The Limits of Market-Rate Housing Supply Policy: The Role of Investors and Housing Homogeneity

Sofia Borushkina* Aleksei Kiselev†

February 9, 2024

Introduction

The burgeoning housing affordability crisis is prompting policymakers to seek solutions to make housing more accessible. The market-rate supply of housing has emerged as a prevailing policy response to address affordability concerns (Fields and Hodkinson, 2018; Glaeser and Gyourko, 2018; Lee et al., 2022). Although recent studies posit that easing restrictions on market-rate housing construction can mitigate price increases and bolster housing affordability (as summarised in Been et al. 2019, 2023), a significant number of scholars and activists challenge this approach. Adherents of "supply skepticism" argue that strategies such as removing constraints on land supply, endorsing urban fringe development, reducing planning controls, and easing application processes for private development can inadvertently intensify housing issues, disproportionately affecting lower-income households (Rodríguez-Pose and Storper, 2020; Wetzstein, 2022). We explore how this supply skepticism might become relevant under the conditions when i) housing tends to be used as an investment and ii) the housing market is formed by homogenous housing units. This study demonstrates how the combination of a strong investment motive and extremely loose regulation favoring housing homogeneity can undermine affordability initiatives, especially for the most vulnerable households.

*PhD candidate, Politecnico di Milano (PoliMi). PoliMi: Department of Architecture and Urban Studies, Via Edoardo Bonardi 3, Milano, Italy, 20133 (e-mail: sofia.borushkina@polimi.it).

†PhD candidate, European University Institute (EUI). EUI: Department of Economics, Via della Fontanelle 18, San Domenico di Fiesole, Firenze, Italy, 50014 (e-mail: aleksei.kiselev@eui.eu).

We argue that allowing smaller and cheaper housing that addresses the requirements of low and middle-income households is, at the same time, increasingly attractive for real estate investors due to its homogeneity and commodity-ness. Standardized housing is easier to appraise and, hence, to buy or sell; this higher liquidity is valued by private investors and should be reflected in higher prices. Private investors might be especially interested in investing in smaller apartments for precautionary motives (Painter et al., 2022). This implies that adding cheap market-rate housing might have a muted overall effect on housing affordability. Considering that in the current urban housing affordability crisis, housing is becoming increasingly inaccessible exactly for low- and middle-income households (Anacker, 2019; OECD, 2021), this research stresses how the typology of housing might affect what seems to be an undisputed economic argument in favor of more housing construction.

To unpack this case, we look into the experience of modern-day Russia, which presents a compelling case for several reasons. First, it adheres to the market-based housing supply policy proposition with support to new market-rate construction and homeownership (Kosareva and Polidi, 2021). Secondly, under pressure from national housing policy in the 2010s, demanding the introduction of enormous volumes of housing, city mayors loosened planning controls and accelerated all approval processes, aligning housing policy with the imperative of market-rate housing supply policy (Golovin et al., 2021). Finally, by the end of the 2010s, the housing market demonstrated widespread use of housing as an investment by households (Khmelnitskaya et al., 2020). As a result, newly constructed housing units became largely homogenized (Gunko et al., 2018) since it was allowed by the regulator and highly demanded by investors because of the ease with which mass housing is appraised and traded. Under these conditions, against the background of mortgage loan subsidies established in 2020, the market-based housing supply policy resulted in higher prices and lower affordability.

To show how this mechanism explains the housing market developments in Russia, we i) provide suggestive evidence on the link between new housing construction and its affordability in relation to housing policy regulation in the largest Russian agglomerations, and ii) show how investment demand in the housing market is strengthened by the increasing homogeneity of housing units. To address the first issue, we use aggregate data on the housing sector and link various affordability indices to the changes in housing policies during the 2000-2022 period. We argue that looser regulation and extended supply of market-rate housing are not always accompanied by increases in housing affordability. To shed light on the second question, we employ more recent contract-level data to analyze the structure of the new housing stock and evaluate the idiosyncratic price risk in the Moscow housing market. We argue that the data supports the claim of highly homogeneous housing stock.

Low idiosyncratic risk means one only needs a few observable characteristics (location, square footage, floor number, etc.) to appraise a housing unit with a negligible margin of error; hence, low risk indicates higher non-observable homogeneity. Then, we show that higher homogeneity decreases prices and average time on the market by using a search and matching model of the housing market based on Albrecht et al. (2007). The latter is of value for real estate investors but not necessarily for regular households who would face poorer matching options in such a market. Taken together, this evidence supports the idea that market-rate housing supply might face limits in its effects on affordability; loose regulation might change not only the quantity of available housing and but also affect the market qualitatively – which is not necessarily in favor of the households that need housing more.

This paper contributes to several strands of literature. First, it responds to the call to put housing at the center of political economy and the need to bridge housing-as-policy with housing-as-market in research (Aalbers and Christophers, 2014; Ansell, 2014). Second, it brings a more nuanced understanding of market-based supply policy and the broader political economy of homeownership in light of the housing affordability crisis as one of the most pressing social and political challenges nowadays (Ansell and Cansunar, 2021; Wetzstein, 2022). Thirdly, it contributes to the literature on house price determinants, focusing on the idiosyncratic price component (Giacoletti, 2021; Kotova and Zhang, 2021). Finally, it is based on geographies outside the more commonly studied European and North American housing systems, which provides a better understanding of the political economy of housing beyond the most studied housing regimes (Aalbers, 2017; Blackwell and Kohl, 2018; Kohl, 2017). Furthermore, this study contributes to the ongoing policy debate concerning how much, what type, and where housing should be constructed to counteract the affordability crisis and whether the homogenization of new housing presents a challenge (USCprice, 2023).

1 Market-Rate Housing: What It Is

Market-rate housing construction means adding unsubsidized (at least directly) residential units and is now a widespread policy response to housing shortage and unaffordability. Economic research attributes housing affordability issues to supply shortages caused by local regulatory restrictions, suggesting increased construction in high-demand areas as a solution to achieve lower prices and rents, enabling more people to afford housing (Glaeser and Gyourko, 2018). This measure can reduce or at least stabilize housing prices, firstly by expanding the housing stock in the neighbourhood, and secondly through more far-reaching indirect effects via a moving chain

process. As new residents occupy newly constructed units, they vacate previous units, which are then occupied by another group, facilitating housing availability (Bratu et al., 2023; Mast, 2023).

Research indicates that new market-rate housing not only stabilizes prices city-wide but also generally enhances the affordability of housing in buildings within its immediate vicinity (see overview in Phillips et al. 2021). The positive relationship between market-rate housing construction and affordability raises the question of how to facilitate such construction, especially in cities with acute housing crises. One of the most popular measures proposed is the adjustment of local land-use regulations, or upzoning, which typically involves increasing permissible development and reducing restrictiveness, such as by allowing for larger buildings (Freemark, 2023; Manville et al., 2020). Another proposed measure is to provide developers with various ways to access new plots for development – expanding the developable land area, with the expectation that it will be effectively converted into new residential units (Murray, 2022).

However, a significant number of scholars and activists challenge market-rate housing supply policy as a tool for increasing housing affordability. Adherents of "supply skepticism" argue that supporting market-rate housing supply can inadvertently intensify housing issues, disproportionately affecting lower-income households (Rodríguez-Pose and Storper, 2020; Wetzstein, 2022). The idea is that new housing attracts wealthier households and introduces amenities, signaling landlords to raise rents, thereby reducing affordability through an "amenity effect" or "demand effect" (Phillips et al., 2021). Critics also argue that land should prioritize affordable over market-rate housing, question if new market-rate units benefit lower-income families, cite inefficiency in housing use as a cause of unaffordability, and doubt that increasing land leads to more housing (see overview in Been et al. 2019, 2023).

Opposition to new development usually stems from homeowners seeking higher prices through supply limits (Ortalo-Magné and Prat, 2014) and also includes some renters advocating for lower rents (Been et al., 2019). Nall et al. (2022) shows that skepticism towards housing supply is not rooted in economic misunderstanding but rather in political positioning. Support for housing supply reforms is driven by self-interest, with individuals backing reforms that align with their financial expectations, whether anticipating decreases or increases in prices. Individuals who oppose new housing projects usually have intense preferences and are likely to be more privileged on various dimensions (Einstein et al., 2019). Main arguments of supply skeptics are usually centered not on affordability but on power dynamics, framing it as a struggle for justice (Mohorčich, 2023).

Despite opposition, decisions by policymakers and conclusions from experts in many countries are increasingly recognizing that a lack of housing

supply is generally understood to be responsible for high housing prices and rents, with "the most important solution to solving the supply shortage being simply more supply" (Alexandrov and Goodman, 2024). Popular measures proposed in policy papers for increasing the construction of market-rate housing include eliminating various regulatory and policy barriers, addressing the lack of competition, facilitating the filtering of existing stock to lower-income households, reducing the cost of credit for both homebuyers and residential developers, and loosening zoning rules (Frayne et al., 2022; Lo et al., 2020; Saiz, 2023). While the typology of constructed housing is less frequently discussed in such research, there are suggestions that mass-produced prefabricated housing and small-sized units are also part of the strategic set relevant for market-rate housing supply policy (Saiz, 2023). On the one hand, such measures could increase the speed of construction and reduce costs; on the other, some experts believe that losing the diversity of housing types being built could negatively impact policy outcomes.

Homogeneity of the types and tenures of newly built housing is understood as one of the main obstacles to increasing market-rate housing supply (Letwin, 2018). The idea is that homogenous residential products slow down the absorption rate, i.e. the number of new housing units sold in a given time period. As a result, housebuilders adjust their output according to low absorption rates and delay the development of land (Murray, 2020, 2022). Policymakers believe that adding variations in products creates additional demand and, therefore, a higher absorption rate, possibly leading to a higher build-out rate. The tool suggested for such a situation adopts a new set of planning rules specifically designed to provide a diversity of offerings (Letwin, 2018). However, the empirical research that followed has demonstrated that diversity leads to lower absorption rates, the opposite of what the policymakers envisioned (Greenhalgh et al., 2021). This observation led us to explore how housing diversity *per se* influences policy effectiveness in addressing varied population groups' needs, using the highly standardized Moscow housing market as a case study.

2 Russia's Housing Market: Structure, Typology, Policies

Housing construction in Moscow is markedly homogeneous, especially when compared to development in Europe or the US, including their capital cities. The typical Moscow household resides in a relatively small apartment within a large-scale residential complex, often featuring prefabricated or highly standardized designs. All housing is developed by private entities, usually sizable companies overseeing multiple projects that include several thousand to tens of thousands of apartments each. This section offers

essential background on the Russian housing system and the Moscow housing market, setting the stage to examine the market-rate housing supply policy proposition as a strategy to address the affordability crisis. We are supplementing this with quantitative evidence from contract-level data in the next section.

Figure 1: An example of a typical residential new-build project in Moscow - The Buninskiye Luga residential complex by PIK, Russia's largest developer. *Sources*: PIK.

In term of tenure the existing housing system in Russia is characterized by a "super-homeownership" regime, where extremely high levels of homeownership are combined with a societal and policy-making perception of homeownership as a necessity (Khmelnitskaya, 2015; Stephens et al., 2015). This phenomenon emerged as a result of mass privatization and subsequent housing policies following the end of the socialist regime in 1991 (Daniel and Struyk, 1994; Kosareva and Struyk, 1993). Tenants of state rental units were given the opportunity to privatize their homes at little or no cost. As a result, 30 years later, by the end of 2021, 91.8% of apartments in Moscow were privately owned, with 90.4% owned by citizens (The Federal State Statistics Service, 2022). Social, public, or subsidized housing for low-income or other vulnerable population groups is not constructed, except for a minimal amount mandated by law for some orphans upon reaching adulthood. In summary, virtually all housing constructed in Moscow is built by private companies and sold to private buyers. Housing policy

is centered exclusively around homeownership and market-based housing, aimed at increasing the construction pace by private developers and enhancing affordability for homebuyers (Kosareva and Polidi, 2021; Puzanov, 2018). Although this policy encompasses a wide range of financial and non-financial support mechanisms for developers, the most notable measure is the subsidization of mortgage loan rates for all buyer groups, with a financial "cap" on subsidized apartment purchases set around 40-50 square meters (sq. m.; roughly 430-540 sq. ft.) in Moscow. Experts attribute to mortgage subsidies not only an overall increase in the cost of housing in new developments but also a rise in the proportion of small-sized housing that falls under the program's limits in developers' new projects.

By the late 2010s, it became common for households to use housing as an investment (Khmelnitskaya et al., 2020), with Moscow being traditionally considered the most appealing market for such investments. Over 30% of apartment buyers in Moscow are registered in regions outside the city (Kuricheva and Popov, 2016). While distinguishing between consumer and investment motives in housing purchases can be challenging, development companies estimate that about 30% of apartments are purchased primarily for investment purposes[1]. In this respect, Russia aligns with the global trend of housing commodification and financialization, particularly in large cities, albeit with distinct features. Unlike in Europe, where institutional investors and financial organizations drive financialization, in Russia, housing finance has developed somewhat insulated from global financial markets, with individual house-buying investors playing the primary role (Büdenbender and Lagna, 2019) It is important to note that property taxes in Russia are minimal and do not increase with the ownership of second or subsequent apartments (Puzanov, 2018).

Due to the centralization of power in Russia, cities, acting as policy recipients, had to relax planning controls and accelerate approval processes to meet the national government's demand for massive housing volumes (Golovin et al., 2021). This policy was in line with the imperative of market-rate housing supply policy. Newly constructed housing units became largely homogenized (Gunko et al., 2018): new housing districts consist of multi-family towers and blocks of standardized or semi-standardized typology. Moscow's newly constructed buildings are large, averaging 25 stories in 2021, with those under 8 stories deemed low-rise. These buildings typically contain several hundred small apartments, averaging just 58 sq. m. each [2].

Initially, market-based supply policy led to an increase in housing construction and improved affordability. In 2021, Moscow set a historic record with 7.4 million square meters of housing constructed (The Federal State

[1]Based on interviews conducted in 2021 with top managers from 8 leading development companies in Moscow, collectively covering over 60% of the city's new housing market.

[2]Authors' calculations based on the Unified Database of Developers data, erzrf.ru.

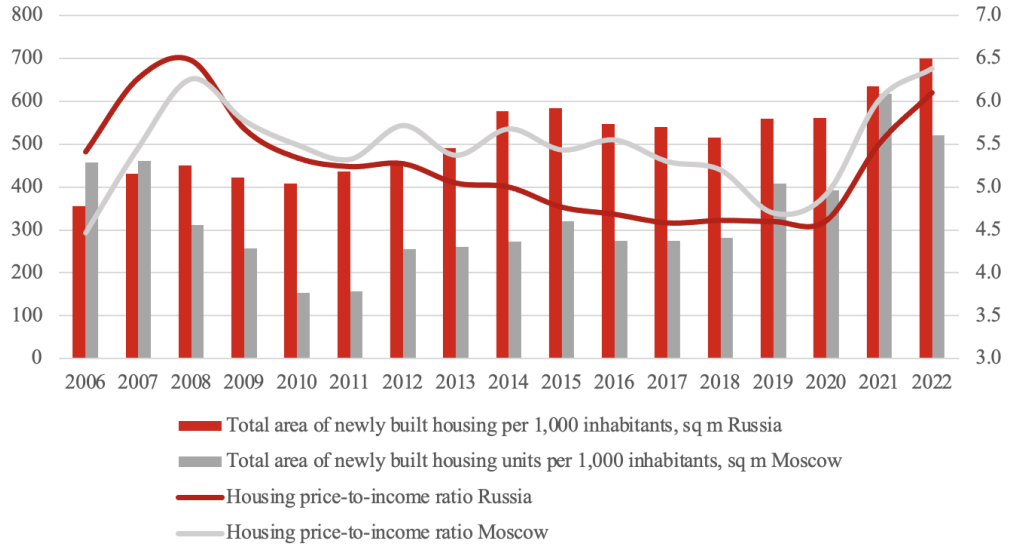


Figure 2: Housing price-to-income ratio in Russia and the total area of newly built housing per 1,000 inhabitants in Russia and Moscow, 2006-2022. *Sources*: Based on data from The Institute for Urban Economics, using the average housing provision per capita in Russia or Moscow, respectively, as the standard housing unit; The Federal State Statistics Service.

Statistics Service, 2022). Statistical estimates showed a consistent increase in housing affordability indicators in Russia, though housing remained largely unaffordable in Moscow (Kosareva and Polidi, 2021). However, following the mortgage loan subsidies introduced in 2020, this policy led to higher prices and reduced affordability, particularly affecting low-income groups (Accounts Chamber, 2021; The Institute for Urban Economics, 2023). This raises questions about the universality of market-based supply policy interventions, which population groups are excluded or adversely affected, and the broader implications such measures may have on the housing sector.

3 Diversity in Moscow Housing Market

We want to illustrate the thesis that the housing market we study is homogenous or, equally, is not diverse.

First, note that housing diversity can be observable or not. Haurin (1988) considered one measure of "atypicality" of a housing unit based on the distance of observable characteristics from the population mean weighted by its coefficient in a hedonic price regression. The idea is that a

typical housing unit would have attributes close to the population mean, while the hedonic price will guide how much this deviation is important. We are not exploring this measure directly but provide descriptive statistics demonstrating the low diversity of the housing stock.

However, an object like housing is often considered a multi-dimensional good with net present value varying significantly for observationally equivalent housing units. Therefore, it must have important *un*observable characteristics, too. These characteristics constitute themselves in sizable idiosyncratic price dispersion. For example, Giacoletti (2021) provides estimates of idiosyncratic price risk for single-family houses in California, U.S., and argues that it has a sizeable effect on the housing risk-return profile. It is shown that at the 15-year horizon, idiosyncratic risk represents 25-60% of capital gains variance; it is even more than that if the holding period is shorter.

We now explore both dimensions of homogeneity using the dataset of transactions in the newly constructed houses provided by a private real estate consulting company, BNMap. It includes Moscow in its extended boundaries, where a lot of greenfield development happened in 2017-2022, the period under consideration. It features more than 140,000 observations with data on contractual price, square, building address, previous owner, and more[3]. Moscow and Moscow region accounted for around 20% of all new construction in Russia during this period.

3.1 Observable Diversity

First, we present the structure of newly built housing units with respect to the number of rooms. Figure 3 provides the breakdown into five categories: the apartment studios (combined living and kitchen area), 1-room apartments, 2-room apartments (similar to "one-bedroom" apartments), 3-room apartments, and apartments with a greater number of rooms. For most of the period, the median apartment is a 2-room unit. By the start of 2022, however, more than 50% of the apartments were studios or 1-room units, which had an average square of 35 sq.m. (around 380 sq. ft.). The apartments are small compared to the European and American standards and have few observable characteristics.

This structure and prevalence of smaller units correspond to the low average size of the apartments in this market. The average size of the apartments in each category went down, too. In an example depicted in Figure 4, the average size of the median, newly built 2-room apartment decreased from 59 sq. m. (around 630 sq. ft.) at the start of 2017 to 53 sq. m. (around 570 sq. ft.) at the start of 2022.

[3]We plan to complete the dataset with the data covering the entire 2022 and 2023.

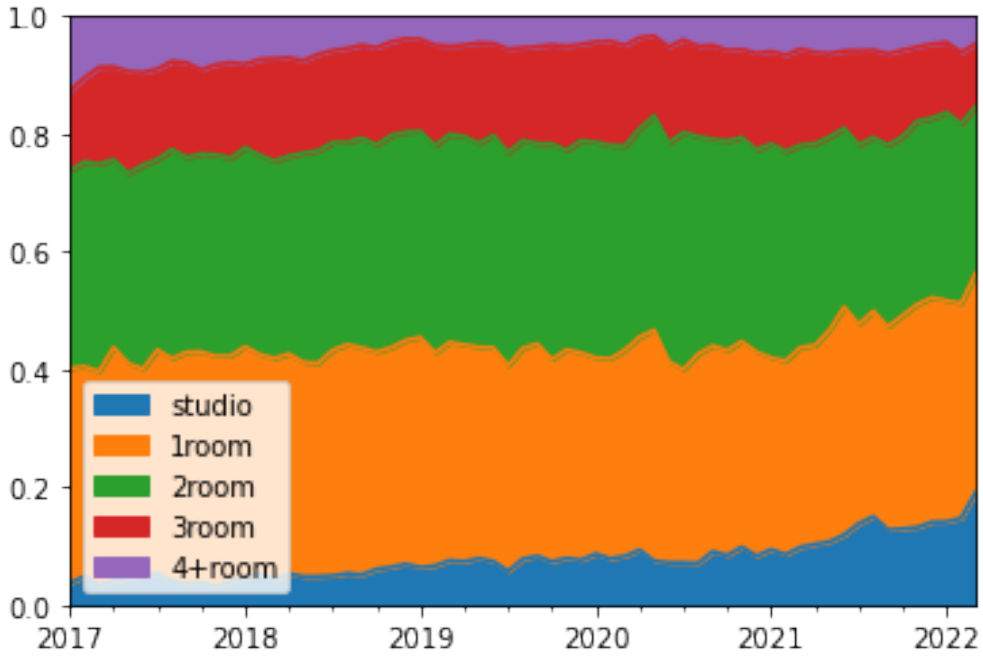


Figure 3: Structure of apartments in the primary market, number of rooms. *Sources*: Based on data from BNMap.

Note how an introduction of large mortgage loan subsidization coincided with this change in the structure of the apartment sales and their size. Downsizing could have resulted from overall weaker demand of the households and increased construction costs. Yet, an investment motive could have played a role by shaping demand for more standardized units in times of uncertainty.

3.2 Non-Observable Diversity

Now, we analyze the prices and their dispersion and do so for two types of sellers. The first type is a construction company (*corporate*) that sells already-built or off-plan apartments. The other type is an individual person or a household (*individual*) that initially purchased a housing unit from the real estate company and resells it later. In the model section, we discuss the difference between the two.

Using the same data, we estimate the following hedonic price regression to control for observable characteristics:

$$log(p_{it}) = \alpha + \gamma_t + Location_i \cdot \delta + Seller_i \cdot \tau + X_i \cdot \beta + \epsilon_{it}, \qquad (1)$$

where $log(p_{it})$ - the logarithm of the apartment i contract price per sq. m. at time t; γ_t - time effects; δ - vector of location coefficients corresponding

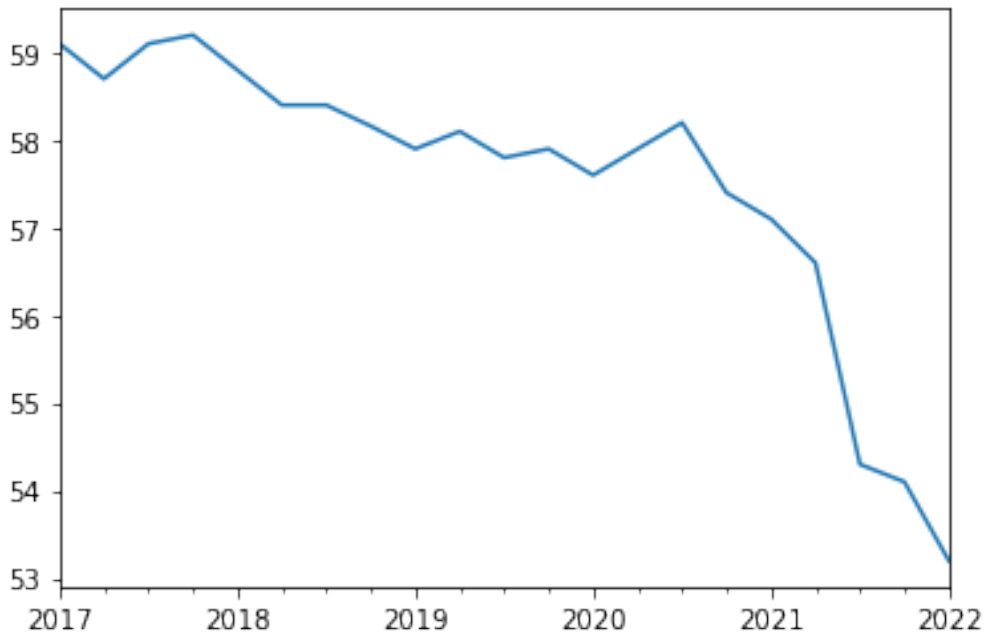


Figure 4: Median 2-room apartment (one-bedroom) size, sq. m.
Sources: Based on data from BNMap.

to location dummy variables $Location_i$; τ - coefficients corresponding to the type of seller $Seller_i$, 1 being a *corporate* and 0 - an *individual* seller; β - vector of coefficients corresponding to apartment characteristics, X_i, such as number of rooms, floor number, completion stage; and ϵ_{it} - idiosyncratic term.

Note that the location dummy is sufficient to assess many of the characteristics of a given apartment. This is because the Moscow housing market is represented mainly by multi-story mass housing buildings that typically host a limited number of apartment types. Different housing units might have the same address. Hence, the location dummy encapsulates information about the building type, such as the materials used in construction, ceiling height, interior amenities, construction company, and more.

The only variable of interest for us is τ, which represents the difference between transaction prices between *corporate* and *individual* sellers, other things being equal. The estimated coefficient $\hat{\tau}$ equals 0.051 (significant at 1% level), which means that there is an approximately 5% average premium for the *corporate* sales. This aligns with the idea that private investors are more impatient when they decide to sell an apartment - which is explored in detail in the model section next.

Finally, we use the standard deviation of the residual from the estimated Equation 1 to assess the magnitude of the idiosyncratic house price risk.

Figure 5 plots this measure for two types of sellers in this market. First, note that the magnitude is relatively small for the corporates and ranges from 5-10%. The individual sellers sell observationally the same units with higher idiosyncratic risk. Again, this is in line with the assumption that the individual investors might be different in their preferences and, in particular, be unwilling to postpone the sale by offering larger discounts compared to the developer's price.

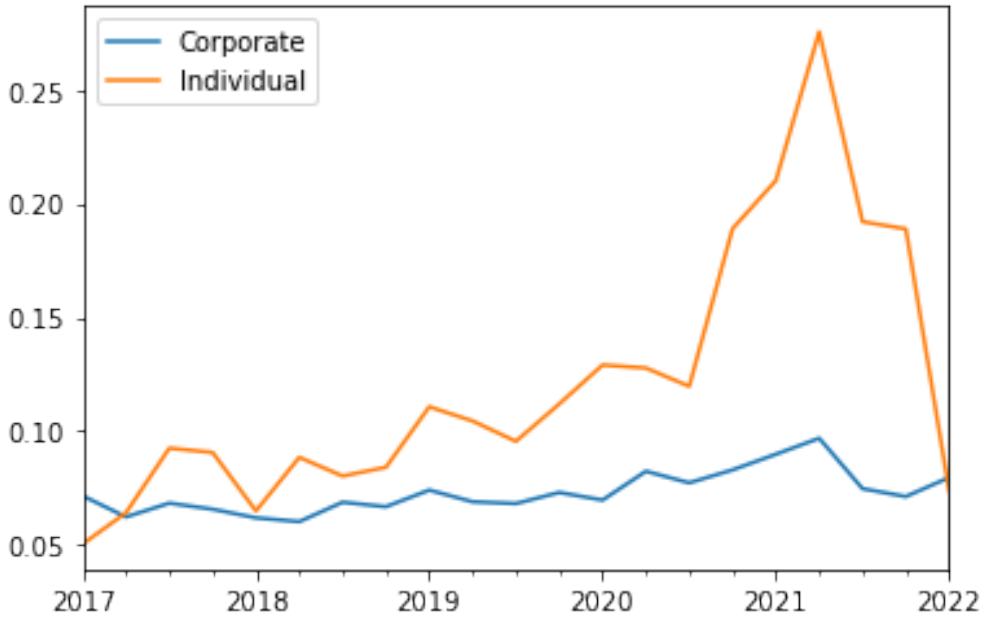


Figure 5: Idiosyncratic risk, measured as the cross-sectional standard deviation of the residual from Equation 1, by type of the seller. *Corporate* stands for a construction company; *Individual* stands for an individual or household reseller, as described in the text. *Sources*: Authors' calculations based on data from BNMap.

Second, the idiosyncratic risk substantially increased in 2020-2022, especially for individual sellers. This is when the global economy was hit by COVID-19 and policy measures against it. Locally, the federal government introduced mortgage loan subsidies to support demand for new housing construction. The differentiated impact of these developments on the price dispersion and a spike in the level of this risk component for the individual sellers might explain the demand for homogeneity observed in the data.

In sum, we find little diversity in the Moscow housing market. The behavior of quantities and price dispersion during the COVID-19 shock points to the presence of an investment motive in this market. The next section presents a stylized equilibrium model that puts search and investment

motives together to analyze the effects of policy interventions affecting housing diversity.

4 Model

This section presents a search and matching housing market model based on Albrecht et al. (2007). It features homogenous buyers and two types of sellers. The *buyers* are households who are looking to buy a house to move in. The first type of seller corresponds to a development company (or a *developer*). The second type is an individual investor (or an *investor*), whose homeownership is driven by an investment motive.

These two types of sellers are assumed to be different in their discounting rates. The developers are assumed to be more patient: they are big companies with stable sources of funding. The Investors enter the market when they face a good investment opportunity and, therefore, would like to sell the house and invest the proceeds. We think about the former group as entrepreneurs who run into new investment opportunities (Chen and Wen, 2017), or wealthy individuals who are, on average, more sophisticated investors (Fagereng et al., 2020) and have higher bargaining intensity (Cvijanović and Spaenjers, 2021). The key implication is that this type of agent discounts the value of owning a house at a higher interest rate.

4.1 Environment

Time is continuous. There is a mass of 1 of buyers and an equal mass of sellers. New buyers and sellers enter the market at a rate that keeps the total mass of each type of agents constant. The agents receive flow values while unmatched and randomly search for a counterparty to buy or sell a house. A match arrives at an exogenous Poisson rate α. The counterparties then bargain and transact if both gain from the transaction. The agents exit the market if they transact and continue searching otherwise.

The buyers are homogenous. They have a flow value $\beta > 0$ and discount future surplus at an interest rate $\rho > 0$. They value housing units they find at a stochastic match value, x. Match value is realized when a buyer and a seller meet and is distributed with probability density $\phi(\cdot)$ and a mean of $\bar{x}$. One way to interpret the match value is that it reflects buyers' offer distribution (Genesove and Han, 2012). Another way is to relate the dispersion of this variable to the atypicality of a housing unit (Haurin et al., 2010). None of the two are observable; moreover, the housing typology limits how diverse the buyers' preferences can be. Hence, in our setting, we think of the spread of this distribution as non-observable product diversity, and we interpret its interquartile range as a measure of the diversity in this market.

The sellers are ex-ante heterogeneous. The first type, which we labeled developers (D-type), has a flow value σ and discounts future surplus at an interest rate $\rho > 0$. The second type, investors (I-type), have the same flow value but discount future surplus at a higher interest rate.[4] Flow values could have been different if the investors rented the housing units out while searching and the developers did not; we assume none of them had rental income while searching. Finally, we assume that I-type sellers constitute a share of $\lambda \in [0, 1]$ in the mass of new-coming sellers. Effectively, two types of sellers are more (D-type) or less (I-type) patient, and the share S of I-type sellers in the total mass of sellers will be determined in equilibrium.

4.2 Individual Optimisation

In this subsection, we describe individual optimization problems. We derive the values for the agents, assuming they operate in a stationary and competitive environment.

The value of a representative buyer B is determined recursively by:

$$\rho B = \beta + \alpha \times [S\mathbb{E}_x \max\{0, x - p(I, x) - B\} + \\ + (1 - S)\mathbb{E}_x \max\{0, x - p(D, x) - B\}], \quad (2)$$

where $p(T, x)$ is the price function dependent on the type of the seller $T \in D, I$ (to be described later in this section) and a match value, x. Here, the first summand corresponds to the flow value of searching; the second and third correspond to the expected gain from a match with the I or D-type sellers, respectively. Maximum operator reflects that a transaction only happens if the buyer gets a positive surplus from a transaction.

The value of a representative T-type seller, S^T, $T \in \{D, I\}$, is determined by:

$$\rho^T S^T = \sigma + \alpha \times \mathbb{E}_x \max\{0, p(T, x) - S^T\}, \quad (3)$$

where σ is the flow value of searching, an economic interpretation is that the developers, or D-type sellers, have built the housing units and now sell them in the market. Investors, or I-type sellers, bought the housing unit earlier and decided to sell it once they found an investment opportunity. We assume $\rho^I > \rho^D$ and equal flow values for the above reasons.

In what follows we assume that prices are set according to a symmetric Nash bargaining:

$$p(T, x) = \frac{1}{2}\left(x - B + S^T\right), \quad (4)$$

[4] We could have assumed that investors enter the market facing the same interest rate as developers and switch to a higher interest rate at an exogenous Poisson rate similar agents becoming "desperate" in Albrecht et al. (2007). This would deliver the same qualitative results but would complicate the model exposition. Hence, we assume they start with a higher discounting rate straightaway.

where $T \in D, I$ is the type of seller and x is a realized match value. This pricing rule makes the parties split extra surplus created by a transaction, i.e. $V(T, x) = (x - B - S^T)$, into two equal parts. [5]

The price is only relevant for a decision maker if $V(T, x) > 0$, i.e., agents transact. Otherwise, the transaction is not taking place, and agents continue searching. Also note that the value of a seller matters not only because it affects the value created in a transaction and the price but also whether a match results in a transaction or not.

4.3 Market Equilibrium Analysis

First, We will show how lower diversity affects market outcomes in a model with homogeneity of sellers. We compare it to an equilibrium of the model with sellers' heterogeneity second. In what follows, we focus on stationary equilibria.

We consider a case in which x takes one of the two values: $\bar{x} - \epsilon$ ("poor match") or $\bar{x} + \epsilon$ ("good match") with probability 0.5 each. In this setting, an increase in ϵ leads to an increase both in variance and interquartile range of the distribution; also, $\phi(\cdot|\epsilon')$ is a mean-preserving spread of the distribution $\phi(\cdot|\epsilon), \epsilon' > \epsilon$. The interquartile range of this distribution is 2ϵ. Hence, we will denote ϵ as a measure of diversity in this market.

4.3.1 Standard Model

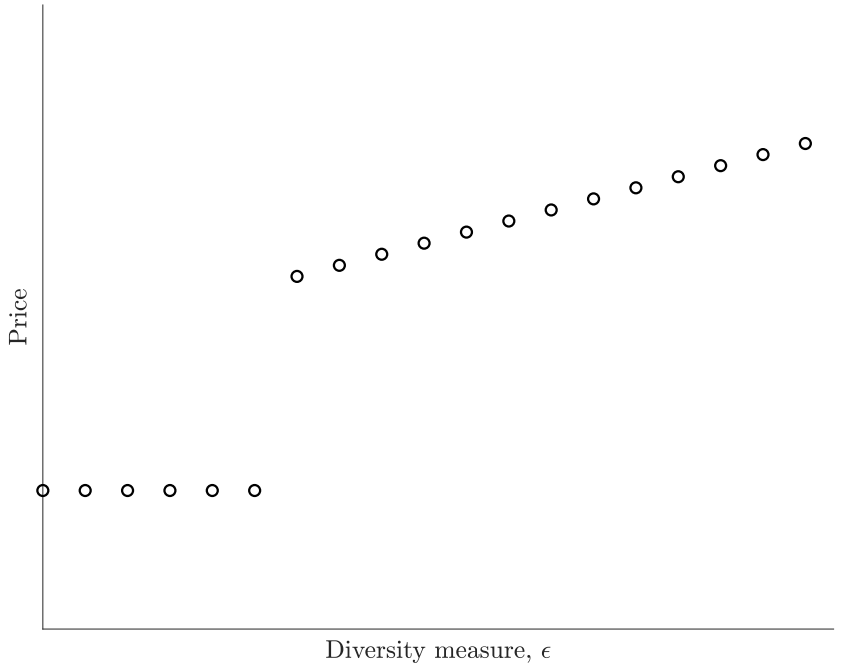
No heterogeneity of sellers corresponds to $\lambda = 0$. The share of I-type, S, also equals zero because there is no inflow of this type of agents. The model equilibrium conditions are then given by equations 2, 3 with $T = D$. Obtaining equilibrium values of B and S^D from this system of two equations is straightforward. The prices are derived from Equation 4.

Figure 6 illustrates equilibrium values and prices given different values of ϵ. The main result is that all endogenous variables' equilibrium values are non-decreasing in ϵ. The housing market clears through prices and time on the market: initially, it is not an optimal strategy for the agents to continue searching because extra search time is unlikely to generate a significantly different outcome compared to the average value of $\bar{x}$. Hence, all the matches result in transactions, and the exact level of diversity is irrelevant for risk-neutral agents. This is why both the expected price (Figure 6a) and values (Figure 6b) are constant at low levels of diversity, ϵ.

As diversity ϵ increases, the extra search time starts to pay off. In the area to the right in Figure 6b, the values increase along with the average

[5] If $(x - B - S^T) > 0$, the buyer would get $x - p(T, x) - B$ while the seller will get $p(T, x) - S^T$. It is easy to verify that both are equal to $\frac{1}{2}(x - B - S^T)$ under the price function specified in the text.

(a) Expected price



(b) Values of the agents

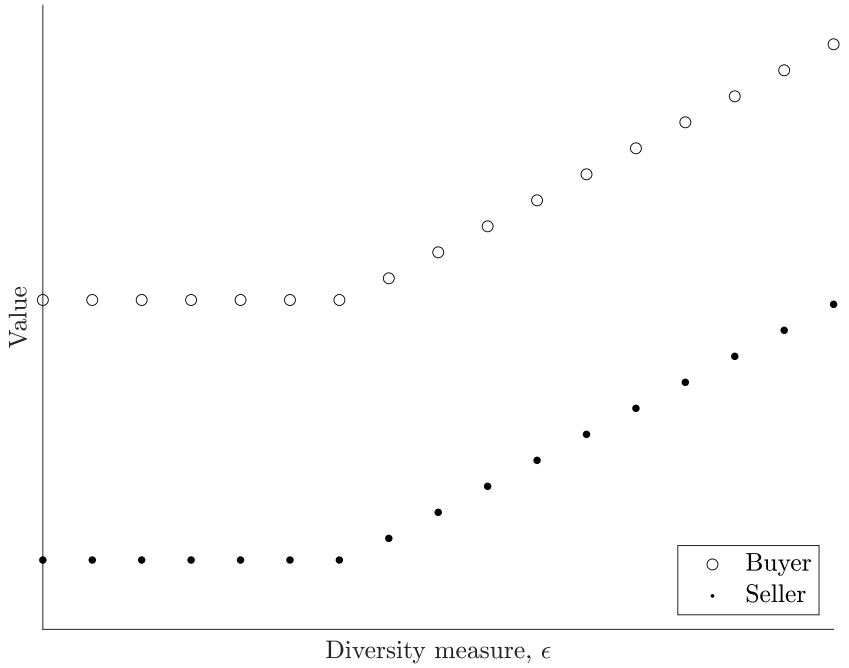


Figure 6: **Standard model**. Equilibrium values of the endogenous variables as functions of the diversity measure, ϵ.

transacted match quality, which is always $\bar{x} + \epsilon$. Prices increase in Figure 6a reflecting higher value created with a successful match. As poor matches corresponding to the match value $\bar{x} - \epsilon$ are not resulting in transactions, time on the market for the sellers increases together with the prices.

In a comparative statics sense, policy-induced increase in homogeneity ($\epsilon \downarrow$) in this standard model leads to lower prices and shorter time on the market. Although we do not explicitly analyze the buyer's decision to start searching for a house nor the seller's decision to build more or less, the buyers who enter a less diverse market will, on average, face lower prices. We interpret this as the positive effect of homogeneity on housing affordability. We are now ready to explore how sellers' heterogeneity will affect this result.

4.3.2 Model with Ex-Ante Heterogenous Agents

What if a longer time on the market, associated with higher diversity, affects different sellers differently? Let us assume now that the share of new-coming investors is positive, $\lambda > 0$. The I-type agents are discounting the future at a higher rate and, as we will show below, do not necessarily benefit from higher diversity as other housing market participants.

The equilibrium conditions for this case are given by equations 2, 3 with $T = D, I$ and a condition that verifies that the share of I-type, S, is constant in time:

$$\lambda \left[\alpha(S \times Pr(x \geq B + S^I) + (1 - S) \times Pr(x \geq B + S^D))\right] = \\ = \alpha S \times Pr(x \geq B + S^I), \quad (5)$$

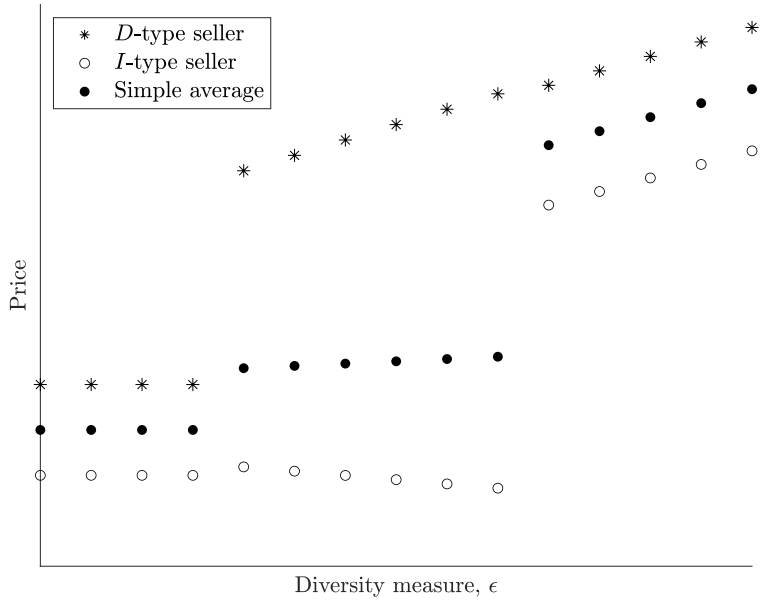
where $Pr(\cdot)$ is a probability of an event. The left-hand side corresponds to the mass of I-type sellers entering the market at any moment in time; the number in square brackets equals the mass of sellers who quit the market. The right-hand side equals the mass of I-type sellers quitting the market after they made a transaction.

As in the previous section, the prices are derived from Equation 4 and depend on the match value x and the values of the counterparties.

In general, obtaining closed-form solutions for this system of four equations is not straightforward. We again focus on a numerical case in which x takes on one of the two values with probability 0.5.

Once heterogeneity is introduced, the market outcomes change as depicted in Figure 7. There are three regions inside which diversity ϵ affects prices and agents' values differently. The region on the left coincides with the first region, and the region on the right coincides with the second region in the standard model (Figure 6). Inside these two regions, buyers' and all types of sellers' values and prices are non-decreasing in ϵ, reflecting the beneficial effects of diversity in this market.

(a) Expected price, by type of the seller



(b) Values of the agents

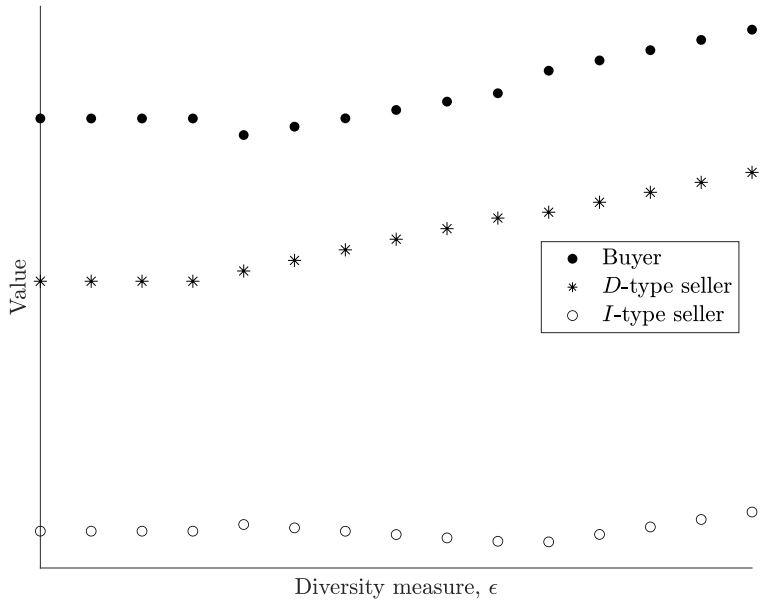


Figure 7: **Model with Heterogenous Agents**. Equilibrium values of the endogenous variables as functions of the diversity measure, ϵ. D-type seller is equivalent to a "developer", I-type - an "individual".

However, there is now a third region in which I-type sellers' transaction prices (Figure 7a) and values (Figure 7b) *decrease* with ϵ. In this region, *any* match results in a transaction for I-type sellers while *only good* matches, $x = \bar{x} + \epsilon$, conclude in a transaction for D-type sellers. This reflects impatience of the I-type compared to the D-type: higher interest rate at which the former discount future makes waiting a dominant option; the investors are standing ready to transact at both poor and good matches. Inside this region, increasing diversity attenuates the I-type's bargaining power: buyers' option of waiting improves with increasing diversity, for the expected value in a future transaction with D-type increases.

Note that the odds of a good match compared to a poor match are not affected by diversity ϵ. The average transaction price of I-type is not driven by the higher probability of selling given a match but rather - by varying the value of a buyer. With this distribution of x, lower diversity increases prices in transactions of I-type only because it destroys value in a potential match for the buyer.

Finally, note that in this region, I-type sellers sell faster but face a higher risk than D-type sellers. For the former, the transacted price can take one of the two values depending on the realization of x, while the latter only transact when they find a good match. This is one explanation for higher idiosyncratic price risk for individual sellers discovered in the previous section.

How is the effect of lower diversity different in this setting? For the interim region studied above, lower diversity $\epsilon \downarrow$ still translates into lower prices, but the marginal impact is weaker. The reason is that the investors' value *increases* as diversity goes down. As a result, the average price is less sensitive to ϵ, unlike buyers' values, which decrease at a rate similar to the high diversity region on the right of Figure 7b.

One way to summarize our results is that diversity has both a consumption and a financial dimension. More diversity benefits those who seek to fulfill their consumption needs through an opportunity to find a good match. Sellers also benefit from higher quality matches, especially if these can be found quickly - as with more homogeneous trading units.

5 Conclusion

Recent findings, aligning with long-standing planning and economic theories about the relationship between housing supply and affordability, have made market-rate housing supply policy an increasingly accepted tool for addressing housing issues. However, existing research on the impact of market-rate housing on affordability often overlooks the specific typology of housing that will be constructed.

In this paper, we examined how housing market diversity interacts with the presence of investment motive-driven investors and why it is relevant to the housing affordability debates. Empirically, we confirmed previous results on a high degree of homogeneity of the Moscow housing market; we also discovered symptoms of it by analyzing the price dispersion of the newly-built apartments. Using a search theoretical model, we show that investors play an important role, and their preferences towards homogeneity help us understand the price dynamics and dispersion we discover in the data.

Our study has shown that through this channel, the degree of diversity or, conversely, homogeneity can affect the outcomes of policies aimed at improving housing affordability. This is because a significant portion of housing today is purchased by households driven by investment motives. In this sense, loosening regulation to the extent that it maximizes standardized residential units in the pursuit of speed and cost reduction may benefit investors more than the most vulnerable households. Thus, while market-rate development generally complements an affordability strategy, it should be attuned to the local context of the housing market, including not just its financial, legal, and institutional organization but also the actual typologies developers bring to the market.

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