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THE HOUSING MARKET IN SERBIA – SEGMENTATION, ARBITRAGE AND OVERVALUATION

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The paper discusses market trends and analyzes the regularities that appear on the Serbian national housing market and regional submarkets. It is assumed that, apart from the common market driving forces, the market for newly constructed houses and the market for the existing housing stock behave like two separate segments of the housing market with the imperfect adjustment of prices. The prime focus of the analysis is on the divergence between the prices in those two segments, with a special interest in the process of mutual adjustments. Granger causality tests are employed in order to reveal whether there is a causal relationship between the price indices in those two segments and it has been found that there is a causality relation between the existing housing market and the newly constructed house market prevailing among the regional submarkets. The same methodology is applied to test if there is any such causality between the regional markets. The results have confirmed a likely influence of the Belgrade new construction market on the other regional markets. The findings will help understand the process of price adjustments between the two market segments and will lead to policy recommendations.

Keywords: regional housing markets, Granger causality, market efficiency, urban development

JEL Classification: R31, R21, G51, C32

INTRODUCTION

Durability, heterogeneity and spatial fixity are the distinctive features of the housing stock as a capital good (Smith, Rosen & Fallis, 1988). Although a number of goods have some of those features, houses have all of them together and they have them to the extent that exceeds those features in the case of all other tradable goods. Durability is a consequence of the long physical and economic life of the housing structure. For market considerations, this means that the existing number of houses will significantly outnumber newly constructed houses at any point in time. This feature limits the overall importance of the current level of the construction activity in the total housing supply. House heterogeneity is an issue that must be overcome in order to quote the prices potentially comparable both in the spatial dimension and in the time dimension. For example, the studies of the price determinants of individual houses operate

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with dozens of house characteristics that may explain cross-sectional price variability (Ke, Yang, Shi, Mougharbel, Guo, & Zheng, 2023; Cai, Smit & Helbich, 2024; Soltani, Zali, Aghajani, Hashemzadeh, Rahimi & Heydari, 2024). The last feature generates the spatial rigidity of housing (service) supply and explains the spatial fragmentation of the housing market. Together with the forces that direct the spatial distribution of housing demand, this will be responsible for a rather persistent spatial price variability.

A house can serve multiple purposes. It can be a durable consumption good, an investment and a speculative asset. To the extent that those purposes are possible to delineate, it is possible to recognize the three components of total housing demand, namely consumption, investment and speculative demand. Only a fraction of houses are bought by their owners to live in (owner-occupied). Those houses are said to serve consumption purposes. If a person buys a house so as to rent it (rented), then it belongs to the investment asset, hence representing investment demand. If someone buys a house in order to sell it at a higher price in a short period, then it becomes a speculative asset and represents speculative demand. The last two motives are not easily delineated, since the expected price increase may be considered as a valuable income stream even in investment-motivated purchases, the same as speculative purchases do not exclude the renting income. The motives pertaining to the income stream (rent or a capital gain) dominating the decision to buy a house differ. The consumption part of demand is the least price-sensitive; investment demand will largely depend on the current and perspective price-rent relationships, whereas speculative demand is purely price-sensitive.

In this paper, the current stance on the local housing market is investigated. In spite of the ardent public debate, the Serbian housing market has not attracted much attention from the academic community so far (to the best of the authors' knowledge, there are rare exceptions such as Đorđević & Petronijević, 2015; Radivojević, 2019; Martin, 2023; Marinković, Džunić & Marjanović, 2024). In the past years, Serbia has been witnessing a steady increase in housing prices. The speeding up of new construction (Jakopin & Gračanac, 2023) appears to be unable to keep up with booming demand. At the same time, the upward trend in prices has not been equally steep across the regions, nor has it been equally strong in the segment of newly constructed houses, in comparison to rising prices on the market for the existing housing stock. The main focus of the paper is on the reasons lying behind the divergent processes prone to being attributed to the ineffectiveness of the market consolidation forces. If the forces are weak, the prices will adjust slowly and even incompletely, indicating the importance of the structural reasons for the housing market inefficiency, which is why the paper employs Granger linear causality tests between the pairs of the indices of the quality-adjusted housing prices testing the null hypothesis reading that there is no causality at all. The methodology can reveal the direction of the influences, as well as adjustment lags. It is a well-established methodology broadly used in studying the co-movement of the stock market indices or the causality between different macroeconomic or macro-financial variables (Gradojević & Dobardžić, 2013; Marinković & Radović, 2014; Radojičić & Radović, 2023; Ekşi, Zeren & Gürsoy, 2024).

In the next section, the basic identities that economic science uses to explain the determinants of housing demand and supply is reviewed, after which how the demand and supply forces mutually interact and how those interactions help to set the prices that would clear the market is analyzed. The analyses are based on contributions from market microstructure theory. Here, it is assumed that the housing market is a market with incompletely integrated segments of newly constructed and the existing houses. In the fourth part, data analysis is carried out and newly built houses are found to potentially systematically differ in prices from the existing housing stock in the medium term, which is attributed to the imperfect adjustment process that produces the incomplete alignment of the housing prices in the two market segments. The conclusions are presented in the final section.

THE HOUSING MARKET EQUILIBRIUM

The stock-flow model that belongs to the specific class of the economic models used to formalize markets for the goods that are constantly produced (flow) and consumed in many years (stock) is the basic framework for the macroeconomic analysis of the housing market. The stock-flow model differentiates between the stock of goods (capital goods or durable consumption goods), which is rigid in the short run, and the flow of new production, which reacts more quickly to changes in economic conditions.

The two-equation stock-flow model of the housing market (Poterba, 1984; DiPasquale & Wheaton, 1994; Meen, 2002) depicts the housing demand and housing supply functions, which are both presumably determined by the housing price, so that demand ultimately equals supply, and the housing market comes to a settled equilibrium with the clearing housing price. In J. Poterba (1984), demand for housing services is the decreasing function of the rental price, the same as the supply of housing services is considered to be the increasing function of the rental price. A number of housing units are entered in the model, with the assumption that the stock of the housing units (new construction not playing a role in the short run) produces a flow supply of services. The supply of housing services will depend on the number of the existing housing units and the rental price. The market clearing rental price equates demand to supply for housing services. The costs of housing services are proportionate to the real price of houses (P), including depreciation (at the rate δ), repair and maintenance costs (κ), mortgage interest payments and the opportunity costs of the housing equity (i). The costs also include tax liabilities, namely the income tax at the rate θ and the property tax at the rate μ. If the rates may differ (they are not constant across individuals), it is assumed to be marginal values. The above sum is reduced by the nominal capital gain (π_H) so as to generate the marginal value of the costs of the housing service provided.

It is assumed that, at any point in time, homeownership demands financing a house purchase with the money borrowed from the loan market at the mortgage rate (i) and the equity supposed to earn some return, on assumption that the same opportunity cost rate i applies. The treatment of capital gains is model-specific, but it is worth knowing that gains may be either added to the homeowner marginal value of housing services or subtracted from the costs. The capital gain is the ratio of the housing price rate of change (ΔP) to the old housing price (P) and, expressed in real terms as it is given below, it is the difference between the house price inflation rate and general inflation. Both house price inflation and general (consumer price) inflation are precious concepts in the housing market analyses. The relevance of inflation for the housing market is based on substitution between housing and composite consumption goods. An equilibrium condition of the residential housing market is represented by the following equation:

$$\Delta P = vP - R \tag{1}$$

where:

$$v = \delta + \kappa + (1 - \theta)(i + \mu) - \pi \tag{2}$$

R is the marginal rental value of the services generated by the existing housing stock (H) and vP is the concept similar to the costs of the housing services provided by the homeowner. The variable v should not be confused with the rate of the costs of the housing services provided, since it substitutes the housing price inflation (π_H) for the overall inflation (π), thus excluding the real capital gain (π_Q). The latter variable uses the housing price inflation or the nominal capital gain. According to economic theory, housing services will be provided until the marginal cost of services exceeds the marginal value of services.

Therefore, the above equation (1) means that, whenever the costs of housing services (the real capital gain not included) exceed the marginal value of housing services, investors must be compensated for by the rise in the housing prices. Market efficiency also requires the following arbitrage relationship to hold (rearranged from G. Meen (2002), p. 6):

$$P = R / [\delta + \kappa + (1 - \theta)(i + \mu) - \pi_Q] \tag{3}$$

where R is the real imputed rental price of housing

services. The rationale for the above-mentioned equation (3) implies that the housing price is the renting income rate (the price of the housing service expressed as the ratio of the housing price) discounted by the sum of the rates of all the costs related to house ownership (cost-of-carry). The arbitrage relationship assumes that the streams of both income and costs continue in time, i.e. they are represented as infinite series.

The next set of equations explains the way new construction relates to the existing housing stock market conditions. The total housing supply (H_s) is a sum of the latest change in the number of houses and the existing housing stock. Change in the number of houses (ΔH_s) is the difference between newly constructed houses, i.e. residential construction investment (I), and the depreciation of the existing housing stock (δH). Residential construction investment is defined as a price-dependent variable, i.e. as the increasing function of the housing price ($I = f(P); f' > 0$):

$$H_s = I + (1 - \delta)H \tag{4}$$

$$\Delta H_s = I - \delta H = f(P) - \delta H \tag{5}$$

The model by J. Poterba (1984) has many virtues because it makes it possible to cover the services that houses provide as consumption, investment and even speculative assets. Firstly, the value of housing services is a concept that can easily incorporate not only the rental income, but also any convenience enjoyable by the homeowner that occupies the home. Therefore, the model is suitable for consumption purposes. Secondly, the model explicitly incorporates the rental price and the capital gain, which makes it suitable for studying investment and speculative motives.

Although this model is a seminal piece of work in the economic modeling of the housing market, some authors afterwards improved it by more specifically defining both the determinants of investments in new housing construction and the determinants of housing demand. For example, D. DiPasquale and W. C. Wheaton (1994) extended the set of the variables that should be used in projecting housing demand to include the vector of exogenous variables, such as various demographic features and the household income and wealth.

More contemporary contributions (DiPasquale & Wheaton, 1994; Meen, 2002) underline the fact that new construction will not depend so much on the sale price as they will depend on the mark up in the building industry, or the difference between the selling price and the cost of construction per unit (land, labor, a material, technology, the financial cost etc.). Some authors (Glaeser & Gyourko, 2018) use the ratio of the housing price to the minimum profitable construction cost, which is akin to Tobin's q, the standard ratio of the market value to the firm replacement cost. Such an approach has some virtues, because housing construction projects take several years to complete, so the costs relevant for price determination are contemporaneous rather than historical (real) costs. Moreover, minimum profitable construction costs will strongly depend on the location and the investor's efficiency, so that, in this case as well, the marginal value of costs is what matters for housing market considerations.

When the depreciation rate (δ) is concerned, it should be noted that the rate is neither purely an accounting variable[1], nor is it an engineering matter. There are many developments of social nature that may influence the rate. For instance, a change in the disposable income, the average family size, housing standards and habits, and huge urban interventions may make one part of the existing housing stock unattractive, abandoned, or consequently demolished. The demolition rate also changes significantly overtime. For example, in the US in the first four decades of the 20th century, the annual ratio of demolitions was below 0.2 percent (Blank & Winnick, 1953), while contemporary standards in the US rule demolitions after barely fifty years of exploitation. The Serbian average was 0.06 percent in 2021, whereas newly built houses represented slightly less than one percent of the existing housing stock (RZS, 2022).

Although the presented model explicitly underlines the distinguishing between the market for the existing houses and the market for new construction (Poterba, 1984), it does not differentiate between the

prices of newly constructed houses and the prices of the existing housing stock. It is obvious that the price relevant in the former case (eq. 1-3) is the price on the secondary market, whereas in the latter (eq. 5), it has to be the price on the primary market, if prices on the primary and secondary markets are allowed to differ.

THE HOUSING MARKET MICROSTRUCTURE

A house is an asset that has too many individual features constraining any effort to decrease the uncertainty of quality. No asset can be standardized to the extent that such standardization would enable exchangeability between different items, which is the reason why houses are always traded through a brokerage mechanism. Real estate agencies act as brokers. Agencies actively search to match sellers and buyers and coordinate exchange between sellers and buyers in the brokered market. There is no dealer active on the market that can help align demand and supply by accepting a risk associated with changing inventory (Harris, 2003). On residential housing markets, virtually not a single transaction passes through a dealer's temporary inventory. Rather infrequent trade[2] prevents dealers from establishing their role in housing markets.

"Sellers of individual homes are typically less concerned with short-term price volatility, and hence with immediacy, than with making sure that the widest possible set of ultimate buyers can be informed of the house's availability. Potential market makers, moreover, face not only all the ordinary costs of maintaining a continuous presence in a thin market, but the additional moral hazard that arise from the owner's possibly adverse private information about the value of the property. The result is a market in which intermediaries, to the extent that they are involved at all, provide brokerage or search services, not immediacy." (Grossman & Miller, 1988, 620).

Not only market-makers[3], but professional traders[4] as well, seldom appear on the housing market to exploit intertemporal price changes, which contributes to the inefficiency of the housing market, which R. Shiller (2014) traces to the high costs of trading. It is costly for traders to trade in and out of the housing market in order to profit from predictable price changes (a high brokerage commission for sellers and high search costs for buyers). It is difficult to profit from overpriced homes because forward markets and short-sale opportunities are nonexistent, carrying costs are high because the rental income is low relative to maintenance costs, and there are many local drivers of demand that are difficult to predict. If excess returns are expected to be positive because of anticipated appreciation, there is nothing to preclude a buy-and-hold strategy, which is why the housing market exhibits serially correlated price changes that may govern profitable trading patterns (Case & Shiller, 1989). Nevertheless, some developments in the financial sphere bring some optimism that the housing market can attain the level of efficiency comparable to that in most financial markets. The appearance of the real estate investment funds that try to profit from buying and selling individual homes may be a game changer in housing markets.

The housing market segmentation

Primary market transactions include newly built houses, while secondary market transactions include trade in the existing housing stock. While the primary market is limited by the construction activity, the secondary market is theoretically limitless, capable of growing to the sizes that are multiple times the size of the primary market[5]. The idea of the primary market segmentation from the secondary market is explicitly employed in D. Mauer and L. Senbet (1992) for the case of the IPO markets. The authors found the price differential reflecting the primary risk premium that captures both limited investors' access to the primary market and the risk associated with the imperfect substitutability of the asset in the secondary market. Similarly, A. Gordon and M. Peterson (2020) found arbitrage trading establishing the connectedness of the prices in the primary and secondary markets for exchange traded funds. For housing markets, the idea of separation between the two market segments has been used so far merely to

derive a single housing market price, with no special interest in the price determination specificities of the two market segments. An interesting issue is which market segment leads, and which follows in said price determination. Based on the previous discussions, it is known that construction costs are integrated in the housing price. According to the stock flow model, it appears as true that costs are included in the price equation only on the primary market, since it is only there that such costs are contemporaneous, whereas on the secondary market, it is the owner/seller who may have some records, or remember historical costs, but those historical costs will not directly influence the selling price, if only.

When the numbers of the current housing units (the secondary market) relative to newly built houses (the primary market) are concerned, the former dominate the latter to a great extent as a rule. As already mentioned, the ratio of new houses to the existing housing stock is very low. For example, the number of the newly constructed houses in 24 Serbian cities for during the period from 2011 to 2021 averaged 0.55 percent of the existing housing stock, ranging from 0.02 to 2.67 percent. The period of the most intensive residential construction activity in Novi Sad was reported in the year 2021 (RZS, 2022). Since residential construction is largely concentrated in urban areas, the national average that also includes rural areas is even lower. However, while the entire stock of new houses enters the market, only a fraction of old houses appears on the market. Researchers (Olsen, 1969; Poterba, 1984) sometimes overcome this issue by choosing to operate using the housing service concept instead of the concept of the housing units supplied on the market, in which way any house, either occupied by the owner or by tenants, provides housing services, irrespective of the fact that it may be offered on the market or not so. However, the amount of the said fraction of the existing housing stock offered on the market greatly reflects on short-term price developments as the most volatile part of the total supply. Essentially, the existing housing stock represents a scope of latent supply, being a reserve pool that can feed up supply if triggered by the price. This part of supply is more speculative by nature. High prices would bring it up, while depressed prices would make this part of the total supply nearly vanish, in which way both the construction activity and the existing housing stock supply on the market will demonstrate a strong dependence on the price.

Tax considerations aside, the primary and secondary housing markets can be considered almost perfect substitutes in terms of demand determinants. Therefore, despite differences in the reasons shaping a decision to build for sale relative to a decision to sell the houses that have already been bought, the housing market must behave like a segmented market that tends to consolidate itself. Housing markets are partly segmented in that the primary market is only accessible to certain buyers who make a subset of the buyer universe contrary to which the secondary market is accessible to all market participants. Namely, bearing in mind the fact that, in the case of Serbia, a large portion of newly built houses are sold before completion (in the so-called 'grey' phase or even in the planning and design phases of the project), the primary market buyers have to be compensated for the risk taking that arises from intertemporal price changes and the other nontrivial reasons that may endanger the project accomplishment, with respect to revealing information to the public financing investors for the period prior to houses starting producing any services at all. For such reasons, the primary market prices may differ from the secondary market prices fixed for the very same house.

Segmented market consolidation

In addition to many other influences, market segmentation may isolate cross-segment price impacts (Chen & Duffie, 2021). According to the market microstructure contributions, there are three mechanisms that consolidate a segmented market (Harris, 2003). Firstly, within each market segment, traders adjust their prices so as to reflect information from all the segments. Secondly, some traders route their trade to market segments where they expect the best prices. Finally, arbitrageurs trade whenever prices in one segment are inconsistent with prices in another.

On the residential housing market, the first consolidation mechanism works efficiently if there are no significant impediments to the flow of information. Real estate agencies collect information from the primary market sellers (investors) and the secondary market sellers and make it public free of charge. Perspective buyers can easily access such information, albeit not without exposing themselves to costs, because housing heterogeneity makes search rather costly (primarily time consuming). In addition to agencies, investors alone invest in direct sale through Internet platforms and sale offices. The second mechanism works a little differently than in the general consolidation case, since it is only buyers who are free to choose between the segments. Finally, the housing market also opens some space for arbitrage to work.

It is obvious that the inability to sell short (Glaeser & Nathanson, 2015) and the limited ability to buy forward limit arbitrageurs' potential to exploit certain inefficiencies on housing markets. There are authors (Caplin & Leahy, 2011) who assign serially correlated housing prices (persistent price trends) to certain housing market specifics. Namely, during the periods of excess supply, buyers extract a surplus from sellers, their ability to do so yet being limited by the sellers' option to wait because unlike other goods, holding inventory in the housing stock is not that costly. Contrary to many other physical goods and similarly to financial assets, houses produce services with the value that may exceed regular carrying costs. The sellers who decide to sell must be at least as well-off as the sellers who postpone it, which links the prices across such periods. During excess demand periods, sellers extract a surplus from buyers, but their ability to do so is limited by buyers' option to search for houses elsewhere, which links the prices across spatial markets, in which sense sellers are responsible for intertemporal arbitrage since they are tied to locations, while buyers are responsible for cross-market arbitrage since they are free to search across markets. Therefore, even on the house market, there are some arbitrage forces that act to align prices spatially and over time. Are there any such forces available for arbitrage between pools of newly built and the existing houses at all?

For example, if the secondary market is relatively expensive, an actor selling his or her home in order to buy a new one on the primary market actually performs arbitrage. Such arbitrage exposes an arbitrageur to the costs[6] of movement (only for occupied houses), which will only be profitable if the price differences are big enough to compensate for such costs of movement. In the industry's jargon, such transactions are called 'related', and it is believed that a large share of the total turnover originates from such transactions. Naturally, only part of related transactions are motivated by exploiting the price differentials arising from market inefficiencies[7]. Furthermore, if the secondary market is relatively cheap, investors may use proceeds from sale to invest on the secondary market. Unfortunately, those are the only ways for arbitrage-like transactions to be made on the residential housing market in order to exploit persistent unjustified differences in housing prices in those two segments. For arbitrage to work perfectly, everyone must be allowed to take any position at any time, without any funds needed and without exposing themselves to any risk (Shleifer & Wishny, 1997). In the real world, such a strategy is all but easy to implement. Arbitrageurs are exposed to risk and do not have unlimited access to resources. No short sale is possible. So, in this case, arbitrage has no potential to fully align the prices of those two market segments.

If two assets are not perfect substitutes, the price equalization process will still work, the market segments eventually attaining their separate equilibriums with two instead of one price that will differ to the extent to which the market values the difference between them. As has already been mentioned above, houses are extremely heterogenic durable capital goods. Those differences are less prominent among newly built houses, since such houses must comply with the same contemporary building standard and the regulation as well, which is why the US Census Bureau first proposed the index of the 'prices of new homes sold', also called the 'Constant Quality Index' (Shiller, 2014). Are there, however, any systematic price-relevant differences between the pool of newly built houses and the pool of the existing housing stock? For the sake of simplicity, some economic models (Poterba, 1984)

explicitly assumed that new construction was the same with respect to the construction quality as the existing housing stock. How does it yet look in real life? The biggest source of differences between newly built and old houses lies in the location. The location is not a tradable source of value since the already built location cannot be easily converted and used for new projects. Probably, the best locations are already taken by the existing housing stock, so that new projects have to be placed either in areas on the outskirts of cities, which are less attractive and often lack in the infrastructure, or in the city downtown, where the scarcity of usable land for building may limit the size and architecture of such new projects. The second difference relates to the building standards and quality. In the time spans of several decades, change in the housing standards and living habits has related to the clearly noticeable various definitions of comfort. An example of these developments is the newly established energy efficiency and thermal comfort regulations. It appears that the pool of newly constructed houses may systematically differ from the existing housing stock in terms of price-relevant features in some periods of time probably more than in others.

SERBIA'S HOUSING MARKET

In this section, market trends are discussed and the regularities in force on the Serbian national housing market and regional submarkets are analyzed. It is assumed that, apart from common market driving forces, the newly constructed house market and the existing housing stock market behave like two separated segments of the housing market with the imperfect adjustment of prices. The prime focus of the analysis is on the divergence between the prices on these two segments, with special interest in the process of mutual adjustments. Therefore, Granger causality tests are done in order to reveal whether there is any causal relationship between the price trends on these two segments or not. The results are indicative of the segment that may lead in response to a price-relevant shock and the one following it, if any such exists. Moreover, the same methodology is applied to test if there is any such causality between the regional markets or not.

Dataset – the house price indices

The data on the housing price can be collated from various sources. Official statistics publish data on the average price based on the reported transaction prices for each individual sale. The second source of data implies collecting data from the real estate agencies which assemble data on brokered units. Irrespective of the extent to which an agency may dominate the market, its data will only refer to a fraction of the total market volume. Houses are priced based on the seller's offer that is subject to bargaining and are quite often contracted at prices lower than the offered ones. It is actually the ask/offer quotation that cannot be taken as the market price for granted. On the other hand, the reported transaction price may also be biased, since there is practice to report a lower price in selling contracts in order to decrease the capital gain and consequently personal income tax, or to decrease stamp duties or value-added tax, in which way a portion of the total price is payable in cash and not reported in contracts. This tax-evasion-motivated misreporting is more likely to occur in secondary markets. Moreover, sales made on the primary market are to a great extent arranged without the intermediation of real estate agencies, so they are free of some levies. Therefore, the data on the price for newly built houses are not completely comparable to those on the existing housing stock and are slightly more reliable for analytical purposes. The price reporting practices that do not take into account the enormous heterogeneity of housing units suffer from a critical flaw. Namely, homogeneous houses are fictitious, so are the average prices.

"What we call 'housing' is a disparate bundle of commodities: copper pipes, hardwood parquet flooring, brick siding, permission to send children to a neighborhood public elementary school, and exposure to certain levels of crime and noise. What most clearly binds these unlike goods together might seem to be the monthly mortgage payment that buys them all" (King, 1976, 1077).

Each housing unit is a different combination of intrinsic characteristics and location attributes, hence the heterogeneity (Gobillon & Goffette-Nagot, 2018). However, thanks to improvements in the scientific methodology (Jensen, De Vries, Coolen, Lamain & Boelhouwer, 2008; Hill & Trojanek, 2022), common price trends can now be extracted from the large baskets of commodities that differ in many price-relevant features. This methodology is based on hedonic price regressions (HPR). HPR-based price indices hold constant all the price determinants that make individual houses differ in their respective prices, only reporting change in common valuation determinants. Therefore, such indices are much better measures of the housing price inflation than any index produced with unfiltered transaction data, or the indices based on the ask/offer prices collected from real estate agencies. RGZ (Republički geodetski zavod – *Republic Geodetic Authority*) reports HPR price indices separately for the primary and secondary housing markets for the period from 2017 to date. Thus, any difference in the two indices represents different market conditions on these two market segments. Table (1) accounts for the base indexed for the Republic of Serbia and the regions.

Concerning the housing prices of the existing housing stock, Vojvodina is the fastest growing submarket, only to be followed by Belgrade Region, Southern and Eastern Serbia, and Šumadija and Western Serbia. In the region of Vojvodina and Belgrade Region, housing prices have more than doubled in the last seven years. Speaking of the prices for newly constructed houses, the two northern regions are clearly separated from the southern regions, which have reported an increase in the price of less than 50 percent, whereas the northern regions have reported an approximately 70 percent increase. The figures shown in the last right-hand column present the ratios between the prices on the two market segments for the national market and for each regional market separately, which can be interpreted as the gaps in the prices on the two segments that have accumulated during the seven-year period. Providing that there was equilibrium between the secondary and primary market prices at the start of 2017, the national market for the existing housing stock (the secondary market segment) was overpriced relative to the new house market (the primary market segment) by more than 20 percent based on the RGZ (2024) housing price index, at the end of 2023. Again, the region of Vojvodina reports the highest rate of relative overvaluation, Šumadija and Western Serbia account for a modest rate, while the other two regions lie on the average. Yet, the assumption of equilibrium is doubtful since there is no reason whatsoever to believe that the market forces that are supposed to align the secondary market prices to the primary market prices worked at all back in 2017. Thus, the real extent of the overvaluation of the secondary market is possibly even higher.

Descriptive statistics

In this section, the summary statistics pertaining to the data series of the quarterly growth rates of the housing prices for each region are presented (Table 2), separately for the newly constructed houses (the primary market prices) and the existing housing stock (the secondary market prices). The dataset relates to

Table 1 The residential housing hedonic price indices, 2023QIV (2017Q1=100)

National and regional markets	New construction (1)	Existing stock (2)	Relative growth in % (2/1)
Republic of Serbia	163.01	198.13	21.54
Belgrade Region	169.42	205.03	21.02
Vojvodina	171.80	223.61	30.16
Southern and Eastern Serbia	145.67	179.63	23.32
Šumadija and Western Serbia	148.98	162.96	9.39

Source: The authors' calculation based on the RGZ (2024) dataset.

Table 2 The summary statistics of the data set (levels data; T=27)

	Mean	Max	Min	St. dev	Skewness	Kurtosis
RS						
New construction	1.83	2.94	0.89	0.50	0.72	3.09
Existing stock	2.57	4.47	0.79	0.98	0.15	2.40
BEL						
New construction	1.97	3.05	0.77	0.55	0.19	3.06
Existing stock	2.70	4.51	0.77	1.01	−0.06	2.25
VOJ						
New construction	2.03	2.94	0.80	0.55	−0.46	2.32
Existing stock	3.03	4.81	0.33	1.14	−0.78	3.29
SES						
New construction	1.40	4.49	0.49	1.11	1.46	4.16
Existing stock	2.20	4.79	0.71	1.25	0.67	2.43
ŠWS						
New construction	1.49	2.68	0.53	0.64	0.41	2.26
Existing stock	1.83	3.93	0.44	1.01	0.63	2.51

Source: The authors' calculation based on the RGZ (2024) dataset.

the Republic of Serbia (RS), Belgrade Region (BEL), Vojvodina (VOJ), Southern and Eastern Serbia (SES) and Šumadija and Western Serbia (ŠWS).

Unit root tests

The presence of the unit root in time series can compromise the statistical inference based on various statistical methods for time series analyses. It is also the case with causality tests. For the reason of that fact, the possibility that the series contains unit roots must be rejected as such. The ADF test proposed by D. Dickey and W. Fuller (1979) and the PP test proposed by P. Phillips and P. Perron (1988) were applied in the analysis in order to test for the presence of the unit root (non-stationarity) as a statistical property crucial for further modelling. These procedures test the null hypothesis that each individual time series has its own unit root. All the variables expressed as the levels (the quarterly growth rates) proved non-stationary (the test results not enclosed), so the procedure was repeated with the first differences. In the table below (Table 3), the computed τ-statistics and the *p*-values assigned to them (as given in parenthesis) are reported. The numbers with the asterisks indicate the cases of stationarity. According to the results, there is confidence greater than 95 percent that no series of the first differences contains the unit root.

Table 3 The unit root tests

	First difference	ADFτ[1)]	PPτ[2)]
RS	New construction	−2.250090* (0.0262)	−2.333880* (0.0217)
	Existing stock	−4.396232** (0.0001)	−1.813142 (0.0670)
BEL	New construction	−2.570621* (0.0124)	−2.570621* (0.0124)
	Existing stock	−3.124905** (0.0033)	−2.248598* (0.0263)
VOJ	New construction	−2.964311** (0.0047)	−2.948069** (0.0049)
	Existing stock	−2.412031* (0.0181)	−2.412031* (0.0181)
SES	New construction	−2.313167* (0.0231)	−3.8616** (0.0073)
	Existing stock	−2.4711* (0.0158)	−2.4922* (0.0150)
ŠWS	New construction	−3.167289** (0.0028)	−3.177429** (0.0027)
	Existing stock	−2.464125* (0.0160)	−2.528307* (0.0138)

Notes: [1)]Augmented Dickey–Fuller estimation with the constant, lag length automatic, based on SIC, MacKinnon (1996) one-sided p–values; [2)]Phillips–Perron estimation with the constant, Bandwidth Newey–West using the Bartlett kernel filter; *The null hypothesis is rejected at the 5% significance level; **The null hypothesis is rejected at the 1 % significance level.

Source: Authors

Granger causality

The statistical procedure proposed by C. Granger (1969) intends to test the statistical causality between a pair of the stationary variables re-sampled as time series. The procedure rather tests time precedence than causality in common sense. According to the test, if the past values of an explanatory variable predict the current (lagged) value of the dependent variable better than the past values of the dependent variable itself, the assumed explanatory variable can be said to Granger-cause the assumed dependent variable. The Granger test tests the null hypothesis (H_0) saying there is no causal relationship. If H_0 is rejected with statistical significance, it can be concluded that there is causality in the tested direction. Then, the test is repeated in the opposite order so as to see if there is any clue showing that causality does exist between the two variables in the opposite direction. Therefore, there are two null hypotheses to test for the pair of the variables. The test results are crucially sensitive to the chosen time lag, so the researcher has to repeat the procedure as many times as needed in order to find the most appropriate (the best fitted) lag length. In the table below (Table 4), the best fitted lag lengths, the computed *F*–values and the *p*–values assigned to them (as given in parenthesis) are reported. The numbers with the asterisks indicate the cases of Granger causality.

The Granger linear causality tests (Table 4) confirmed the statistically robust case of unidirectional causality from the secondary market prices to the primary market housing prices for the national market and for the majority of the submarkets. With the exception of Belgrade Region, there is no evidence of the bidirectional causal relationship between those two housing segments in the other regions. Based on the causality tests, the secondary market, rather than the primary market, seems to lead in response to the prices. The primary market follows the trend of setups and reversals of the secondary market, with the lags of up to four quarters. The one-year lag (the four quarterly periods) fits best for all the regions except Vojvodina, where the one quarter lag is the best fitted lag length. For Vojvodina, the results are less conclusive (10 percent significance). The Belgrade Region case appears to stand out from other cases. Although bidirectional causality is confirmed, the causality from the primary market housing prices to the secondary market housing prices is more convincing in this particular case, which exception deserves special attention. Belgrade Region was the location of choice for almost 40 percent of all the

Table 4 The Granger causality test results – the prices for newly constructed houses (y)

Existing housing stock prices (*x*)	Lag	H_0: x does not cause y	lag	H_0: y does not cause x
First difference				
Republic of Serbia	4	8.6734*** (0.0031)	4	1.4740 (0.2585)
Belgrade Region	4	3.3096* (0.0645)	4	8.4806*** (0.0031)
Vojvodina	1	3.1687* (0.0662)	1	0.9689 (0.3975)
Southern and Eastern Serbia	4	10.1730*** (0.0016)	4	1.2365 (0.3167)
Šumadija and Western Serbia	4	6.8626*** (0.0077)	4	1.9368 (0.1765)

Notes: *The null hypothesis is rejected at the 10% significance level; **The null hypothesis is rejected at the 5% significance level; ***The null hypothesis is rejected at the 1% significance level.

Source: Authors

houses built in the group of the 24 major Serbian cities in the year 2021, in which very same year Belgrade Region held one-half of the whole national housing market in the number of sale transactions and even 63 percent of the total turnover, which is by far the most active submarket and simultaneously the submarket with the strongest influence of the new construction prices on the overall housing price level. This is why it may be assumed that the Belgrade submarket may have some influence over the other markets.

The above procedure (Table 4) assumes that the adjustment forces may work for cross-segment price alignments and that the forces are only in place within the submarket spatial boundaries. In addition to that, some other tests were done to check if there are such processes between different submarkets. Namely, house services fixed in location (trailers being the exception) can only be utilized by the movement of people, which *per se* is largely (but not entirely) motivated by search for income (job or business), the chain of the housing substitutes for buyers is limited by the travel time or distance from the site of the locational preference (Blank & Winnick, 1953). Those limitations create boundaries around the housing submarkets and bring upon the spatial delineation of the housing markets. However, this is completely true if houses are treated as solely serving the purpose of consumption, i.e. only if a house is bought to be lived in. If a house is treated as an investment vehicle, then its location may deviate from the investor's locational preference but is still closely related to the job and income prospects of the submarket of the house location (Marinković *et al*, 2024). Bearing in mind the investment purpose of houses, all houses can be considered close substitutes, and the spatial boundaries will stay loose. The most plausible assumption is that the Belgrade Region price trends influence the price trends in the other regions (submarkets). Separate tests were performed for the new construction (Table 5) and the existing housing stock (Table 6) price trends. As in the previous case, reverse causality was also checked for, although this direction of causality is obviously less likely to be found.

The results obtained upon completion of the testing (Table 5) confirm the fact that the changes in the prices for the new construction in Belgrade Region precede the same direction changes in the prices in the other regions, which is indicative of the fact that the Belgrade prices may have a certain influence on the prices on the other submarkets, the influence being the strongest (the most conclusive) in Vojvodina, only gradually weakening in the two southern regions. The same applies if the best fitted lags are compared. The fastest transition of the prices to new levels is found to have occurred in Vojvodina, whereas the other regions need more time to react.

The next tests (Table 6) take the prices of the existing housing stocks for the purpose of analysis. The clear causality cases that appeared among the Belgrade submarket and other regional submarkets when the

Table 5 The Granger causality test results – The Belgrade newly constructed housing prices *(y)*

Newly constructed housing prices (x)	Lag	H_0: x does not cause y	lag	H_0: y does not cause x
First difference				
Vojvodina	1	0.3297 (0.7231)	1	8.2075*** (0.0027)
Southern and Eastern Serbia	2	1.1919 (0.3253)	2	4.4446** (0.0280)
Šumadija and Western Serbia	4	1.3385 (0.2901)	4	2.7910* (0.0912)

Notes: *The null hypothesis is rejected at the 10% significance level; **The null hypothesis is rejected at the 5% significance level; ***The null hypothesis is rejected at the 1% significance level.

Source: Authors

Table 6 The Granger causality test results – the Belgrade existing housing stock prices *(y)*

Existing housing stock prices (x)	Lag	H_0: x does not cause y	lag	H_0: y does not cause x
First difference				
Vojvodina	2	3.7925** (0.0422)	2	5.6926** (0.0121)
Southern and Eastern Serbia	4	2.0795 (0.1556)	4	0.6865 (0.5185)
Šumadija and Western Serbia	3	1.3802 (0.2783)	3	3.3065* (0.0612)

Notes: *The null hypothesis is rejected at the 10% significance level; **The null hypothesis is rejected at the 5% significance level; ***The null hypothesis is rejected at the 1% significance level.

Source: Authors

prices for the newly constructed houses were being considered are not visible here to a great extent. Only Vojvodina and to a lesser extent Šumadija and Western Serbia proved to be responsive to the Belgrade prices. These are Belgrade Region's bordering submarkets, so it is more likely that buyer-led cross-market arbitrage achieved the spatial alignment of the price movements. In the market segment of newly constructed houses, investors' pricing decisions are more important in determining the price and the investor's community is more spatially maneuverable. They have greater freedom to opt for the locations to build in than buyers when choosing the location to live in. The difference in the causality established as such through testing the existing housing market and the newly built housing market may be explained by the assumption that a large share of national investment in and speculative demand for houses are both directed towards the newly constructed houses in Belgrade Region as the major national submarket, which is probably the reason why buyer-led arbitrage will work better in the new construction market segment.

Based on the findings, some explanations can be summarized and the following sequence of the impacts between the market segments is suggested. Since the majority of new houses are sold in the early construction phase and, bearing in mind the comparably modest level of the residential construction activity, unsaturated demand ends on the secondary market pushing prices up. Excess demand heats the secondary market, first with the tendency to spill over to the primary market and the prices of newly constructed houses. This sequence will generate co-movement in prices in the two segments, with the new construction housing prices lagging behind the existing housing stock prices. This explanation must be considered with some caution. Namely, the observed regularity can be at least to some extent explained by the fact that it is one of a more technical nature. The fact that a large share of newly constructed houses are sold at pre-agreed prices based on pre-contracts, i.e. in the early construction phases, but such sales are reported upon completion based on final contracts with lags of up to the total length of the production time, some of the reported new construction prices will reflect previous market conditions.

Is cooling possible on the Serbian housing market or not? If the answer is *yes*, where would it start? If the slowing down of demand is assumed, then the primary market will face slowing sales, with the potential for prices and/or the output to fall. For the given structure of the construction industry, the output fall is a more likely scenario. If there is a decrease in the price to some extent, then there will be a spillover onto the secondary market. If this happens, however, the falling trend is not believed to potentially continue any longer and a significant downward correction of the prices is needed. The

high price elasticity of new construction is likely to hold on any further downward adjustment of the housing prices. If the fact that the current level of the housing prices endangers housing affordability in terms of a desirable policy is accepted as such, the findings recommend the measures that will stimulate residential construction and prevent shocks from the housing demand side. The first aim could be addressed by applying numerous measures. For example, urban development theory (Caldera & Johansson, 2011) indicates the beneficial influences of the measures that tackle the physical limitation on development land, the restrictive regulation on the land use, the provision of the infrastructure and other public services complementary to housing, as well as the degree of competition in the residential construction industry. Those measures affect housing supply responsiveness to prices in more densely populated areas, especially in large cities. It is exactly inelastic supply that is considered to be primarily responsible for housing bubbles (Glaeser, Gyourko & Saiz, 2008). The second aim prescribes inflation control and activity to promote financial alternatives for inflation hedges i.e. the financial investment vehicles that may offer return comparable to real estate investments.

CONCLUSION

The paper investigates the dynamics of the prices on the Serbian residential housing market. The data confirm the fact that, in the medium term, newly built houses may systematically differ in quality-adjusted prices from the existing housing stock. The cross-segment adjustment process was imperfect producing not only the slow but also incomplete alignment of the prices in those two housing market segments and is likely responsible for the steady divergence of the secondary market housing prices from the primary market housing prices. The trend that has continued during the last seven years has led to the overvaluation of the existing housing stock relative to the newly constructed houses on the national market of over 20 percent, with notable differences among the regions. The paper employs the Granger linear causality tests between the pairs of the quality-adjusted housing price indices testing the null hypothesis implying the presence of no causality at all. The Granger tests confirmed the statistically robust case of the unidirectional causality from the secondary market housing prices to the primary market housing prices for the national market and all the submarkets, except for Belgrade Region, which shows bidirectional causality with the even more conclusive reverse causality case. Thus, it seems that the secondary market, rather than the primary market, leads in response to prices. In the majority of the regional submarkets, the primary market follows the secondary market regarding the trend of setups and reversals with the lags of up to four quarters. Concerning new construction, the Granger causality tests performed so as to test whether there is any causality in the co-movements of the regional submarkets or not have confirmed the assumed direction of causality from Belgrade Region to the other regional markets. The results of the tests of the co-movement of the markets for the existing housing stocks are of a mixed nature. In terms of the desirable policy, the findings recommend the activity that will stimulate residential construction and prevent shocks coming from housing demand.

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ENDNOTES

1 In Serbia's accounting regulation, it is currently 2.5% annually.

2 The average time to sell a house in the City of Niš with *4zida* agency is 51 days after the house has first appeared on the market.

3 To some extent, investors may play a certain role in smoothing intertemporal price changes, which is the market-maker's role. By holding inventory when prices are low in expectance of future rising prices or selling in advance ongoing projects when prices are considered as high, investors exert an influence on smoothing price developments.

4 'Early bird' buyers are a specific type of speculators on housing markets, although they are not professional traders. They buy in advance and share risk with the main investor. The position of such buyers–investors is rather complex, but certainly includes speculation on intertemporal price movements. Some of them engage themselves in repeated transactions of buying and selling in a sequence, targeting early bird discounts on new houses. The similar role is played by subcontractors if they are paid in housing units.

5 It is estimated that, in Serbia, a half of the total market turnover is realized in the newly constructed house segment.

6 Such costs have a more direct influence on owner-occupied houses, although even in the cases of rented houses, movement costs may be of relevance since the costs may affect the tenant's readiness to pay the renting price and hence the readiness of the house buyers to pay the price for the house intended for rent.

7 The sale of a house followed by the purchase of another house, or vice versa, immediately or at short notice, if aimed to exploit unjustifiable price differentials between those houses, is actually an arbitrage-like trade. Such trades may 'relate' the houses of a different market segment or the houses of the same segment.

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