Bidding with Confidence: How Consumer Sentiment Affects Housing Market Participation and Prices

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Abstract

This paper studies how household expectations affect housing market participation and transaction prices. We link consumer confidence in the Netherlands to administrative housing transactions between 2003 and 2023, exploiting within-quarter cross-sectional variation in confidence measured prior to market entry. The difference in the odds of buying between negative and positive respondents is 23.4%, driven primarily by households with negative confidence opting out of the market. Conditional on participation and accounting for endogenous selection, positive buyers pay 2.8% higher prices in supply-constrained markets, with effects rising to 5.7% in the most constrained areas. Seller confidence has no economically meaningful effect on the odds of participation and house prices. The results imply that housing market dynamics are shaped by the beliefs of marginal buyers, and that belief heterogeneity affects both turnover and price formation.

Key words: Housing Markets, Beliefs, Transaction Prices, Market Participation, Sample Selection.

JEL codes: C34, D12, D84, G41, R30.

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1 Introduction

Housing transactions are infrequent, highly leveraged, and involve the largest asset in most household portfolios. Entering the housing market therefore represents a discrete and largely irreversible decision, characterized by substantial transaction costs and infrequent adjustment opportunities. Homebuyers and sellers face fundamentally different risks and strategic considerations when deciding whether and when to transact: buyers commit to long-term leverage and future price risk, while sellers choose when to realize accumulated housing exposure and set the terms of exit. At the same time, many buyers are simultaneously sellers, implying that households often participate on both sides of the market (Wheaton, 1990). It is therefore natural that expectations about economic conditions and personal financial conditions play a central role in both the decision to enter the market and the terms at which households are willing to transact (Manski, 2004; Malmendier and Steiny Wellsjo, 2024; Ben-David et al., 2018).

However, direct evidence on how individual expectations jointly shape both market entry and transaction prices is largely absent. While a broad literature shows that beliefs can influence financial decision-making (Manski, 2004; Giglio et al., 2021; Greenwood and Shleifer, 2014), housing prices are determined by the willingness to pay of marginal buyers and sellers rather than by the beliefs of the full population (Piazzesi and Schneider, 2009; Burnside et al., 2016). This implies that the relationship between individual beliefs and observed market outcomes is shaped by selection into participation: although expectations may influence the decisions of many households, only the beliefs of those who choose to transact are reflected in prices. Understanding how beliefs translate into market outcomes therefore requires observing beliefs at the individual level and linking them to both participation decisions and realized transactions on both sides of the market.

We show that buyers reporting negative confidence are substantially less likely to enter the market, while buyers reporting positive confidence exhibit higher willingness to pay among those who enter the market. We find no economically meaningful effects of seller confidence on either market entry or transaction prices. These results imply that housing market outcomes reflect both selection into participation by buyers and differences in willingness to pay among those who enter. Because pessimistic households are less likely to enter, transactions reflect a selected subset of relatively optimistic buyers, and prices are determined by their willingness to pay rather than by average expectations in the population. Deteriorating consumer confidence may therefore reduce participation without immediately

lowering prices, as long as optimistic marginal buyers remain active. The absence of corresponding effects for sellers implies that belief-driven shifts in demand are not offset by a corresponding response of sellers.

We combine individual-level survey data on consumer confidence with transaction data from the Dutch housing market. We adopt a measure that proxies beliefs about the economy and financial health that remained largely unexplored in the literature: *consumer confidence*. Consumer confidence, as measured in the Netherlands, is based on the average of five survey questions, namely the respondents opinion on their financial situation over the past and next twelve months, their opinion on the economic climate over the past and next twelve months, and whether respondents consider it a favorable or unfavorable time to make major purchases. Consumer confidence is measured using a nationally representative survey administered by Statistics Netherlands (CBS, 2017). We link survey respondents to residential property transactions between 2003 and 2023, allowing us to determine whether and when respondents subsequently enter the housing market as buyers or sellers, and the prices at which they transact.

We begin to motivate our analysis by two stylized facts. First, housing transactions are disproportionately concentrated among households with higher consumer confidence. This pattern holds for both buyers and sellers and suggests that beliefs are strongly related to the decision to transact, motivating a focus on the extensive margin.

Second, conditional on participation, households with consumer confidence above the quarterly average transact at higher prices. This holds for both buyers and sellers, indicating a systematic association between reported confidence and transaction prices. The fact that prices vary with confidence conditional on participation suggests that beliefs matter not only for selection into transacting, but also for transaction prices, motivating an analysis of the intensive margin.

At the same time, because prices are observed only for households that choose to transact, these raw differences do not directly reveal whether confidence affects pricing behavior or reflects selection into transactions. The result is that naively estimating a pricing equation conflates strategic behavior in the matching process with selection into market participation. Moreover, even when selection is accounted for, credible identification requires that confidence be measured prior to subsequent behavior and that the influence of factors that simultaneously shape beliefs and outcomes be controlled for (Kuchler et al., 2023).

We address selection into market entry by adopting a two-stage empirical framework. In the first stage, we estimate a selection model to assess whether consumer confidence

predicts market participation. The resulting Inverse-Mills ratio is then included in the pricing equation to account for endogenous selection when estimating the effect of confidence on transaction prices.

To ensure that confidence is predetermined with respect to transaction outcomes, we restrict attention to respondents who reported consumer confidence prior to buying or selling a property. If confidence is measured after the transaction, both the participation and pricing equations may capture belief updating induced by the transaction outcome. As a result, estimates may confound the effect of beliefs on behavior with the effect of realized outcomes on reported beliefs.

Finally, we observe consumer confidence of buyers and sellers separately, but not jointly within the same transaction. Because transaction prices are jointly determined by buyers and sellers, ignoring counterpart beliefs may confound the estimated price effect of a respondent's confidence if beliefs are correlated. To mitigate this concern, we conduct the analysis separately for buyers and sellers, applying the two-stage procedure to each sample. By conditioning on region-time fixed effects, this approach controls for average confidence on the opposite side of the market. However, we cannot control for individual deviations from average counterpart confidence. Instead, we exploit heterogeneity across supply-constrained and -unconstrained markets to isolate the role of confidence in environments where it is expected to be most relevant. In supply-constrained markets, heightened competition among buyers for a limited stock of housing implies that differences in buyer beliefs are more likely to be reflected in transaction prices. By contrast, in less constrained markets, competitive pressure among buyers is weaker, and seller beliefs are therefore more likely to be reflected in prices.

In the main analysis, we exploit cross-sectional within-quarter variation in individual consumer confidence. Identification therefore comes from differences in confidence across respondents within the same quarter, holding aggregate conditions fixed. Conditioning on year–quarter, region, and respondent characteristics, the selection model shows that the odds of buying are 17.7% lower for negative respondents and 2.2% higher for positive respondents relative to those reporting neutral confidence in the same quarter. This means that selection is primarily driven by negative respondents opting out. In contrast, we find only weak evidence that confidence predicts seller participation.

Turning to transaction prices, in supply-constrained markets, buyers reporting positive confidence obtain transaction prices that are approximately 2.8% higher than those of buyers reporting neutral confidence, accounting for selection into transactions. The effect increases

to 5.7% when focusing on the most supply-constrained municipalities This means that the price effect is biased downward if selection is not controlled for. By contrast, the estimated price effect for sellers reporting positive confidence in supply-constrained markets is not statistically significant, both before and after accounting for selection. Thus, conditional on entry, variation in transaction prices is related to buyer confidence but not to seller confidence.

Taken together, the evidence indicates that housing market dynamics are shaped by the expectations of marginal participants rather than by average confidence in the population. Confidence affects market outcomes through two channels: it influences entry into the market and it affects the valuations of those buyers who transact. Consequently, equilibrium prices adjust not only because willingness to pay changes, but also because the identity of the marginal buyer shifts. Even in the absence of changes in observable fundamentals, belief heterogeneity can therefore alter both turnover and price formation by affecting participation and marginal willingness to pay.

We further examine the sensitivity of the results to the timing of the confidence measure relative to the transaction date. The estimated effects of buyer confidence on entry remain robust when the analysis window is extended well beyond the two to ten quarter horizon used in the main results. This suggests that the reported confidence in deviation from the quarterly average is not a short-lived signal formed immediately before a transaction, but retains predictive power over longer horizons. For transaction prices in supply-constrained markets, the estimated coefficients remain of comparable magnitude when the window is extended, although they are estimated less precisely. In contrast, when confidence is measured after the transaction date, the relationships with both market participation and transaction prices change substantially and would lead to markedly different conclusions, consistent with ex-post confidence reflecting belief updating rather than ex-ante expectations.

Overall, the evidence shows that belief heterogeneity has first-order consequences for housing market adjustment, operating primarily through the demand side. Confidence shapes both the composition of active buyers and the valuation of the marginal participant, implying that transaction prices cannot be understood solely through changes in fundamentals or average confidence. Housing market dynamics therefore reflect shifts in who enters the market and in the willingness to pay of those who do.

1.1 Relation to Previous Literature and Contribution

This paper contributes to the growing literature linking beliefs to housing market behavior.[1] This literature builds on the view that heterogeneous beliefs can shape economic outcomes (Manski, 2004; Harrison and Kreps, 1978; Burnside et al., 2016; Case et al., 2012), a mechanism supported by extensive empirical evidence linking beliefs about various economic variables to economic behavior (Greenwood and Shleifer, 2014; Giglio et al., 2021; Armona et al., 2019; Malmendier and Steiny Wellsjo, 2024; Bailey et al., 2018). A large body of work studies the origins of this heterogeneity. Beliefs differ with personal experiences (Kuchler and Zafar, 2019), extrapolation (Armona et al., 2019; Case et al., 2012; Case and Shiller, 1989), tenure status (Adelino et al., 2018), social interactions (Bailey et al., 2018), and age (Hjalmarsson and Österholm, 2020). A single economic indicator is therefore unlikely to capture the full cross-sectional variation in households economic outlook (Kuchler et al., 2023), and important for this paper, the beliefs that matter for economic behavior need not be the same across households.

We build on this insight by using consumer confidence as a broad measure of economic sentiment rather than focusing on specific beliefs in isolation. Our approach is related to Piazzesi and Schneider (2009), who classify survey respondents using multiple questions that capture their overall economic outlook. Consumer confidence summarizes households assessment of the economic climate and their own financial well-being. As a result, it can reflect heterogeneity both in beliefs about the same economic variables and in the particular beliefs households rely on when forming their expectations.

A number of recent papers link household beliefs to realized housing market outcomes. Malmendier and Steiny Wellsjo (2024) show that experienced inflation increases the likelihood of homeownership across European households. Bottan and Perez-Truglia (2025) go beyond tenure choice by showing that sellers who receive more optimistic price signals are significantly more likely to delay or withdraw their listings. Much less evidence exists on the relation between beliefs and transaction prices. A key challenge is to observe both individual expectations and the corresponding individual transaction prices (Kuchler et al., 2023). Bailey et al. (2018) provide the closest evidence linking beliefs to transaction prices. Using geographically distant friends house price experiences as exogenous belief shifters, they show that exposure to friends' housing market experiences increases both the probability of transacting and the prices paid by buyers and received by sellers. Using the same belief shifter,

[1] Kuchler et al. (2023) provide an overview of recent research on expectations and individual housing market behavior.

Bailey et al. (2017) show that pessimistic buyers make smaller down payments and take on more leverage. Our paper contributes to this literature by studying how predetermined consumer confidence affects both the probability of entering the housing market and transaction prices conditional on entry. Using administrative data, we can link individual expectations to individual housing transactions. By jointly examining market participation and prices, we account for the endogenous selection of households into transactions. This design allows us to distinguish whether beliefs matter through the composition of market participants, through pricing behavior conditional on entry, or through both, and to compare how the same belief measure operates on the buyer and seller sides of the market.

This paper also relates to the literature that studies the joint determination of market participation and prices in housing markets. A large body of work models housing markets as search markets in which transaction prices depend on the balance between buyers and sellers. Early work by Wheaton (1990) shows that small changes in the arrival rates of buyers and sellers can have large effects on prices, implying that greater turnover is associated with higher prices. Consistent with this mechanism, Carrillo et al. (2015) show that housing market tightness, measured by the ratio of buyers to sellers, predicts subsequent house price appreciation. Beyond the balance between buyers and sellers, related work emphasizes that prices also depend on which households enter the market. Piazzesi and Schneider (2009) and Burnside et al. (2016) show that optimistic households disproportionately enter the housing market, so that prices reflect the willingness to pay of optimistic marginal buyers. The implication is that if beliefs influence who enters the market, observed price differences may reflect changes in the composition of marginal buyers rather than differences in behavior among participants conditional on entry. Our empirical design accounts for this mechanism by jointly estimating the effect of beliefs on market entry and, conditional on entry, on transaction prices.

The remainder of the paper is structured as follows. Section 2 describes the consumer confidence survey, the transaction data, and the procedure used to link both at the individual level. It also presents the stylized facts introduced above. Section 3 outlines the two-step empirical framework, consisting of a selection model and a hedonic pricing model. Section 4 presents the main empirical results. Section 5 reports a series of robustness checks, and Section 6 concludes.

2 Data

The primary data sources are residential property transactions obtained from the Dutch land registry office and the Dutch consumer confidence survey between 2006 and 2023 from Statistics Netherlands (CBS, 2017).

2.1 Consumer Confidence Survey

The Dutch consumer confidence survey started annually in 1972 and has been held monthly since 1986 by CBS, with the primary objective to construct the national consumer confidence indicator. We use the underlying individual-level responses to the same set of questions that enter the aggregate indicator. This retains the standard measure of consumer confidence while allowing us to exploit cross-sectional heterogeneity across respondents. Each monthly wave follows a cross-sectional design on an annually renewed sampling frame to ensure representativeness of the Dutch population, and respondents are not followed over time. In each month, 2,150 individuals are invited to participate, of whom on average 928 respond (SD = 185). The response rate increases over time, due to improved contact procedures, e.g., digital surveys and follow-up reminders.

Column (1) of Table 1 reports the summary statistics for all respondents in the consumer confidence survey. We remove 1,793 responses (0.95%) from individuals who participated more than once to avoid dependence across observations and restrict the sample to the period between 2006 and 2023, the years for which all individual and household characteristics are available. This yields 186,411 unique respondents. Within this sample, 49,493 respondents purchase a property and 51,623 respondents sell a property at least once.

The consumer confidence measure is based on the average of five survey questions, each scored at -100, 0, or 100. This produces eleven possible confidence values between 100 and 100 in increments of 20. The questions assess: the respondents opinion on their financial situation over the past and next twelve months, their opinion on the economic climate over the past and next twelve months, and whether respondents consider it a favorable or unfavorable time to make major purchases. Additional details on the survey and the survey instrument are provided in Appendix A.1.

Consumer confidence therefore measures both financial health *within* and economic expectations *outside* the household. Variation may come from both from dispersion in answers across respondents who consider the same economic indicators and differences in the indicators respondents consider when reporting confidence.

To categorize respondents as negative, neutral, or positive, we will consolidate the eleven categories that CBS considers in the consumer confidence measurement into three groups. Specifically, we construct a measure of *relative* consumer confidence. For each year–quarter, we demean individual confidence by the cross-sectional mean of the same quarter. This transformation ensures that respondents reporting the same confidence level in markedly different macroeconomic environments are not assigned to the same category. For example, a score of 20 implies markedly different relative position when the quarterly average was -30 in March 2009 than when it was 24 in March 2017. We then partition the resulting demeaned distribution into tertiles, yielding three equally sized groups. For brevity, we refer to respondents reporting negative, neutral, and positive consumer confidence as negative, neutral, and positive respondents, respectively.

2.2 Housing Transaction Data

Column (2) of Table 1 reports the summary statistics for the housing transaction data. The data contain 3.1 million transactions between 2006 and 2023 and include information on transaction price and date, and property characteristics. The dataset consists of transactions of existing properties in which a natural person purchases a single property.

The transaction records are linked to administrative data to obtain information on the characteristics of both the buyer and the seller. We can determine information for both parties for approximately 2 million transactions, representing 64% of all transactions between 2006 and 2023. Buyer characteristics are unavailable for 376,513 transactions and seller characteristics for 862,788 transactions, primarily reflecting properties sold by investors or social housing corporations. The household-level characteristics include income, wealth, and household size. The individual-level characteristics include age, gender, and education. All variables have a measurement date of January 1 of the transaction year.

The corresponding summary statistics are presented in columns (3) and (4) of Table 1. We make two observations. First, the house characteristics of the sub-sample do not show any significant imbalance compared to those of the complete transaction dataset in column (2). Second, buyers and sellers differ systematically in their characteristics. Relative to sellers, buyers have higher average income and wealth, are more highly educated, and are younger on average.

Table 1: Summary Statistics

	Full datasets		Transaction data		Matched samples	
	(1) Respondents	(2) Transactions	(3) Buyers	(4) Sellers	(5) Buyers	(6) Sellers
Consumer Confidence Survey						
Consumer confidence (negative)	0.34	–	–	–	0.22	0.24
Consumer confidence (neutral)	0.33	–	–	–	0.29	0.29
Consumer confidence (positive)	0.33	–	–	–	0.50	0.46
House characteristics						
Transaction price	–	287,118	303,363		346,408	328,346
	–	(189,517)	(189,744)		(164,637)	(159,894)
House size	–	121.46	123.40		133.84	129.72
	–	(191.64)	(155.17)		(56.31)	(59.83)
Year of construction	–	1964.92	1,967.62		1971.31	1970.71
	–	(54.78)	(48.50)		(42.77)	(43.86)
Type (apartment)	–	0.28	0.25		0.20	0.20
Type (corner)	–	0.14	0.14		0.14	0.16
Type (semi-detached)	–	0.11	0.11		0.13	0.12
Type (chained)	–	0.34	0.37		0.35	0.38
Type (detached)	–	0.13	0.13		0.18	0.14
Located in four largest cities	–	0.14	0.12		0.09	0.11
Located in forty largest cities	–	0.31	0.32		0.30	0.29
Individual and Household characteristics						
Income	47,186	–	60,702	55,444	58,220	56,979
	(46,805)	–	(134,292)	(117,869)	(39,884)	(42,435)
Median income	40,371	–	48,849	46,023	51,985	49,723
Net wealth	262,822	–	338,039	322,491	268,021	250,126
	(941,154)	–	(2,548,695)	(2,971,318)	(601,526)	(778,454)
Median net wealth	125,413	–	79,783	103,322	118,112	149,483
Household size	2.43	–	2.40	2.49	2.69	2.66
	(1.29)	–	(1.24)	(1.27)	(1.21)	(1.27)
Homeowner	0.71	–	–	–	0.71	1.00
Gender	0.53	–	0.55	0.56	0.54	0.59
Age	55.75	–	47.96	55.55	52.89	58.79
	(15.73)	–	(13.74)	(15.80)	(14.40)	(15.89)
Education level (primary)	0.08	–	0.01	0.02	0.03	0.03
Education level (lower secondary)	0.25	–	0.04	0.05	0.12	0.16
Education level (upper secondary)	0.30	–	0.27	0.23	0.31	0.31
Education level (higher education)	0.27	–	0.23	0.19	0.38	0.37
Education level (university)	0.10	–	0.15	0.12	0.18	0.14
Education level (unknown)	0.00	–	0.29	0.40	0.00	0.00
N	186,411	3,106,132	2,053,706		4,266	5,528

This table reports summary statistics for housing transactions, administrative records on household and individual characteristics, and data from the consumer confidence survey for the period 2006–2023. Standard deviations are reported in parentheses.

2.3 Linking Individual Consumer Confidence to Transactions

In order to merge the transaction dataset with the consumer confidence survey, we must carefully align the timing of of the survey response τ with the transaction date t. The most relevant measure of consumer confidence is the one observed shortly before the buyer and seller reach agreement. Measuring confidence at this stage best isolates the effect of

confidence on both the decision to transact and the negotiated price, while minimizing contamination from other events.

However, this raises two empirical challenges. First, the transaction date in our dataset corresponds to the transfer of ownership rather than the execution date. As a result, using survey responses too close to the transaction date t captures confidence after the buyer and seller have already reached agreement. To avoid measuring confidence during the time-to-close period, we exclude survey responses from the final two quarters before the transaction date and retain only observations with $t-\tau > 2$. The six-month cutoff ensures that we cover the average time-to-close estimated at 73 days in the Netherlands (Wang et al., 2025).

Second, few respondents are surveyed shortly before the two-quarter cutoff. To retain sufficient observations, we allow consumer confidence to be measured up to 10 quarters before the transaction date, imposing $t-\tau \leq 10$. This window balances relevance—by keeping the survey reasonably close to the transaction—and sample size. In Section 5.1, we show that the results are robust against alternative window sizes.

Combining both constraints, our final timing condition is: $2 < t-\tau \leq 10$. Applying this condition yields the *buyer sample* of 4,266 buyers (2.3% of all respondents) and the *seller sample* of 5,528 sellers (3.0% of all respondents) used in the analysis. These samples exclude transactions with prices below the 1st or above the 99th percentile. We observe consumer confidence for both the buyer and the seller in 72 transactions, which therefore appear in both samples.

In addition, 2,956 buyers and 4,552 sellers are classified as movers. For buyers, this indicates ownership of a property at some point prior to the transaction date. For sellers, this indicates continued homeownership after the transaction date. The number of movers among sellers should therefore be interpreted as a lower bound, as the sample is truncated at the end of the observation period.

2.4 Sample Characteristics and Comparability

Columns (4) and (5) present summary statistics for the buyer and seller sample at transaction date t except for consumer confidence, which is measured at the survey response date τ. Compared to the full consumer confidence survey in column (1), we observe that the share of positive respondents is 17 percentage points higher in the buyer sample and 13 percentage points higher in seller sample, indicating that more optimistic individuals are more likely to transact a house. Differences in household and individual characteristics are expected, as the full survey includes tenants. Notably, compared to all respondents, median wealth is lower

among buyers and higher among sellers, consistent with sellers accumulated housing equity and the fact that 30% of buyers are first-time buyers. Median income is higher in both the buyer and seller sample.

We next compare the buyer and seller samples in columns (4) and (5) with the full transaction dataset in columns (2) and (3). The higher average prices partly reflect the larger average house size in the matched samples, yielding price-per-square-meter differences that are relatively modest: €2,580 in the transaction dataset with observed buyer and seller characteristics, €2,740 in the buyer sample, and €2,680 in the seller sample. In addition, both transaction prices and survey response rates increase over time, giving more weight to recent transactions. The year of construction and house type are similar across samples. The share of transactions located in the four largest cities (Amsterdam, Rotterdam, The Hague, and Utrecht) is 12% in the full dataset and slightly lower in the matched samples. For household characteristics, income is comparable while wealth is lower in the matched samples, and household size is slightly larger. Individual characteristics are broadly similar.

2.5 Stylized Facts

The survey and transaction data reveal two stylized facts on the relation between consumer confidence, market participation, and transaction prices among both buyers and sellers.

Stylized fact 1: *Housing transactions are disproportionately concentrated among households with higher consumer confidence.*

Figure 1 displays the empirical distribution of quarterly demeaned consumer confidence for all respondents (blue), the buyer sample (orange), and the seller sample (green) between 2006 and 2023. The distribution of consumer confidence in the buyer and seller samples is shifted to the right relative to the distribution of the full survey population, indicating systematically higher confidence among transacting households.

Consistent with this pattern, and using the three-category classification used in the main analysis, 50% of buyers and 46% of sellers report positive confidence, compared with 33% among all respondents. Conversely, 22% of buyers and 24% of sellers report negative confidence, compared with a 33% in among all respondents (see Table 1).

Stylized fact 2: *Among transacting households, higher consumer confidence is associated with higher transaction prices.*

Figure 2 plots transaction prices against consumer confidence. Panel A presents the buyer sample, and Panel B the seller sample. Both variables are expressed as deviations from their respective quarterly means, so the figure captures within-quarter cross-sectional

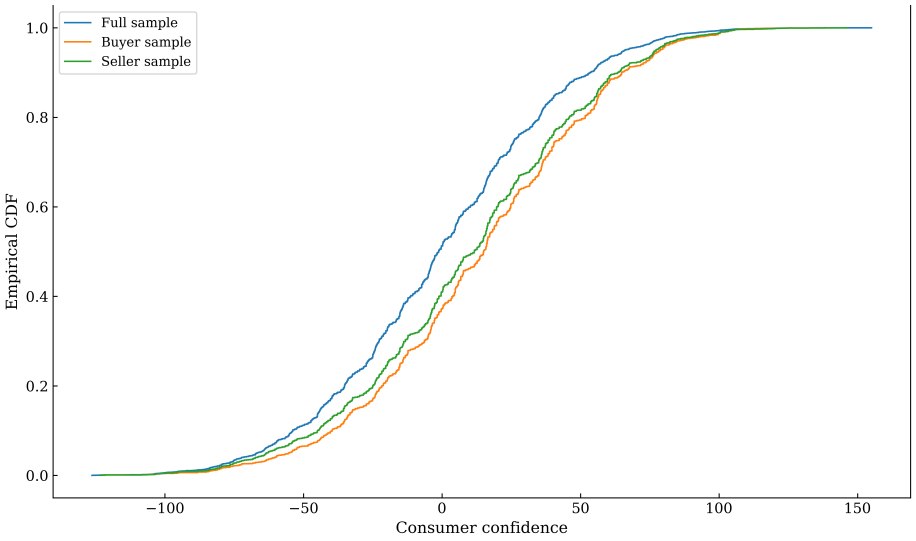


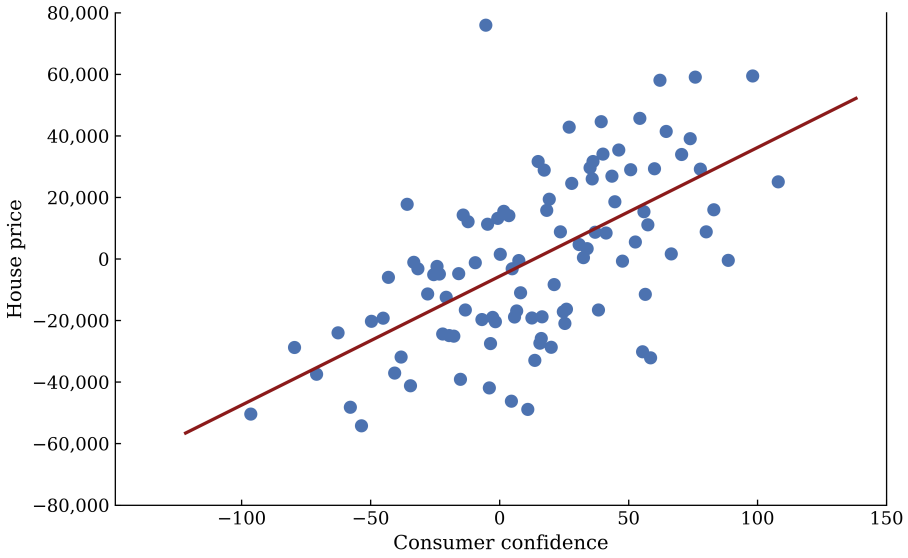
Figure 1: Empirical Distribution of Consumer Confidence. The figure plots the empirical cumulative distribution function of demeaned consumer confidence for all respondents (blue), the buyer sample (orange), and the seller sample (green) between 2006 and 2023

variation. Each point represents the average transaction price within bins of consumer confidence, and the solid line reports the corresponding linear fit.

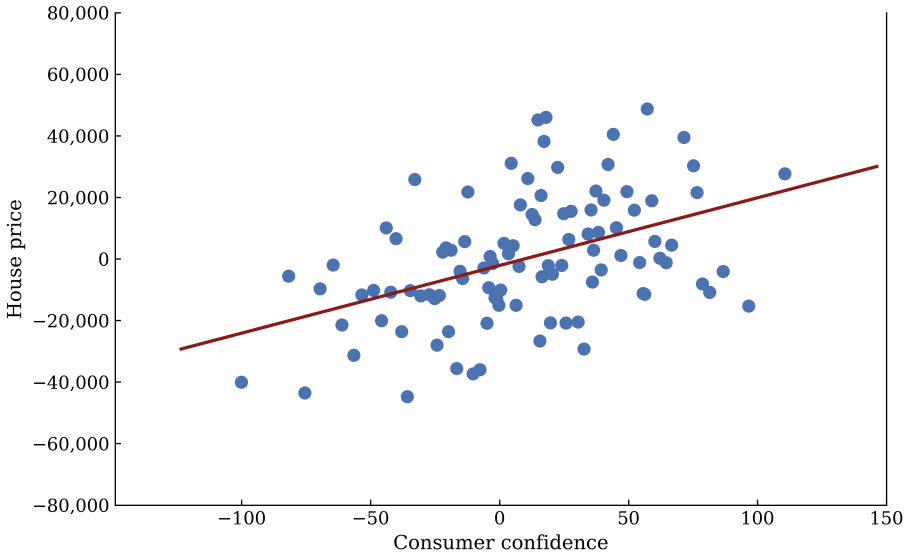
Panel A shows a clear positive association between consumer confidence and transaction prices in the buyer sample. The fitted line increases from approximately €-56,600 at the lower end of the confidence distribution to about €52,200 at the upper end. In most bins, transaction prices tend to be below the quarterly mean in bins where confidence falls below its quarterly mean, and above the quarterly mean in bins where confidence is above it, indicating a systematic relationship. The mass of observations is concentrated near the center of the distribution, suggesting that relatively few buyers exhibit extreme deviations in confidence.

Panel B displays a more nuanced pattern for the seller sample. A larger share of bins has average transaction prices close to the quarterly mean, indicating that variation in seller confidence is associated with relatively modest price differences. The fitted line increases from approximately €-29,300 to €30,000 across the support of confidence, implying a substantially flatter gradient than in Panel A. Nevertheless, bins below the mean confidence level are generally associated with below-average prices, and bins above the mean with above-average prices.

Consistent with these patterns, aggregating to the three confidence categories used in the main analysis yields similar differences. Relative to buyers reporting neutral confidence, neg-



(A) Buyers



(B) Sellers

Figure 2: Demeaned Consumer Confidence and Transaction Prices. Panel A plots demeaned transaction prices against demeaned consumer confidence for the buyer sample, and Panel B for the seller sample. Both variables are expressed as deviations from their respective quarterly means. Points represent average transaction prices within 150 bins of consumer confidence, and the solid line shows the corresponding linear fit.

ative buyers transact at prices approximately €12,900 lower, while positive buyers transact at prices about €26,000 higher. For sellers, the corresponding differences are approximately €12,300 lower and €9,600 higher, respectively, indicating a substantially weaker gradient

across confidence categories.

Several considerations qualify these descriptive relationships. First, the associations are unconditional and do not account for observable household characteristics that may affect confidence, market participation, and transaction prices. Second, market participation and transaction prices are jointly determined outcomes, so the observed patterns may reflect differences in which households transact rather than differences in pricing behavior among active participants. Third, although confidence is measured relative to the quarterly average, cross-sectional differences may still reflect local market conditions or other factors correlated with both beliefs and outcomes.

3 Empirical Model

This section presents the empirical models to study the role of consumer confidence in housing market participation and transaction prices. We model the transaction process as a two-stage decision: agents first decide whether to participate in the market, and conditional on participation, prices are determined by supply and demand and analyzed within a hedonic pricing framework.

Figure 1 shows that buyers and sellers are disproportionately represented among respondents with higher levels of consumer confidence relative to non-participants, suggesting that confidence is systematically related to market entry. Motivated by this pattern, Section 3.1 presents a selection model that estimates the effect of individual confidence on the probability of participating in a housing transaction, conditional on observed respondent characteristics.

Figure 2 documents substantial differences in transaction prices across confidence categories, suggesting a relationship between confidence and realized prices. To formalize this relationship, Section 3.2 presents a hedonic pricing model augmented with buyer and seller characteristics. Identification in the price equation requires addressing two challenges: unobserved counterpart confidence and endogenous market participation. To isolate the effect of counterpart confidence, we exploit cross-municipality variation in housing supply constraints, which shifts price determination between buyers and sellers by altering the degree of competition on each side of the market. To account for endogenous participation, we include an Inverse-Mills ratio constructed from the estimated selection model.

Taken together, the selection and hedonic pricing models allow us to separately identify the effect of consumer confidence on the extensive margin of market participation and on

transaction prices conditional on participation. The following sections describe each model in detail and discuss the associated identification assumptions, with empirical results presented in Section 4.

3.1 Selection Model

The selection model examines whether consumer confidence impacts market participation, i.e. the extensive margin. If confidence affects participation, respondents reporting higher confidence should be more likely to enter the buyer or seller sample than otherwise similar respondents with lower confidence in the same quarter.

To illustrate, consider the Dutch housing market in the first quarter of 2018. The housing stock comprised approximately 7.7 million dwellings, of which 4.4 million were owner-occupied. As described in Section 2, the 3,424 survey respondents are assumed to be representative of the population of potential buyers, while the 2,454 homeowners in the survey are assumed to be representative of potential sellers. Within the analysis window of $2 < t - \tau \leq 10$ quarters, a small fraction of respondents transact: on average 51 respondents (1.5%) purchase a property and 58 respondents (2.3%) sell a property. The selection model therefore assesses whether this transacting subset differs systematically from all eligible respondents within the same quarter.

Ideally, participation probabilities would be estimated separately by quarter, comparing transacting respondents to all eligible respondents within the same quarter. In practice, the limited number of transactions yields insufficient within-quarter variation, leading to imprecise estimates. We therefore estimate a pooled logit model with year–quarter fixed effects to capture temporal variation in selection probabilities. We use a logit specification rather than a probit for ease of interpretation, as coefficients can be directly mapped into odds ratios, while both models yield qualitatively similar marginal effects under standard assumptions. The latent participation equation is given by:

$$I^*_{r\tau} = c'_{r\tau}\alpha_1 + w'_{r\tau}\alpha_2 + \eta_\tau + \theta_\iota + \omega_\kappa + u_{r\tau}, \tag{1}$$

where $I_{r\tau} = 1$ if respondent r transacted a property between 2 and 10 quarters after the survey date ($2 < t - \tau \leq 10$). The variable $c_{r\tau}$ denotes reported consumer confidence relative to mean in the same year–quarter, categorized as negative, neutral, and positive, with neutral as the omitted category. The corresponding coefficient vector α_1 therefore captures how the log odds of entering the housing market differ for respondents reporting negative or positive

confidence relative to those reporting neutral confidence. The vector $w_{r\tau}$ contains household characteristics measured at January 1 in the year corresponding to response quarter τ, with coefficients α_2.

The term η_τ denotes a year–quarter time fixed effect capturing aggregate time variation in participation probabilities. The term θ_ι denotes a location fixed effect for the household's place of residence. It is measured at the COROP-region level with an average population of approximately 440,000 per region in 2023, roughly half the size of a U.S. metropolitan statistical area, . The term ω_κ denotes a city-size category fixed effect defined by three categories: properties located in one of the four largest cities, in one of the next forty cities, or in a smaller municipality. We include COROP-region and city-size category fixed effects rather than municipality fixed effects because the number of observations per municipality in both the buyer and seller samples is insufficient to support reliable estimation. We assess sensitivity to the granularity of fixed effects in Section 5.3. The error term is given by $u_{r\tau}$.

3.2 Hedonic Pricing Model

We next examine whether consumer confidence is directly related to transaction prices, conditional on market participation. If confidence affects transaction prices, otherwise similar respondents with higher confidence should transact at different prices than respondents with lower confidence in the same quarter. To examine this relationship, we estimate a hedonic pricing model augmented with buyer and seller characteristics, including consumer confidence:

$$\log(p_{it}) = \underbrace{c'_{b\tau}\nu_b + z'_{bt}\delta_b}_{\text{buyer}} + \underbrace{c'_{s\tau}\nu_s + z'_{st}\delta_s}_{\text{seller}} + x'_{it}\beta + \eta_t + \theta_j + \omega_k + \epsilon_{it}. \tag{2}$$

Here, p_{it} is the transaction price of property i transacted in quarter t. The vector x_{it} contains property characteristics with corresponding coefficients β. The terms η_t, θ_j, and ω_k denote the year–quarter, COROP-region, and city-size category fixed effects, respectively, defined analogously to Equation (1), but measured at transaction date t and the location of the property j. In 95% of the seller sample and 75% of the buyer sample, respondents are surveyed and transact in the same COROP-region ($j = \iota$). The error term is ϵ_{it}.

Consumer confidence c_τ is measured at the response date τ. The associated coefficients ν capture how transaction prices for properties bought or sold by respondents reporting negative or positive confidence differ from those for neutral respondents. The vector z_t contains household characteristics measured at January 1 of the corresponding transaction quarter t.

Incorporating buyer and seller characteristics is particularly relevant in our context because z_t includes variables such as wealth and income that directly reflect financial well-being. Controlling for these variables is necessary to isolate the effect of c_τ.

3.2.1 Counterpart Confidence

Data limitations prevent direct estimation of Equation (2) due to limited overlap in buyer and seller confidence measures (see Section 2.3). That is why we estimate two separate specifications instead. First, we omit seller confidence ($c_{s\tau}$) and estimate the model using the buyer sample. Second, we omit buyer confidence ($c_{b\tau}$) and estimate the model using the seller sample.

This approach controls for average counterpart confidence within quarter t, COROP region j, and city-size category k. While we cannot control for individual deviations from this average, we further isolate the role of consumer confidence by exploiting variation in housing supply constraints. The underlying idea, following Carrillo et al. (2015), is that market tightness determines how transaction prices are formed. In supply-constrained markets, high tightness induces competition among buyers, and transaction prices are largely determined by marginal buyer willingness to pay. Buyer confidence therefore plays a central role in price formation. In unconstrained markets, buyer competition weakens and shifts price determination toward sellers' reservation values and their willingness to wait. Hence, seller confidence, by affecting willingness to wait and accept concessions, becomes more relevant for realized transaction prices.

We proxy housing supply constraints using the share of developed land, following Hilber and Vermeulen (2016) and its application to Dutch municipalities by Öztürk et al. (2018). The distribution is presented in Appendix B.1[2].

In the main results we interact consumer confidence with a dummy variable d_k, which equals 1 if the ratio of developed to total developable land is below the median across municipalities, indicating lower supply constraints, and zero otherwise. In Section 5.2, we test the sensitivity of the results to alternative thresholds than the median. This yields the following specification:

$$\log(p_{it}) = c'_\tau \nu + d_k \zeta + d_k \times c'_\tau \xi + z'_{st} \delta_s + z'_{bt} \delta_b + x'_{it} \beta + \eta_t + \theta_j + \omega_k + \epsilon_{it}. \tag{3}$$

The coefficients ν reflect the price association in constrained municipalities $d_{jt} = 0$, while

[2]Although this measure is constructed for 2018, it primarily captures long-run, structural constraints on housing supply and the time variation is negligible.

the sum of the main ν and interaction ξ coefficients reflect the association in unconstrained municipalities $d_{jt} = 1$. The coefficient ζ measures the direct price effect of a property located in an unconstrained municipality, relative to an unconstrained municipality, within the same COROP-region. Also note that while counterpart confidence is omitted, both the vector of individual and household characteristics for the buyer (z_{bt}) and seller (z_{st}) are retained. We estimate this equation separately for the buyer sample, using buyer confidence, and for the seller sample, using seller confidence.

3.2.2 Endogenous Selection

A second challenge is endogenous selection into market participation. The summary statistics in Table 1 reveal systematic differences between all survey respondents and only those who buy or sell within the analysis window. This suggests that unobserved factors—such as liquidity constraints, parental wealth, or exposure to regulatory changes—may jointly influence both the decision to buy or sell and the realized transaction price p_{it}. This concern is amplified by the fact that confidence is measured prior to the transaction, allowing for shocks to occur between the survey response date τ and the transaction date t. Correlation between unobservables in the participation and price equations would therefore induce selection bias in the estimated effect of consumer confidence on transaction prices.

To address endogenous participation, we rely on the probit version of Equation (1) to model the selection mechanism and correct for non-random participation through the implied the Inverse-Mills ratio (IMR) (Heckman, 1979). Identification may require exogenous variation that affect the probability of selection but not the transaction price (Cameron and Trivedi, 2005). Although the IMR is globally nonlinear by definition, it is often approximately linear over the range spanned by the data. Consequently, functional-form variation may provide insufficient identifying power because the IMR tends to be highly collinear with the regressors in the outcome equation.

We use marital status $m_{r\tau}$ as the exclusion restriction. Marital status is a natural shifter of market participation in this context, as household formation and dissolution are key drivers of housing demand and therefore strongly predict entry into the housing market. At the same time, conditional on observed household characteristics, property characteristics, and location-time fixed effects, marital status is assumed not to directly affect the transaction price of a given property.

Additional identifying variation is provided by the temporal structure of the data. Participation is modeled using predetermined household characteristics and expectations mea-

sured at τ, whereas the outcome equation conditions on characteristics measured at the transaction date t. The lag between τ and t helps separate participation shocks from contemporaneous price determination.

The remaining individual and household characteristics are collected in $w_{r\tau}^{(o)}$ and are included in the selection equation measured at the survey date τ and in the pricing equation measured at the transaction date t. The resulting selection equation is:

$$I_{r\tau}^{*} = c_{r\tau}'\alpha_1 + w_{r\tau}^{(o)\prime}\alpha_2 + m_{r\tau}\alpha_3 + \eta_\tau + \theta_\iota + \omega_\kappa + u_{r\tau}. \tag{4}$$

The IMR, used to correct for selection bias, is defined as $\hat{\lambda}_{r\tau} = \phi(\hat{z}_{r\tau}^{*})/\Phi(\hat{z}_{r\tau}^{*})$, where $\hat{z}_{r\tau}^{*}$ is the fitted value from Equation (4).

The Inverse-Mills ratio therefore corrects for selection on unobservables correlated with characteristics observed at τ, while shocks and innovations arising between τ and t are not part of the selection correction by construction. This ensures that the selection decision depends only on the respondents information set $\mathcal{F}_\tau$ available at the time of the survey. Including realized covariates that belong to the future information set $\mathcal{F}_t$ would violate the exogeneity assumption, because such variables incorporate future innovations that are jointly determined with the outcome disturbance. The selection Equation (1) and the outcome Equation (3), augmented with the IMR, are estimated for both the buyer and seller sample.

4 Empirical Results

This section presents the main empirical findings. We first present results from the selection Equation (1) to assess whether consumer confidence predicts subsequent market entry in the buyer sample and the seller sample. We then present results from the outcome Equation (3) to examine whether consumer confidence affects realized transaction prices conditional on market participation.

4.1 The Effect of Consumer Confidence on Market Participation

Table 2 reports estimation results from the selection model specified in Equation (1). Columns (1)–(4) progressively add regional fixed effects, respondent characteristics, and exclusion restrictions to a baseline specification that includes consumer confidence and year–quarter fixed effects. Panel A reports results for the buyer sample, and Panel B for the seller sample.

We focus on the coefficients on demeaned consumer confidence partitioned into negative,

Table 2: Consumer Confidence and Housing Market Participation

Dep. var: in sample (1/0)	(1)	(2)	(3)	(4)
Panel A: Buyer sample (mean = 2.081%)				
Consumer confidence (negative)	0.663***	0.663***	0.820***	0.799***
	(0.058)	(0.059)	(0.056)	(0.056)
Consumer confidence (positive)	1.391***	1.370***	1.031	1.031
	(0.038)	(0.040)	(0.037)	(0.037)
Wald	135.293***	118.535***	11.348***	11.650***
Observations	185,739	185,739	185,739	185,739
Pseudo R^2	0.037	0.042	0.114	0.114
Panel B: Seller sample (mean = 3.707%)				
Consumer confidence (negative)	0.883***	0.887**	0.942	0.939
	(0.046)	(0.047)	(0.049)	(0.049)
Consumer confidence (positive)	1.212***	1.195***	1.057	1.056*
	(0.032)	(0.034)	(0.033)	(0.034)
Wald	45.751***	37.455***	4.188**	4.336**
Observations	131,419	131,419	131,419	131,419
Pseudo R^2	0.026	0.030	0.054	0.056
Included in all specifications				
Response quarter	Yes	Yes	Yes	Yes
COROP and city size		Yes	Yes	Yes
Respondent characteristics			Yes	Yes
Exclusion restrictions				Yes

This table reports the results from Equation (1). Panel (A) presents results for the buyer sample, Panel (B) for the seller sample. The dependent variable equals 1 for 4,266 transactions in the buyer sample and 5,528 transactions in the seller sample. Coefficients for positive and negative consumer confidence are interpreted relative to the neutral category. Household characteristics refer to wealth, income and household size for both the buyer and seller. Individual characteristics include gender, age, and education of respondent; and characteristics of the counterpart refer to the head of household and the highest attained education level in the household. Standard Errors are clustered at the COROP-region, and presented in parentheses. The Wald statistic tests the joint null hypothesis $\alpha_{1,\text{neg}} = \alpha_{1,\text{pos}} = 0$. Logit coefficients are interpreted as odds, calculated as $\exp(\hat{\alpha_1})$, and reflect changes in the latent propensity to enter in a transaction. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.

neutral, and positive tertiles. For sellers, the reference group consists of other homeowners, while for buyers the comparison group consists of all survey respondents. This construction ensures that participation is evaluated relative to the appropriate pool of eligible non-participants. Based on the stylized facts in Section 2.5, we expect negative confidence to be associated with lower odds of subsequent market participation, while positive confidence is associated with higher odds of participation, between two and ten quarters after the survey response.

4.1.1 Buyer Participation

Column (1) reports a parsimonious specification including consumer confidence and year–quarter fixed effects. Identification comes from within-quarter deviations in individual confidence, implying that we abstract from aggregate confidence effects and that respondents

are exposed to the same economic conditions. Relative to neutral respondents, negative respondents have 33.7% lower odds of transacting within the subsequent two to ten quarters, while positive respondents have 39.1% higher odds of doing so.

Column (2) adds COROP and city-size category fixed effects. The coefficients on confidence are essentially unchanged, and the pseudo-R^2 increases only marginally. This suggests that regional and city-size differences contribute little additional explanatory power for buyer participation and that the estimated relationship between confidence and market entry is not driven by geographic composition.

In column (3), we introduce respondent characteristics. Their inclusion substantially attenuates the estimated relationship between confidence and participation. The coefficients on negative and positive confidence decline to -18.0% and 3.1%, respectively. This decline is expected, as characteristics such including income, education, and wealth jointly influence both reported confidence and the probability of selection into the housing market.

Column (4) adds marital status to identify the selection correction, yielding our baseline specification. The marital status indicators are jointly significant (Wald $\chi^2(3) = 7.9$). The coefficient on negative confidence increases in magnitude to -20.1%, while the coefficient on positive confidence remains largely unchanged. The results are qualitatively similar when the selection equation is estimated using a probit specification instead of logit. The full regression results are presented in Table C.1.

Translating the estimates from column (4) into marginal effects, the baseline participation rate for neutral buyers is 2.2%. Relative to this baseline, negative confidence is associated with a 0.36 percentage point lower probability of transacting (about 16.4%), while positive confidence is associated with a 0.06 percentage point higher probability (about 2.7%). The implied gap between positive and negative respondents is approximately 0.43 percentage points, corresponding to about a 23.4% higher participation probability for positive relative to negative buyers. Thus, even after conditioning on a rich set of respondent characteristics, variation in consumer confidence remains an economically meaningful determinant of buyer participation.

4.1.2 Seller Participation

We next turn to the results for sellers in Panel B. Column (1) reveals that confidence-related selection effects are substantially weaker for sellers than for buyers. Relative to neutral respondents, negative respondents have 11.7% lower odds and positive respondents have 21.2% higher odds of selling, compared to 33.7% and 39.1%, respectively, in the buyer

selection model (Panel A). Consistent with these smaller magnitudes, the corresponding Wald statistic is roughly one third of that observed in the buyer sample, and the pseudo-R^2 is lower.

As in the buyer sample, adding COROP-region and city-size category fixed effects in column (2) leaves the confidence coefficients roughly unchanged and yields only a marginal improvement in model fit. In contrast, the inclusion of respondent characteristics in column (3) substantially attenuates the estimated relationship between confidence and seller participation. The coefficient on negative confidence declines to -5.8% and becomes insignificant, while the coefficient on positive confidence declines to 5.7%. However, the joint significance of the confidence variables remains at the 5% level.

Column (4) adds marital status to identify the selection correction. The corresponding indicators are jointly significant (Wald $\chi^2(3) = 14.5$). Their inclusion leaves the confidence coefficients largely unchanged, and the joint significance of the confidence variables remains at the 5% level. The pseudo-R^2 remains modest at 5.6%, approximately half the value observed in the buyer sample. The full regression results are presented in Table C.1.

Translating the seller estimates from column (4) into marginal effects, the baseline participation rate under neutral confidence is 3.7%. Negative confidence is associated with a 0.19 percentage point lower probability of selling (about 5.1%), while positive confidence is associated with a 0.20 percentage point higher probability (about 5.4%). The implied gap between positive and negative sellers is 0.39 percentage points, corresponding to a 11.1% difference in participation. In contrast to the buyer sample, these effects are economically modest and statistically weaker, indicating that variation in reported confidence plays only a limited role in explaining seller participation.

4.2 The Effect of Consumer Confidence on Transaction Prices

We continue with the results for the pricing Equation (3), reported in Table 3. Columns (1)–(4) progressively extend a baseline specification including consumer confidence and year–quarter fixed effects by adding regional fixed effects, house characteristics, buyer and seller characteristics. Column (5) augments the specification with the Inverse-Mills ratio constructed from the preferred selection model in Table 2. Panel A reports results for buyers, and Panel B reports results for sellers.

We focus on the coefficients on consumer confidence and its interactions with an indicator for supply-constrained markets. Based on the stylized facts in Section 2.5, we expect negative respondents to transact at discounts and positive respondents to transact at premia

relative to the neutral category, with these largest effects for buyers in supply-constrained markets and for sellers in supply-unconstrained markets.

4.2.1 Price Effect of Buyer Confidence

Column (1) reports a specification where transaction prices are regressed on consumer confidence, controlling only for year–quarter fixed effects. Including year–quarter fixed effects restricts identification to cross-sectional variation in individual confidence within quarters, abstracting from aggregate confidence effects. Relative to buyers reporting neutral confidence within the same quarter, transaction prices are approximately 3.5% lower for negative buyers and about 7.4% higher for positive buyers in supply-constrained markets. These coefficients are individually and jointly statistically significant. No statistically significant price effects are observed in unconstrained markets.

Column (2) adds COROP-region and city-size category fixed effects, restricting comparisons to transactions within the same region, quarter, and city-size category. The estimated relationship between prices and confidence is largely unchanged, indicating that the baseline price effects are not driven by regional and city-size differences in prices or confidence. This finding mirrors the participation results in Section 3.1, where controlling for regional fixed effects similarly leaves the estimated confidence coefficients unaffected.

Column (3) introduces controls for housing characteristics. Their inclusion substantially attenuates the estimated price effects of confidence: the coefficient on negative confidence becomes close to zero, while the coefficient on positive confidence declines to approximately 2.8%. This attenuation suggests that the baseline price effects partly reflect sorting into different housing segments by respondents with different confidence levels. In column (4), we further add buyer and seller characteristics. The inclusion of these controls reduces the remaining price effect of positive confidence to about 2.2%, but remains statistically significant at the 5 percent level.

Column (5) accounts for endogenous selection into transactions by including the IMR. The estimated IMR is negative and statistically significant at the 1% level, indicating negative selection on unobservables into transactions. Estimation is restricted to observations with complete information at both the survey and the transaction date, reducing the sample size to 3,913 transactions.[3] To separate the effect of the IMR from sample composition, we re-estimate the specification in column (4) on this restricted sample without including the

[3]Most excluded observations in both the buyer and seller samples originate from survey years between 2003 and 2005, for which part of the control variables are unavailable.

Table 3: Consumer Confidence and Transaction Prices

Dep. var: log(transaction price)	(1)	(2)	(3)	(4)	(5)
Panel A: Buyer Sample					
Consumer confidence (negative)	-0.035*	-0.036*	-0.017	-0.015	0.000
	(0.019)	(0.018)	(0.011)	(0.011)	(0.012)
Consumer confidence (positive)	0.074***	0.064***	0.028**	0.022**	0.028**
	(0.018)	(0.017)	(0.011)	(0.011)	(0.011)
Unconstrained market	-0.029	0.044	-0.022	-0.014	0.001
	(0.037)	(0.032)	(0.026)	(0.024)	(0.023)
Consumer confidence (negative) × unconstrained	-0.007	-0.007	-0.001	0.002	-0.009
	(0.028)	(0.028)	(0.015)	(0.017)	(0.018)
Consumer confidence (positive) × unconstrained	-0.023	-0.021	-0.016	-0.018	-0.032
	(0.031)	(0.032)	(0.021)	(0.020)	(0.020)
IMR					-0.078***
					(0.019)
Wald (constrained)	30.385***	33.174***	13.390***	9.063***	7.040**
Wald (unconstrained)	22.073***	12.451***	4.558	2.535	0.582
Observations	4,266	4,266	4,266	4,266	3,913
R^2	0.222	0.307	0.719	0.772	0.772
Panel B: Seller Sample					
Consumer confidence (negative)	-0.035**	-0.025*	-0.009	-0.001	-0.011
	(0.016)	(0.013)	(0.012)	(0.010)	(0.010)
Consumer confidence (positive)	0.022	0.018	0.023**	0.012	0.009
	(0.019)	(0.017)	(0.010)	(0.007)	(0.008)
Unconstrained market	-0.044	0.058*	-0.041	-0.038	-0.041*
	(0.038)	(0.032)	(0.028)	(0.023)	(0.023)
Consumer confidence (negative) × unconstrained	0.006	0.019	0.010	0.011	0.017
	(0.037)	(0.035)	(0.019)	(0.018)	(0.019)
Consumer confidence (positive) × unconstrained	-0.001	0.003	-0.008	0.002	0.009
	(0.027)	(0.025)	(0.018)	(0.014)	(0.015)
IMR					0.054***
					(0.019)
Wald (constrained)	10.518***	9.756***	7.625**	3.561	4.015
Wald (unconstrained)	2.907	1.388	1.470	1.338	2.167
Observations	5,528	5,528	5,528	5,528	4,962
R^2	0.222	0.311	0.710	0.767	0.771
Included in all specifications					
Transaction quarter	Yes	Yes	Yes	Yes	Yes
COROP and city size		Yes	Yes	Yes	Yes
House characteristics			Yes	Yes	Yes
Buyer and seller characteristics				Yes	Yes

This table reports the results from Equation (3). Panel A presents results for the buyer sample, Panel B for the seller sample. The dependent variable is the log(transaction price). Coefficients for positive and negative consumer confidence are interpreted relative to the neutral category. The buyer sample includes 872 negative, 1,253 neutral and 1,788 positive respondents; in column (5) this falls to 872, 1,253, and 1,788 respondents, respectively. The seller sample includes 872 negative, 1,253 neutral and 1,788 positive respondents; in column (5), 1,269, 1,551, and 2,142, respectively. House characteristics include log(size), year of construction and property type. Household characteristics refer to wealth, income and household size for both the buyer and seller. Individual characteristics include gender, age, and education of respondent; and characteristics of the counterpart refer to the head of household and the highest attained education level in the household. Standard Errors are clustered at the COROP-region, and presented in parentheses. The Wald (constrained) statistic tests the joint null hypothesis $H_0^{(d=0)} : \nu_{\text{neg}} = \nu_{\text{pos}} = 0$. The Wald (unconstrained) statistic tests the joint null hypothesis $\nu_{\text{neg}} + \rho_{\text{neg}} = 0$ and $\nu_{\text{pos}} + \rho_{\text{pos}} = 0$. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.

IMR in Table C.2. This yields a price premium of approximately 2.8% (s.e. = 0.11) for positive buyers and a coefficient on negative confidence of −0.007 (s.e. = 0.012). These results imply that including the IMR in column (5) leaves the positive confidence estimate essentially unchanged and attenuates the negative confidence coefficient to 0.000 (s.e. = 0.012).

The results suggest that, although selection into participation is present, the baseline confidence-price relationship in columns (1)–(4) is not driven by endogenous selection. In particular, this indicates that the estimated price effects of confidence do not reflect unobserved factors that jointly influence both participation and transaction prices. Instead, confidence captures differences in willingness to pay among participating buyers. At the average transaction price in 2024 of €453,000, this effect corresponds to prices approximately €13,000 higher for positive buyers relative to those reporting neutral confidence.

4.2.2 Price Effects of Seller Confidence

We next turn to the pricing results for sellers in Panel B. In contrast to the buyer sample, the evidence for seller confidence effects is weaker. Column (1) shows that negative seller confidence is associated with a statistically significant price discount of 3.5%. By contrast, positive seller confidence is associated with a statistically insignificant price premium of approximately 2.2%. As in the buyer sample, no price effect of confidence is observed in unconstrained markets.

Column (2) adds COROP-region and city-size category fixed effects. In contrast to the results for the buyer sample, the inclusion of regional controls affects the estimated coefficients: the effect of negative confidence attenuates to 2.5%, while the positive confidence coefficient is remains statistically insignificant. This pattern suggests that part of the baseline seller-side price effect reflects between-region variation.

Once housing characteristics are added in column (3), the coefficient on negative confidence attenuates further, while the coefficient on positive confidence increases to 2.3% and becomes statistically significant at the 5% level. This shift indicates that, after accounting for sorting across housing segments, positive seller confidence is associated with a price premium, yielding patterns broadly comparable to those observed for buyers.

Further differences emerge in columns (4) and (5). After controlling for buyer and seller characteristics in column (4), the price premium attenuates to 1.2% and is close to significant at the ten percent level. The corresponding Wald test fails to reject the null of no effect in constrained markets. When the IMR is included in column (5), this premium further decreases to 0.9% and becomes statistically insignificant. The IMR is positive and

statistically significant, indicating that unobserved factors associated with a higher probability of selling are positively correlated with unobserved determinants of transaction prices in the seller sample. To isolate the effect of the IMR from the change in sample composition, we re-estimate the specification in column (4) on the restricted sample used in column (5) *without* including the IMR in Table C.3. This yields coefficients of -0.011 (s.e. $= 0.010$) for negative confidence and 0.009 (s.e. $= 0.008$) for positive confidence, which are nearly identical to those obtained when including the IMR in column (5).

The results indicate that once seller characteristics and endogenous selection into selling are accounted for, we find no evidence of a price effect of seller confidence. This means that there is no support for the hypothesis in Section 3.2.1 that seller-specific beliefs play a larger role in supply-unconstrained markets when competitive pressure is weaker. Additional robustness checks for the IMR are reported in Appendix A.2, and the full regression results are presented in Table C.3.

4.3 Economic interpretation of participation and price effects

As discussed in Section 2.1, consumer confidence reflects both perceived financial well-being *within* the household and expectations about the economic climate *outside* the household. In our empirical design, confidence is measured relative to the cross-sectional mean within each year–quarter, so identification comes from differences in relative confidence among households facing the same aggregate conditions. The results reveal that buyer confidence affects housing market outcomes both through participation decisions and, conditional on participation, through transaction prices in supply-constrained markets. By contrast, once observed characteristics and endogenous participation are accounted for, we find no evidence that seller confidence affects either market entry or transaction prices.

The main implication of our findings is that observed turnover and transaction prices reflect the beliefs of active market participants rather than those of the broader population. Market outcomes therefore adjust in part through asymmetric selection into participation between buyers and sellers, rather than solely through price responses among a fixed set of participants. This means that changes in market activity are driven both by how confidence affects participants' willingness to pay and by which households choose to enter the market in the first place. As a result, equilibrium prices reflect the beliefs of the marginal buyer and changes in who participates. This implies that belief heterogeneity can affect prices even when fundamentals and other determinants are held fixed.

The absence of participation and price effects in the seller sample implies that belief-

driven shifts in demand are not met with a corresponding adjustment on the supply side. In other words, increases in buyer confidence raise the number of active buyers without triggering an equivalent increase in active sellers.

4.3.1 Institutional Context and Market Mechanisms

These findings are intuitive in the context of housing markets, where transactions are infrequent, highly leveraged, and involve the largest asset in a household portfolio. In such an environment, even modest differences in perceived financial well–being or economic conditions can translate into differences in participation decisions and willingness to pay. Consistent with this mechanism, the participation effects are driven primarily by relatively negative respondents, indicating that selection operates mainly through households opting out rather than through additional entry by optimistic households. This asymmetry is understandable in a setting where downside risk is salient, as households are likely to be more responsive to perceived potential losses than to comparable gains when deciding whether to undertake a large, irreversible investment decision[4].

The same mechanism that drives selective participation among relatively pessimistic households also implies that, conditional on participation, more confident buyers are willing to bid more aggressively. Confidence affects transaction prices by shifting buyers' willingness to pay through its effect on perceived downside risk and financial constraints. More confident buyers may require a lower risk premium and face fewer perceived constraints, leading them to submit higher bids for a given property. In supply-constrained markets, where buyers compete for a fixed stock of housing, these differences in willingness to pay translate directly into transaction prices.

4.3.2 Limited Role of Seller Beliefs

The absence of seller-side participation effects can be understood through frictions in the selling process and limited responsiveness to beliefs. Buyers can enter and exit the market without incurring financial search costs. For sellers, by contrast, obtaining an informative price signal typically requires listing the property, and delisting often entails brokerage fees, which limits the flexibility of entry and exit. In addition, sellers are typically less financially constrained than buyers and therefore less sensitive to fluctuations in confidence when timing their transactions. Moreover, many sales are driven by factors largely orthogonal to con-

[4]Evidence consistent with reference dependence and loss aversion in housing markets is documented by Genesove and Mayer (2001).

sumer expectations, such as household formation and dissolution, job changes, or life-cycle transitions.

Conditional on participation, features of the search and matching process further limit the role of seller confidence in pricing decisions. Most sellers are represented by real estate agents, who provide guidance on pricing and valuation. Once the property is listed, the sellers role is largely confined to deciding whether to accept an offer or extend the time on market. By contrast, buyers are not always represented by agents and typically engage more directly in the decision-making process. Because properties are heterogeneous, buyers must continuously assess their willingness to pay relative to financial capacity and patience in the search process. These differences are amplified by sealed-bid procedures, which are common and require buyers to submit offers within a limited window. As a result, consumer confidence is more likely to affect buyer bidding behavior than seller pricing decisions.

4.3.3 Sample Composition and Timing Incentives

Another explanation for our findings lies in heterogeneous timing incentives within the samples. In the buyer sample, 30% are first-time buyers, while 14% of sellers exit the market[5]. As a result, the seller sample consists primarily of movers, who change their housing exposure only marginally, combined with an exiting group with opposing timing incentives. Positively confident sellers who intend to exit have an incentive to postpone sales to benefit from further price increases, whereas movers are less sensitive to market timing, particularly when moving up the property ladder. By contrast, timing incentives between first-time buyers and movers in the buyer sample are more uniformly aligned, as both benefit from entering the market earlier when expecting future price increases. This heterogeneity mechanically attenuates the relationship between confidence and seller participation relative to the buyer sample.

By contrast, these heterogeneous timing incentives do not operate in the same way for pricing decisions. Conditional on transacting, both optimistic buyers and sellers should anticipate higher prices, and this is equally true for movers that both buy and sell in the same period. This implies that differences in sample composition do not offset pricing incentives on the buyer or seller side.

[5]The 14% share should be interpreted as an upper bound, as some sellers may purchase a property after the end of the sample period in 2023 and are therefore not observed as buyers.

5 Robustness Analysis

We proceed with four robustness analyses. First, we assess the sensitivity of the results to the length of the window used to link survey responses to subsequent transactions by extending the baseline window. Second, we examine the role of the supply-constrained threshold by varying the cutoff used to classify municipalities. Third, we address concerns about unobserved local price dynamics by adopting an alternative specification that leverages the full universe of transactions. Fourth, we test the asymmetry between buyers and sellers across constrained and unconstrained markets by constructing alternative samples.

5.1 Sensitivity to the Timing of Confidence Measurement

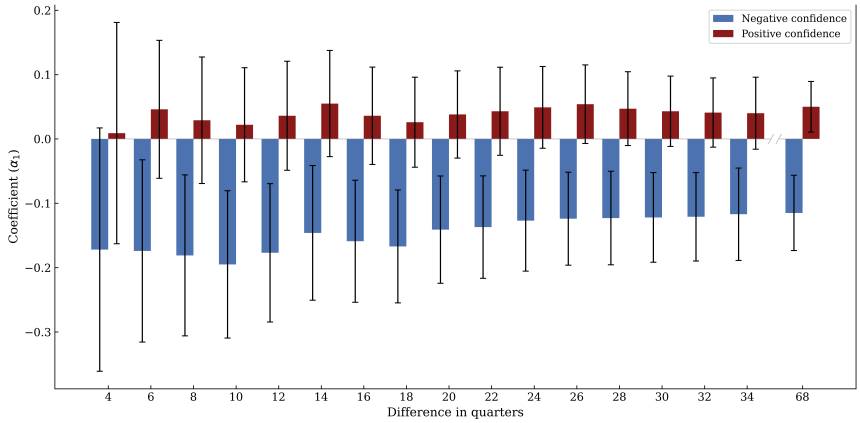
In the baseline analysis, consumer confidence is measured between two and ten quarters prior to the transaction date, motivated in part by sample size considerations (see Section 2.3 for details on sample construction). This raises the concern that the estimated role of consumer confidence may depend on the specific window imposed. We therefore assess the sensitivity of the selection and pricing results by re-estimating the models over progressively wider analysis windows.

As in the baseline analysis, we exclude the two quarters immediately preceding the transaction to avoid capturing respondents who may have already committed to a purchase or sale decision. Starting from a window that links survey responses three to four quarters prior to the transaction, we expand the window in two-quarter increments up to the maximum horizon observed in the data. For each window, we re-estimate the selection model in Equation (1) and the hedonic pricing model in Equation (3) on the resulting sample.

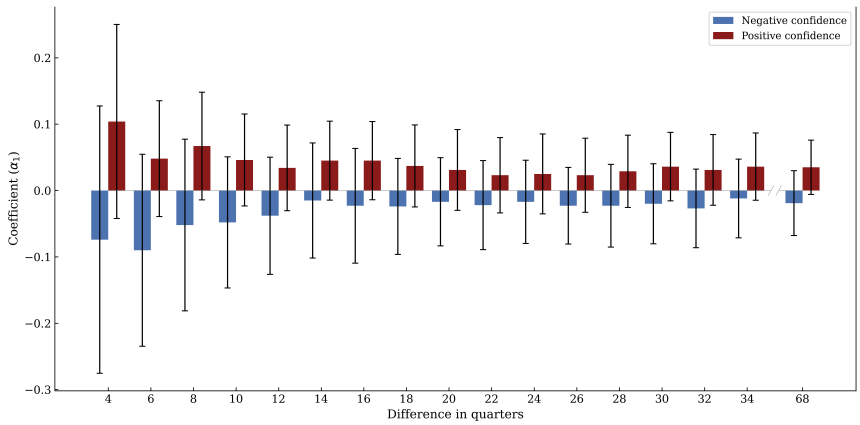
5.1.1 Confidence and Market Participation Across Windows

Figure 3 reports estimates from the selection model across progressively wider analysis windows. Panel A presents results for buyers and Panel B for sellers. The horizontal axis shows the upper bound of the window in quarters relative to the transaction date, and the vertical axis reports the estimated coefficients on consumer confidence.

For buyers, the estimated relationship between confidence and market participation is stable across window lengths. Extending the window up to 68 quarters yields coefficients that remain similar in sign and statistical significance to those obtained in the baseline specification, although magnitudes attenuate modestly as the window expands. This implies that the cross-sectional ranking of confidence within a given response quarter remains informa-



(a) Buyer sample



(b) Seller sample

Figure 3: Consumer Confidence and Market Participation Across Measurement Windows. Equation (1) is estimated for analysis windows that expand in two-quarter increments omitting the first two quarters. The x-axis indicates the maximum allowable time difference in quarters between the survey response and the transaction date. The y-axis plots the estimated coefficients for positive and negative consumer confidence compared to the neutral category.

tive about subsequent market participation even at longer horizons. This suggests, in turn, that the association between buyer confidence and participation is not driven by the specific timing of the survey response.

For sellers, the estimated effects are more sensitive to window length. As the window expands, the coefficient on negative confidence attenuates toward zero, while the coefficient on positive confidence declines but remains positive. Relative to buyers, seller participation appears more strongly related to confidence measured closer to the transaction date.

Figure B.3 also reports estimates from placebo specifications in which consumer confi-

dence is measured after the transaction date. For buyers, the relationship between confidence and market participation is substantially weaker in these post-transaction specifications relative to the ex-ante estimates. For sellers, the estimated effects are stronger in the models up to ten quarters after the transaction and turn insignificant for the remaining windows.

5.1.2 Confidence and Transaction Prices Across Windows

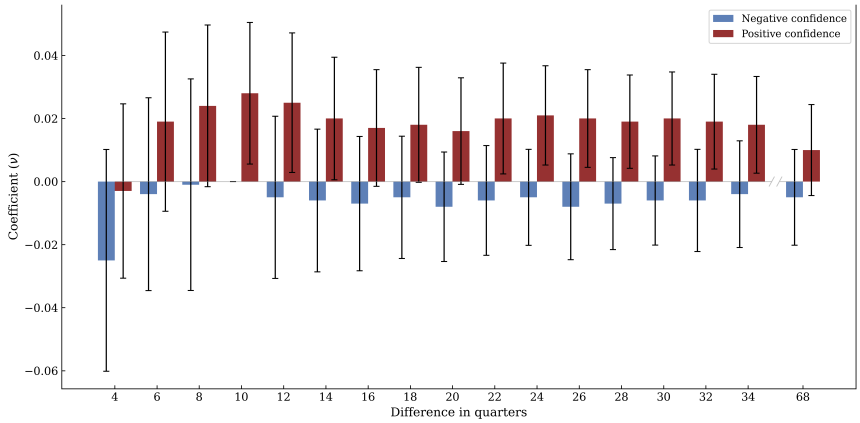
We next examine the sensitivity of the hedonic pricing results to the length of the analysis window. Figure 4 reports estimates of the effect of consumer confidence in supply-constrained markets from the hedonic pricing model, with Panel A for buyers and Panel B for sellers.

For buyers, the estimated coefficient on positive confidence is largest in magnitude in the window from four up to ten quarters and attenuates as the window expands. The coefficient on negative confidence is insignificantly different from zero across all windows. The only window that deviates from the baseline pattern is the narrowest window, in which negative confidence attains its largest magnitude and the coefficient on positive confidence is close to zero. The coefficients in the remaining windows are consistent with those obtained in the baseline specification.

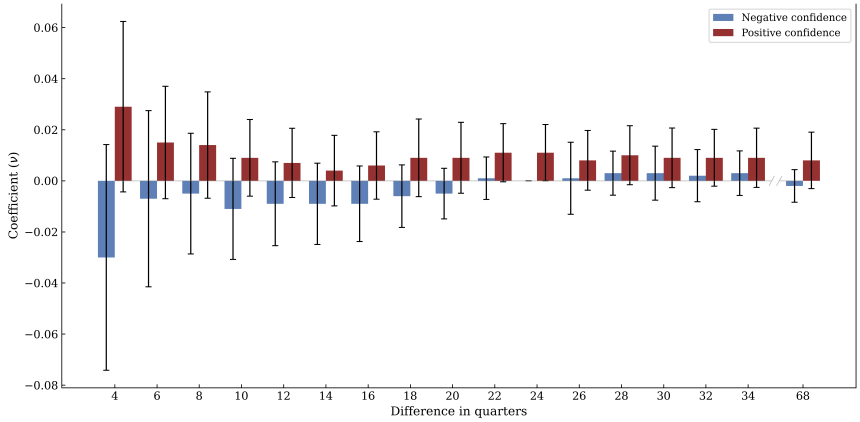
When we exclude the first four quarters prior to the transaction—rather than two as in the baseline—the estimated price premium for positive buyers increases to 3.8% (s.e. = 0.018), compared to 2.8% in the baseline specification. The corresponding participation effect rises to 19.1% (s.e. = 0.060), relative to 17.7% in the baseline. In Section 2.3, we argued that confidence measured shortly before agreement—excluding the time-to-close period—would be most informative. The stronger effects obtained when excluding the first four quarters suggest that this restriction may not be sufficient. Given the average time-to-close of 73 days, the pattern is unlikely to reflect mechanical dating alone. Instead, confidence measured within the two to four quarter window may already reflect beliefs formed while respondents are actively searching for housing, whereas confidence observed further in advance more cleanly captures ex ante expectations.

For sellers, the estimated effect of negative and positive confidence is highest in the narrowest window and attenuates as the window expands, remaining statistically insignificant across most windows. A plausible interpretation is that confidence measured very close to the transaction date partly reflects contemporaneous time on market.

Figure B.4 reports estimates from placebo specifications in which confidence is measured after the transaction date. For buyers, coefficients on both positive and negative confidence are statistically insignificant across nearly all post-transaction windows and attenuates as



(a) Buyer sample



(b) Seller sample

Figure 4: Consumer Confidence and Transaction Prices Across Measurement Windows. Equation (3) is estimated for analysis windows that expand in two-quarter increments omitting the first two quarters. The x-axis indicates the maximum allowable time difference in quarters between the survey response and the transaction date. The y-axis plots the estimated coefficients for positive and negative consumer confidence compared to the neutral category.

the window expands. Estimates for the first two windows are imprecise, consistent with confidence measured close after the transaction date partly reflecting revised expectations in response to the transaction outcome. For sellers, we similarly find no significant relation between confidence and transaction prices, and the coefficients reverse sign relative to the ex-ante specifications.

Taken together, the placebo results from the selection model (Figure B.3) and the hedonic pricing model (Figure B.4) indicate that consumer confidence measured after the transaction reflects different underlying mechanisms than ex-ante confidence. This reinforces

the importance of measuring confidence prior to the transaction when assessing its role in market participation and price formation.

5.2 Sensitivity to the Supply Constraint Threshold

The supply constraint indicator in the main results uses the median share of developed land as the threshold, classifying half of the municipalities above 15.5% as supply-constrained and the other half as supply-unconstrained. However, The distribution is strongly right-skewed, with developed land shares ranging from 6% to 77% (see Figure B.1). This implies that municipalities with relatively modest land development shares are classified supply-constrained.

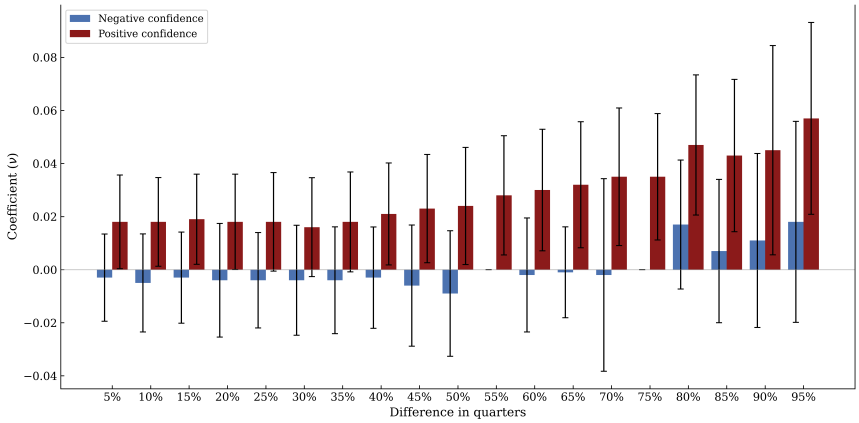
To assess sensitivity of the results to this choice, we re-estimate the hedonic pricing model (Equation (3)) using alternative thresholds defined at 5% increments of the developed-land-share distribution. At the upper end of this range, only the most constrained municipalities such as Amsterdam and The Hague are classified as supply-constrained.

Figure 5 presents the estimated coefficients on consumer confidence in municipalities classified as supply-constrained under each threshold. Panel A reports the results for buyers, and Panel B for sellers. The horizontal axis shows the quantile used to define the supply-constrained threshold, while the vertical axis reports the estimated coefficient on consumer confidence in constrained markets.

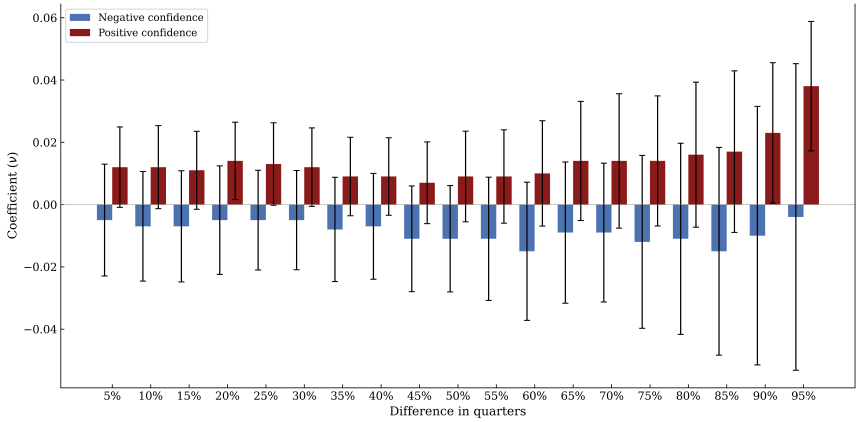
The results show that the effect of positive confidence in supply-constrained markets increases as the threshold becomes tighter, reaching a price effect of 5.7% when only the most constrained 5% of municipalities are classified as supply-constrained. In contrast, the corresponding coefficients in the seller sample remain relatively stable across thresholds, except in the most constrained municipalities, for which confidence does affect prices. These results indicate that the magnitude of the buyer price effect varies with the extent of supply constraints, with the largest effects observed in the most tightly constrained municipalities.

5.3 Residual Prices Using the Full Transaction Sample

The limited sample size of the buyer and seller samples precludes the inclusion of granular zip-code-by-quarter fixed effects in the pricing analysis. Consequently, the estimated relationship between consumer confidence and transaction prices may partly reflect unobserved local price dynamics not absorbed by COROP-region, city-size category and year–quarter fixed effects. To address this concern, we implement a two-step robustness exercise that leverages the full



(a) Buyer sample



(b) Seller sample

Figure 5: Consumer Confidence and Transaction Prices Across Supply Constraint Thresholds. The figure reports estimates of Equation (3) using alternative thresholds to define supply-constrained municipalities. The x-axis shows the quantile of the developed-land share used as the threshold for the supply-constraint indicator. The y-axis plots the estimated coefficients on consumer confidence in supply-constrained markets.

universe of housing transactions to include more granular location fixed effects.

First, we take the residuals from the hedonic pricing model corresponding to Equation (2) estimated on all 2,053,706 transactions for which buyer and seller characteristics are observed, omitting confidence and replacing COROP-region and year–quarter fixed effects with zip-code-by-quarter fixed effects. The data contain 3,743 zip codes, with an average of 532 transactions per zip code. Second, we examine whether consumer confidence explains the residual component of prices in the buyer and seller samples. This approach conditions out zip-code-specific price levels and local time variation, allowing us to assess whether

Table 4: Consumer Confidence and Residual Transaction Prices

Dep. var: residual price	(1)	(2)
Consumer confidence (negative)	-0.006 (0.010)	0.002 (0.008)
Consumer confidence (positive)	0.017** (0.008)	0.012* (0.007)
Unconstrained market	0.015 (0.011)	0.008 (0.009)
Consumer confidence (negative) × unconstrained	-0.005 (0.017)	-0.005 (0.014)
Consumer confidence (positive) × unconstrained	-0.009 (0.014)	-0.017 (0.012)
IMR	0.011 (0.008)	0.042*** (0.010)
Intercept	-0.021 (0.019)	-0.084*** (0.021)
Observations	3,837	4,884
R^2	0.004	0.004

This table reports estimates from the second-stage pricing equation. The dependent variable is the residual from Equation 2, estimated excluding consumer confidence and including zip-code-by-quarter fixed effects. The second-stage regression relates this residual to consumer confidence and the Inverse-Mills ratio obtained from the first-stage selection model. Coefficients on positive and negative consumer confidence are interpreted relative to the neutral category. The buyer sample in column (1) includes 939 negative, 1,313 neutral, and 1,932 positive respondents; the seller sample in column (2) includes 1,402 negative, 1,672 neutral, and 2,362 positive respondents. Standard errors are reported in parentheses. All specifications include quarter (N = 64), COROP-region (N = 40), and city-size (N = 3) fixed effects. *p<0.1; **p<0.05; ***p<0.01.

confidence is related to price variation orthogonal to local price dynamics.

The results from the second-stage pricing regressions are reported in Table 4. Overall, the estimated patterns are similar from those obtained in the baseline specifications.

For buyers in column (1), positive confidence continues to be associated with higher transaction prices. The estimated effect is at 1.7% lower in magnitude compared to the baseline specification. Moreover, the Inverse-Mills ratio does not seem to affect prices once local price dynamics are conditioned out.

For sellers in column (2), we find a 1.2% price effect of positive confidence significant at the 10% level, compared with an estimate of 0.9% that was statistically insignificant in the baseline specification. The coefficient on the Inverse-Mills ratio is similar in magnitude and statistical significance to that in the baseline specification.

5.4 Results Across Alternative Samples

The main pricing specifications rely on the assumption that buyer confidence is most responsive in supply-constrained markets, while seller confidence is most responsive in supply-unconstrained markets. Motivated by this hypothesis, we consider three complementary samples: (i) buyers in supply-constrained markets combined with sellers in supply-unconstrained markets, (ii) the symmetric restriction combining sellers in supply-constrained markets with buyers in supply-unconstrained markets, and (iii) pooling buyers and sellers into a single sample. The pooled specification addresses the possibility that buyers and sellers assort on confidence, such that either measure may proxy for confidence at the transaction-pair level.

Table 5: Confidence, Market Participation, and Transaction Prices Across Alternative Samples

Panel A: Selection Model			
Dep. var: in sample (1/0)	(1)	(2)	(3)
Consumer confidence (negative)	0.890**	0.908**	0.911**
	(0.055)	(0.043)	(0.037)
Consumer confidence (positive)	1.037	1.061*	1.060**
	(0.036)	(0.034)	(0.027)
Pseudo R^2	0.087	0.070	0.083
Observations	171,003	171,143	185,736
Panel B: Hedonic Pricing Model			
Dep. var: log(transaction price)	(1)	(2)	(3)
Consumer confidence (negative)	0.007	-0.006	0.000
	(0.008)	(0.009)	(0.008)
Consumer confidence (positive)	0.022***	0.006	0.015**
	(0.007)	(0.007)	(0.006)
Unconstrained market			-0.024
			(0.021)
Consumer confidence (negative) × unconstrained			0.001
			(0.013)
Consumer confidence (positive) × unconstrained			-0.007
			(0.012)
IMR	-0.080***	-0.040*	-0.062***
	(0.015)	(0.022)	(0.012)
observations	4,244	4,795	8,782
R^2	0.783	0.757	0.751

This table reports estimates of Equation 1 in Panel (A) and Equation 3 in Panel (B). The dependent variable equals one if the respondent enters the market in Panel (A) and the log of the transaction price in Panel (B). Coefficients on positive and negative consumer confidence are interpreted relative to the neutral category. Column (1) includes 1,307 buyers in constrained markets and 3,488 sellers in unconstrained markets (1,180 negative, 1,501 neutral, and 2,114 positive respondents). Column (2) includes 2,595 buyers in unconstrained markets and 1,619 sellers in constrained markets (1,008 negative, 1,329 neutral, and 1,877 positive). Column (3) includes 4,953 sellers and 3,829 unique buyers and sellers (2,150 negative, 2,765 neutral, and 3,867 positive). Control variables, fixed effects, and clustering are identical to the main specification. Standard errors are clustered at the COROP-region level and reported in parentheses. Logit coefficients are interpreted as odds, calculated as $\exp(\hat{\alpha_1})$, and reflect changes in the latent propensity to enter in a transaction. *p<0.1; **p<0.05; ***p<0.01.

We estimate the selection model (Equation (1)) in Panel A and the hedonic pricing model (Equation (3)) in Panel B on each of these samples.

For sellers, the comparison group consists of other homeowners, while for buyers the comparison group consists of all survey respondents. This construction ensures that participation is evaluated relative to the appropriate pool of eligible non-participants. Consistent with the baseline analysis, positive confidence is a weak determinant of participation across all samples, while negative confidence is statistically significant across all samples likely driven by the share of buyers in each sample.

Panel B reports the corresponding pricing results. Column (1), which combines buyers in constrained markets with sellers in unconstrained markets, yields a statistically significant premium of approximately 2.2% for positive confidence, consistent with the baseline finding

that buyer confidence in constrained markets exhibits the strongest price effects. Column (2), which applies the symmetric restriction, shows no statistically significant effect of consumer confidence on transaction prices. Column (3) pools buyers and sellers and reveals a 1.5% price premium for positive respondents. One explanation could be that confidence primarily affects prices in supply-constrained markets, largely independent of whether it is measured on the buyer or seller side.

6 Conclusion

This paper studies the relation between consumer confidence, market participation, and transaction prices in housing markets. We document that consumer confidence strongly predicts buyer entry: among households facing the same aggregate economic conditions, households reporting negative confidence are substantially less likely to enter the market, while the entry response of households reporting positive confidence is comparatively modest. Selection therefore operates mainly through households opting out rather than through disproportionate entry by optimistic households. This is consistent with entry involving a discrete and highly leveraged investment with long-term financial commitments, particularly for first-time buyers. By contrast, seller participation responds only weakly to confidence. Sellers are already exposed to housing market risk, are typically less financially constrained, and face a range of motives largely orthogonal to confidence, limiting the responsiveness of selling decisions to fluctuations in beliefs. As a result, selling decisions respond little to fluctuations in beliefs, generating a pronounced asymmetry between buyers and sellers on the participation margin.

The asymmetry extends to the price margin. Conditional on participation, positive buyers pay higher transaction prices, whereas seller confidence has no economically meaningful effect on prices. These price effects are confined to supply-constrained municipalities, indicating that belief heterogeneity among buyers matters most where competition for housing is most fierce. In such environments, cross-sectional differences in buyers willingness to pay are more likely to be reflected in transaction prices, even when housing characteristics, participant attributes, and selection into the market are held constant.

The main implication is that the beliefs of market participants differ systematically from those of the broader population. As a result, observed outcomes reflect asymmetric selection into participation between buyers and sellers. Conditional on participation, otherwise comparable marginal buyers are willing to pay higher prices. The direct consequence

is that belief heterogeneity affects housing market outcomes both through the composition of participants and through differences in willingness to pay among searching buyers, even when housing characteristics, buyer and seller attributes, and selection into the market are held constant.

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A Appendix

A.1 The Dutch Consumer Confidence Survey

Survey responses are recorded on either three- or five-point Likert scales, with an additional "don't know" option. An English translation of the survey instrument, presented in the original question order, is reported in Section A.1; the original Dutch questionnaire is available from Statistics Netherlands[6].

CBS defines three indicators based on these responses. Individual responses are first mapped into a numerical scale: negative responses (i.e., "deteriorated" or "unfavorable") are assigned a value of -100, neutral responses (i.e., "remained the same" or "don't know") are assigned a value of 0, and positive responses (i.e., "improved" or "favorable") are assigned a value of 100. The *willingness to consume* indicator is the average of Q1, Q2, and Q9. The *economic climate* indicator is the average of Q3 and Q4. *Consumer confidence* is defined as the average across all five questions.

A.1.1 Survey Instrument

Q3 What is your opinion of the general economic situation in the Netherlands over the past 12 months?
It has:

1. Improved a lot
2. Improved somewhat
3. Remained the same
4. Deteriorated somewhat
5. Deteriorated a lot

Don't know

Q4 What do you expect for the general economic situation in the Netherlands over the next 12 months?
It will:

1. Improve a lot
2. Improve somewhat
3. Remain the same
4. Deteriorate somewhat
5. Deteriorate a lot

Don't know

[Questions omitted for brevity]

[6] https://www.cbs.nl/nl-nl/achtergrond/2017/16/vragenlijst-cco-2017

Q1 What is your opinion of the financial situation of your household over the past 12 months?

It has:

1. Improved a lot
2. Improved somewhat
3. Remained the same
4. Deteriorated somewhat
5. Deteriorated a lot

Don't know

[Questions omitted for brevity]

Q2 What do you expect for the financial situation of your household over the next 12 months?

It will:

1. Improve a lot
2. Improve somewhat
3. Remain the same
4. Deteriorate somewhat
5. Deteriorate a lot

Don't know

Q9 Considering the general economic situation, do you think it is a favorable or unfavorable time for major purchases, such as furniture, electronics, etc.?

1. A favorable time
2. Neither a favorable nor an unfavorable time
3. An unfavorable time

Don't know

[Questions omitted for brevity]

A.2 Sensitivity of the IMR to Alternative Selection and Outcome Specifications

Table 6 reports estimates of Equation (3) including an Inverse-Mills ratio (IMR) constructed from alternative specifications of the selection equation (Equation (4)). Panel A presents results for the buyer sample and Panel B for the seller sample. Throughout, we focus on the coefficient on the IMR, as the estimated effects of negative and positive consumer confidence remain stable across all specifications.

Column (1) reports the baseline specification estimated on the restricted sample with complete information at both the survey date τ and the transaction date t, corresponding to

column (5) in Table 3. This serves as the benchmark against which alternative constructions of the IMR are compared.

In column (2), we omit the exclusion restriction based on marital status. Identification of the selection correction therefore relies on the functional form of the probit model and on variation in predetermined individual and household characteristics measured at τ. The magnitude of the IMR coefficient decreases modestly in the buyer sample and increases modestly in the seller sample, relative to the baseline. This indicates that marital status contributes additional identifying variation, but is not the main source of identification.

Column (3) restricts the selection equation to consumer confidence and fixed effects. This specification assesses whether confidence, together with coarse differences in participation rates across time and space, is sufficient to characterize selection. The resulting IMR differs from the baseline in both panels, indicating that consumer confidence alone does not adequately capture the selection process and that additional household-level characteristics are informative for participation.

Column (4) further restricts the selection equation to fixed effects only. In this case, identifying variation is limited to differences in average participation rates across time and space, combined with the nonlinearity of the probit link function, which carries through to the construction of the IMR. In the buyer sample, the estimated IMR remains negative and of similar magnitude to the baseline, albeit less precisely estimated. In the seller sample, by contrast, the IMR becomes large, negative, and statistically significant, in contrast to the positive coefficient obtained in the baseline specification. This indicates that fixed effects and functional-form variation alone do not provide a stable characterization of the selection process for sellers.

In column (5), we augment the baseline selection specification with changes in household income, wealth, and household size between the survey date τ and the transaction date t. This assesses whether the IMR proxies for observable changes between both dates. In both panels, the magnitude of the IMR decreases relative to the baseline, while the qualitative pattern remains unchanged.

Finally, column (6) includes reported purchase intention within two years as an additional control in the selection equation. This variable is a strong predictor of subsequent participation and may proxy for latent transaction propensity. Its inclusion has only a limited effect on the estimated IMR, indicating that the selection correction is not driven by this proximate measure of participation.

Taken together, the results indicate that the IMR is robust across a range of alternative

specifications of the selection equation once household-level controls are included. Omitting the exclusion restriction based on marital status, or augmenting the selection equation with changes in income, wealth, household size, or purchase intention, leaves the qualitative pattern of the IMR largely unchanged. By contrast, the IMR becomes less stable in specifications that omit household-level controls altogether, either by restricting the first stage to consumer confidence and fixed effects or to fixed effects only. This instability is most pronounced in the seller sample.

Table 6: Sensitivity of the IMR to Alternative Specifications

Dep. var: log(transaction price)	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Buyer Sample						
IMR	-0.078***	-0.071***	-0.018	-0.080***	-0.069***	-0.077***
	(0.019)	(0.021)	(0.026)	(0.043)	(0.019)	(0.020)
Consumer confidence (negative)	0.000	-0.0007	-0.004	-0.006	0.001	0.0006
	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)
Consumer confidence (positive)	0.028***	0.028***	0.027***	0.029***	0.028***	0.028***
	(0.011)	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)
Unconstrained market	0.001	0.001	-0.001	0.000	0.001	0.001
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Consumer confidence (negative) × unconstrained	-0.009	-0.009	-0.010	-0.010	-0.011	-0.009
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Consumer confidence (positive) × unconstrained	-0.032	-0.031	-0.031	-0.031	-0.032	-0.031
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Change in household income					-0.011***	
					(0.005)	
Change in net household wealth					0.000	
					(0.000)	
Change in household size (decreased)					0.032*	
					(0.017)	
Change in household size (increased)					-0.002	
					(0.013)	
Intended home purchase						0.012
						(0.008)
Observations	3,913	3,913	3,913	3,905	3,913	3,913
R^2	0.772	0.772	0.722	0.772	0.773	0.773
Panel B: Seller Sample						
IMR	0.054***	0.063***	0.065	0.069	0.043**	0.055***
	(0.019)	(0.020)	(0.039)	(0.042)	(0.021)	(0.019)
Consumer confidence (negative)	-0.011	-0.011	-0.007	-0.010	-0.011	-0.011
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Consumer confidence (positive)	0.009	0.010	0.003	0.007	0.009	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)

Continued on next page

Dep. var: log(transaction price)	(1)	(2)	(3)	(4)	(5)	(6)
Unconstrained market	-0.041*	-0.041*	-0.042*	-0.041*	-0.041*	-0.041*
	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)
Consumer confidence (negative) × unconstrained	0.017	0.017	0.016	0.016	0.017	0.017
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Consumer confidence (positive) × unconstrained	0.009	0.008	0.009	0.009	0.008	0.009
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Change in household income					-0.001***	
					(0.000)	
Change in net household wealth					0.000	
					(0.000)	
Change in household size (decreased)					0.032**	
					(0.014)	
Change in household size (increased)					-0.010	
					(0.009)	
Intended home purchase (Yes)						-0.006
						(0.006)
Observations	4,962	4,962	4,962	4,960	4,962	4,962
R^2	0.771	0.771	0.771	0.772	0.771	0.771

This table reports estimates of Equation (3) using alternative constructions of the Inverse-Mills ratio (IMR), and additional controls included in columns (4) and (5). Panel A presents results for the buyer sample and Panel B for the seller sample. Column (1) reproduces the baseline specification from column (5) of Table 3. All specifications, variable definitions, and fixed effects are identical to those in the main table. The dependent variable is the log(transaction price). The change in household income and net wealth represents the corresponding level at the transaction date divided by the level at the survey date. The change in household size is compared against no change between the transaction and survey date. Intended home purchase is compared against respondents who did not intended a home purchase. Standard Errors are clustered at the COROP-region, and presented in parentheses. The Wald (constrained) statistic tests the joint null hypothesis $H_0^{(d=0)} : \nu_{\text{neg}} = \nu_{\text{pos}} = 0$. The Wald (unconstrained) statistic tests the joint null hypothesis $\nu_{\text{neg}} + \rho_{\text{neg}} = 0$ and $\nu_{\text{pos}} + \rho_{\text{pos}} = 0$. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.

B Additional Figures

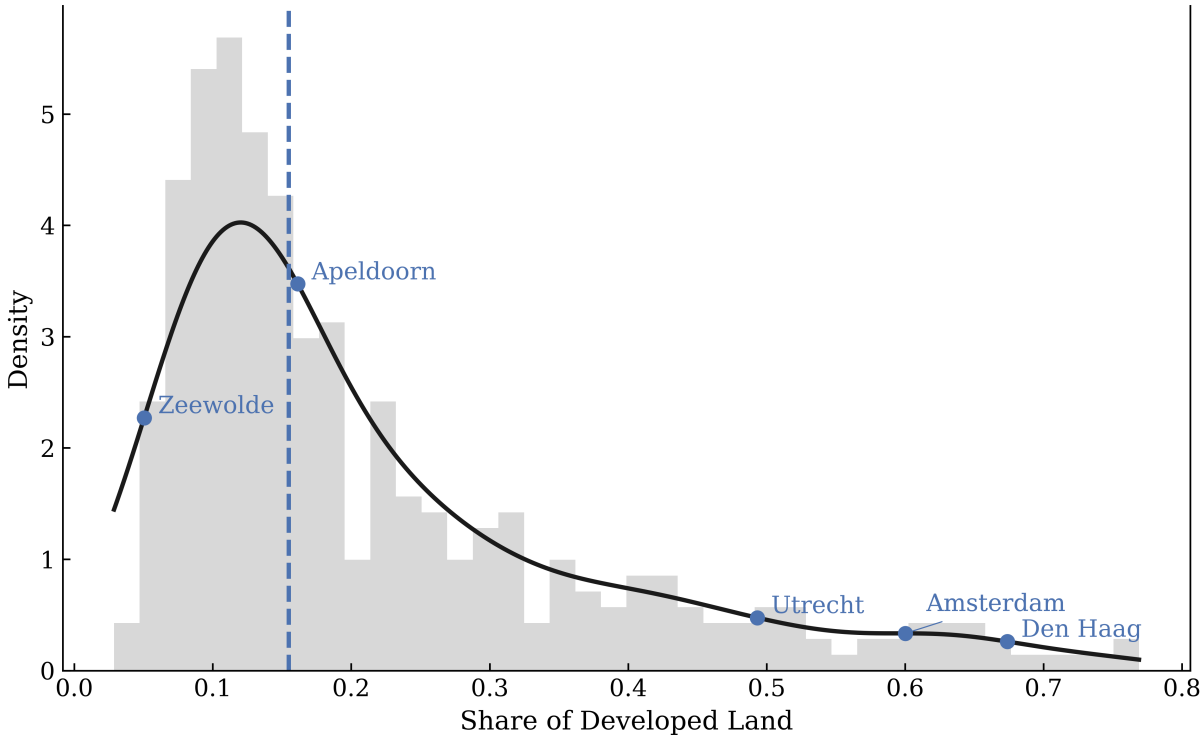


Figure B.1: Distribution of Developed Land Shares. This figure shows the distribution of developed land shares across municipalities. The dashed vertical line indicates the median developed land share. The supply-constraint indicator equals one if the developed land share is above the median.

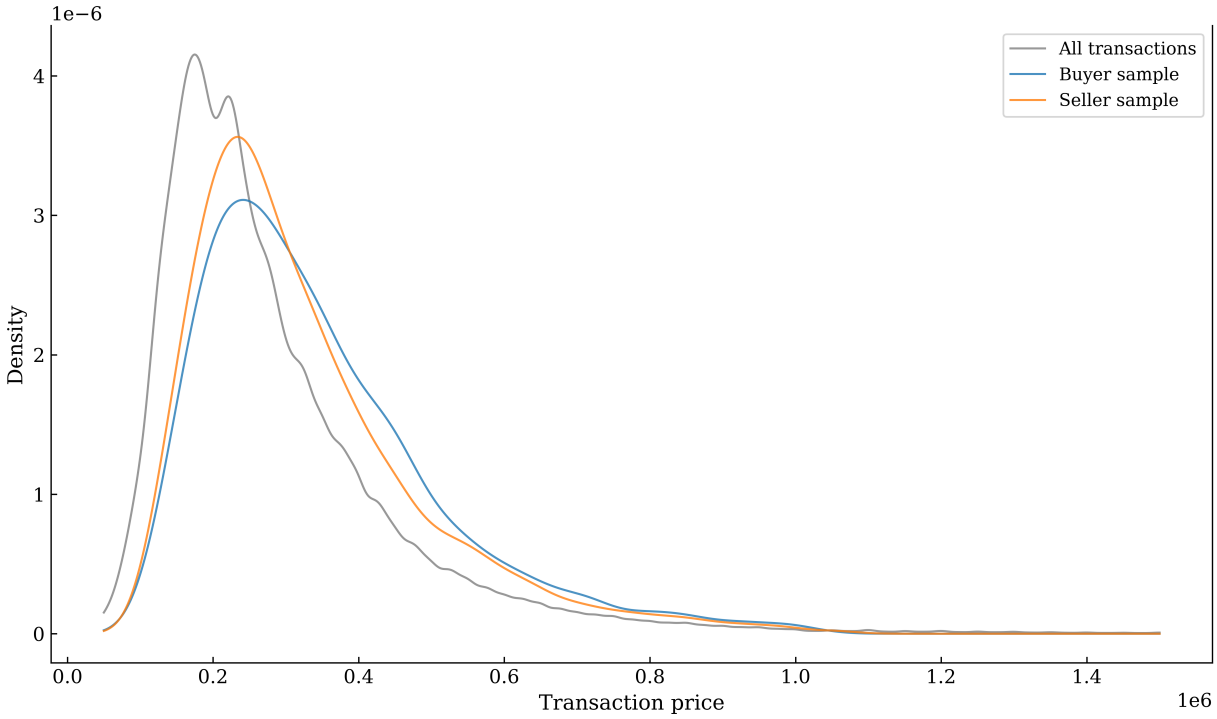
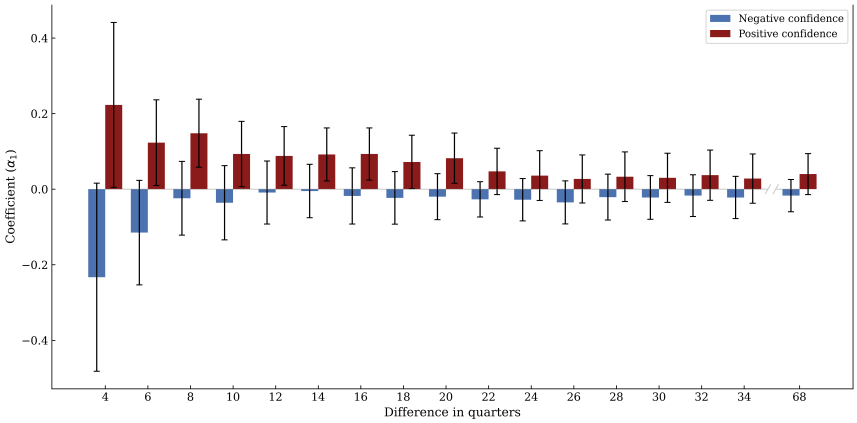
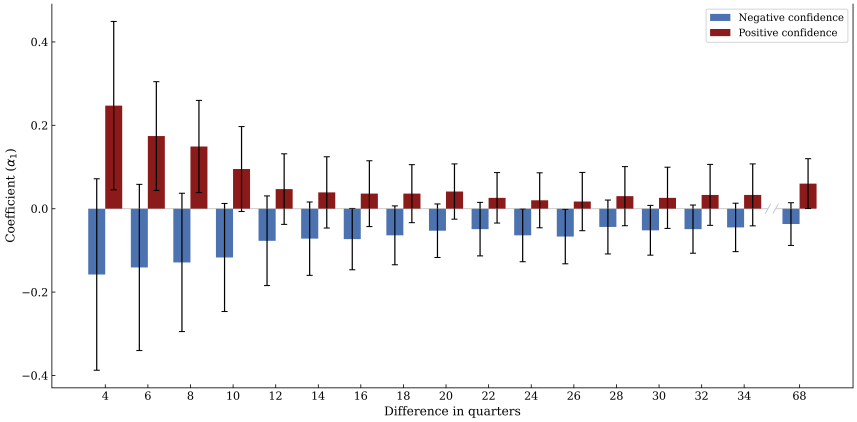


Figure B.2: Distribution of Transaction Prices. The figure shows the distribution of transaction prices for all transactions (gray), the buyer sample (blue), and the seller sample (orange).

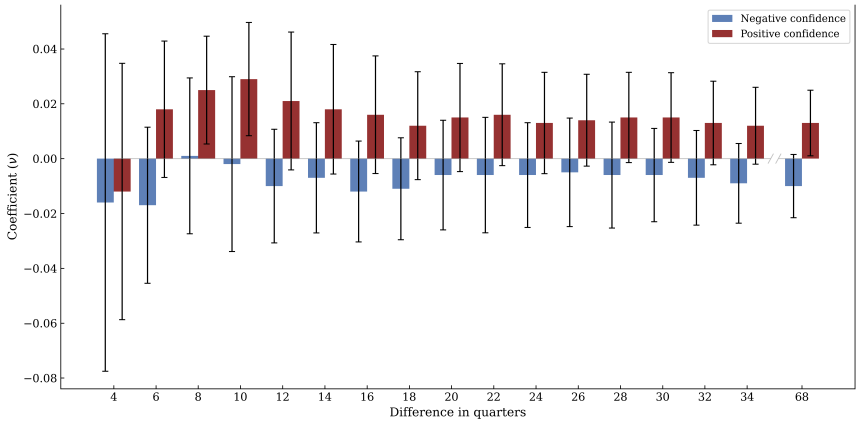


(a) Buyer sample

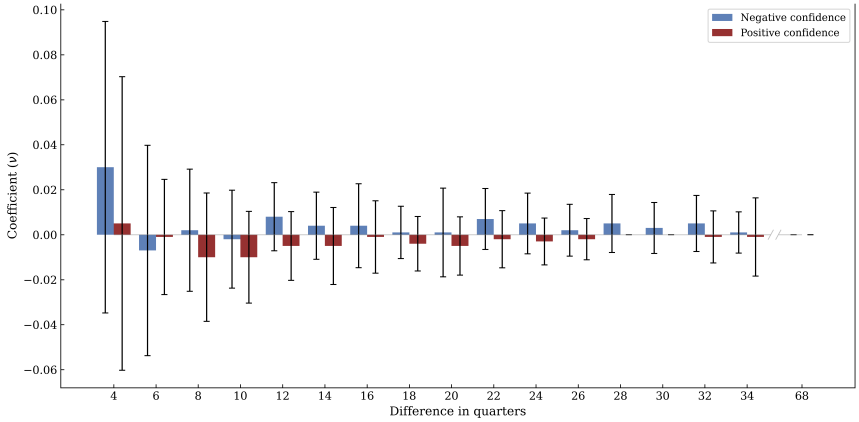


(b) Seller sample

Figure B.3: Market Participation and Post-Transaction Confidence. Equation (1) is estimated for analysis windows that expand in two-quarter increments omitting the first two quarters. The x-axis indicates the maximum allowable time difference in quarters between the survey response and the transaction date. The y-axis plots the estimated coefficients for positive and negative consumer confidence compared to the neutral category.



(a) Buyer sample



(b) Seller sample

Figure B.4: Transaction Prices and Post-Transaction Confidence. Equation (3) is estimated for analysis windows that expand in two-quarter increments omitting the first two quarters. The x-axis indicates the maximum allowable time difference in quarters between the survey response and the transaction date. The y-axis plots the estimated coefficients for positive and negative consumer confidence compared to the neutral category.

C Additional Tables

Table C.1: Consumer Confidence and Housing Market Participation: Full Selection Model Results

Dep. var: in sample (1/0)	(1)	(2)
Sample	Buyer sample (mean = 2.081%)	Seller sample (mean = 3.707%)
Consumer confidence (negative)	-0.195*** (0.055)	-0.048 (0.048)
Consumer confidence (positive)	0.022 (0.038)	0.046 (0.035)
Marital status (divorced)	0.275*** (0.062)	0.279*** (0.061)
Marital status (widowed)	0.262*** (0.093)	0.367*** (0.077)
Marital status (never married)	-0.010 (0.048)	-0.169*** (0.059)
Household income (20,000–30,000)	0.650*** (0.149)	-0.002 (0.104)
Household income (30,000–40,000)	1.07*** (0.125)	0.042 (0.093)
Household income (40,000–50,000)	1.16*** (0.138)	0.073 (0.079)
Household income (50,000–60,000)	1.30*** (0.132)	0.107 (0.096)
Household income (60,000–70,000)	1.34*** (0.147)	0.190** (0.089)
Household income (70,000–80,000)	1.26*** (0.178)	0.333*** (0.099)
Household income (80,000–90,000)	1.36*** (0.174)	0.296*** (0.100)
Household income (90,000–100,000)	1.33*** (0.191)	0.298** (0.120)
Household income ($\geq$ 100,000)	1.51*** (0.179)	0.335*** (0.114)
Net household wealth (0,000–10,000)	0.083 (0.075)	-0.210* (0.108)
Net household wealth (10,000–25,000)	0.194*** (0.056)	-0.154** (0.063)
Net household wealth (25,000–50,000)	0.089 (0.069)	-0.114 (0.078)
Net household wealth (50,000–100,000)	-0.018 (0.060)	-0.232*** (0.049)
Net household wealth (100,000–200,000)	-0.057 (0.059)	-0.394*** (0.050)
Net household wealth ($\geq$200,000)	0.042 (0.062)	-0.590*** (0.043)
Gender (female)	-0.093*** (0.028)	-0.156*** (0.026)
Education level (lower secondary)	0.278** (0.121)	0.090 (0.100)
Education level (upper secondary)	0.509*** (0.110)	0.217** (0.088)
Education level (higher education)	0.697*** (0.112)	0.388*** (0.082)
Education level (university)	0.735*** (0.131)	0.339*** (0.079)
Age (35–44)	-0.590*** (0.051)	-0.340*** (0.057)
Age (45–54)	-1.29*** (0.061)	-0.896*** (0.053)
Age (55–64)	-1.74*** (0.077)	-0.994*** (0.062)
Age (65–74)	-1.94*** (0.075)	-0.925*** (0.062)
Age ($\geq$75)	-2.78*** (0.114)	-0.805*** (0.097)
Household size (2)	0.040 (0.056)	-0.148** (0.059)
Household size (3)	-0.207*** (0.064)	-0.236*** (0.074)
Household size (4)	-0.416*** (0.074)	-0.345*** (0.078)
Household size (5)	-0.397*** (0.120)	-0.334*** (0.084)
Household size (6)	-0.384** (0.160)	-0.510*** (0.116)
Wald	11.650***	4.336**
Observations	185,739	131,419

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Dep. var: in sample (1/0)	(1)	(2)
Sample	Buyer sample (mean = 2.081%)	Seller sample (mean = 3.707%)
Pseudo R^2	0.114	0.056
Response quarter	Yes	Yes
COROP and city size	Yes	Yes
Respondent characteristics	Yes	Yes
Exclusion restrictions	Yes	Yes

This table reports the full results from Equation (1). Column (1) corresponds to Column (4) in Panel A of Table 2 (buyer sample), and Column (2) to Column (4) in Panel B of Table 2 (seller sample). All specifications, variable definitions, and fixed effects are identical to those in the main table. Standard Errors are clustered at the COROP-region, and presented in parentheses. The Wald statistic tests the joint null hypothesis $\alpha_{1,\text{neg}} = \alpha_{1,\text{pos}} = 0$. Logit coefficients are interpreted as odds, calculated as $\exp(\hat{\alpha_1})$, and reflect changes in the latent propensity to enter in a transaction. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.

Table C.2: Consumer Confidence and Transaction Prices: Full Results for the Buyer Sample

Dep. var: log(transaction price)	(1)	(2)
Consumer confidence (negative)	0.000 (0.012)	-0.007 (0.012)
Consumer confidence (positive)	0.028** (0.011)	0.028** (0.011)
Unconstrained market	0.001 (0.023)	-0.0005 (0.023)
Consumer confidence (negative) × unconstrained	-0.010 (0.018)	-0.010 (0.018)
Consumer confidence (positive) × unconstrained	-0.032 (0.020)	-0.031 (0.020)
IMR	-0.077*** (0.019)	
House characteristics		
Log(size)	0.513*** (0.030)	0.514*** (0.030)
Year of construction (1906–1929)	-0.047 (0.028)	-0.045 (0.028)
Year of construction (1930–1944)	-0.048* (0.028)	-0.047 (0.029)
Year of construction (1945–1959)	-0.087*** (0.030)	-0.087*** (0.031)
Year of construction (1960–1969)	-0.141*** (0.035)	-0.141*** (0.035)
Year of construction (1970–1979)	-0.129*** (0.028)	-0.128*** (0.028)
Year of construction (1980–1989)	-0.098*** (0.033)	-0.099*** (0.034)
Year of construction (1990–1999)	-0.023 (0.028)	-0.023 (0.029)
Year of construction (≥2000)	0.026 (0.033)	0.027 (0.033)
House type (corner)	0.123*** (0.022)	0.124*** (0.022)
House type (semi-detached)	0.172*** (0.029)	0.174*** (0.029)
House type (chained)	0.067*** (0.021)	0.069*** (0.021)
House type (detached)	0.308*** (0.026)	0.310*** (0.026)
Respondent characteristics (buyer)		
Household income (20,000–30,000)	-0.0005 (0.022)	0.004 (0.021)
Household income (30,000–40,000)	-0.019 (0.024)	-0.008 (0.024)
Household income (40,000–50,000)	0.041 (0.025)	0.054** (0.025)

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Dep. var: log(transaction price)	(1)	(2)
Household income (50,000–60,000)	0.060*** (0.021)	0.075*** (0.021)
Household income (60,000–70,000)	0.075*** (0.023)	0.089*** (0.023)
Household income (70,000–80,000)	0.089*** (0.033)	0.103*** (0.033)
Household income (80,000–90,000)	0.081** (0.035)	0.095** (0.035)
Household income (90,000–100,000)	0.105*** (0.030)	0.121*** (0.030)
Household income (≥100,000)	0.090*** (0.031)	0.107*** (0.031)
Net household wealth (0–10,000)	-0.010 (0.017)	-0.010 (0.018)
Net household wealth (10,000–25,000)	0.006 (0.010)	0.008 (0.011)
Net household wealth (25,000–50,000)	0.021 (0.013)	0.023* (0.014)
Net household wealth (50,000–100,000)	0.042*** (0.013)	0.043*** (0.013)
Net household wealth (100,000–200,000)	0.075*** (0.014)	0.075*** (0.014)
Net household wealth (≥200,000)	0.103*** (0.014)	0.104*** (0.014)
Household size (2)	0.004 (0.014)	0.005 (0.014)
Household size (3)	-0.007 (0.014)	-0.009 (0.014)
Household size (4)	0.015 (0.018)	0.006 (0.018)
Household size (5)	0.007 (0.019)	-0.004 (0.019)
Household size (6)	-0.125** (0.050)	-0.132*** (0.049)
Gender (male)	0.025*** (0.008)	0.023*** (0.008)
Age (35–44)	0.040** (0.015)	0.036** (0.015)
Age (45–54)	0.065*** (0.019)	0.044** (0.018)
Age (55–64)	0.045** (0.020)	0.008 (0.016)
Age (65–74)	0.080*** (0.023)	0.032* (0.016)
Age (≥75)	0.181*** (0.027)	0.123*** (0.020)
Education level (lower secondary)	0.027 (0.020)	0.035* (0.019)
Education level (higher secondary)	0.024 (0.021)	0.040* (0.021)
Education level (higher education)	0.062*** (0.022)	0.085*** (0.022)
Education level (university)	0.119*** (0.024)	0.144*** (0.023)
Counterpart characteristics (seller)		
Household income (20,000–30,000)	0.008 (0.015)	0.009 (0.015)
Household income (30,000–40,000)	0.019 (0.018)	0.021 (0.019)
Household income (40,000–50,000)	0.043* (0.021)	0.044** (0.021)
Household income (50,000–60,000)	0.036** (0.018)	0.038** (0.018)
Household income (60,000–70,000)	0.093*** (0.024)	0.095*** (0.024)
Household income (70,000–80,000)	0.084*** (0.021)	0.085*** (0.021)
Household income (80,000–90,000)	0.106*** (0.025)	0.108*** (0.025)
Household income (90,000–100,000)	0.102*** (0.025)	0.102*** (0.025)
Household income (≥100,000)	0.133*** (0.026)	0.134*** (0.026)
Net household wealth (0–10,000)	0.012 (0.019)	0.012 (0.019)
Net household wealth (10,000–25,000)	-0.033** (0.016)	-0.034** (0.016)
Net household wealth (25,000–50,000)	-0.013 (0.013)	-0.012 (0.013)
Net household wealth (50,000–100,000)	0.018 (0.015)	0.018 (0.014)
Net household wealth (100,000–200,000)	0.029** (0.011)	0.029** (0.011)
Net household wealth (≥200,000)	0.061*** (0.011)	0.061*** (0.011)
Household size (2)	-0.008 (0.011)	-0.008 (0.011)
Household size (3)	-0.002 (0.012)	-0.002 (0.012)

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Dep. var: log(transaction price)	(1)	(2)
Household size (4)	0.003 (0.015)	0.002 (0.015)
Household size (5)	0.005 (0.019)	0.005 (0.019)
Household size (6)	-0.053** (0.024)	-0.053** (0.024)
Gender (male)	0.019* (0.010)	0.018* (0.010)
Age (35–44)	-0.0008 (0.020)	-0.0009 (0.020)
Age (45–54)	0.008 (0.022)	0.009 (0.022)
Age (55–64)	0.026 (0.023)	0.027 (0.023)
Age (65–74)	0.018 (0.026)	0.020 (0.026)
Age (≥75)	0.042* (0.022)	0.042* (0.022)
Education level (lower secondary)	-0.019 (0.032)	-0.018 (0.032)
Education level (higher secondary)	0.005 (0.027)	0.007 (0.027)
Education level (higher education)	0.016 (0.028)	0.019 (0.028)
Education level (university)	0.051* (0.029)	0.053* (0.029)
Education level (unknown)	0.011 (0.027)	0.013 (0.026)
Wald (constrained)	9.063***	7.040**
Wald (unconstrained)	2.535	0.582
Observations	4,266	3,913
Pseudo R^2	0.772	0.772
Transaction quarter	Yes	Yes
COROP and city size	Yes	Yes
House characteristics	Yes	Yes
Buyer and seller characteristics	Yes	Yes

This table reports the full results from Equation (3). Column (1) and (2) correspond to Column (4) and (5) in Panel B of Table 3. All specifications, variable definitions, and fixed effects are identical to those in the main table. Year of construction is defined relative to properties built before 1906; house type relative to apartments; household income relative to the 0–20,000 category; net household wealth relative to households with negative wealth; household size relative to single-person households; age relative to the 0–34 category; and education level relative to individuals with primary education only. Counterpart characteristics refer to the head of household. The Wald (constrained) statistic tests the joint null hypothesis $H_0^{(d=0)} : \nu_{\text{neg}} = \nu_{\text{pos}} = 0$. The Wald (unconstrained) statistic tests the joint null hypothesis $\nu_{\text{neg}} + \rho_{\text{neg}} = 0$ and $\nu_{\text{pos}} + \rho_{\text{pos}} = 0$. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.

Table C.3: Consumer Confidence and Transaction Prices: Full Results for the Seller Sample

Dep. var: log(transaction price)	(1)	(2)
Consumer confidence (negative)	-0.011 (0.010)	-0.010 (0.010)
Consumer confidence (positive)	0.009 (0.008)	0.007 (0.008)
Unconstrained market	-0.041* (0.023)	-0.041* (0.023)
Consumer confidence (negative) × unconstrained market	0.017 (0.019)	0.016 (0.019)
Consumer confidence (positive) × unconstrained market	0.009 (0.015)	0.009 (0.015)
IMR	0.048** (0.019)	

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Dep. var: log(transaction price)	(1)	(2)
House characteristics		
Log(size)	0.462*** (0.040)	0.463*** (0.040)
Year of construction (1906–1929)	-0.055 (0.039)	-0.056 (0.039)
Year of construction (1930–1944)	-0.064 (0.047)	-0.064 (0.048)
Year of construction (1945–1959)	-0.132** (0.058)	-0.133** (0.058)
Year of construction (1960–1969)	-0.151** (0.059)	-0.152** (0.059)
Year of construction (1970–1979)	-0.135** (0.054)	-0.135** (0.054)
Year of construction (1980–1989)	-0.115** (0.056)	-0.115** (0.057)
Year of construction (1990–1999)	-0.033 (0.052)	-0.033 (0.052)
Year of construction (≥2000)	0.003 (0.062)	0.003 (0.062)
House type (corner)	0.134*** (0.018)	0.134*** (0.019)
House type (semi-detached)	0.209*** (0.021)	0.210*** (0.021)
House type (chained)	0.085*** (0.016)	0.085*** (0.016)
House type (detached)	0.339*** (0.020)	0.340*** (0.020)
Respondent characteristics (seller)		
Household income (20,000–30,000)	0.023 (0.015)	0.024 (0.015)
Household income (30,000–40,000)	0.044*** (0.016)	0.044*** (0.016)
Household income (40,000–50,000)	0.057*** (0.014)	0.057*** (0.014)
Household income (50,000–60,000)	0.064*** (0.017)	0.064*** (0.017)
Household income (60,000–70,000)	0.090*** (0.018)	0.089*** (0.018)
Household income (70,000–80,000)	0.106*** (0.023)	0.104*** (0.024)
Household income (80,000–90,000)	0.111*** (0.016)	0.110*** (0.016)
Household income (90,000–100,000)	0.133*** (0.021)	0.131*** (0.021)
Household income (≥100,000)	0.150*** (0.020)	0.148*** (0.021)
Net household wealth (0–10,000)	0.008 (0.022)	0.008 (0.022)
Net household wealth (10,000–25,000)	-0.040*** (0.013)	-0.039*** (0.013)
Net household wealth (25,000–50,000)	-0.008 (0.012)	-0.007 (0.012)
Net household wealth (50,000–100,000)	0.004 (0.013)	0.005 (0.013)
Net household wealth (100,000–200,000)	0.015 (0.009)	0.018* (0.009)
Net household wealth (≥200,000)	0.074*** (0.011)	0.080*** (0.010)
Household size (2)	0.019* (0.011)	0.022** (0.010)
Household size (3)	0.007 (0.014)	0.011 (0.014)
Household size (4)	0.031* (0.016)	0.037** (0.015)
Household size (5)	0.022 (0.016)	0.028* (0.015)
Household size (6)	0.009 (0.033)	0.016 (0.031)
Gender (male)	0.010 (0.008)	0.013* (0.007)
Age (35–44)	-0.006 (0.014)	-0.004 (0.013)
Age (45–54)	-0.013 (0.014)	-0.004 (0.013)
Age (55–64)	0.014 (0.014)	0.030** (0.012)
Age (65–74)	0.018 (0.018)	0.038** (0.015)
Age (≥75)	0.037 (0.023)	0.055** (0.021)
Education level (lower secondary)	0.039* (0.020)	0.039* (0.020)
Education level (higher secondary)	0.056*** (0.020)	0.054** (0.020)
Education level (higher education)	0.093*** (0.022)	0.087*** (0.023)
Education level (university)	0.130*** (0.028)	0.125*** (0.028)

Continued on next page

Dep. var: log(transaction price)	(1)	(2)
Counterpart characteristics (buyer)		
Household income (20,000–30,000)	0.002 (0.017)	0.001 (0.017)
Household income (30,000–40,000)	0.008 (0.019)	0.008 (0.019)
Household income (40,000–50,000)	0.022 (0.019)	0.022 (0.019)
Household income (50,000–60,000)	0.035* (0.019)	0.034* (0.019)
Household income (60,000–70,000)	0.054*** (0.016)	0.054*** (0.015)
Household income (70,000–80,000)	0.070** (0.027)	0.070** (0.027)
Household income (80,000–90,000)	0.080*** (0.023)	0.080*** (0.023)
Household income (90,000–100,000)	0.084*** (0.025)	0.084*** (0.025)
Household income (≥100,000)	0.098*** (0.026)	0.098*** (0.026)
Net household wealth (0–10,000)	-0.011 (0.011)	-0.011 (0.011)
Net household wealth (10,000–25,000)	0.012 (0.010)	0.011 (0.010)
Net household wealth (25,000–50,000)	0.030** (0.013)	0.030** (0.013)
Net household wealth (50,000–100,000)	0.026** (0.011)	0.026** (0.011)
Net household wealth (100,000–200,000)	0.053*** (0.009)	0.053*** (0.009)
Net household wealth (≥200,000)	0.048*** (0.009)	0.048*** (0.009)
Household size (2)	0.037*** (0.010)	0.037*** (0.010)
Household size (3)	0.040*** (0.011)	0.040*** (0.011)
Household size (4)	0.039*** (0.013)	0.040*** (0.013)
Household size (5)	0.033* (0.019)	0.034* (0.018)
Household size (6)	-0.021 (0.034)	-0.020 (0.034)
Gender (male)	0.018** (0.008)	0.018** (0.008)
Age (35–44)	0.044*** (0.009)	0.044*** (0.009)
Age (45–54)	0.080*** (0.009)	0.080*** (0.009)
Age (55–64)	0.070*** (0.013)	0.070*** (0.013)
Age (65–74)	0.087*** (0.017)	0.087*** (0.017)
Age (≥75)	0.162*** (0.019)	0.162*** (0.019)
Education level (lower secondary)	0.022 (0.018)	0.023 (0.019)
Education level (higher secondary)	0.037* (0.020)	0.038* (0.020)
Education level (higher education)	0.073*** (0.019)	0.074*** (0.019)
Education level (university)	0.138*** (0.021)	0.139*** (0.022)
Education level (unknown)	0.068*** (0.019)	0.069*** (0.019)
Wald (constrained)	3.561	4.015
Wald (unconstrained)	1.338	2.167
Observations	5,528	4,962
Pseudo R^2	0.767	0.771
Transaction quarter	Yes	Yes
COROP and city size	Yes	Yes
House characteristics	Yes	Yes
Buyer and seller characteristics	Yes	Yes

This table reports the full results from Equation (3). Column (1) and (2) correspond to Column (4) and (5) in Panel B of Table 3. All specifications, variable definitions, and fixed effects are identical to those in the main table. Year of construction is defined relative to properties built before 1906; house type relative to apartments; household income relative to the 0–20,000 category; net household wealth relative to households with negative wealth; household size relative to single-person households; age relative to the 0–34 category; and education level relative to individuals with primary education only. Counterpart characteristics refer to the head of household. The Wald (constrained) statistic tests the joint null hypothesis $H_0^{(d=0)} : \nu_{\text{neg}} = \nu_{\text{pos}} = 0$. The Wald (unconstrained) statistic tests the joint null hypothesis $\nu_{\text{neg}} + \rho_{\text{neg}} = 0$ and $\nu_{\text{pos}} + \rho_{\text{pos}} = 0$. The fixed effects are quarter (N = 64), COROP-region (N = 40) and city-size (N = 3). *p<0.1; **p<0.05; ***p<0.01.