The Presale Price Premium Puzzle[*]

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Abstract

Using two and a half decades of microdata from the Survey of Construction, we document a robust presale price premium: houses sold before construction commences sell at an average of 2.8% more, with premiums reaching 15% for homes sold five or more months before construction starts. Houses sold post completion of construction also carry a modest 1.4% premium, creating a distinctive U-shaped pricing pattern. To explain this pricing pattern, we develop a search-theoretic model of the housing market in which developers face credit market frictions. We show that these credit frictions give rise to a novel channel that can rationalize the existence of both the presale and post completion premia. A calibration of our economy to the US housing market implies the credit frictions channel can explain about a third of the presale premium.

JEL Classification: E2, E44, G21, R21, R31.
Keywords: Presales; Housing market; Search and matching; Housing market liquidity; Credit frictions.

1 Introduction

In the US single-family housing market, approximately 30% of new homes are sold before construction begins — a practice known as presales. While one third are sold before, a third of homes are sold after construction has finished and a third during construction.[1] Yet little is known about how the timing of sale relative to construction affects prices, despite the importance of new construction prices for the housing market as a whole (Head et al., 2014; Gabrovski and Ortego-Marti, 2025). Moreover, the pricing dynamics of presales have important policy implications, as many countries implement subsidies or regulations that explicitly distinguish between presale and speculative construction.[2]

This paper aims to fill the gap in the literature. Our first contribution is to document the relationship between prices and the timing of sale relative to construction. Using data from the Survey of Construction spanning over two decades, we show that homes sold before construction begins sell at a *premium* relative to comparable homes sold while under construction. The premium is largest, at 15% of the house price, 6 to 12 months prior to construction and gradually decreases as the day of sale approaches the start of construction. Moreover we find evidence that homes sold after construction is completed also command a post completion premium which peaks 10 to 12 months after construction has been completed at about 8%. The second contribution of our paper is to develop a search-theoretic model of the housing market that proposes two possible explanations behind the observed presale price premium: (i) the option to customize home purchases before construction has began and (ii) financial frictions faced by developers. A careful calibration of our model to the US economy allows us to decompose the relative contribution of these two channels for the presale premium: about a third of the premium (5.4pp) is due to financial frictions, whereas the rest can be attributed to the customization optionality. Moreover, in an extension of our model, we show that the financial frictions channel we highlight can rationalize the existence of the post completion premium as well.

Our housing market models search frictions in a similar vein to Gabrovski and Ortego-

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[1]According to the U.S. Census Bureau's Survey of Construction, during 1999-2024 about 29% of houses were sold before construction started and 34% after it has been completed.

[2]Examples include the differential treatment of presold loans in US capital requirements, where banks must use 50% risk weights for presold residential construction loans versus 100% for speculative construction (U.S. Department of the Treasury et al., 2024; Federal Deposit Insurance Corporation, 2012); Singapore's Additional Buyer's Stamp Duty with transitional exemptions for presale options to purchase granted before policy implementation (Monetary Authority of Singapore, 2011); and Australia's First Home Owner Grant schemes available for off-the-plan and construction stage purchases with different application timing requirements (Revenue NSW, 2024).

Marti (2019): buyers and sellers on the market meet according to a matching function à la Pissarides (2000). Once a meeting happens the counter-parties negotiate prices using Nash bargaining. Both the number of buyers and sellers on the market is determined endogenously through entry — entry of buyers captures household formation, new households who move to the area, etc., whereas entry of sellers captures new housing development. We follow Gabrovski and Ortego-Marti (2025) and model construction as a costly undertaking that requires external financing from banks. Developers simultaneously search for, and meet with, banks on a frictional credit market in the spirit of Wasmer and Weil (2004), Petrosky-Nadeau and Wasmer (2017), Gabrovski et al. (2024a) where they secure financing and negotiate the terms of credit.[3]

Our paper departs from the existing literature by explicitly modeling the process of developers selling a house prior to its construction, i.e. a *presale* and the associated implications for the developer's credit needs.[4] Developers with a viable housing project simultaneously put the home for sale on the housing market and search for credit. If she finds a bank willing to extend a loan before she finds a buyer, the developer builds the home and puts the newly constructed house for sale as *new* construction. If, on the other hand, she finds a buyer first, the developer makes a presale and collects a deposit from the buyer, which helps offset some of the construction costs. A presold construction loan is thus smaller, which leads to more favorable financing terms for the developer.

Consequently there are three types of houses for sale in our model: (i) homes listed for presale; (ii) newly constructed homes; and (iii) existing (previously occupied) homes, each with a distinct price p^P, p^N, p^E, even though houses yield identical utility.[5] Securing construction financing from a bank comes with a cost that reduces the transaction surplus available to split between the buyer and the seller. Since sellers of existing homes do not need to secure financing such transactions generate the largest surplus and these homes command prices higher than prices for presold homes and newly constructed homes. When

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[3]There is much empirical evidence in support of the hypothesis that there are important search frictions in the market for credit. See, for example, Ambrose and Peek (2008), Agarwal et al. (2018), Dell'Ariccia and Garibaldi (2005), Agarwal and Hauswald (2021), Agarwal et al. (2024). For a detailed summary of the evidence see Gabrovski and Ortego-Marti (2025).

[4]Most papers in the search-theoretic literature on the housing market do not model construction at all. Notable exceptions are Gabrovski and Ortego-Marti (2019, 2021, 2025); Gabrovski et al. (2024b), Head et al. (2014, 2016b), however none of these papers allow for the possibility of presales.

[5]In our baseline model we treat all houses as yielding identical utility because we want to highlight as cleanly as possible the mechanism through which financial frictions differentially affect the sales price of a new home sold before and after construction. Of course, in practice there may be many differences between these two types of homes, such as the possibility to customize a presold home. We take that possibility into account when we calibrate the model and explore its quantitative properties.

a developer meets a buyer first and makes a presale, she is able to get more favorable financing terms. Moreover, because the presale contract is made before financing has been secured, the developer can pass on some of the credit-finding costs to the buyer. This increases the price of presold homes relative to new home sales. On the other hand, after a developer secures a credit line for speculative construction and builds the home, she must make interest repayments until a buyer is found and the loan can be fully repaid. This creates a holdup problem, which makes her more eager to sell the home at a lower price. This effect also tends to push the price of new homes lower relative to the price of presold units. As a result, our model predicts the existence of a presale premium due to the financial frictions faced by developers.

To gauge the quantitative importance of this financial frictions channel, we calibrate an augmented model to the U.S. economy. In the augmented model buyers who purchase a presold home receive a utility premium which captures the option to customize the house. In order to give the customization option channel the best possible chance at explaining as much of the data as possible, we calibrate the size of the customization premium so as to match a 15% presale premium.[6] That is, we choose to target the premium at its maximum and we choose to identify the customization option premium using the "residual" in our calibration strategy. In contrast, we calibrate the size of the financial frictions channel by directly targeting financial moments in the data. Our numerical results show that the financial frictions channel can explain about 5.4pp of the premium, or about one third of it.

Next, we examine an extension of our model that can rationalize the existence of the post completion premium. In the extended economy, developers who do not sell their newly constructed house receive periodic liquidity boosts, which allow them to repay some of the remaining principal. This reduces the on-going interest payments faced by the developer. Thus, each successive payment reduces the severity of the holdup problem and allows the developer to negotiate a higher price for their house. A calibrated version of the model is able to match the entire path of the post completion premium fairly well, although it under-predicts the magnitude of the premium 12 months after construction has been completed.

On the empirical side, we employ microdata from the Survey of Construction to document the prevalence of the phenomenon of presales across the United States. The dataset is nationally representative and covers over 20 years and tens of thousands of individual single-family homes, capturing geographic variation, building sizes, structural attributes, and other

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[6]This also aligns with the notion that if customization requires time the premium will be higher for houses that are presold well before construction starts - which is exactly what we find in our empirical results.

property characteristics. Our hedonic regressions consistently show a presale premium of on average 2.7% and up to 15% for houses presold well before construction. These results are robust to different model specifications and clustering methods. Furthermore, we find evidence for the existence of a post completion premium, albeit with a more modest mean of 1.4% and a peak of 8% at 10-12 months post construction.

Partitioning the presale premium into the contribution of the customization optionality and the financial frictions channel is unfortunately not directly possible using the data we have at hand. However, we do perform two empirical exercises that are broadly consistent with the predictions of our calibrated model. First, we compare the original contract price of homes with their final price at completion. On average the final price is 1.3% higher than the original contract price for presold homes, 0.6% higher for homes sold under construction, and just as high for homes sold after construction. Interpreting this as the lower bound for the magnitude of the customization optionality, these results imply that about at least 50% of the presale premium is due to the customization optionality. Moreover, we also document that this uplift in the final price relative to the original contract price is invariant over time. This is in sharp contrast to the presale premium, which exhibits significant variation, suggesting that the customization optionality cannot explain the entirety of the price premium. Second, we also find that areas with stronger demand for housing, as proxied by local wage growth, see a smaller presale premium and a larger post completion premium, which is consistent with our theoretical predictions.

The remainder of this paper unfolds as follows. Section 2 surveys the existing literature on presale pricing, risk compensation, developer financing constraints, and the search-theoretic literature of the housing market more broadly. Section 3 establishes four key stylized facts about presale pricing using Survey of Construction microdata, documenting the systematic presale premium and U-shaped pricing pattern. Section 4 develops a search-theoretic model with credit market frictions that explains how presale premiums emerge when construction financing is costly. Section 5 calibrates the model and decomposes the financial frictions versus customization channels driving the premium. This section also highlights how the financing frictions channel can rationalize the existence of a post completion premium. Section 6 discusses policy implications and concludes.

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2 Related Literature

Empirical literature. The pricing dynamics of presold homes relative to completed new construction homes have been sparsely studied in the economic literature. The predominant empirical finding is that presold homes generally sell at a discount compared to comparable completed homes — though this empirical finding is largely confined to the price of apartments in East Asian cities. For example, Gan et al. (2024) found that in Hong Kong's presale market, each additional month before project completion was associated with a statistically significant decline in presale unit prices. Similar findings have been reported in Singapore, where Agarwal and Hauswald (2021) observed that developers launch presale units at lower prices and gradually increase them over time as uncertainty diminishes. Their study estimated that presale home prices rise by approximately 1 percent per 100 days from launch. The literature has also identified financial constraints as a potential cause for presale discounts: Lai et al. (2004a) examines Hong Kong's housing market and finds that developers with weaker balance sheets tended to set lower initial prices for presale units to attract early buyers. Similar behavior has been documented in mainland China, where Deng and Liu (2009) finds that highly leveraged developers engage in more aggressive presale pricing strategies to satisfy lender requirements. These studies suggest that presale discounts are not solely a function of risk transfer but are also shaped by the financial health and liquidity needs of developers.

Another theoretical explanation for presale discounts comes from forward pricing models. Chang and Ward (1993) conceptualized presale contracts as forward transactions, in which the presale price should, in an efficient market, reflect the expected future price of the home adjusted for carrying costs, including financing interest and depreciation. However, deviations from this theoretical benchmark occur due to frictions such as liquidity constraints, risk aversion, and information asymmetry. These factors drive observed presale discounts, as buyers demand compensation for bearing uncertainty in price movements and potential delivery risks.

While presale discounts dominate the literature, recent studies have identified specific conditions under which presale homes command a premium. One such condition is the presence of speculative demand in rapidly appreciating housing markets. In periods of strong price growth, presale buyers may be willing to pay a premium to secure a unit before anticipated price increases. Gan et al. (2024) observed that during certain phases of Hong Kong's housing cycle, later-stage presale units were priced higher than comparable completed units, suggesting that buyers expected continued price appreciation. Similar speculative behavior

has been documented in China's housing boom, where Deng and Liu (2009) found that some presale prices exceeded anticipated completion values due to investor speculation and contract flipping. This finding suggests that in rapidly rising markets, presale units can attract excess demand, leading to a presale premium rather than a discount.

Finally, buyer preferences for customization can also generate presale price premiums. Chang and Ward (1993) studied Taiwan's presale housing market and found that presale units were not necessarily priced at a discount relative to existing homes; rather, they were sometimes priced slightly higher. The authors attribute this phenomenon to buyers valuing early access to unit selection and customization options, such as floor plans and interior finishes. In luxury condominium markets, presale premiums have been observed for high-demand units, particularly those with desirable locations, views, or unique layouts. Munneke et al. (2019) finds that in high-end developments, some presold units were priced above completed units due to the ability of early buyers to secure premium inventory before general availability. These findings suggest that presale pricing is not always driven by risk-sharing incentives but can also reflect consumer willingness to pay for early selection benefits.

In contrast to the studies above, we present evidence from a nationally representative survey for the US single-family home market. We believe that this evidence captures the empirical regularities in the US housing market better for several reasons. First, the data is from the United States, which has different institutional frameworks and is more diversified than the Asian cities previously examined in the literature. Second, our data is for single-family units, which represents the vast majority of transactions on the US housing market. In contrast, the existing literature has focused on apartment buildings instead. These types of properties have very different characteristics when it comes to their ability to be customized. They are also more expensive on a per project basis and require different types of financing than the single-family home developments in the United States. Third, our data is nationally representative and spans over two decades. This is in contrast to the existing literature, which has focused on specific cities and limited time periods.

Theoretical literature. To the best of our knowledge, ours is the first paper to study a model of the housing market with presales.[7] Following the seminal works of Arnott (1989) and Wheaton (1990), much of the literature has used search models a la Diamond-Mortensen-Pissarides to study prices and liquidity in the housing market.[8] One strand of the literature

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[7]We should note that there are a handful of studies within the finance literature that have studied presales in the context of asset pricing models. See, for example, Shih (1992); Lai et al. (2004b); Wong et al. (2006); Chan et al. (2008); Edelstein et al. (2012).

[8]For an extensive survey see Han and Strange (2015).

follows the matching function approach to capture the empirical regularities that it takes time to both sell a house and buy one (Anenberg, 2016; Arefeva, 2022; Arefeva et al., 2024; Burnside et al., 2016; Diaz and Jerez, 2013; Gabrovski and Ortego-Marti, 2019, 2021; Gabrovski et al., 2024b; Gabrovski and Ortego-Marti, 2025; Garriga and Hedlund, 2020; Genesove and Han, 2012; Guren, 2018; Han et al., 2022; Head et al., 2014, 2016a; Smith, 2020). Another strand relies on fluctuations in the reservation value of houses: Krainer (2001); Ngai and Sheedy (2020); Ngai and Tenreyro (2014).

Among these papers only Gabrovski and Ortego-Marti (2019, 2021); Gabrovski et al. (2024b); Gabrovski and Ortego-Marti (2025); Head et al. (2014, 2016b) analyze environments focusing on construction and the entry decision of developers. Gabrovski and Ortego-Marti (2025) is the only paper to model developer's credit constraints and their impact on the housing market. The authors model credit constraints through the means of search frictions à la Wasmer and Weil (2004): developers have a viable project, but no access to funds so they must search for bank loans on a frictional market. Upon securing financing, they construct new houses and list them for sale on the market.

Our study is also related to models of the housing market with search frictions and financially constrained households. Head et al. (2016b) studies the linkages between the size of the seller's outstanding mortgage, prices, and time-to-sell, whereas Guren et al. (2021) and Hedlund (2016) explore the link between house prices, sales, and foreclosures. Greenwald and Guren (2021) explore the relationship between credit and cycles in the housing market within the context of a model without frictions, whereas Garriga and Hedlund (2020) utilize a search model with mortgages to study the impact of the 2006 — 2011 housing bust and its spillover to consumption. Gabrovski and Ortego-Marti (2021) study a model with search frictions on both the housing and mortgage markets to analyze the relationship between housing prices, liquidity, and mortgage debt during the pre-bust build-up on the market and Gabrovski and Ortego-Marti (2025) analyzes the importance of credit frictions faced by developers in the context of the post-bust recovery during the 2012 — 2019 period. In a recent study Hedlund et al. (2025) explore the role of mortgage structures on the impact of changes in mortgage interest rates on housing prices in the context of the post-pandemic period, 2020 — 2024.

With the exception of Gabrovski and Ortego-Marti (2025), all these papers focus on the credit frictions faced by households. By contrast, Gabrovski and Ortego-Marti (2025) highlights the importance of credit frictions for developers for prices and liquidity on the market. Relative to Gabrovski and Ortego-Marti (2025), our paper contributes to the literature by

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allowing for the possibility of presales. This lets us analyze the mechanism through which credit frictions generate a presale price premium, thereby providing a novel explanation behind the existence of the premium. Our model is also rich enough to quantitatively match key characteristics of the US housing market, which makes it possible for our calibrated economy to quantify the contribution of the financial frictions channel to the size of the observed presale premium.

3   Empirical Evidence

In this section we use Survey of Construction microdata to establish four stylized facts about newly constructed single-family homes in the US:

1. Presold homes sell at a premium of 2.8%, relative to homes sold while already under construction.

2. The presold premium is non-linear and is higher for houses that are sold well in advance of construction. Homes that are sold 5 or more months prior to construction sell at a 15% premium.

3. Homes sold post construction also sell at a more modest premium of 1.2% on average, with a positive relationship with the lag between completion and sale. Homes that are sold 12 months after completion sell at a premium of 8%.

4. We find that in areas where demand is higher, the presale premium is smaller whereas the post completion premium is larger.

Overall our analysis suggests that the pricing dynamics of new home construction follow a U-shape relative to the date of construction. Houses are sold at a high premium about 5 to 12 months prior to construction commencing. As the construction commencement date nears the premium shrinks. Houses are thus sold at their "cheapest" during construction. Once construction has been completed houses begin to sell at a post completion premium. This premium increases gradually until about a year after completion. Furthermore, the size of the two premia is dictated by market conditions: areas with high demand are associated with a lower presale premium, but a higher post completion premium. This evidence suggests that the premia are, at least partially, the result of market forces, rather than purely mechanical reasons such as the option to customize presold homes.

3.1 The Presale Premium

To examine the relationship between the timing and price of new house sale we utilize microdata from the Survey of Construction, which provides a representative sample of newly built single-family homes across the United States.[9] The dataset covers a randomly selected sample of new single-family home constructions from 1999 to 2024, comprising 138,592 observations after excluding properties built for rental purposes or constructed by their owners.

Table 1: Descriptive Statistics by Sale Timing

Sale Timing	Count	Price ($)	Sq. Ft.	Bedrooms	Bathrooms
Before Start	49,860	372,098	2,936	3.7	3.4
During Construction	66,501	379,049	2,659	3.5	3.3
After Completion	27,687	379,914	2,697	3.6	3.4
Total/Average	**144,048**	**376,809**	**2,762**	**3.6**	**3.4**

*Notes:* Sample includes new single-family homes from Survey of Construction (1999-2024).

Newly built homes follow one of three construction-sale pathways as shown in Figure 1. First, homes may be presold, such that the sale occurs prior to the commencement of construction. Roughly 35% of our sample is presold. In these cases, the median lag between sale and construction is approximately two months, whereas the median construction period is five months. Second, developers may initiate construction without a pre-committed buyer and sell the home during the construction phase.[10] 46% of our sample is sold while under construction. Lastly, in 19 percent of our sample, developers start and complete construction before securing a sale.

Table 1 presents descriptive statistics for homes across these three sales pathways, indicating broad similarities in structural characteristics. However, presold homes tend to be larger and exhibit higher sale prices on average. To quantify the impact of presale status on the sale price, we estimate a range of hedonic regression models in which the log of the sales price is regressed on a set of controls capturing home size and quality. To avoid capturing price increases from post-sale customizations or alterations, our main specification uses the sale price agreed at contract signing. The model includes a dummy variable to indicate whether a home was presold, sold during construction, or sold post completion:

$$\log(p_i) = \boldsymbol{\beta} \cdot D_{\text{Stage Sold}} + \boldsymbol{\delta} \cdot \boldsymbol{S}_i + \boldsymbol{\gamma} \cdot \boldsymbol{Q}_i + \phi_{t,d} + \varepsilon_i. \tag{1}$$

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[9]Multi-family homes are omitted from the analysis.

[10]We classify houses that are sold in the same month as construction as being sold while under construction.
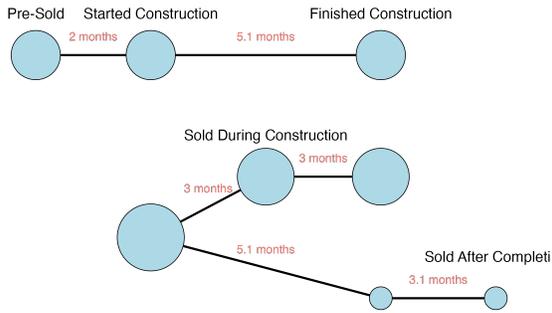
(a) House Sale Process Flow
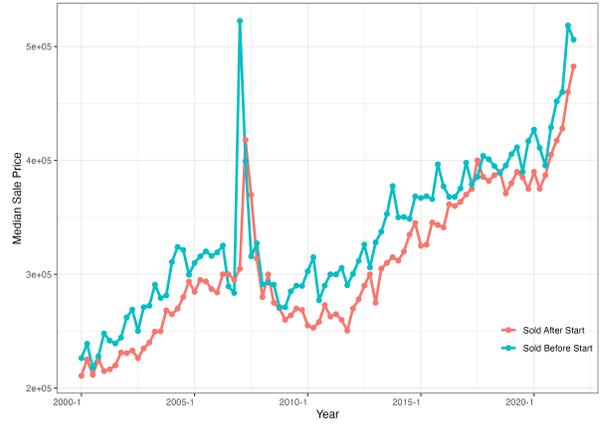
(b) Quarterly Median Prices by Sale Timing
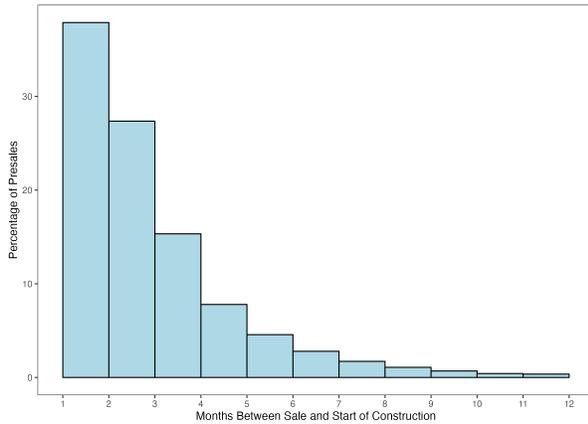
(c) Distribution of Sale Timing
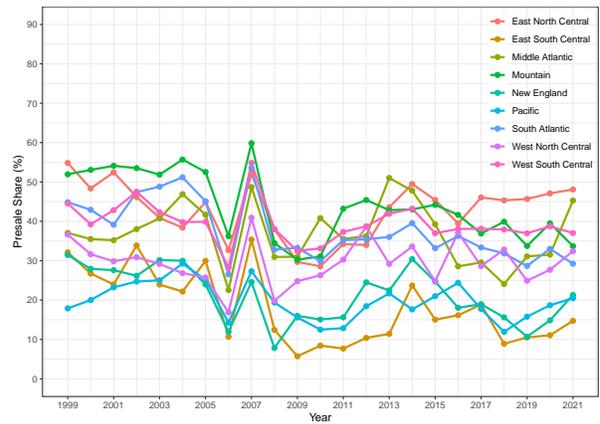
(d) Share of Presold Homes Over Time by Census Division

Figure 1: Descriptive Overview of the U.S. Single-Family Housing Market

Notes: Panel (a) illustrates the typical timeline and decision points in the house sale process. Panel (b) displays quarterly median contract prices by sale timing category. Panel (c) presents the distribution of months between sale and construction start for all presold homes. Panel (d) shows the evolution of presale market share from 1999–2024 based on Survey of Construction data.

The size controls in our regression specification include square footage, number of bedrooms, and the number of bathrooms, while quality controls incorporate a range of features documented in the Survey of Construction. These quality measures encompass the type of foundation, the presence of air conditioning, the existence of a basement, patio, deck, or porch, as well as the materials used in the frame, wall construction, and whether the home includes a garage.

The results, summarized in Table 2, indicate that across all model specifications, presold homes command a price premium. In our preferred model, column (5), this is 2.8 percent relative to homes sold during construction. This relationship is statistically significant at the 1 percent level across all specifications, irrespective of the inclusion of quality controls or the use of year and division-by-year fixed effects. Houses sold post completion also exhibit a slightly smaller price premium of 1.2 percent. We should note that the post completion premium is significant only in Column (5) but this is to be expected since households are likely to systematically purchase higher quality homes first. There is thus a non-linear relationship between price and the stage of sale, with homes sold at a relative discount while under construction, while being more expensive when they are either presold or sold after completion.

Our results remain broadly consistent across different clustering specifications, with largely unaffected statistical significance as shown in Table 3. The only exception arises when clustering by census division only, which attenuates the statistical significance of the estimated presale premium. However, clustering at the year level or at the division-by-year level preserves the statistical significance of the estimated price premium associated with presold homes.

The second formulation of the hedonic regression extends the simple presale dummy variable by incorporating a more granular measure of the time difference between the start of construction and the sale date (equation (2)). This refinement allows for a more precise estimation of how the timing of sales influences final home prices:

$$\log(\mathrm{p}_i) = \boldsymbol{\beta} \cdot D_{t_{sold} - t_{start}} + \boldsymbol{\delta} \cdot \boldsymbol{S}_i + \boldsymbol{\gamma} \cdot \boldsymbol{Q}_i + \phi_{t,d} + \varepsilon_i. \tag{2}$$

The results of this refined model reveal an even more pronounced presale premium as shown in Figure 2. Specifically, homes sold five months or more before the commencement of construction exhibit an average price premium of 15% relative to homes sold in the same month that construction begins. This suggests that buyers who commit to a purchase substantially in advance of construction are willing to pay a sizable premium.

Table 2: Hedonic Models

| Dependent Variable:			Log Price		
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Sold Before Start	0.0154***	0.0126***	0.0130***	0.0179***	0.0280***
	(0.0020)	(0.0019)	(0.0019)	(0.0019)	(0.0025)
Sold After Completion	-0.0022	-0.0023	-0.0017	-0.0008	0.0117***
	(0.0023)	(0.0023)	(0.0023)	(0.0022)	(0.0027)
Log Square Feet	0.9686***	0.9713***	1.028***	0.8724***	0.7444***
	(0.0025)	(0.0025)	(0.0032)	(0.0034)	(0.0051)
Bedrooms			-0.0422***	-0.0716***	-0.0875***
			(0.0014)	(0.0014)	(0.0019)
Full Bathrooms				0.1642***	0.1684***
				(0.0016)	(0.0021)
Fixed Effects	Year	Div $\times$ Year	Div $\times$ Year	Div $\times$ Year	Div $\times$ Year
Quality Controls	No	No	No	No	Yes
Fit statistics					
Observations	144,048	144,048	144,048	144,048	75,497
R^2	0.65893	0.67081	0.67274	0.69397	0.68380
Adjusted R^2	0.65884	0.67020	0.67214	0.69340	0.68293

IID standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 3: Model with Size and Quality Controls

Dependent Variable:	Log Price			
Model:	(1)	(2)	(3)	(4)
Variables				
Sold Before Start	0.0280***	0.0280	0.0280***	0.0280***
	(0.0025)	(0.0204)	(0.0033)	(0.0064)
Sold After Completion	0.0117***	0.0117	0.0117**	0.0117**
	(0.0027)	(0.0080)	(0.0055)	(0.0055)
Log Square Feet	0.7444***	0.7444***	0.7444***	0.7444***
	(0.0051)	(0.0243)	(0.0071)	(0.0102)
Bedrooms	-0.0875***	-0.0875***	-0.0875***	-0.0875***
	(0.0019)	(0.0171)	(0.0037)	(0.0054)
Full Bathrooms	0.1684***	0.1684***	0.1684***	0.1684***
	(0.0021)	(0.0204)	(0.0051)	(0.0068)
Clustering	-	Div	Year	Div × Year
Fit statistics				
Observations	75,497	75,497	75,497	75,497
R^2	0.68380	0.68380	0.68380	0.68380
Adjusted R^2	0.68293	0.68293	0.68293	0.68293

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*
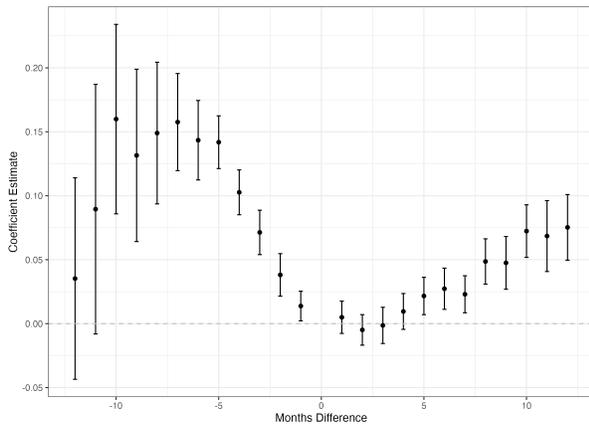
(a) U-shaped premium
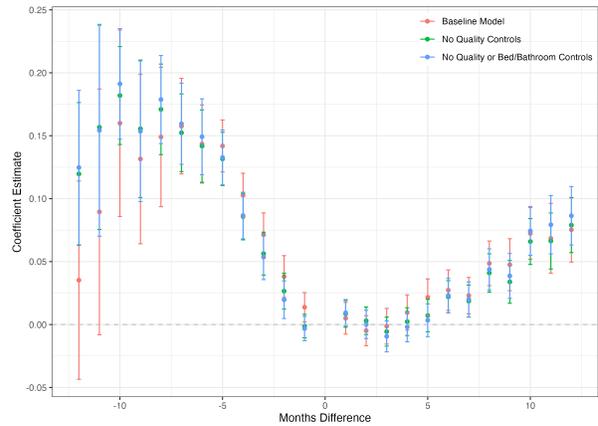
(b) Alternative models

Figure 2: Presale Premium by Time Between Sale and Start of Construction

Notes: Panel (a) shows coefficient estimates from our preferred hedonic regression as a function of the number of months between sale date and construction start. Panel (b) displays fitted values from our alternative models. All regressions include division-by-year fixed effects and control for house characteristics.

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In addition to the presale premium, we also find compelling evidence of a post completion price premium. Prices are significantly higher for homes sold a year after construction been completed, suggesting that completed homes also command a higher price relative to those sold mid-construction. The pattern of estimated price premiums follows a U-shape, with two distinct peaks: a large premium for homes sold well before construction begins and a more modest but still substantial premium for homes sold post-completion.

The marginal price impact of the sale timing relative to the completion of the project exhibits a similar pattern. Both the presale premium and the post completion premium remain robustly statistically significant. Estimating these timing premiums across a range of models finds that these results are robust regardless of whether size or quality controls are included. These results suggest that the timing of a home's sale is an important determinant of its final price, with both early commitment and post completion sales commanding higher valuations.

3.2   House Customization

As we have highlighted in section 2, existing research suggests the optionality to customize a presold home maybe be a driving force behind the existence of a presale premium. Indeed, presold homes offer greater scope for customization than homes that are already completed. This can affect the value of a home and its sale price in two ways. First, households may choose more expensive design and decoration options which naturally increases the price. Second, households may place value on simply having the ability to make choices about design aspects that do not affect the underlying cost of the home, for example, choosing the preferred color of painted walls.

We estimate this customization premium using two approaches. One is to compare the original contract price of presold homes with their final price at completion. On average, the final price for a presold home is 1.3% higher than the original contracted price. By contrast, homes sold while under construction see a smaller increase of just 0.6%, and homes sold after completion show no variation between contract and final price. This 1.3% price increase for presold homes is evidence of a post-contract customization premium, where buyers choose upgrades or changes that increase the final cost. For example, a buyer may opt for higher-end fixtures—such as premium tapware or cabinetry—compared to the baseline inclusions specified in the original contract.

This uplift is largely invariant over time, suggesting it does not reflect price renegotiation in response to changing conditions in the housing market. We interpret it as a lower bound on

Figure 3: Contract vs. Final Sale Prices

Notes: This figure shows the difference in the contract price (as used in hedonic regressions) and the final price at the time of completion.

the degree of house customization associated with presale homes, as it captures only changes in price that occur after the initial contract is signed. Notably in our hedonic analysis we use the *contracted price at the time of sale* as the dependent variable. If we were to use the final price instead, the estimated presale premium would be 1.3 percentage points higher.

The second approach we take is to estimate the extent to which presold homes tend to have higher quality characteristics, as measured by the Survey of Construction. We estimate a set of logistic regressions which the presence of each measure of quality is regressed on whether it is presold, controlling for census division and year. As shown in Figure 4 the results are more mixed. A presold house is associated with a higher probability of having a full basement, central air conditioning, a non-wooden frame or a larger garage. However, it is negatively associated with having a deck, patio, porch, or premium wall material.

Overall, our results show that the customization optionality associated with a presold home plays an important part in determining the magnitude of the presale premium: it can account for at least 50% of the observed premium. However, it is unlikely to be able to explain all of it. Moreover, our estimates suggest that the premium associated with the customization optionality is stable across time and market conditions. As we show in the next subsection, this is not the case for the presale premium. Together, these two observations point towards the existence of a separate, independent channel behind the presale premium.

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Table 4: Effect of Presale on Housing Quality Features

Feature	Coefficient	Std. Error	AME
More Common in Presales			
Central A/C	0.58***	(0.02)	0.04
Two/Three-Car Garage	0.47***	(0.02)	0.04
Basement Present	0.34***	(0.01)	0.08
Non-Wood Frame	0.11***	(0.04)	0.00
Less Common in Presales			
Deck	−0.47***	(0.01)	−0.09
Porch	−0.31***	(0.01)	−0.08
Premium Wall Material	−0.18***	(0.01)	−0.04
Patio	−0.11***	(0.01)	−0.03

Notes: Coefficients from logit regression of presale indicator on housing features. AME = Average Marginal Effects. Sample includes 70,041 homes with complete feature data.
All coefficients significant at 1% level. Standard errors clustered by division×year.
Interpretation: Positive coefficients indicate features more common in presold homes; negative coefficients indicate features less common in presold homes.
Premium wall materials include brick, stone, stucco exterior. Non-wood frame includes steel, concrete, masonry construction.

3.3 The Price Premia and Market Conditions

Our previous subsection highlights the stability of the presale price premium attributed to the house customization optionality of presold homes. Here, we contrast this stability to the observed variation in both the presale and post completion premia and with their responsiveness to demand shocks. Both of these results highlight the customization optionality's inability to fully capture the observed housing price dynamics.

To examine how the presale premium varies with local housing market conditions, we classify Census divisions into high and low demand markets based on regional wage growth patterns. Divisions with above-median wage growth according to the wage growth data from the Atlanta Federal Reserve's Wage Growth Tracker (Federal Reserve Bank of Atlanta, 2024) are classified as high-demand markets, while those with below-median wage growth represent low-demand markets. Wage growth serves as a fundamental proxy for housing demand through several economic channels. Higher wage growth directly increases households' purchasing power and their ability to qualify for mortgages, driving up demand for housing. Areas with strong wage growth also attract in-migration of workers creating additional housing demand pressure. Indeed the existing literature has documented an income elasticity of housing demand in the range of 0.7 — 1 (Harmon, 1988).

We implement our analysis using an interaction model that tests whether the presale and post construction premia systematically differ between markets that feature high wage growth and markets that feature low wage growth:

$$\log(\mathrm{p}_i) = \beta \cdot D_{\text{Stage Sold}} + \alpha \cdot D_{\text{High Wage}} + \theta \cdot (D_{\text{Stage Sold}} \times D_{\text{High Wage}}) + \boldsymbol{\delta} \cdot \boldsymbol{S}_i + \boldsymbol{\gamma} \cdot \boldsymbol{Q}_i + \phi_{t,d} + \varepsilon_i, \quad (3)$$

where θ captures the additional presale premium in high wage growth areas relative to low wage growth areas.

Table 5: Presale Premium by Wage Growth – Baseline and Interaction Models

Dependent Variable:	Log Price	
	Baseline	Interaction Model
Model:	(1)	(2)
Variables		
Presold Before Construction	0.0280***	0.0367***
	(0.0064)	(0.0083)
Sold After Completion	0.0117**	0.0060
	(0.0055)	(0.0073)
Presold Before Construction × High Wage Growth		-0.0278**
		(0.0116)
Sold After Completion × High Wage Growth		0.0175*
		(0.0101)
Fit statistics		
Observations	75,497	75,497
R²	0.684	0.684
Adjusted R²	0.683	0.683

Notes: Clustered (Division and Year) standard errors in parentheses.
Signif. codes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5 shows how the baseline estimates vary in markets with high and low wage demand. We find that high wage growth markets tend to have lower (but still positive) presale premium. By contrast, the post-completion premium is higher in high wage growth markets albeit at a level that is only statistically significant at the 10% level ($p < 0.10$). However breaking down the marginal impact of high wage growth by the month of sale in Figure 4 we can see that this increase in the premium is higher for houses that are sold more than 6 months after the start of construction. Although the effects of higher housing demand have an opposite impact on the two premia, in section 5 we show how our financing frictions
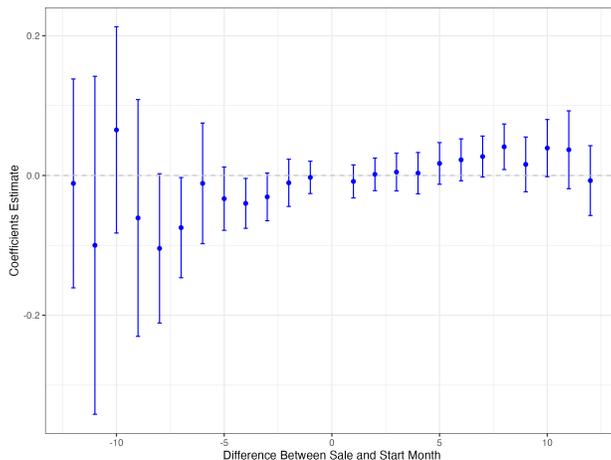
channel can rationalize the sign of both effects.

Figure 4: High Wage Growth Interaction Coefficients

Notes: This figure shows coefficient estimates for the interaction of the high wage dummy with the number of months between sale date and construction start. Positive (negative) values indicate a higher (lower) price for houses sold in high wage growth areas.

Finally, we report how the premium has varied over time presenting 5-year rolling regressions in Figure 5. The presale premium peaked in the 2010s before declining in the 2020s. While the post completion premium was more volatile, being estimated at slightly below zero until the 2012 when it rose sharply. This suggests that changing market conditions play an important role in both the presale and post completion premia, consistent with the financing frictions channel.

3.4   Robustness

There are several omitted house characteristics such as good views, precise location, or orientation that will be capitalized into sale prices. Bias in our estimated premia, however, arises only if those same attributes are also systematically linked to the timing of when a dwelling is sold. We consider the sign of the correlation for many of these variables and the time of sale to be ambiguous. For example consider two otherwise identical homes except that one has a slightly nicer view. One might think that the house with the nicer view, being more desirable, might be sold first and thus more likely to be presold. Alternatively the developer might decide to commence construction on the lot with the more desirable view first to take advantage of the higher inherent value of the site, since construction starts earlier it is thus more likely to be sold during or after construction.
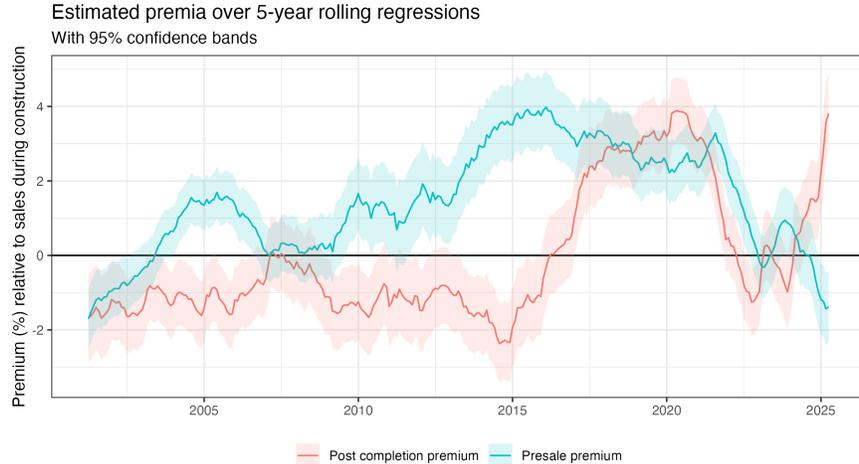
Figure 5: Rolling regressions.

Notes: This figure shows the estimates of the presale and post completion premia from 5 year rolling regressions of the baseline model with the sample window ending denoted by the x-axis. Bands denote 95% confidence intervals.

One omitted variable that could influence our results is developer quality and reputation. Because buying a presold home involves greater risk, such sales maybe more likely to be secured by developers with a long track record of delivering high-quality projects. That reputation, in turn, can enable them to command higher prices controlling for presale timing. Consequently, our estimate of the presale premium may be biased upward, as we cannot fully capture this dimension of developer quality in this dataset.

To test the robustness of our results, we estimate the presale price premium in a range of different sub-samples limited to new construction with home owner associations , condominiums, detached housing, and those located in metropolitan areas only. Across all sub-samples the presale price premium remains positive and significant (Table 6).[11]

4 A model of the housing market with presales

In the previous section, we established the empirical existence of a presale price premium as well as a post completion price premium. Moreover, we showed that the two premia a not time-invariant and respond to market changes. One potential explanation behind the existence of a presale premium is the option to customize a presold home. Our empirical

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[11]Note that the Survey of Construction microdata only covers new single family home so the "Condos" column consists of the relatively small sample of houses that are single family yet still are part of a condominium legal structure

Table 6: Sub-samples with Quality Controls

Dependent Variable:	Log Price				
	Baseline	HO Association	Condos	Detached	Metro
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Sold Before Start	0.0276***	0.0437***	0.0527***	0.0274***	0.0247***
	(0.0067)	(0.0062)	(0.0164)	(0.0066)	(0.0077)
Sold After Completion	0.0139**	0.0072	0.0320**	0.0161***	0.0066
	(0.0058)	(0.0057)	(0.0148)	(0.0057)	(0.0072)
Log Square Feet	0.7461***	0.7297***	0.7419***	0.7682***	0.7635***
	(0.0106)	(0.0124)	(0.0325)	(0.0129)	(0.0140)
Bedrooms	-0.0877***	-0.1062***	-0.0448***	-0.0786***	-0.0876***
	(0.0056)	(0.0044)	(0.0153)	(0.0052)	(0.0083)
Full Bathrooms	0.1656***	0.1558***	0.1556***	0.1552***	0.1593***
	(0.0071)	(0.0063)	(0.0171)	(0.0074)	(0.0103)
Fit statistics					
Observations	70,041	52,770	4,615	58,452	34,056
R^2	0.67130	0.68735	0.67450	0.68815	0.63055
Adjusted R^2	0.67041	0.68622	0.66152	0.68714	0.62908

Clustered (Division and Year) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

analysis shows that this customization optionality can account for about 50% of the empirically observed presale premium, leaving much of the premium unexplained. Moreover, the customization optionality appears to be constant throughout time, leaving it unable to explain the variation we see in the presale price premium throughout time and location. Lastly, the customization option cannot explain at all the existence of a post completion price premium. Motivated by these observations, we develop a model of the housing market where developers face financial frictions and show that these frictions give rise to a novel channel that can rationalize both the existence of the two premia and their empirical responses to demand shocks.

Our environment is closely related to that in Gabrovski and Ortego-Marti (2025), with the exception that we extend the framework to allow for the possibility of presales. Time is continuous, agents live forever, are risk-neutral, and discount the future at a rate r. There are three types of agents in the economy: households, financiers, and developers.[12] Households are either homeowners, buyers (they do not have a house but are actively searching for one), or idle (they do not have a house and are not actively trying to buy one).[13] Developers have the technology to construct houses, but are liquidity constraint, i.e. they need to secure financing for their project before construction can commence. Financing can be secured in two ways. First, if the developer manages to find a financier (bank) willing to extend a loan, she uses the loan to fund the construction of a house that is then put for sale. Second, if the developer manages to find a buyer willing to purchase the home "off the plan", she makes a presale. Upon buying a presold home, the buyer transfers a deposit to the developer that the developer uses to finance part of the construction project. Importantly, the deposit cannot cover the entire cost, so the developer still needs to secure a loan from a financier. However, the loan she has to secure is smaller, which helps her save on financing costs. Once the developer secures financing, she builds the home and transfers it to the buyer. When the buyer receives the house she pays the price (net of any deposits made in the case of a presale) and the developer uses the funds to repay the principal to the financier. Searching for both credit and buyers is costly and time-consuming. We model these frictions in the spirit of Wasmer and Weil (2004), Petrosky-Nadeau and Wasmer (2017), Gabrovski and Ortego-Marti (2021, 2025). A point of departure from most of these studies is that in

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[12]There is also a representative realtor, that provides services to the buyers on the housing market, similarly to Gabrovski and Ortego-Marti (2019). However, the realtor is just a convenient modeling tool and does not play an important part in our analysis.

[13]In our model, idle households can be thought of as either renting, living with relatives, or choosing not to form a separate household. We follow much of the theoretical literature and do not model the rental market.

our economy the credit and housing markets operate in parallel, i.e. developers search for financing and buyers simultaneously, with the order in which the matches occur determining whether or not a house is presold.[14]

Searching on the housing market is a costly and time-consuming process for buyers as well: it takes time for them to find a suitable house and they must rent the services of a realtor. Even though assuming the existence of realtors is a realistic characterization of the market, it is not a necessary ingredient to obtain our results.[15] Due to the possibility of presales in our economy, there are three types of sellers on the market: (i) developers with a construction project looking to make a presale; (ii) developers with a newly built house looking to make a sale; (iii) existing homeowners looking to sell their house. In particular, homeowners suffer a separation shock with some exogenous rate which induces them to put their existing house for sale. Thus, in our economy there are sales of *new* and *existing* houses, as well as *presales*.

Prices, as well as the terms of credit, are determined through Nash bargaining. Consequently, even though houses are identical, their prices might differ, because the seller's surplus from trade is different depending on whether she is selling an existing home, a new home, or making a presale. In addition, the credit terms might differ, depending on whether or not the developer has already made a presale. Due to the sequential timing of events, we assume that bargaining is also sequential, i.e. if the developer has made a presale, she and the financier take the negotiated presale price as given and if the developer has not made a presale, the buyer and seller take the financial contract between the developer and financier as given. Lastly, there is free entry of buyers, developers, and financiers. Free entry of both buyers and sellers (through the entry of developers) is a necessary model ingredient to match housing market dynamics.[16]

4.1 The credit market

Obtaining financing for a construction project is costly and time-consuming. We follow Gabrovski and Ortego-Marti (2021, 2025), Petrosky-Nadeau and Wasmer (2017), Gabrovski et al. (2024a), and Wasmer and Weil (2004) and capture credit frictions through search and matching frictions and free entry of both borrowers (developers) and lenders (financiers).

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[14]In a robustness exercise in the appendix, Gabrovski and Ortego-Marti (2021) do consider an economy where households search for credit and housing simultaneously.

[15]See Gabrovski and Ortego-Marti (2019) for details; for a recent paper that explicitly considers the intermediation role of realtors see Gabrovski et al. (2024b).

[16]See Gabrovski and Ortego-Marti (2019) for details.

The credit contract terms include a loan repayment schedule and a financing fee. The terms are negotiated using Nash bargaining (Nash, 1950; Rubinstein, 1982). There is considerable empirical support for this approach of modeling credit frictions, especially in the case of construction loans.[17] We denote by $\mathcal{F}$ the measure of financiers. The measure of developers is $\mathcal{D} = \mathcal{D}_0 + \mathcal{D}_1$, where $\mathcal{D}_0$ is the measure of developers who have not made a presale and $\mathcal{D}_1$ is the measure of developers who have. The number of matches per unit of time is given by the matching function $M^C(\mathcal{D}, \mathcal{F})$. The matching function satisfies the usual properties: it is strictly increasing in each argument and is homogeneous of degree one. Matching is random, so the rate with which developers find credit is given by $q(\phi) \equiv M^C(\mathcal{D}, \mathcal{F})/\mathcal{D} = M^C(1, \phi^{-1})$, where $\phi \equiv \mathcal{D}/\mathcal{F}$ is the market tightness on the credit market. Similarly, financiers find a borrower at a rate $\phi q(\phi)$. Both the developer and the financier incur search costs while searching for a match on the credit market. The developer's cost is denoted by c^D and captures the cost of searching for potential lenders, gathering information on loan rates, and preparing the documentation necessary for a loan application. The financier's cost is denoted by c^F and captures the costs associated with attracting applicants, advertising, and screening. Given our assumption of random matching, there is a probability $f^N = \mathcal{D}_0/\mathcal{D}$ that this borrower is a developer that has not made a presale. In that event the bank finances the entire construction cost, k. With the complimentary probability, $1 - f^N$, the bank matches with a developer who has made a presale and thus only has to finance the cost $k - d$, where d is the deposit the buyer has made at the time of signing the presale contract.

Financing a construction project is costly for the bank. In particular, the cost to the bank of financing k units of capital is $\chi(k)$, where $\chi(k)$ is a strictly increasing and convex function. Intuitively, the cost is the principal k plus any additional loan-servicing costs the bank incurs while the loan is active. We do not explicitly model these costs, but one could think of them as including balance sheet costs, regulatory capital constraints, and loan monitoring costs. Indeed, there is much evidence that banks incur theses costs in practice and that their behavior is affected by the costs.[18] As a compensation for its services the bank receives repayments from the developer. If the bank fully finances the construction project, the developer does not have the funds to repay the loan principal until she finds a buyer to buy the house. At that time she collects the house price and repays the principal. During

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[17]See, for example, Ambrose and Peek (2008), Agarwal et al. (2018), Dell'Ariccia and Garibaldi (2005), Agarwal and Hauswald (2021), Agarwal et al. (2024). For a detailed summary of the evidence see Gabrovski and Ortego-Marti (2025).

[18]See, for example, Kashyap et al. (2002) the discussions in Gabrovski and Ortego-Marti (2021) and Gabrovski et al. (2024a).

the duration of the loan (while the developer is searching for a buyer) the developer makes the interest payments ρ per unit of time. If, on the other hand, the bank extends credit to a developer with a presale, she need not wait for the developer to repay the principal since there is no construction lag. Thus, the developer receives the funds $k - d$, instantaneously builds the house, collects the sale proceeds from the buyer, and repays the bank its principal $k - d$ along with a financing fee, ψ. Both ρ and ψ are determined through Nash bargaining.

4.2   The housing market

The housing market is also subject to search and matching frictions. This captures the empirical regularity that it takes time to both sell a house and find a suitable home to buy. Similarly to Gabrovski and Ortego-Marti (2019, 2025), buyers require the services of a representative realtor in order to search on the market. The realtor incurs a cost $\bar{c}b^{\gamma+1}/(\gamma+1)$ from servicing b buyers and receives a revenue $bc^B(b)$, where $c^B(b)$ is the flow cost the realtor charges each buyer. Profit maximization implies that $c^B(b) = \bar{c}b^\gamma$, i.e. the buyers' search cost is increasing in the number of buyers searching for homes. This approach to modeling the buyers' search cost is consistent with the empirical literature and allows us to model entry of both buyers and sellers on the market.[19]

Symmetrically, sellers experience a search cost c^S, which we model as constant. Unlike buyers, however, sellers are heterogeneous. First, some homeowners experience separation shocks and at an exogenous rate s put their home for sale. We call this type of (housing) vacancies *existing* vacancies and denote their mass as v^E. Second, there are newly built homes that have been put on the market for sale by developers. We refer to these as *new* vacancies and denote their measure as v^N. Third, if the developer has not yet secured financing she does not have a newly built home, but rather a permit to build. Buyers can purchase such homes "off the plan", before they are constructed. We call such types of vacancies *presale* vacancies and denote them by v^P.

As in the credit market, we model search frictions with the help of a matching function. The number of matches (or sales) on the housing market is given by $M^H(b, v)$, where $v \equiv v^E + v^N + v^P$ is the total measure of vacancies and $M^H(b, v)$ is strictly increasing in each of its arguments, concave, and exhibits constant returns to scale. Given these assumptions the home-finding rate is $m(\theta) \equiv M^H(b, v)/b = M^H(1, \theta^{-1})$ and the home-selling rate is $\theta m(\theta) = M^H(b, v)/v = M^H(\theta, 1)$, where $\theta \equiv b/v$ is the tightness on the housing market. Thus, a higher market tightness means there are more buyers on the market per vacancy

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[19]See Gabrovski and Ortego-Marti (2019) for a detailed discussion.

which makes selling a home faster and, at the same time, finding one to buy slower.

Like much of the existing literature, we do not model the rental market since there is empirical evidence that the two markets are different. For example, Glaeser and Gyourko (2007) find that there is no arbitrage between the rental and owner-occupied homes and that the two types of homes have very different characteristics.

4.3 Bellman equations

Developers. Consider first the value functions for the developer. Once she enters the market, she begins searching for credit and for a buyer simultaneously. As she is conducting a simultaneous search in two markets, the developer's search costs are $c^S + c^D$ per unit of time. At the rate $q(\phi)$ she finds a financier willing to extend her credit and thus transitions to the state of having a newly constructed vacant house with a corresponding value of V^N. If, on the other hand, she first finds a buyer, she makes a presale, collects the deposit, denoted by d, and transitions to the state of having made a presale and searching for credit to fund the remaining construction costs. Thus,

$$rV_0 = -c^S - c^D + q(\phi)[V^N - V_0] + \theta m(\theta)[V^P - V_0], \tag{4}$$

where V^P denotes the value for the developer of having made a presale.

Next, if δ denotes the rate of home destruction, the value function for a developer who has a new vacancy is given by[20]

$$(r + \delta)V^N = -c^S - \rho + \theta m(\theta)[p^N - k - V^N]. \tag{5}$$

Intuitively, the discounted flow value of having a new vacancy is the sum of three terms. First, the developer has to incur the search costs c^S and second she needs to make the interest payments ρ to the bank. Third, at a rate $\theta m(\theta)$ she finds a buyer and realizes a capital gain. The gain is simply the price of the house, p^N, net of the loan principal amount, k, and the value of the vacancy, V^N.

Similarly, a developer who has made a presale incurs the flow search cost c^D while looking for financing. At the rate $q(\phi)$ she finds credit, builds the home, collects the sale proceeds $p^P - d$, and repays the financier the loan principal $k - d$ along with the financing fee, ψ.

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[20]We assume that at rate δ homes are destroyed. Thus captures the home depreciation observed in practice and provides an incentive for developers to build new homes even at the steady state equilibrium.

Hence,

$$(r + \delta)V^P = -c^D + q(\phi)[p^P - d - (k - d) - \psi - V^P]. \tag{6}$$

Financiers. Next, we turn to financiers. Upon entering the market, financiers search for developers with projects to whom they can extend credit. As this process requires advertisement, as well as screening of applicants it comes at the cost c^F per unit of time. With a rate $\phi q(\phi)$ the financier meets a developer. In a fraction $f^N \equiv \mathcal{D}_0/\mathcal{D}$ of these meetings, the developer is one that has not made a presale, so the financier realizes the capital gain of $F_1 - F_0 - x(k)$, where F_1, F_0 are the value functions of the financier when she has and when she has not yet extended credit. With the complementary probability, the financier meets a developer who has made a presale, so she only has to finance $k - d$. Thus, her capital gain in that event is $\psi - F_0 - \chi(k - d) + k - d$. Consequently,

$$rF_0 = -c^F + \phi q(\phi)\left[f^N[F_1 - F_0 - \chi(k)] + (1 - f^N)[\psi - F_0 - \chi(k - d) + k - d]\right]. \tag{7}$$

Once the financier forms a relationship with the developer, she finances the entire construction project and receives the repayment ρ, while the credit line is active. At the rate $\theta m(\theta)$, the developer finds a buyer and repays her loan principal, which ends the relationship. Thus,

$$(r + \delta)F_1 = -c^F + \rho + \theta m(\theta)[k - F_1]. \tag{8}$$

Households. A household that owns a home enjoys utility ε per unit of time. At a rate s, the household suffers a separation shock and puts the house for sale as an existing vacancy. Thus,

$$(r + \delta)H = \varepsilon - s[H - V^E], \tag{9}$$

where H is the value function for a homeowner and V^E is the value function for an existing vacancy. In particular, if p^E is the price of an existing vacancy, then

$$(r + \delta)V^E = -c^S + \theta m(\theta)[p^E - V^E]. \tag{10}$$

Next, consider a household that does not have a home, but would like to purchase one, i.e. a buyer. Upon entry, it pays the search costs and is matched with a home at the rate $\theta m(\theta)$. With probability $\pi^E \equiv v^E/v$ this home is an existing vacancy, with probability $\pi^N \equiv v^N/v$, it is a new vacancy, and with probability $\pi^P \equiv v^P/v$ the household signs a presale contract.

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Hence, if the value function for a buyer is B, then

$$rB = -c^B(b) + m(\theta) \left[\pi^E[H - p^E - B] + \pi^N[H - p^N - B] + \pi^P[B^P - d - B] \right], \quad (11)$$

where B^P is the value function of a buyer that has signed a presale contract. In particular, once a presale is made, the buyer only has to wait for the developer to find financing to complete construction of the home. Once it is completed, she pays the remainder of the price and becomes a homeowner. Namely,

$$(r + \delta)B^P = q(\phi)[H - (p^P - d) - B^P]. \quad (12)$$

4.4 Bargaining, laws of motion, and entry

Bargaining. Both the terms of the credit contract between the developer and the financier and the terms of trade in the housing market are determined through Nash bargaining (Nash, 1950; Rubinstein, 1982). Similar to Petrosky-Nadeau and Wasmer (2017); Gabrovski and Ortego-Marti (2021, 2025) we assume that bargaining is sequential. That is, if a developer has a newly created vacancy, then her and the buyer take the negotiated terms of credit as given and if a developer makes a presale before meeting a financier, then she and the financier take the deposit and negotiated price as given.

Let us first consider the credit market. When a developer without a presale and a financier meet the surplus to the developer is $V^N - V_0$ whereas the surplus to the financier is $F_1 - F_0 - \chi(k)$. On the other hand, if the developer has already made a presale, then the surpluses are $p^P - d - (k - d) - \psi - V^P$ and $\psi - F_0 - \chi(k - d) + k - d$. Thus, the repayment ρ and the financing fee ψ solve

$$\rho = \arg\max_{\rho} [V^N - V_0]^\eta [F_1 - F_0 - \chi(k)]^{1-\eta}, \quad (13)$$

$$\psi = \arg\max_{\psi} [p^P - d - (k - d) - \psi - V^P]^\eta [\psi - F_0 - \chi(k - d) + k - d]^{1-\eta}, \quad (14)$$

where η is the bargaining power for the developer on the credit market. Similarly, if the

bargaining power of the developer on the housing market is β, then

$$p^N = \arg\max_{p^N}[p^N - k - V^N]^\beta[H - p^N - B]^{1-\beta}, \tag{15}$$

$$p^P = \arg\max_{p^P}[V^P - V_0]^\beta[B^P - d - B]^{1-\beta}, \tag{16}$$

$$p^E = \arg\max_{p^E}[p^E - V^E]^\beta[H - p^E - B]^{1-\beta}, \tag{17}$$

where for symmetry we also assume that the bargaining power of an existing home seller is the same as that of a developer. We should note that the deposit, d, is a parameter in our model, rather than a quantity the buyer and seller bargain over.

Since a developer with a newly built vacancy and the buyer take the terms of credit the developer has negotiated as given, it follows that $\partial[p^N - k - V^N]/\partial p^N = -\partial[H - p^N - B]/\partial p^N = 1$. Similarly, $\partial[p^E - V^E]/\partial p^E = -\partial[H - p^E - B]/\partial p^N = 1$ and, by (6), (12), $\partial[V^P - V_0]/\partial p^P = -\partial[B^P - d - B]/\partial p^P = 1/[r + \delta + q(\phi)]$.[21] Hence, the first-order conditions for the bargaining in the housing market imply the following surplus-sharing rules:

$$\beta[H - p^E - B] = (1 - \beta)[p^E - V^E], \tag{18}$$

$$\beta[H - p^N - B] = (1 - \beta)[p^N - k - V^N], \tag{19}$$

$$\beta[B^P - d - B] = (1 - \beta)[V^P - V_0]. \tag{20}$$

Analogously, one can derive the following surplus-sharing rules in the credit market:

$$\eta[F_1 - F_0] = (1 - \eta)[V^N - V_0], \tag{21}$$

$$\eta[\psi - F_0 - \chi(k - d) + k - d] = (1 - \eta)[p^P - d - (k - d) - \psi - V^P]. \tag{22}$$

Entry and laws of motion. In our economy, there is free entry of buyers, developers and financiers. Thus, the masses b, $\mathcal{D}_I$, $\mathcal{F}$ are determined through the free entry conditions $B = 0$, $V_0 = 0$, $F_0 = 0$. Since creating a vacancy requires either construction or for an existing homeowner to separate from their house, the masses of vacancies are determined

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[21]Observe that the negotiated price p^P is not contingent on the financing fee, ψ, the developer expects to negotiate. Similarly, at the credit bargaining stage, the negotiated repayment ρ is not contingent on the price p^N the developer is expected to negotiate in the housing market.

through the following laws of motion:

$$\dot{v}^N = q(\phi)\mathcal{D}_0 - \theta m(\theta)v^N - \delta v^N, \tag{23}$$

$$\dot{v}^E = sh - \theta m(\theta)v^E - \delta v^E, \tag{24}$$

where h is the mass of homeowners. Consider the law of motion for a new vacancy. In order to build a new home the developer needs to find financing, which happens at the rate $q(\phi)$. Since there are $\mathcal{D}_0$ developers looking for such financing at any given time, the flow into the stock of newly built vacancies is $q(\phi)\mathcal{D}_0$. The flow out of the stock is the combination of two terms: (i) depreciation, which reduces the stock by δv^N per unit of time and (ii) sales, which amount of $\theta m(\theta)v^N$ per unit of time. The intuition behind the law of motion for v^E is analogous so we omit it. Similarly, the law of motion for developers with a presale and for homeowners are given by:

$$\dot{\mathcal{D}}_1 = \theta m(\theta)\mathcal{D}_0 - q(\phi)\mathcal{D}_1 - \delta\mathcal{D}_1, \tag{25}$$

$$\dot{h} = (v^N + v^E)\theta m(\theta) + \mathcal{D}_1 q(\phi) - sh - \delta h. \tag{26}$$

Lastly, given that developers who have not yet secured financing post their projects on the housing market, we have the following accounting identity $\mathcal{D}_0 = v^P$.

4.5 Steady State Equilibrium

To solve for the steady state equilibrium we first we evaluate the laws of motion at steady state to find an expression for the probabilities π^E, π^N, π^P, f^N. Then, we derive the free entry conditions for developers, financiers, and buyers. Next, we provide a characterization for house prices, the repayments, and the financing fee. Lastly, derive the equilibrium presale price premium in our model.

Steady state distributions. First, we solve for the probabilities π^E, π^P, π^N, f^N. Given the laws of motion for existing vacancies and homeowners, (24), (26), it follows that at steady state $h = [[v^E + v^N]\theta m(\theta) + \mathcal{D}_1 q(\phi)]/(s + \delta)$ and $v^E = sh/[\theta m(\theta) + \delta]$. Moreover, $v^N = v^P q(\phi)/[\theta m(\theta) + \delta)]$ and $\mathcal{D}_1 = v^P \theta m(\theta)/[q(\phi) + \delta)]$. Hence, since $\pi^E \equiv v^E/v = v^E/(v^E + v^P + v^N)$, it follows that

$$\pi^E = \frac{\frac{1}{q(\phi)+\delta} + \frac{1}{\theta m(\theta)+\delta}}{\frac{s+\delta}{sq(\phi)\theta m(\theta)}[q(\phi) + \theta m(\theta) + \delta] + \frac{1}{q(\phi)+\delta} - \frac{1}{q(\phi)}}. \tag{27}$$

Next, since $v^N = v^P q(\phi)/[\theta m(\theta) + \delta)]$ implies that $\pi^N = \pi^P q(\phi)/[\theta m(\theta) + \delta)]$:

$$\pi^P = (1 - \pi^E)\frac{\theta m(\theta) + \delta}{q(\phi) + \theta m(\theta) + \delta}, \tag{28}$$

$$\pi^N = (1 - \pi^E)\frac{q(\phi)}{q(\phi) + \theta m(\theta) + \delta}. \tag{29}$$

Lastly, manipulating the laws of motion and noting that $f^N \equiv \mathcal{D}_1/(\mathcal{D}_1 + \mathcal{D}_0)$, implies

$$f^N = \frac{q(\phi) + \delta}{\theta m(\theta) + q(\phi) + \delta}. \tag{30}$$

Entry conditions. Substituting for the free entry condition $F_0 = 0$ into (7) yields the Credit Entry (CE) condition

$$\frac{c^F}{\phi q(\phi)} = f^N[F_1 - \chi(k)] + (1 - f^N)[\psi - \chi(k - d) + k - d]. \tag{31}$$

Intuitively, the left-hand side of the equation represents the cost a financier expects to pay while searching for suitable lending opportunities. The right-hand side is the expected profits, which are the weighted average of two terms. First, if the financier meets a developer who has not made a presale, she realizes the capital gain $F_1 - \chi(x)$: the gain in value of having a lending relationship with a developer who is building a new vacancy net of the cost of financing the venture. Second, in the event she meets a developer who has made a presale, the financier receives the financing fee net of the costs to provide liquidity, $\chi(k - d) - (k - d)$. The Housing Entry (HE) condition, which has a similar interpretation, can be derived by substituting $V_0 = 0$ into (4):

$$c^S + c^D = q(\phi)V^N + \theta m(\theta)V^P. \tag{32}$$

Combining the Bellman equations for the value of a new vacancy with that for F_1, (5), (8), yields an expression of the surplus created between a developer and financier when they jointly create a new vacancy. Similarly, from (6), one can derive the following expression for the surplus created between the developer and the financier when the developer has already made a presale. Substituting the the two expressions into (31), together with the Nash

bargaining solutions (21), (22) implies the following CE condition

$$\text{CE:} \quad \frac{c^F}{\phi q(\phi)} = (1 - \eta) f^N \left[\frac{\theta m(\theta) p^N - (c^S + c^F)}{r + \delta + \theta m(\theta)} - \chi(k) \right]$$
$$+ (1 - \eta)(1 - f^N) \left[p^P - d - \chi(k - d) - \frac{q(\phi)[p^P - k - \psi] - c^D}{r + \delta + q(\phi)} \right]. \qquad (33)$$

Next, consider the surplus generated when the developer makes a presale. The total surplus is $B^P - d - B + V^P - V_0$. Using free entry and the Bellmans (12), (6) yields an expression for the surplus we can plug into (32) to get the HE condition:

$$\text{HE:} \quad c^S + c^D = \eta q(\phi) \left[\frac{\theta m(\theta) p^N - (c^S + c^F)}{r + \delta + \theta m(\theta)} - \chi(k) \right]$$
$$+ \beta \theta m(\theta) \frac{q(\phi) [H - k - \psi] - c^D - d(r + \delta)}{r + \delta + q(\phi)}. \qquad (34)$$

On the buyers side, free entry together with (11) and the Nash bargaining solutions (18), (19), (20) imply the following Buyer Entry (BE) condition

$$\frac{c^B(b)}{m(\theta)} = (1 - \beta) \left\{ \pi^E[H - V^E] + \pi^N[H - k - V^N] + \pi^P[B^P - d + V^P] \right\}. \qquad (35)$$

The intuition behind it is similar to the intuitions behind the (CE) and (HE) conditions: the expected search cost for buyers equals a fraction $(1 - \beta)$ of the expected surplus from trade. Manipulating the Bellman equations, together with (18), yields the equilibrium (BE):

$$\text{BE:} \quad \frac{c^B(b)}{m(\theta)} = (1 - \beta) \left\{ (\pi^E + \pi^N) \frac{\varepsilon + c^S}{r + \delta + \beta \theta m(\theta)} + \pi^N \frac{\rho - (r + \delta)k}{r + \delta + s + \beta \theta m(\theta)} \right.$$
$$\left. + \pi^P \frac{q(\phi)[H - k - \psi] - c^D - d(r + \delta)}{r + \delta + q(\phi)} \right\}. \qquad (36)$$

Together equations (33), (34), (36) solve for ϕ, θ, b as functions of prices, p^E, p^N, p^P, the repamynet ρ, and the financing fee ψ.

Repayments, and the financing fee. Next we turn our attention to the repayment, ρ, and the financing fee ψ. Using the Nash bargaining solutions (21) and (22), together with

the Bellman equations (8), (6), and (5) one can obtain

$$\rho = (1 - \eta) \left[\theta m(\theta)(p^N - k) - c^S \right] + \eta \left[c^F + [r + \delta + \theta m(\theta)]\chi(k) - \theta m(\theta)k \right], \tag{37}$$

$$\psi = \frac{r + \delta + q(\phi)}{r + \delta + \eta q(\phi)} \left[\eta \frac{\chi(k - d) - (k - d)}{r + \delta + q(\phi)} + (1 - \eta)[c^D + (r + \delta)(p^P - k)] \right]. \tag{38}$$

The presale price premium. Using the Nash bargaining solutions (18), (19) one can express the prices for an existing and a newly built house as a function of the value of the house, H, and the trade surplus:

$$p^E = H - (1 - \beta)\frac{\varepsilon + c^S}{r + \delta + s + \beta\theta m(\theta)}, \tag{39}$$

$$p^N = H - (1 - \beta) \left(\frac{\varepsilon + c^S}{r + \delta + s + \beta\theta m(\theta)} + \frac{\rho - (r + \delta)k}{r + \delta + s + \beta\theta m(\theta)} \right). \tag{40}$$

Intuitively, the price of the house is the entire net present value of owning a home, H, net of the fraction of the surplus allocated to the buyer.

The price of a presold house is characterized by an analogous expression

$$p^P = H - \frac{r + \delta}{q(\phi)}d - (1 - \beta) \left[H - k - \psi - \frac{r + \delta}{q(\phi)}d - \frac{c^D}{q(\phi)} \right]. \tag{41}$$

The difference as compared to the expressions for p^E and p^N is that the buyer has to pay the deposit d at the time of signing the contract, so the price takes into account the cost of providing these funds for the buyer.

Using the expressions for the price of a presold home and a newly built home we can approximate the presale premium as

$$p^P - p^N = (1 - \beta) \left[\psi + \frac{c^D}{q(\phi)} - V^N \right] - \beta d \frac{r + \delta}{q(\phi)} \simeq (1 - \beta) \left[\psi + \frac{c^D}{q(\phi)} - V^N \right], \tag{42}$$

for r and δ relatively small as compared to $q(\phi)$. When the discount and depreciation rates are small, the buyer's cost of prepaying the deposit is essentially zero, so the only difference in the prices comes from the cost of providing the house to the developer. In the case of a presale this is the expected search cost of financing, $c^D/q(\phi)$ together with the financing fee ψ. In the case of a new home sale, the cost is the value of the vacancy V^N. Substituting for

V^N, ψ while maintaining that $r + \delta$ is small, yields

$$p^P - p^N \simeq (1 - \beta) \left[\chi(k - d) - (k - d) + \frac{1}{\eta} \frac{c^D}{q(\phi)} - \eta \left[p^N - \chi(k) - \frac{c^F + c^S}{\theta m(\theta)} \right] \right]. \qquad (43)$$

Intuitively, when the developer and the buyer sign the presale contract, the developer is able to pass on the expected financing costs, $\chi(k - d) - (k - d) + c^D/[\eta q(\phi)]$, to the buyer. This tends to inflate the price p^P. When the developer makes a new sale, however, she has already secured financing and is thus subject to a holdup problem. The bank was able to negotiate an interest fee ρ such that the developer can only extract a fraction η of the surplus to the developer-bank pair from making a sale, $p^N - \chi(k) - (c^F + c^S)/[\theta m(\theta)]$. This tends to depress the price p^N. Hence, when making a presale the developer is able to pass on some of the financing costs to the buyer whereas when making a new home sale she is instead subject to a holdup problem from the bank. This generates the presale price premium in our economy.

5   Numerical Results

The main focus of our paper is to analyze how the price of a new home depends on the timing of its sale. Our results in section 3 establish the empirical existence of a presale premium and our model in section 4 proposes a novel mechanism behind the presale premium: the holdup problem developers face when selling a new home due to financial frictions. In practice, presold houses may sell for higher prices because of the option for customization. This is particularly plausible in our data sample of single-family units, which are generally easier to customize than condominiums. To account for this potentially quantitatively important distinction between presold houses and houses sold post construction we extend our model to allow for the utility flow of a home purchased before construction to be different from that of a new or existing home purchase. In particular, if the buyer purchases a presold home, her instantaneous utility is now $(1 + x)\varepsilon$, where x governs how much the household values the option to customize her home relative to the utility of a non-customized home. Everything else in the model is kept the same. Appendix A details how the model equations change as a result.

5.1   Calibration

We calibrate the model at quarterly frequency. To begin with, normalize the utility of homeownership and the scale parameter for the buyer's search cost both to one, i.e. $\varepsilon = \bar{c} =$

1.[22] The discount rate is set to $r = 0.0079$ in order to match an annual real mortgage rate of 3.156%.[23] The destruction rate, δ, is set to 0.004 to match an annual depreciation rate of 1.6% (Van Nieuwerburgh and Weill, 2010). For the purposes of our quantitative analysis, we impose a Cobb-Douglas matching function in both the credit and housing markets, i.e. $m(\theta) = \mu\theta^{-\alpha}$ and $q(\phi) = \mu_f\phi^{-\alpha_f}$, an approach that is standard in the literature. The elasticity of the matching function in the housing market, α is set to 0.16 following the evidence in Genesove and Han (2012). The elasticity in the credit market is $\alpha_f = 0.5$ as in Petrosky-Nadeau and Wasmer (2013). The bargaining power in the housing market is set to one half, following Ngai and Sheedy (2020) and Gabrovski and Ortego-Marti (2025).

This leaves us with thirteen parameters to be calibrated internally using aggregate data targets. First, we set the separation rate $s = 0.0172$ in order to match an average tenure of 11.8 years, as reported by Redfin for 2023 (the last year in our sample). Next, we set the time-to-sell equal to 1.6 quarters, which is consistent with the average in the U.S for the period 1991:M1 — 2023:M12.[24] The evidence in Genesove and Han (2012) suggests that the time-to-sell and time-to-buy have similar magnitudes, so we set the time-to-buy equal to 1.6 quarters as well. These moments allow us to pin down $\mu = 0.6250$ and $\mu_f = 0.3085$. Next, we set the average search cost for the seller to 2.25% of existing home prices, which is consistent with the realtor commissions reported by Barwick et al. (2017). Thus, $c^S = 1.02$. Similarly, Ghent (2012) estimates an average transaction cost for the buyer equal to 8% of the house price, so we set $c^B(b)/m(\theta) = 0.08p^E$. This moment pins down $c^D = 42.03$. To calibrate the search costs for the financier, we follow Gabrovski and Ortego-Marti (2021, 2025) and interpret them as liquidity costs, i.e. the difference between the yields of a safe but perfectly illiquid asset and a safe but perfectly liquid asset. The annual yield of the perfectly illiquid asset is set to 7%, following the New Monetarist literature, whereas the yield of the perfectly liquid asset is set to 3%, consistent with the average secondary market rate on 3-month T-bills for the past 30 years.[25] Consequently, we set c^F to be 0.9853% of k. To pin down the

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[22]Indeed, in this class of models both the utility and the scale of the cost function can be normalized to any positive number, without affecting the numerical results. See Gabrovski and Ortego-Marti (2025) for details.

[23]During the period of 1991 — 2023, the average nominal rate for a 30-year fixed mortgage was 5.85% (data series reported by Freddie Mac's Primary Mortgage Market Survey), whereas the inflation rate was 2.61% (as calculated from the Consumer Price Index for All Urban Consumers: All Items in U.S. City Average series released by the U.S. Bureau of Labor Statistics).

[24]In particular, the measure of time-to-sell we use is the Median Number of Months on Sales Market for Newly Completed Homes series reported in the New Residential Sales release by the U.S. Department of Housing and Urban Development.

[25]For example, Herrenbrueck and Wang (2023) uses data on time preference, expected real growth, and expected inflation to estimate the interest rate on a perfectly safe and illiquid asset of around 7% and

deposit on presold homes we set $d = 10\%$ of p^E, which yields $d = 6.6788$. Next, as pointed out by Gabrovski and Ortego-Marti (2025), the equilibrium equations pin down the buyer's cost $c^B(b)$, but not b and γ separately. Thus, one needs to look at deviations from steady state in order to calibrate γ. To this end, we increase ε by 1% and pick $\gamma = 0.3187$ in order to match $(db/b)/(dv/v) = 2$, which is the estimate of the slope of the Beverdige Curve in the housing market from Gabrovski and Ortego-Marti (2024).

We take special attention in calibrating the last five parameters x, η, k, $\bar{\chi}$, and ϵ ($\chi(k) \equiv \bar{\chi}k^\epsilon$) since these parameters govern directly the size of the presale price premium and the relative contribution of the customization option channel and the financial frictions channel to the premium. Specifically, the bargaining power η directly impacts the magnitude of the holdup problem and the function $\chi(k)$ governs both the magnitude of how much more expensive it is to provide credit for speculative versus presold loans and the size of the credit costs the developer can pass on the buyer when making a presale. Consequently, we choose moments directly relating to the credit market and to presales to pin down the parameters. To begin with, the bargaining power in the credit market is set so that we match the average fraction of presold homes to sales of newly built homes for our sample period. This yields $\eta = 0.8804$.[26] Next, we follow Gabrovski and Ortego-Marti (2025) and match the debt-to-equity ratio for developers, k/V^N to be 94.7%. This yields $k = 19.7810$. To calibrate the bank's costs of carrying a construction loan, we impose $\chi(k) = \bar{\chi}k^\epsilon$. In practice a pre-commitment by the buyer lowers the financial risk of the loan, so financial regulators assign a risk-adjusted weight for presold home construction loans equal to 50% of the weight assigned to speculative construction loans (U.S. Department of the Treasury et al., 2024). As capital requirements are likely to be a major source of loan-servicing costs for banks, we use this information to target the relative cost of financing loans for presold construction versus speculative construction. In particular, we set $\chi(k-d)/(k-d) = 0.5 * \chi(k)/k$ so that the bank's balance sheet cost of carrying one unit of presold construction loan on its books is half that of carrying one unit of speculative construction loan. This moment yields $\bar{\chi} = 0.0104$. Next, the Survey on Acquisition, Development and Construction Financing reports the average effective interest rate on presold construction loans. Using the information for the 2023Q1 — 2024Q4 period, we find the average effective interest rate to be 11.6588% and

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Berentsen et al. (2011) uses 7.4% as the interest rate on such an asset, consistent with the average rate for AAA corporate bonds.

[26]Intuitively, the fraction of presold homes relative to new home sales is determined by how much more likely it is for the developer to find a buyer before she finds credit. Since the credit-finding rate is $q(\phi)$, there is a direct link between the credit market tightness and the fraction of presales. Given free entry, this translates to a direct link between the bank's expected profits, i.e. η and the fraction of presales.

the average loan term to be a little over a year. During the same period inflation was 3.55% annually, so we set the financing fee to $\psi/(k-d) = 8.1083\%$. This yields $\epsilon = 2.6826$. Lastly, we turn to x, the parameter governing the customization optionality premium. To calibrate it we take the most conservative approach possible and target a presale price premium of 15%. Thus, x is identified by the residual premium that is unexplained by the financial channel in our model, giving the customization channel the best possible standing relative to the financing channel. For the same reason we target a presale price premium of 15%, which is the maximal premium for our sample (for homes sold 5 or more months before construction) rather than the average premium of about 3%. This yields $x = 27.97\%$.

5.2   Model Fit

Our calibrated equilibrium does well on a number of un-targetted moments which we summarize in Table 8. First, the model replicates a fraction of existing home sales to total home sales that is close to that in the data. The model counterpart of the moment is π^E and its value at the calibrated equilibrium is 80.6%. To arrive at a data counterpart, we use the series New One Family Houses Sold reported by the U.S. Census Bureau in the New Residential Sales release together with data on existing home sales reported by the National Association of Realtors. This yields an average empirical value for 1991Q1 — 2024Q3 of 88.49%. The second moment is the vacancy rate. It's model-generated expression is $(v^E + v^N)/(v^E + v^N + h)$ and its value at the calibrated equilibrium is 3.1%.[27] This is slightly larger than the 1991Q1 — 2024Q3 average value for the Homeowner Vacancy Rate, reported by the U.S. Census Bureau, of 1.8%, but still within the ballpark. Next, both the model-implied construction rate, $\frac{\mathcal{D}_0 q(\phi) + \mathcal{D}_1 q(\phi)}{h}$, and new home sales rate, $\frac{(v^N + v^P)\theta m(\theta)}{h}$ are about 0.41%, whereas their data counterparts are 0.99% and 0.51% respectively.[28] Lastly, the average markup reported in De Loecker et al. (2020) for the period 1999 — 2015 (the last year reported) is 46.88%. This is a bit lower than the model-implied one of 98.65%, but not quantitatively too far off.

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[27]Note that in our model there are three types of vacancies: "off the plan" vacancies available for a presale, newly built homes, and existing homes available for sale. Since presale vacancies have not been constructed yet, the vacant houses in our economy are $v^E + v^N$.

[28]To calculate the construction and sales rates in the data we use three series reported by the Census Bureau: New One Family Houses Sold, New Privately-Owned Housing Units Started, and Housing Inventory Estimate: Total Housing Units in the United States. Since the last series is only available from 2000Q2, we take the data averages for the period 2000Q2 — 2024Q4.

Table 7: Calibration

Externally calibrated parameters			
Preferences/Technology	Parameter	Value	Source/Target
Utility	ε	1	Normalization
Buyer cost scale parameter	$\bar{c}$	1	Normalization
Discount rate	r	0.0079	Real mortgage rate= 3.156%
Elasticity of Housing Market Matching Function	α	0.16	Genesove and Han (2012)
Elasticity of Credit Market Matching Function	α_f	0.5	Petrosky-Nadeau (2013)
Destruction rate	δ	0.004	Van Nieuwerburgh and Weill (2010)
Bargaining power in housing market	β	0.5	Ngai and Sheedy (2020)

Internally calibrated parameters			
Preferences/Technology	Parameter	Value	Source/Target
Separation Rate	s	0.0172	Tenure= 11.8 years
Efficiency of Housing Market Matching Function	μ	0.6250	TTS= 1.6 quarters
Efficiency of Credit Market Matching Function	μ_f	0.3085	TTB=TTS
Seller cost	c^S	1.0200	Realtor fee = 2.25% of price
Developer cost	c^D	42.0301	Average buyer cost= 8% of price
Financier cost	c^F	0.1949	Liquidity premium= 4%
Deposit on presold homes	d	6.6788	Deposit = 10% of price
Bargaining power in credit market	η	0.8804	Frac. of presold home sales to presales and newly built home sales = 29.29%
Construction cost	k	19.7810	Debt-to-equity ratio = 94.7%
Loan-servicing scale cost	$\bar{\chi}$	0.0105	presale loans risk adjusted weight= 0.5 of speculative loans risk adjusted weight
Loan-servicing cost elasticity	ϵ	2.6826	presold construction loans interest rate = 8.11%
Utility premium from customization	x	0.2797	presale price premium = 15%
Buyer cost function elasticity parameter	γ	0.3187	Elasticity of buyers wrt vacancies = 2

Note.- *Table 7 summarizes the calibrated parameter values and their sources/targets. The top panel depicts the externally set parameters and their sources. The bottom panel shows the internally calibrated ones and the empirical targets used to recover each parameter.*

Table 8: Un-targeted moments

Moment	Expression	Model	Data
Existing to Total Home Sales	π^E	80.6%	88.49%
Vacancy Rate	$\frac{v^E+v^N}{v^E+v^N+h}$	3.1%	1.8%
Construction Rate	$\frac{\mathcal{D}_0 q(\phi)+\mathcal{D}_1 q(\phi)}{h}$	0.41%	0.99%
New Home Sales Rate	$\frac{(v^N+v^B)\theta m(\theta)}{h}$	0.41%	0.53%
Developer Markup	$\frac{\pi^N}{\pi^N+\pi^P}\frac{p^N}{k+\frac{\rho}{\theta m(\theta)}+\frac{c^S}{\theta m(\theta)}} + \frac{\pi^P}{\pi^N+\pi^P}\frac{p^P}{k+\psi+\frac{c^S}{\theta m(\theta)}} - 1$	98.65%	46.88%

Note.- Table 8 compares model moments to those in the data for moments not targeted in the calibration.

5.3 Numerical Exercises

We conduct two counter-factual exercises so as to evaluate the quantitative importance of the channels in our model. Since our main focus is on the pricing implications of the financial frictions faced by the developer, we begin by asking what fraction of the presale premium can be attributed to the ability to customize one's home and what fraction can be attributed to the financial frictions faced by developers. To this end, we set $x = 0$ and re-calculate the implied equilibrium prices, as well as several measures of liquidity summarized in Table 9.

If there were no option for customization, our model predicts that the presale premium would be around 5.42%, about a third of the observed presale premium. Interestingly, this value is close to the observed premium for properties sold within one quarter of the construction start date. Since such properties are less likely to have the same range of customization options as properties bought further out from the construction inception date, this can be seen as further (indirect) support in favor of our model's quantitative fit. In addition to a reduced premium, the absence of customization leads to small changes to the overall liquidity on the market. We see that the time-to-sell decreases slightly and, at the same time, the vacancy rate decreases pointing towards an increase in market liquidity. This, however, is the result of a buyers' exodus as seen in the 11% decrease in the equilibrium number of homeowners.

Next, Gabrovski and Ortego-Marti (2025) estimate that during the post 2007 housing market crash recovery (i) the cost for developers c^D increased; (ii) the separation rate s decreased; (iii) construction costs k increased; (iv) the utility of homeownership increased. Since these parameters capture important determinants of the presale price premium in our model, we investigate its response to shocks to these parameters in Figure 6. We also explore the premium's response to changes in the search cost for banks, c^F and the bargaining power of developers, η. First, quantitatively, changes to the developer's search costs (Figure 6c)

Table 9: Counterfactual Exercise: No Customization Utility Premium

Moment	Expression	Baseline Value	Counterfactual Value
Presale premium	$\dfrac{p^P}{p^N} - 1$	15%	5.42%
Vacancy Rate	$\dfrac{v}{v+h}$	3.1%	2.86%
Fraction of presales	$\dfrac{\pi^P}{\pi^P + \pi^N}$	29.29%	30.51%
Time-to-sell	$\dfrac{1}{\theta m(\theta)}$	1.6	1.48
Homeowners	h	1,680	1,496

Note.—Table 9 compares the calibrated equilibrium values of several model moments to the values in the model-implied equilibrium when $x = 0$.

or the separation rate (Figure 6e) do not affect the presale premium by much. This is the case because both parameters affect the surplus symmetrically, whether it is a new home sale or a presale so they have comparable impacts on both p^P and p^N. Next, changes to the bank's search costs (Figure 6d) have slightly larger impact on the premium. Intuitively, larger search costs exacerbate the holdup problem for developers with a speculative loan, which tends to increase the presale premium. Interestingly, a demand shock captured by an increase in the utility of homeownership (Figure 6a) has a similar quantitative effect. The quantitative size of the holdup problem is also governed by the bargaining power for developers, η. For larger η the bank is able to extract less of the surplus, which tends to decrease the presale premium. At the same time, since banks generate less profits, they are disincentivized to enter the market which makes finding credit harder. As a result, the expected search cost $c^D/q(\phi)$ increases. Since developers with a presale are able to pass on some of these costs to the buyer, this effect tends to increase the presale premium. Figure 6f shows that for η less than ≈ 0.85 the former effect dominates and for larger bargaining powers, the latter. Lastly, supply shocks in the form of an increase in construction costs have large effects on the presale premium. This is because more expensive construction increases the gap between the cost to finance a presale loan for the bank, $\chi(k-d)$ and the principal. Since this gap is a cost the developer can partially pass on to the buyer, the increase results in an increase in the presale premium. Moreover, a higher construction cost increases the severity of the holdup problem for a developer with a speculative loan, since the cost to finance such loan for the bank, $\chi(k)$ increases as well.
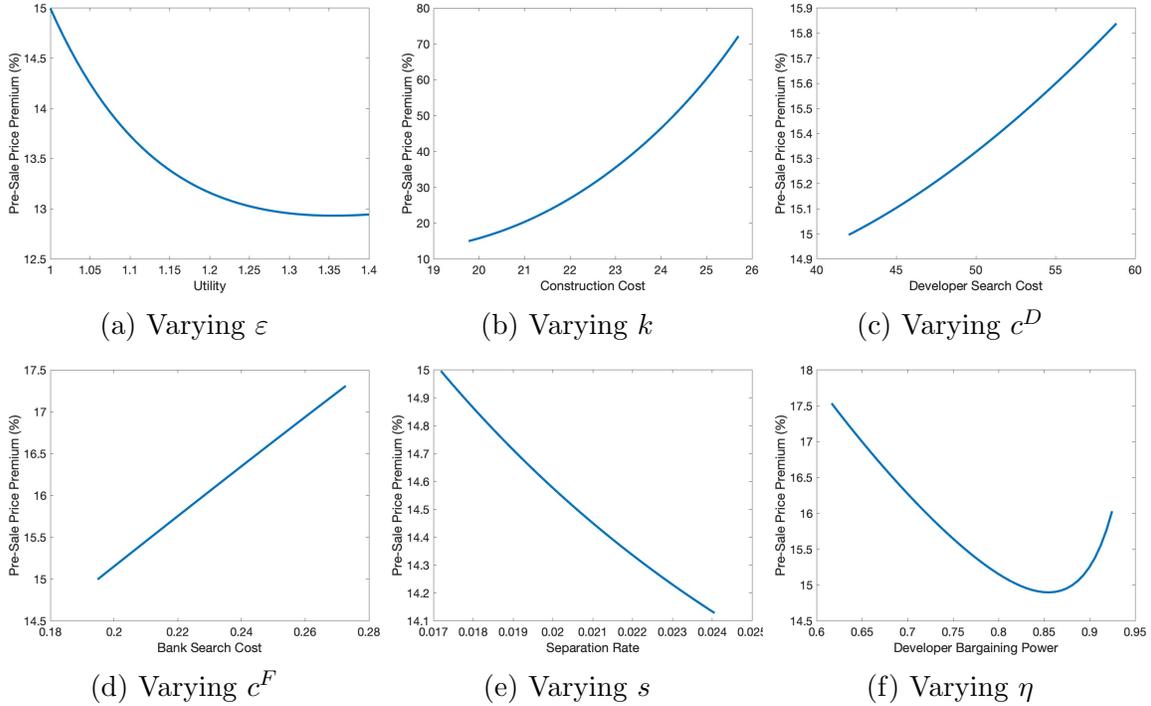
(a) Varying ε	(b) Varying k	(c) Varying c^D
(d) Varying c^F	(e) Varying s	(f) Varying η

Figure 6: *The figure graphs the value of the presale price premium $= p^P/p^N - 1$ as a function of parameter values. Panel (a) depicts the premium as a function of the utility ε; (b) as a function of the construction cost k; (c) the developer search cost c^D; (d) the bank's search cost c^F; (e) the separation rate s; (f) the developer's bargaining power in the credit market, η.*

5.4   Explaining the post completion Premium

Apart from the existence of a presale price premium, our empirical results also support the presence of a post completion premium: houses sold post construction tend to sell for about 1.4% higher. Moreover, the premium is increasing the longer the house takes to sell with the premium of houses sold about a year after completing being around 8%. The financial friction channel we analyze in our exploration behind the causes of the presale price premium also offers a natural explanation for the post completion premium. If developers repay some fraction of the loan as they are waiting to make a sale, this would reduce the severity of the holdup problem they are facing and consequently yield a higher price. In this section we present an extension of our framework that explicitly shows our mechanism of financial frictions can indeed reproduce the empirical behavior of the post completion premium outlined in Figure 2.

In particular, we extend our theoretical environment from Section 4 in the following way. Once developers secure a speculative construction loan and build a new house they search for a buyer, as in our baseline model. However, now they are subject to a Poisson shock s_C

that leaves them with some extra liquidity which they use to make a principal repayment on the loan. Each time they are hit with the liquidity shock they repay k/φ^{i+1}, where $\varphi > 1$ is a parameter that governs how much the developer repays at each step and i is an index indicating how many principal repayments the developer has made thus far. To capture the idea that principal repayments decrease the cost of carrying the loan, we also impose that the interest payments, are contingent on how many principal repayments the developer has made. That is a developer who has made i principal repayments and has negotiated an interest payment ρ repays ρ/φ^i per unit of time. Since the cumulative principal repayments made by a developer who holds the loan forever are $\sum_{i=0}^{\infty} k/\varphi^{i+1} = k/(\varphi - 1)$, we choose $\varphi = 2$ in our calibration strategy, so the sum equals the principal k. We should explicitly mention that the exact process through which the developer makes principal repayments will not qualitatively impact our results. As long as developer's interest payments decrease as time passes, our mechanism would deliver a post completion premium. The rest of the environment is as in section 5. We also keep our calibration strategy as close as possible to that of the baseline model. Appendix B contains a complete description of the theoretical environment and the calibration strategy when developers make periodic principal repayments to their speculative loans.
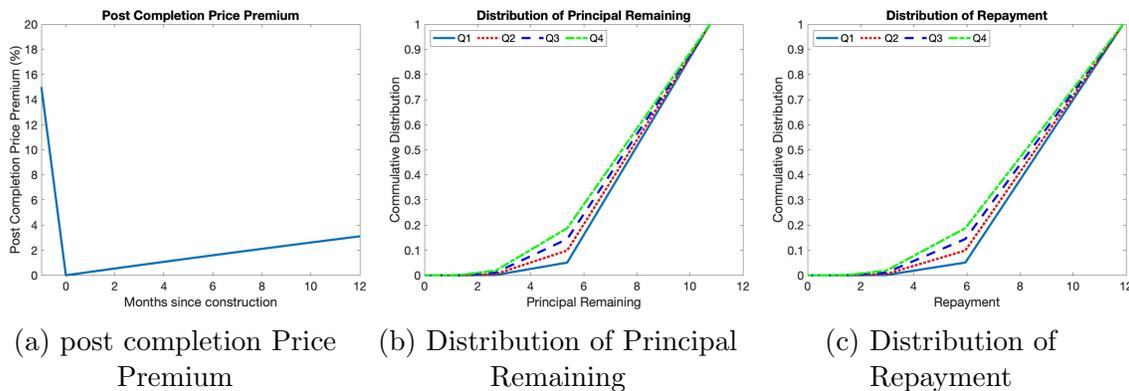

(a) post completion Price Premium (b) Distribution of Principal Remaining (c) Distribution of Repayment

Figure 7: *Panel (a) graphs the price premium for houses sold -1 (presale), and $\tau = 0, \ldots 12$ months after construction. The premium for presold homes is $100(p^P/p_0^N - 1)$, where p_0^N is the price of a home sold prior to the developer making any principal repayments. The premium for a home sold τ months after construction is the expected price p_i^N given the distribution of developers who have made i repayments τ months after construction. Panels (b) and (c) graph the distribution of the remaining portion of the principal $L(i) = k - \sum_{j=1}^{i} k/\varphi^j$ (b) and the interest repayments ρ/φ^i (c) for developers who have finished their project 1,2,3, or 4 quarters ago, conditional on not making a sale.*

Figure 7a depicts the model-predicted post completion premium, which reproduces the empirical pattern quite well. Intuitively, once the developer secures a speculative loan and completes construction she lists the house for sale. From then on she may experience a liquidity shock that allows her to repay a fraction of her remaining principal balance. In

particular, τ quarters after construction is completed, the probability the developer has made i principal repayments is $e^{-\tau s_C}(\tau s_C)^i/i!$. Given the randomness of the process, this generates a distribution of remaining principal balances $L(i) = k - \sum_{j=1}^{i} k/\varphi^j$ (Figure 7b) and interest repayments $\rho(i) = \rho/\varphi^i$ (Figure 7c). As τ increases, the developer experiences, on average, a higher number of liquidity shocks. This leads to a decrease in the average $L(i)$ and $\rho(i)$ for this cohort. As a result, the developer faces a less severe holdup problem. This makes them less eager to sell, which consequently leads to a higher average price for houses sold τ quarters after construction as opposed to τ' quarters, where $\tau > \tau'$.
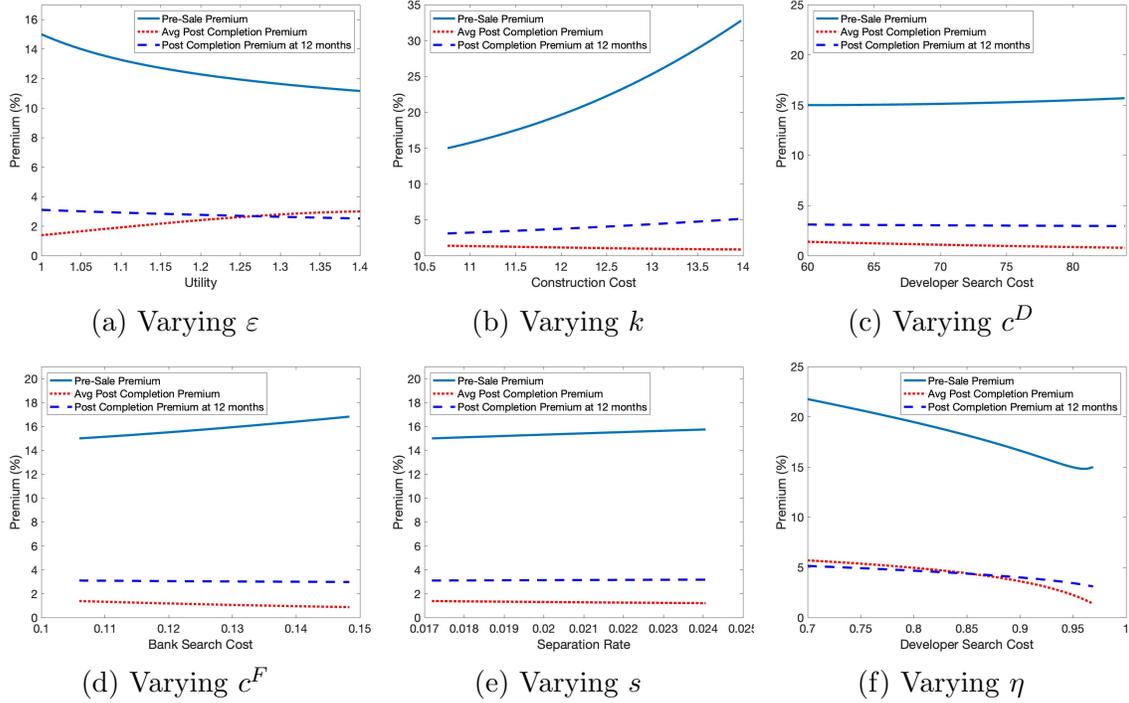

Figure 8: *The figure graphs the value of the presale price premium (solid line)* $= p^P/p_0^N - 1$; *the average post completion premium for houses built 12 months after completion (dashed line)* $= \sum_{i=0}^{\infty} p_i^N \frac{e^{-4s_C}(4s_C)^i}{i!}/p_0^N - 1$; *and the average post completion price premium (dotted line)* $= \sum_{\tau=1}^{\infty} e^{-\theta m(\theta)(\tau-1)/3}(1 - e^{-\theta m(\theta)/3})[\sum_{i=0}^{\infty} p_i^N \frac{e^{-\tau s_C/3}(\tau s_C/3)^i}{i!}]/p_0^N - 1$ *as a function of parameter values. Panel (a) depicts the premiums as a function of the utility ε; (b) as a function of the construction cost k; (c) the developer search cost c^D; (d) the bank's search cost c^F; (e) the separation rate s; (f) the developer's bargaining power in the credit market, η.*

As one would expect the presale premium and the post completion premium 12 months post completion respond similarly to changes in parameter values. Figure 8 compares quantitatively the responses of the presale premium and the post completion premium for homes sold 12 months after completion (which is the point at which the post completion period is largest). The two premia respond largely the same to parameter changes with the presale premium being a bit more elastic. One exception is their response to changes in the bargain-

ing power for the developer, η. This is the case because for high η the developer search costs $c^D/q(\phi)$ are very high. Since a developer with a presold home can pass on some of these costs to the buyer, this tends to increase p^P and hence the presale premium. This effect is absent from the post completion premium, so it is decreasing for all η.

Our model can also rationalize the empirical evidence we highlighted in section 3. In that section, we showed that regions with higher wage growth tend to experience a lower presale but a higher post completion premium. Through the lens of our model, a higher wage growth translates to larger demand for housing, i.e. an increased ε.[29] Consistent with the evidence, Figure 6a shows the presale premium decrease in ε. Morerover, consistent with the evidence, the *average* post completion premium increases, even though the premium at 12 months post construction decreases. This is the case because an increase in utility incentivizes more construction, which increases the congestion in the market and consequently time-to-sell. This generates a composition effects, leading to the average house sold post construction being sold later and consequently to a larger average post completion premium.[30]

6   Conclusion

Despite comprising one third of all new, single family house sales in the US the presale process has been remarkably under studied. This paper documents a striking departure from conventional wisdom about presale pricing in housing markets. Using comprehensive data spanning 1999-2024, we find that US single-family homes sold before construction command systematic premia rather than the discounts typically found in the literature. These premia are economically significant, averaging 2.8% and reaching as high as 15% for sales well before construction begins. Moreover, our analysis documents the existence of a post completion premium: houses sold after construction has been completed sell at a premium of 1.4%, with houses sold a year after completion selling for about 8% higher. Thus, housing prices follow a U-shaped relationship relative to the date of construction. Importantly, we find that the buyers' option to customize a home if purchased as a presale could account for some, but

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[29]There is a direct empirical link between income and housing demand (Harmon, 1988) which, as Ngai and Sheedy (2020) argue, translates to a correspondence between income and the utility parameter ε.

[30]We should point out that our analysis does not make a distinction between the presale premium at a single point in time and the average presale premium. If we were to consider a model with heterogeneous presale premia, as the date of sale nears the date of construction, the presale premium would decrease due to the decreased utility benefit of the customization optionality. At the same time the magnitude of the financial frictions channel should remain unchanged. As the composition effect would make it more likely homes are presold closer to the date of construction, the average presale premium would decrease even further. This would magnify the strength of the response but not change its sign.

not all of the premium. In addition, we find that the customization optionality induces a presale price premium that is stable over time. This is in sharp contrast to the evidence on the presale and post completion premia, which both ary through time and respond to changes in demand.

Together these observations, along with the fact that the customization optionality cannot explain the existence of a post completion price premium motivates us to develop a search-theoretic model in order to explain the data. In the model, there are frictions associated with both finding construction credit and finding a buyer for a house. Thus, developers search for buyers and credit simultaneously. If they first find a buyer willing to purchases the home "of the plan", developers make a presale and continue searching for presold construciton loan. If they first find a lender, developers receive a speculative construction loan, build the home, and continue searching for a buyer. When the developer makes a presale, she enters an agreement with the buyer, which allows her to pass on some of the expected costs associated with finding credit. When she secures speculative construction loan, on the other hand, she must bare all of the credit-finding costs. In addition, she is stuck with an active loan that is associated with periodic interest payments. This creates a holdup problem for the developer when she negotiates a price with the buyer: the buyer knows the developer wants to sell the house fast, so she can repay the loan, which allows the buyer to negotiate a lower price. Together both effects tend to push the price of a presold home higher relative to the price of a newly built home, giving rise to a presale price premium in our model.

To gauge the quantitative importance of the financial frictions channel for the presale price premium, we carefully calibrate a version of our model to the US economy. Our results imply that 5.4pp of the premium (or about one third) are due to the credit frictions channel and the rest can be attributed to the customization option. Moreover, we show that in an extension of our model where developers periodically repay some of the speculative construction loan principal, the financial frictions channel can explain the post completion premium as well.

Our findings raise several productive lines of inquiry. Future research could explore whether the size of the presale premium varies across types of housing, developers or in response to broader market fluctuations, such as tightening credit cycles. Likewise, the role of regulatory frameworks — for instance, presale escrow rules or local lending standards—could alter developer incentives and reshape the magnitude and persistence of the premium. By documenting the existence of a robust presale premium in the US single-family home market and offering a model to explain it, our paper demonstrates that the financial frictions faced

by developers have important consequences not only for overall liquidity and prices on the market, but also for price dispersion.

References

Agarwal, S., Chomsisengphet, S., Liu, C., Song, C., and Souleles, N. S. (2018). Benefits of relationship banking: Evidence from consumer credit markets. *Journal of Monetary Economics*, 96:16–32.

Agarwal, S., Grigsby, J., Hortaçsu, A., Matvos, G., Seru, A., and Yao, V. (2024). Searching for approval. *Econometrica*, 92:1195–1231.

Agarwal, S. and Hauswald, R. (2021). Information disclosure and the choice between arm's-length and inside debt. *Journal of Monetary Economics*, 117:1008–1022.

Ambrose, B. W. and Peek, J. (2008). Credit availability and the structure of the homebuilding industry. *Real Estate Economics*, 36(4):659–692.

Anenberg, E. (2016). Information frictions and housing market dynamics. *International Economic Review*, 57(4):1449–1479.

Arefeva, A. (2022). Housing markets: Auctions, microstructure noise, and weekly patterns. *Mimeo, University of Wisconsin-Madison*, (17-12).

Arefeva, A., Guo, S., Han, L., and Ortego-Marti, V. (2024). Can stay-at-home orders create a pandemic housing boom? *mimeo*.

Arnott, R. (1989). Housing vacancies, thin markets, and idiosyncratic tastes. *The Journal of Real Estate Finance and Economics*, 2:5–30.

Barwick, P. J., Pathak, P. A., and Wong, M. (2017). Conflicts of interest and steering in residential brokerage. *American Economic Journal: Applied Economics*, 9(3):191–222.

Berentsen, A., Menzio, G., and Wright, R. (2011). Inflation and unemployment in the long run. *American Economic Review*, 101(1):371–98.

Burnside, C., Eichenbaum, M., and Rebelo, S. (2016). Understanding booms and busts in housing markets. *Journal of Political Economy*, 124(4):1088–1147.

Chan, S., Fang, F., and Yang, J. (2008). Presales, financing constraints, and developers' production decisions. *Journal of Real Estate Research*, 30(3):345–376.

Chang, C. and Ward, C. W. R. (1993). Forward pricing and the housing market: The pre-sales housing system in taiwan. *Journal of Property Research*, 10(3):217–227.

De Loecker, J., Eeckhout, J., and Unger, G. (2020). The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics*, 135(2):561–644.

Dell'Ariccia, G. and Garibaldi, P. (2005). Gross credit flows. *The Review of Economic Studies*, 72(3):665–685.

Deng, Y. and Liu, P. (2009). Mortgage prepayment and default behavior with embedded forward contract risks in china's housing market. *The Journal of Real Estate Finance and Economics*, 38(3):214–240. RePEc:kap:jrefec:v:38:y:2009:i:3:p:214-240.

Diaz, A. and Jerez, B. (2013). House prices, sales, and time on the market: A search-theoretic framework. *International Economic Review*, 54(3):837–872.

Edelstein, R., Liu, P., and Wu, F. (2012). The market for real estate presales: A theoretical approach. *The Journal of Real Estate Finance and Economics*, 45(1):30–48.

Federal Deposit Insurance Corporation (2012). Regulatory capital rules: Standardized approach for risk-weighted assets. Technical report, Federal Deposit Insurance Corporation. FIL-12-027, requires 50% risk weight for pre-sold residential construction loans.

Federal Reserve Bank of Atlanta (2024). Wage growth tracker. Online database. Accessed: 18th August 2025.

Gabrovski, M., Kospentaris, I., and Lebeau, L. (2024a). The macroeconomics of labor, credit and financial market imperfections.

Gabrovski, M., Kospentaris, I., and Ortego-Marti, V. (2024b). Endogenous realtor intermediation and housing market liquidity. Technical report.

Gabrovski, M. and Ortego-Marti, V. (2019). The cyclical behavior of the beveridge curve in the housing market. *Journal of Economic Theory*, 181:361–381.

Gabrovski, M. and Ortego-Marti, V. (2021). Search and credit frictions in the housing market. *European Economic Review*, 134:103699.

Gabrovski, M. and Ortego-Marti, V. (2024). On the slope of the beveridge curve in the housing market. *Economics Bulletin*, 44(3):948–960.

Gabrovski, M. and Ortego-Marti, V. (2025). Home construction financing and search frictions in the housing market. *Review of Economic Dynamics*, 55:101253.

Gan, Q., Hu, M., Shi, Y., and Zhang, A. (2024). Presale dynamics: Risk sharing via early discounts and quick sales. *Available at SSRN 4848642*.

Garriga, C. and Hedlund, A. (2020). Mortgage debt, consumption, and illiquid housing markets in the great recession. *American Economic Review*, 110(6):1603–34.

Genesove, D. and Han, L. (2012). Search and matching in the housing market. *Journal of urban economics*, 72(1):31–45.

Ghent, A. (2012). Infrequent housing adjustment, limited participation, and monetary policy. *Journal of Money, Credit and Banking*, 44(5):931–955.

Glaeser, E. L. and Gyourko, J. (2007). Arbitrage in housing markets. Technical report, National Bureau of Economic Research.

Greenwald, D. L. and Guren, A. (2021). Do credit conditions move house prices? Technical report, National Bureau of Economic Research.

Guren, A. M. (2018). House price momentum and strategic complementarity. *Journal of Political Economy*, 126(3):1172–1218.

Guren, A. M., Krishnamurthy, A., and McQuade, T. J. (2021). Mortgage design in an equilibrium model of the housing market. *The Journal of Finance*, 76(1):113–168.

Han, L., Ngai, L. R., and Sheedy, K. D. (2022). *To Own Or to Rent?: The Effects of Transaction Taxes on Housing Markets*. Centre for Economic Policy Research.

Han, L. and Strange, W. C. (2015). The microstructure of housing markets: Search, bargaining, and brokerage. *Handbook of regional and urban economics*, 5:813–886.

Harmon, O. R. (1988). The income elasticity of demand for single-family owner-occupied housing: An empirical reconciliation. *Journal of Urban Economics*, 24(2):173–185.

Head, A., Lloyd-Ellis, H., and Sun, H. (2014). Search, liquidity, and the dynamics of house prices and construction. *American Economic Review*, 104(4):1172–1210.

Head, A., Lloyd-Ellis, H., and Sun, H. (2016a). Search, liquidity, and the dynamics of house prices and construction: Corrigendum. *American Economic Review*, 106(4):1214–1219.

Head, A., Sun, H., and Zhou, C. (2016b). Default, mortgage standards and housing liquidity. Technical report.

Hedlund, A. (2016). The cyclical dynamics of illiquid housing, debt, and foreclosures. *Quantitative Economics*, 7(1):289–328.

Hedlund, A., Larkin, K., Mitman, K., and Ozkan, S. (2025). Mortgage market structure and the transmission of monetary policy during the great inflation.

Herrenbrueck, L. and Wang, Z. (2023). *Interest rates, moneyness, and the fisher equation.* Simon Fraser University, Department of Economics.

Kashyap, A. K., Rajan, R., and Stein, J. C. (2002). Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. *The Journal of finance*, 57(1):33–73.

Krainer, J. (2001). A theory of liquidity in residential real estate markets. *Journal of urban Economics*, 49(1):32–53.

Lai, R. N., Wang, K., and Zhou, Y. (2004a). Sale before completion of development: Pricing and strategy. *Real Estate Economics*, 32(2):329–357. American Real Estate and Urban Economics Association.

Lai, R. N., Wang, K., and Zhou, Y. (2004b). Sale before completion of development: pricing and strategy. *Real Estate Economics*, 32(2):329–357.

Monetary Authority of Singapore (2011). Additional buyer's stamp duty for a stable and sustainable property market. Technical report, Monetary Authority of Singapore. Establishes ABSD exemptions for presale options granted before policy implementation.

Munneke, H. J., Ooi, J. T. L., Sirmans, C. F., and Turnbull, G. K. (2019). Testing for price anomalies in sequential sales. *The Journal of Real Estate Finance and Economics*, 58(4):517–543. ID: Munneke2019.

Nash, J., J. F. (1950). The bargaining problem. *Econometrica*, pages 155–162.

Ngai, L. R. and Sheedy, K. D. (2020). The decision to move house and aggregate housing-market dynamics. *Journal of the European Economic Association*, 18(5):2487–2531.

Ngai, L. R. and Tenreyro, S. (2014). Hot and cold seasons in the housing market. *American Economic Review*, 104(12):3991–4026.

Petrosky-Nadeau, N. (2013). Tfp during a credit crunch. *Journal of Economic Theory*.

Petrosky-Nadeau, N. and Wasmer, E. (2013). The cyclical volatility of labor markets under frictional financial markets. *American Economic Journal: Macroeconomics*, 5(1):193–221.

Petrosky-Nadeau, N. and Wasmer, E. (2017). *Labor, Credit, and Goods Markets: The macroeconomics of search and unemployment.* MIT Press.

Pissarides, C. (2000). *Equilibrium unemployment theory.* the MIT press.

Revenue NSW (2024). First home owner (new homes) grant. Technical report, NSW Government. Specifies grant availability for off-the-plan and construction stage purchases.

Rubinstein, A. (1982). Perfect equilibrium in a bargaining model. *Econometrica: Journal of the Econometric Society*, pages 97–109.

Shih, K. (1992). Real estate pricing in a forward market. *Journal of Management and Science*, 9:31–37.

Smith, E. (2020). High and low activity spells in housing markets. *Review of Economic Dynamics*, 36:1–28.

U.S. Department of the Treasury, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency (2024). Joint report to congressional committees: Differences in accounting and capital standards among the federal banking agencies as of september 30, 2024. Technical report, U.S. Department of the Treasury. Retrieved from [URL if available].

Van Nieuwerburgh, S. and Weill, P.-O. (2010). Why has house price dispersion gone up? *The Review of Economic Studies*, 77(4):1567–1606.

Wasmer, E. and Weil, P. (2004). The macroeconomics of labor and credit market imperfections. *American Economic Review*, pages 944–963.

Wheaton, W. C. (1990). Vacancy, search, and prices in a housing market matching model. *Journal of political Economy*, 98(6):1270–1292.

Wong, S. K., Yiu, C., Tse, M., and Chau, K. (2006). Do the forward sales of real estate stabilize spot prices? *The Journal of Real Estate Finance and Economics*, 32(3):289–304.

A   Appendix: Calibrated Model with Customization Utility Premium

Our baseline economy outlined in section 4 treats the utility households receive from living in a house as identical regardless of whether or not the home was presold, new construction, or previously occupied. In practice, presold homes likely come with an utility premium from customization: the buyer can choose add-ons such as a porch, granite counter-tops, or specific door handles. Such options to customize one's house may significantly impact the utility from living in the home and are likely captured in the house price. Of course, one can customize a newly built or previously occupied house as well, but their purchase price is likely not going to capture the customization option in the same way it is captured in a presale. Since this effect may have quantitatively important implications, we extend our model to take into account the potentially higher utility one derives from living in a home they have bought prior to construction.

We model the customization utility premium as a scalar x to the utility of the home, ε: if a household has purchased a previously occupied house or a newly built one, the utility is ε; if it has purchases the house as a presale the utility is $(1 + x)\varepsilon$. In the model we do not impose any sign restriction on x let our calibration speak to whether or not there is indeed a utility premium, i.e. $x > 0$. Everything else about the environment is as in the baseline model. Hence, we only introduce the equations that change in our extended environment.

Since presold homes yield different utility, (12) transforms into

$$(r + \delta)B^P = q(\phi)\left[\tilde{H} - (p^P - d) - B^P\right],\tag{44}$$

where $\tilde{H}$ is the value of owning a presold home:

$$(r + \delta)\tilde{H} = (1 + x)\varepsilon - s[\tilde{H} - V].\tag{45}$$

Consequently, the housing entry condition, (34), transforms into

$$\text{HE:} \quad c^S + c^D = \eta q(\phi)\left[\frac{\theta m(\theta)p^N - (c^S + c^F)}{r + \delta + \theta m(\theta)} - \chi(k)\right]$$
$$+ \beta\theta m(\theta)\frac{q(\phi)\left[\tilde{H} - k - \psi\right] - c^D - d(r + \delta)}{r + \delta + q(\phi)},\tag{46}$$

and the price for presold homes is now given by

$$p^P = \tilde{H} - \frac{r+\delta}{q(\phi)}d - (1-\beta)\left[\tilde{H} - k - \psi - \frac{r+\delta}{q(\phi)}d - \frac{c^D}{q(\phi)}\right]. \tag{47}$$

Furthermore, the Buyer Entry condition is now given by

$$\text{BE:} \quad \frac{c^B(b)}{m(\theta)} = (1-\beta)\Bigg\{(\pi^E + \pi^N)\frac{\varepsilon + c^S}{r+\delta+s+\beta\theta m(\theta)} + \pi^N \frac{\rho - (r+\delta)k}{r+\delta+\beta\theta m(\theta)}$$

$$+ \pi^P \frac{q(\phi)[\tilde{H} - k - \psi] - c^D - d(r+\delta)}{r+\delta+q(\phi)}\Bigg\}. \tag{48}$$

All other equilibrium equations in the model remain unchanged.

B   Appendix: Model with Principal Repayment

B.1   Environment

Let us now detail the model environment when developers make periodic principal repayments to the bank once they have built a new house, but before they have made a sale. Since our extension only affects newly built homes, most of the model equations remain unchanged. Thus, we only detail the equations which do change.

To begin with, a developer who has a newly built housing vacancy now has a value function given by

$$(r+\delta)V_i^N = -c^S - \frac{\rho}{\varphi^i} + \theta m(\theta)\left[p_i^N - V_i^N\right] + s_C\left[V_{i+1}^N - V_i^N - \frac{k}{\varphi^{i+1}}\right], \tag{49}$$

where the index i indicates how many times previously has the developer experienced a positive liquidity shock. Similarly, the value function for a bank with an existing speculative loan on its books is given by

$$(r+\delta)F_{1,i} = -c^F + \frac{\rho}{\varphi^i} - \theta m(\theta)F_{1,i} + s_C\left[F_{1,i+1} - F_{1,i} + \frac{k}{\varphi^{i+1}}\right]. \tag{50}$$

Since there is now a distribution of loan balances for newly constructed homes, the buyer's

value function is given by

$$rB = -c^B(b) + m(\theta)\left[\pi^E[H - p^E - B] + \pi^P[B^P - d - B]\right] + \pi^N \sum_{i=0}^{\infty}[H - p^N - B]g(i), \quad (51)$$

where

$$g(i) = \frac{\theta m(\theta) + \delta}{\theta m(\theta) + \delta + s_C}\left[\frac{s_C}{\theta m(\theta) + \delta + s_C}\right]^i \quad (52)$$

is the probability of matching with a developer who has made i repayments on their principal conditional on matching with a developer with a new construction.

Next, prices for new homes reflect the severity of the holdup problem faced by the developer. Since that severity depends on the magnitude of the remaining principal, prices for newly built homes will differ. In particular,

$$p_i^N = \arg\max_{p_i^N}[p_i^N - V_i^N]^\beta[H - p_i^N - B]^{1-\beta}, \quad (53)$$

hence,

$$\beta[H - p_i^N - B] = (1 - \beta)[p_i^N - V_i^N]. \quad (54)$$

The rest of the model environment equations remain unchanged.

B.2   Steady State Equilibrium

Firstly, the expressions for the distribution of sales, π^E, π^P, π^N remain unchanged from the model in the main text and so does the expression for f^N. Next, the expression for the Credit Entry condition now transforms into

$$
\begin{aligned}
\text{CE:}\quad \frac{c^F}{\phi q(\phi)} =\ & (1 - \eta)f^N\left[\frac{\theta m(\theta)p^N - (c^S + c^F)}{r + \delta + \theta m(\theta)} - \chi(k)\right] \\
& + (1 - \eta)(1 - f^N)\left[p^P - d - \chi(k - d) - \frac{q(\phi)[p^P - k - \psi] - c^D}{r + \delta + q(\phi)}\right] \\
& + (1 - \eta)f^N\frac{(\rho + \frac{s_C k}{\varphi})(1 - \beta)\theta m(\theta)s_C\frac{\varphi-1}{\varphi}}{(r + \delta + \beta\theta m(\theta) + s_C\frac{\varphi-1}{\varphi})(r + \delta + \theta m(\theta) + s_C\frac{\varphi-1}{\varphi})(r + \delta + \theta m(\theta))},
\end{aligned}
$$

$$(55)$$

where the last line is the difference between the current expression and the one in the text and it captures the adjustment in the surplus from the bank receiving periodic principal repayments while the loan is active.

Similarly, the Housing Entry condition is now given by

$$\text{HE:} \quad c^S + c^D = \eta q(\phi) \left[\frac{\theta m(\theta) p^N - (c^S + c^F)}{r + \delta + \theta m(\theta)} - \chi(k) \right]$$

$$+ \beta \theta m(\theta) \frac{q(\phi) \left[\tilde{H} - k - \psi \right] - c^D - d(r + \delta)}{r + \delta + q(\phi)}$$

$$+ \eta \frac{(\rho + \frac{s_C k}{\varphi})(1 - \beta) \theta m(\theta) s_C \frac{\varphi - 1}{\varphi}}{(r + \delta + \beta \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi})(r + \delta + \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi})(r + \delta + \theta m(\theta))}. \quad (56)$$

The Buyer Entry condition is transomed analogously to take into account the fact that now there is a distribution of loan balances for developers who have a newly constructed house and hence, a distribution in the severity of the holdup problem they face:

$$\text{BE:} \quad \frac{c^B(b)}{m(\theta)} = (1 - \beta) \left\{ (\pi^E + \pi^N) \frac{\varepsilon + c^S}{r + \delta + s + \beta \theta m(\theta)} \right.$$

$$+ \pi^N \frac{(\rho + \frac{s_C k}{\varphi})(\theta m(\theta) + \delta)}{(r + \delta + \beta \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi})(\delta + \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi})}$$

$$\left. + \pi^P \frac{q(\phi)[\tilde{H} - k - \psi] - c^D - d(r + \delta)}{r + \delta + q(\phi)} \right\}. \quad (57)$$

The equation for the equilibrium repayment, ρ is now given by:

$$\rho = \frac{\eta[c^F + (r + \delta + \theta m(\theta))\chi(k)] + (1 - \eta)[\theta m(\theta) p_0^N - c^S]}{\frac{\eta(r + \delta + \theta m(\theta))}{r + \delta + \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi}} + \frac{(1 - \eta)(r + \delta + \beta \theta m(\theta))}{r + \delta + \beta \theta m(\theta) + s_C \frac{\varphi - 1}{\varphi}}}. \quad (58)$$

Lastly, the equilibrium expression for ψ remains unchanged and the expressions for prices can be derived from the Nash bargaining conditions.

B.3 Calibration

We calibrate the model with principal repayment using a strategy that follows the baseline model calibration as closely as possible. In particular, we keep the exact same moments except for the moment used to identify k: developer firms' debt-to-equity ratio. We drop

this moment because the link between k and a firm's debt is no longer as tight. Instead, we target $k/\chi(k) = 0.63022$, which is the ratio implied by the calibrated baseline model equilibrium. This leaves us with two new parameters we need to calibrate: s_C and φ. We pick $\varphi = 2$, so that firms never make principal repayments in excess of what they have borrowed, i.e. $\sum_{i=1}^{\infty} k/\varphi^i = k$. The value of s_C is chosen to be 0.052 in order to match an average post completion premium $p^N/p_0^N - 1 = 1.39\%$, where $p^N \equiv \sum_{\tau=1}^{\infty} \text{E[price} \mid \text{sold } \tau \text{ months after completion]}[e^{-(\tau-1)\theta m(\theta)/3} - e^{-\tau\theta m(\theta)/3}]$ and E[price $\mid$ sold τ months after completion] $= \sum_{i=0}^{\infty} p_0^N \frac{e^{-\tau s_C/3}(\tau s_C/3)^i}{i!}$. Table 10 summarizes the calibration.

Table 10: Calibration

Externally calibrated parameters			
Preferences/Technology	Parameter	Value	Source/Target
Utility	ε	1	Normalization
Buyer cost scale parameter	$\bar{c}$	1	Normalization
Discount rate	r	0.0079	Real mortgage rate= 3.156%
Elasticity of housing Market matching function	α	0.16	Genesove and Han (2012)
Elasticity of credit Market matching function	α_f	0.5	Petrosky-Nadeau (2013)
Destruction rate	δ	0.004	Van Nieuwerburgh and Weill (2010)
Bargaining power in housing market	β	0.5	Ngai and Sheedy (2020)

Internally calibrated parameters			
Preferences/Technology	Parameter	Value	Source/Target
Separation rate	s	0.0172	Tenure= 11.8 years
Efficiency of housing Market matching function	μ	0.6250	TTS= 1.6 quarters
Efficiency of credit Market matching function	μ_f	0.3722	TTB=TTS
Seller cost	c^S	1.0200	Realtor fee = 2.25% of price
Developer cost	c^D	59.9236	Average buyer cost= 8% of price
Financier cost	c^F	0.1060	Liquidity premium= 4%
Deposit on presold homes	d	6.3458	Deposit = 10% of price
Bargaining power in credit market	η	0.9689	Frac. of presold home sales to presales and newly built home sales = 29.29%
Construction cost	k	10.7538	$k/\chi(k) - 0.63022$
Loan-servicing scale cost	$\bar{\chi}$	0.2505	presale loans risk adjusted weight= 0.5 of speculative loans risk adjusted weight
Loan-servicing cost elasticity	ϵ	1.7772	presold construction loans interest rate = 8.11%
Utility premium from customization	x	0.0626	presale price premium = 15%
Buyer cost function elasticity parameter	γ	0.3187	Baseline model calibration
Principal repayment scale	φ	2	$\sum_{i=1}^{\infty} k/\varphi^i = k$
Principal repayment rate	s_C	0.0520	Post completion premium = 1.39%

Note.- *Table 10 summarizes the calibrated parameter values and their sources/targets in the model with principal repayment. The top panel depicts the externally set parameters and their sources. The bottom panel shows the internally calibrated ones and the empirical targets used to recover each parameter.*