized supremum Augmented Dickey-Fuller (GSADF) test of Phillips et al. (2015). It addresses one major issue in the existing housing literature, including Turkey, which is the reliance on aggregate/provincial data.⁴ Notably, this study stands out by analysing housing price dynamics at the district level. The paper has a dual purpose and novelty: firstly, it examines the presence of price exuberance in Istanbul and its densely populated districts, encompassing the period before and during the COVID-19 pandemic; secondly, it uncovers the factors driving exuberant housing prices, providing insights into the mechanisms underpinning housing bubbles. Thus, it holds substantial significance for policymakers.

In the next section, we introduce the dataset and conduct empirical analysis with relevant comments. We conclude the paper with final remarks and policy implications.

II. Data, methods and empirical analysis

Our dataset covers monthly house-price-to-rent ratios for Istanbul and its 33 districts during 2010m1–2022 m3. These ratios are based on

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¹See also The Financial Times, Chart of the week: Turkey's real estate boom isn't slowing yet. <https://www.ft.com/content/0f7b7bfd-ef4b-3625-99b0-9f8320ddcd4a>

²<https://www.pwc.com/gx/en/industries/financial-services/asset-management/emerging-trends-real-estate.html>

³<https://content.knightfrank.com/research/1026/documents/en/global-residential-cities-index-q3-2022-9617.pdf>

⁴For example, Cagli (2019) and Ceritoglu et al. (2019) tested explosive behaviour in Turkish housing markets at regional (NUTS-2) levels, without exploring causes of explosiveness.

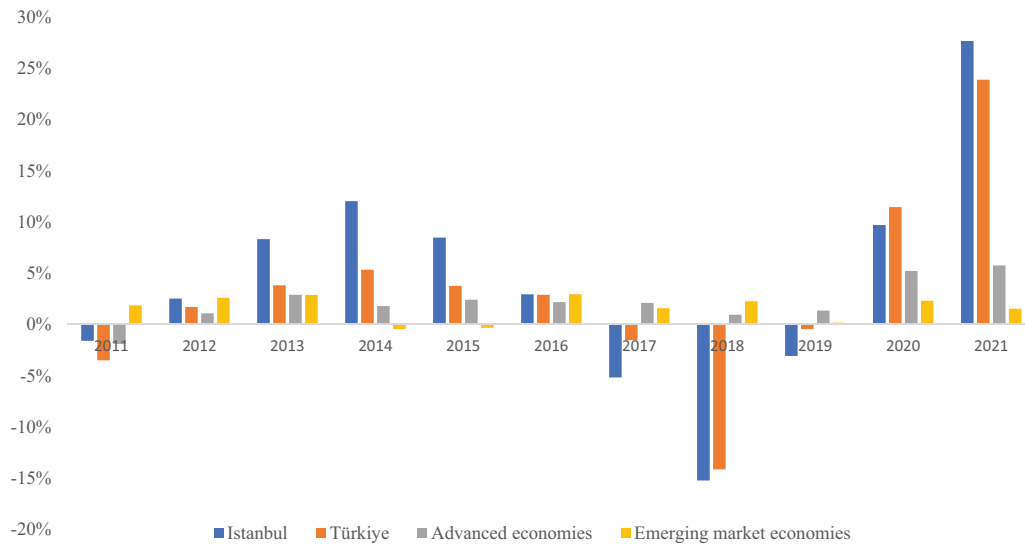


Figure 1. Annual growth rates of real house prices. Source: Bank for International Settlements and the Central Bank of Turkey.

valuation reports by real estate appraisal companies for mortgage loans by banks, representing the median price per square-metre of flats sold in Turkish Lira. We calculate the ratios using Istanbul's monthly rent price index, following standard literature practices.⁵ Note that data after the introduction of the rental price cap are not included.

We employ the GSADF test of (Phillips, Shi, and Yu 2015) (PSY, hereafter) to detect explosive behaviour in housing markets. It is a right-tailed unit root test that performs recursive ADF regressions by allowing the sample window's starting and ending dates to vary, thereby identifying and date-stamping the existence of explosive episodes in the house prices.⁶

Figure 2 presents the results of the date-stamping procedure (backwards supremum ADF) of the test.⁷ The grey areas show episodes of exuberance (explosive periods) in the house price-to-rent ratio. We neglect short periods to evaluate the overall picture and require at least six consecutive months to label an explosive episode.⁸ Four main observations stand out. First, there is a synchronicity of explosive behaviour across most districts during 2014m7-2015m11, although the duration of exuberant episodes differs

slightly across districts. Specifically, over two-thirds of the districts experienced synchronous price exuberance in 2015q1. It suggests the existence of a common factor contributing to housing price exuberance among districts, which is not explicit in aggregate-level studies. Policymakers should consider this synchronicity because it may signal a more robust transmission of the same regional or national shocks to local housing markets. Second, a remarkable distinction emerges from the explosiveness in Istanbul during 2013m1-2013m12. This bubble formation at the aggregate (city) level is absent in most districts and hence questions the relevance of employing aggregate series in housing bubble studies. In fact, Pavlidis et al. (2019) show that exploiting disaggregated data can help identify such explosive episodes more successfully as aggregation lowers the power of right-tailed unit root tests. Third, a negative correlation exists between the number of explosive periods a district has and the level of house prices. That is, the districts with higher house prices experienced very little explosiveness, if any. For instance, Besiktas, Sariyer and Bakirkoy, at the top of the housing market in Istanbul with high average house prices, demonstrated explosive behaviour at the end of the

⁵We also used real house prices for robustness, and our results remained consistent, only indicating fewer explosive months in some cases, which was expected because the rent price index is a subcomponent of the CPI and is comparatively more stable, whereas the CPI includes other items, such as volatile food and energy prices.

⁶See PSY for a broader discussion of GSADF and alternative specifications.

⁷The GSADF test results support the explosive behaviour at 5% significance in most housing markets except Bakirkoy, Besiktas, Sariyer, Beyoglu and Sisli, some of which, however, display explosiveness during the COVID-19 pandemic. These districts are all located on the European side and are mostly neighbours of each other.

⁸PSY label an episode explosive when that period (a month in our case) exceeds the critical value.

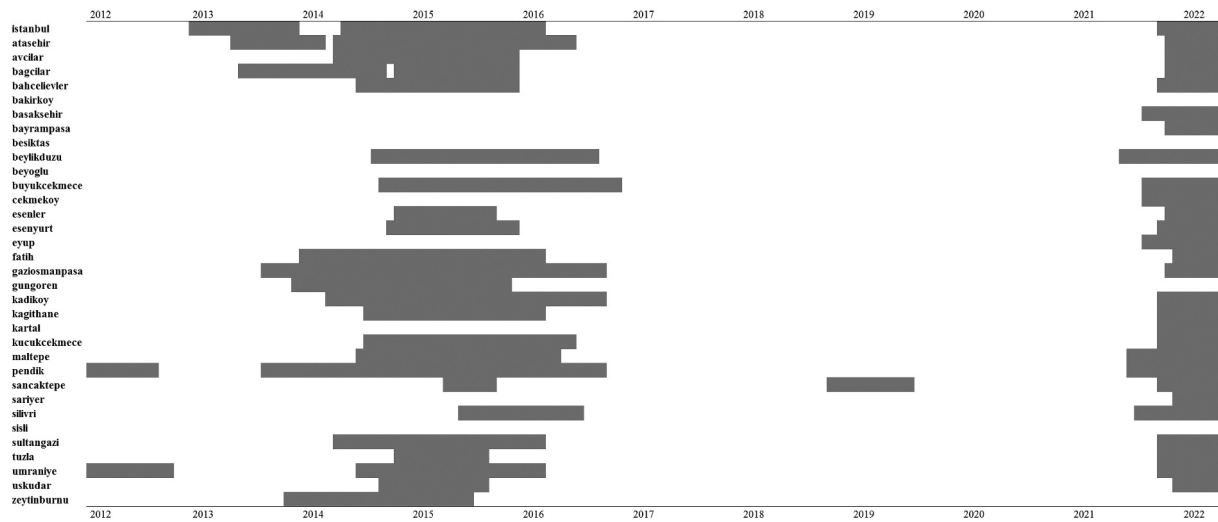


Figure 2. Date-stamping explosiveness in house-price-to-rent-prices in Istanbul and districts. Shaded areas indicate minimum six months of price exuberance per GSADF exceeding 95% wild bootstrapped critical values. The smallest window size is 23 observations, and the lag order is 1 in auxiliary regressions to reduce size distortion risk. The results are similar to the case with zero lag.

COVID-19 pandemic. Geographically, these districts with scarce housing bubbles are located on the European side, most of which are also on the shores of the Bosphorus Strait (Figure 3). However, the differences in the length of explosive episodes across space and time deserve further study.⁹ Fourth, most of the districts experienced explosive house prices starting from the second half of 2021, and all districts unanimously entered 2022 with hot housing markets as soon as most pandemic restrictions were lifted.¹⁰ This phenomenon parallels what has been witnessed worldwide during the pandemic, i.e. housing prices rising globally at record levels which starkly contrasts with what happened before. Put simply, there was an increase in the number of districts having exuberant house prices as soon as the pandemic restrictions started to be lifted.

After identifying the exact dates of exuberance in Istanbul house prices, we run dynamic probit and logit models to evaluate the in-sample predictive ability of several macroeconomic variables.¹¹ The models are expressed by:

$$P(EXU_t = 1 | EXU_{t-1}, X) = \Phi(\beta_0 + \beta_1 EXU_{t-1} + \beta_2 X)$$

$$\Phi(z) = P(Z \leq z), Z \tilde{N}(0, 1)$$

$$P(EXU_t = 1 | EXU_{t-1}, X) = F(\beta_0 + \beta_1 EXU_{t-1} + \beta_2 X)$$

$$F(x) = \frac{1}{1+e^{-x}}$$

where the occurrence of exuberance (EXU_t) is a dummy variable taking the value of 1 in the case of exuberance and 0 otherwise. Lagged exuberance variable (EXU_{t-1}) is included to control for the effect of previous period's exuberance.¹² X represents the vector of predictor variables as shown in Table 1. Our choice of predictor variables is based on the literature and Turkish context but is also dictated by the availability of monthly data.

Table 1 presents results using maximum likelihood.¹³ The dynamic models (with the lagged dependent variable) have higher R^2 and lower information criterion. The results are, however, similar across all models.¹⁴ The mortgage

⁹See Genc et al. (2022) for different price responses of districts to an external shock.

¹⁰A simple bivariate regression analysis shows that easing the strictness of lockdown-style policies (stringency index at <https://www.bsg.ox.ac.uk/covidtracker>) explains more than two-thirds of the change in Istanbul's districts with explosive house prices during 2020 m3–2022 m3.

¹¹Recently, there has been an increase in network-based models addressing the complex interconnectedness of socioeconomic systems. Once local-level data are available, it will be worth studying the drivers of explosive price interconnectedness in housing studies using multiplex network analysis. See Batrancea et al. (2022) for empirical implementation in a different setting.

¹²We made several attempts to find the optimal model as there is lack of guidance on selecting the form and lagged orders of dynamic probit model given limited sample size.

¹³We ensured the stationarity and correct model specification.

¹⁴Eliminating insignificant variables through the general-to-specific approach does not change our main finding.

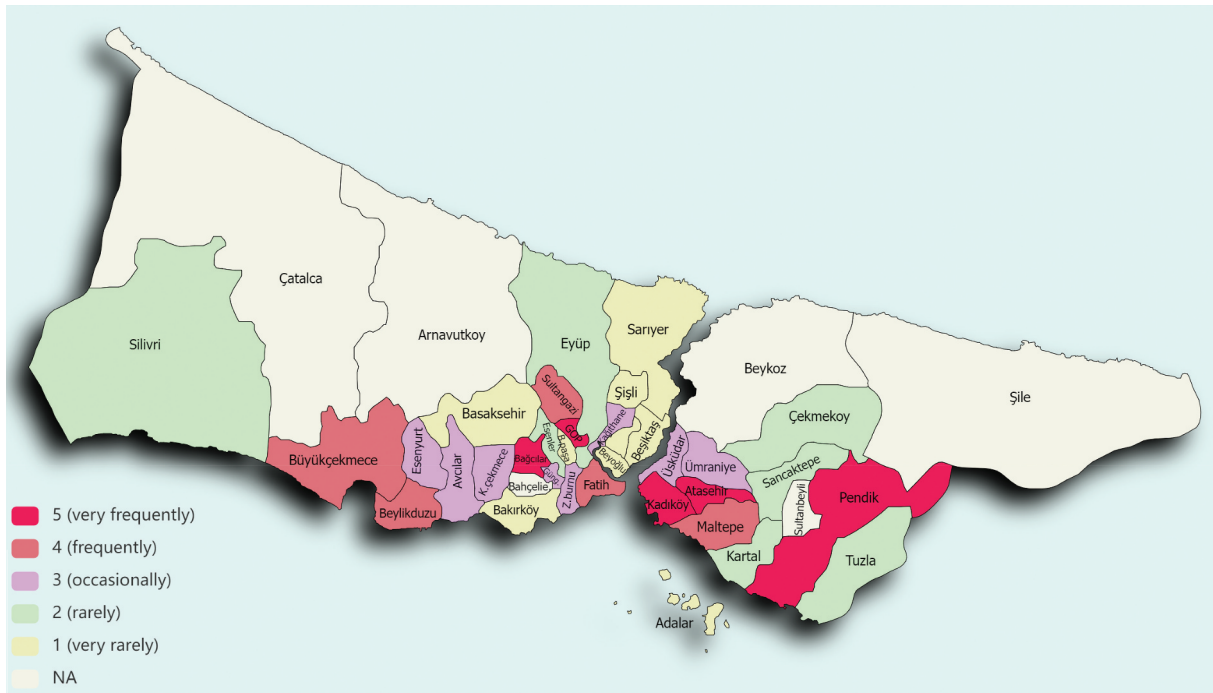


Figure 3. Classification of explosive districts. Intervals are created according to the standardized values of explosive months based on GSADF test.

Table 1. Estimation results.

	Static Probit Model	Dynamic Probit Model	Dynamic Logit Model
Constant	-4.566***	-4.391***	-8.313***
EXU(-1)		2.7052***	4.8752***
D(Interest rate)	-17.625**	-24.231**	-48.827**
Occupancy permits	-0.000219	-0.00012	-0.00030
D(Construction cost)	11.886	20.424	40.371
D(Exchange rate)	.0289	.0638	.1227
D(Unemployment)	-1.331	2.396	-13.446
Stock price	1.515***	1.008***	1.979***
D(Gold price)	-0.00503*	-0.00438	-0.01057
Number of Observations	122	121	121
Log-Likelihood	64.88	-28.67	-28.67
Bayesian Info.Crit.	167.80	100.51	99.90
McFadden's R^2	.2090	.6452	.6490

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Monthly data from 2012 m2 to 2022 m3. D(.) indicates the first difference of the related series. The dependent variable (EXU) is a dummy variable, taking the value of 1 if there is evidence of exuberance and 0 otherwise. The exchange rate refers to the U.S. Dollar to the Turkish Lira exchange rate. The interest rate is the mortgage rate measuring the cost of financing houses. Occupancy permits are the number of permits for dwelling units. Construction cost is the cost index for residential buildings. Unemployment is the overall unemployment rate. Stock price and gold price refer to the BIST100 stock market index and international gold price, respectively, representing alternative asset classes for households' financial wealth. Sources: The dataset comes from CBRT, the Turkish Statistical Institute, and the FRED Federal Reserve Economic Data and is adjusted for inflation, excluding unemployment rate and occupancy permits.

interest rate and stock market index have strong predictive content. Put differently; easy housing loan conditions increase the likelihood of explosiveness in the housing market. Additionally, wealth effects generated via the stock market are important for urban house prices, as Kakes and Van den End (2004) suggested.

III. Conclusion

This paper investigates mildly explosive behaviour in the Istanbul housing market at aggregate and disaggregate levels both prior to and during the pandemic. We find numerous instances of exuberant house prices in Istanbul and its districts over the past decade. In 2014 and 2015, most districts simultaneously

witnessed explosive house prices, and almost all districts experienced hot housing markets in 2022 once pandemic restrictions were lifted. Additionally, financial factors like low mortgage rates and high stock prices increased the likelihood of housing price explosiveness. Normalization in house prices is expected if interest rates rise and policy supports are withdrawn.

Our findings yield key policy insights. District house prices influence broader trends, presenting both opportunities and challenges in addressing housing inflation. National policies, like interest rate adjustments, can effectively combat local housing price inflation, but poorly conceived local policies can become challenging national issues.

Furthermore, we find that expensive houses tend to avoid bubbles, indicating market maturity. Metro politan municipality housing policies should consider district-level characteristics rather than adopting one-size-fits-all approaches. For instance, the wealth effect from a thriving stock market may impact less affluent areas more than prosperous districts.

Finally, policymakers should prioritize local-level research and data collection to study the duration and patterns of price explosiveness in various regions and timeframes. Subsequently, they can utilize real-time monitoring techniques such as the GSADF methodology to establish early warning systems for identifying housing price exuberance (a)synchrony across districts.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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