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Algorithmic Price Forecasts and Supply Chain Frictions in Housing Markets

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ABSTRACT
Algorithmic price forecasts are now a routine feature of consumer decision environments, yet little is known about how they shape market dynamics beyond individual choice. This research examines how publicly visible housing price forecasts influence belief persistence and market adjustment. Using metro-level Zillow Home Value Index (ZHVI) data combined with national housing price trends from Federal Reserve Economic Data (FRED) spanning 2000–2025, we document an informational environment characterized by smooth national price narratives alongside highly heterogeneous local price dynamics. We argue that this structure allows algorithmic price forecasts to function as belief anchors, reinforcing seller expectations and delaying adjustment when local conditions diverge from national narratives. Descriptive evidence reveals substantial dispersion in local price growth across markets despite shared national regimes, highlighting systematic opportunities for forecast misalignment. We conceptualize housing inventory as an aggregate behavioral outcome reflecting collective decisions to wait rather than revise beliefs. By reframing algorithmic forecasts as active components of belief formation rather than passive information, this research advances understanding of how algorithmic transparency can generate persistent market frictions in consumer markets
Keywords: algorithmic price forecasts; consumer expectations; housing market; inventories

1. INTRODUCTION:

Algorithmic price forecasts have become a routine feature of consumer decision environments. From housing platforms and investment tools to labor marketplaces and credit scoring systems, consumers increasingly encounter numeric predictions that summarize past data and project future outcomes. These forecasts are often framed as objective, data-driven, and informationally superior, leading both consumers and policymakers to view algorithmic transparency as a mechanism for improving decision

quality and market efficiency. Yet growing evidence suggests that algorithmic forecasts may shape behavior in ways that extend beyond information provision, influencing belief formation, expectation persistence, and adjustment dynamics (Dietvorst et al., 2015; Logg et al., 2019).

This research examines how publicly visible algorithmic price forecasts shape the informational structure of markets, focusing on housing as a canonical context in which prices are salient, stakes are high, and beliefs evolve slowly. Housing markets are particularly well suited for studying belief formation because sellers observe both local market signals and widely shared national price narratives. In recent years, automated

valuation models (AVMs), such as Zillow's Zestimate and related indices, have become highly salient reference points for homeowners, shaping perceptions of value even when transactions do not occur. These forecasts persist over time and are updated incrementally, making them especially powerful anchors in uncertain environments.

Classic work on anchoring and adjustment demonstrates that numeric reference points exert durable influence on judgment, even when individuals recognize their imprecision (Tversky & Kahneman, 1974). More recent research on algorithmic advice shows that consumers frequently overweight algorithmic outputs relative to human judgment, particularly when algorithms are perceived as objective or unbiased (Logg et al., 2019). At the same time, research on loss aversion and belief persistence in housing markets shows that sellers are reluctant to revise expectations downward, often choosing to wait rather than accept prices below salient benchmarks (Genesove & Mayer, 2001; Anenberg, 2012). Together, these literatures suggest that algorithmic price forecasts may function not merely as informational inputs, but as belief anchors that stabilize expectations over time.

Despite growing interest in algorithmic decision aids, little consumer research has examined how algorithmic forecasts operate at the market level, shaping shared expectations and aggregate outcomes. Most studies focus on individual reliance or accuracy perceptions, leaving open the question of how persistent algorithmic signals interact with heterogeneous local conditions. In housing markets, this interaction is particularly consequential. While national price indices and platform-provided forecasts evolve slowly and episodically, local housing markets are subject to idiosyncratic demand shocks, supply constraints, and regional economic conditions.

This creates the potential for divergence between shared national narratives and local price dynamics.

The present research investigates whether this divergence is a structural feature of housing markets and whether it persists across national price regimes. Rather than testing causal effects on inventory or transaction outcomes, the study focuses on documenting the informational environment in which beliefs are formed. Using publicly available national and metro-level Zillow Home Value Index (ZHVI) data spanning 2000–2025, we examine whether local housing price dynamics exhibit substantial dispersion, whether national price expectations evolve in distinct regimes, and whether local heterogeneity persists across these regimes. Demonstrating these structural conditions is a necessary

step for understanding how algorithmic price forecasts can reinforce belief persistence and delay adjustment.

By reframing algorithmic forecasts as components of the informational environment rather than exogenous treatments, this research advances consumer theory on belief formation in markets. It contributes to a growing literature that views markets not only as aggregations of preferences, but as collective belief systems shaped by salient information cues. In doing so, the study bridges micro-level research on anchoring and judgment under uncertainty with macro-level patterns in market dynamics.

Conceptual Framework and Hypotheses

We propose that algorithmic price forecasts function as shared belief anchors that coexist with heterogeneous local market conditions. When national price narratives are smooth and persistent, while local price dynamics vary widely, sellers face an environment in which belief updating may lag behind local fundamentals. This framework leads to the following hypotheses, which are directly testable using the available data.

H1: Monthly metro-level housing price growth rates exhibit substantial dispersion across markets within the same time period.

H2: National housing price expectations evolve in distinct regimes characterized by extended periods of appreciation, contraction, and recovery rather than continuous adjustment.

H3: Dispersion in local housing price growth persists across different national housing price regimes.

H4: Periods of national price deceleration coincide with increased salience of local price divergence relative to national trends.

Together, these hypotheses test whether the structural conditions necessary for belief anchoring and forecast misalignment are present in housing markets. Establishing these conditions provides a foundation for understanding how algorithmic price forecasts may influence belief persistence and, ultimately, market adjustment.

Data and Methods

Data Sources and Sample

The analysis draws on publicly available housing price data from Zillow Research and the Federal Reserve Bank of St. Louis. The primary measure of housing prices is the Zillow Home Value Index (ZHVI), which represents a smoothed, seasonally adjusted estimate of typical home values and is widely used in both academic and applied research. We combine two ZHVI series: (1) a national index capturing aggregate housing price trends in the United States, and (2) metro-level indices capturing local housing price dynamics across metropolitan statistical areas.

The sample period spans January 2000 through December 2025, providing coverage across multiple housing market cycles, including the early-2000s expansion, the Great Recession, the post-2012 recovery, the COVID-era price acceleration, and the subsequent deceleration. This long time horizon allows for the identification of distinct expectation regimes and the examination of local price dispersion across varying macroeconomic conditions.

All data are monthly. Observations with missing values are excluded. Because the analysis focuses on distributional properties and structural patterns rather than individual market trajectories, all available metro-month observations are retained.

Measures

National housing price expectations:

National price expectations are operationalized using the national ZHVI series. This measure captures the evolution of widely shared housing price narratives and serves as a proxy for the algorithmically summarized national price signal that is salient to consumers and sellers.

Local housing price dynamics:

Local price dynamics are measured using monthly growth rates of metro-level ZHVI. Monthly growth is computed as the log difference of the index between consecutive months. This transformation captures relative price changes and facilitates comparison across markets with different price levels.

Local price dispersion:

Dispersion in local housing price dynamics is assessed using the cross-sectional distribution of metro-level monthly ZHVI growth rates. Dispersion is evaluated descriptively through distributional analysis, including the spread and shape of the growth rate distribution within and across time periods.

Empirical Strategy

The empirical strategy is designed to document the informational structure in which housing market participants form beliefs, rather than to estimate causal effects of algorithmic forecasts on downstream outcomes. Algorithmic price forecasts are treated as salient belief signals embedded in the market environment, not as exogenous treatments. To test the hypotheses, the analysis proceeds in three steps.

First, we examine the distribution of monthly metro-level ZHVI growth rates across the full sample to assess the degree of cross-market dispersion (H1). This step establishes whether local housing price dynamics vary substantially across markets at a given point in time.

Second, we analyze the national ZHVI time series to identify regime-like behavior in aggregate housing price expectations (H2). Visual inspection and descriptive trends are

used to characterize extended periods of appreciation, contraction, and recovery, consistent with the notion that national price narratives evolve episodically rather than continuously.

Third, we evaluate whether dispersion in local price growth persists across national price regimes (H3) and whether periods of national price deceleration coincide with heightened salience of local divergence (H4). This is assessed by examining the stability of cross- sectional dispersion in metro-level growth rates during different phases of the national housing price cycle.

All analyses are descriptive and distributional in nature. The goal is to establish whether the structural conditions implied by the conceptual framework (shared national signals combined with heterogeneous local dynamics) are present in the data.

Scope and Interpretation

The analyses are not intended to establish causal relationships between algorithmic forecasts and specific market outcomes such as inventory accumulation or transaction speed. Instead, the results are interpreted as evidence regarding the informational environment and belief structure of housing markets. Demonstrating the coexistence of persistent national price narratives and heterogeneous local price dynamics is a necessary condition for belief anchoring and forecast misalignment to influence market behavior.

By focusing on structural consistency with the proposed conceptual framework, the empirical approach aligns with prior consumer research that uses large-scale archival data to motivate theory development and identify mechanisms operating at the market level.

Results

The results document the structural features of housing price dynamics that define the informational environment in which algorithmic price forecasts operate. Consistent with the study's theory-building orientation, the analyses focus on cross-market dispersion, national price regimes, and the persistence of local heterogeneity rather than on causal estimation of downstream market outcomes.

Descriptive Statistics

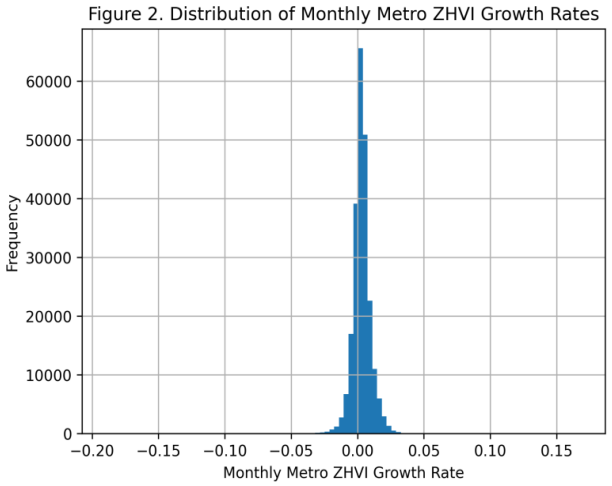
Table 1 reports descriptive statistics for national and metro-level ZHVI measures over the January 2000–December 2025 sample period. The national ZHVI series exhibits relatively smooth long-run growth punctuated by distinct turning points, while metro- level indices display substantially greater variability. This contrast underscores the difference between aggregate price narratives and localized market conditions.

Statistic	Metro ZHVI ($)	National ZHVI ($)
Count	229,974	312
Mean	$183,677.85	$211,848.69
SD	$121,519.20	$68,125.03
Minimum	$42,616.75	$120,438.32
25th percentile	$110,379.55	$164,008.04
Median	$148,732.34	$192,296.77
75th percentile	$213,399.36	$237,693.63
Maximum	$1,576,510.18	$357,884.07

Table 1: Distribution of Metro-Level and National Housing Price Indices (ZHVI), 2000–2025

Dispersion in Local Housing Price Dynamics (H1)

Figure 2 presents the distribution of monthly metro-level ZHVI growth rates across all metropolitan areas. The distribution exhibits substantial dispersion around zero, with a wide spread of both positive and negative growth rates within the same time periods. Although the modal growth rate clusters near zero, the distribution features fat tails, indicating that a nontrivial share of markets experience sharp appreciation or depreciation even when aggregate conditions appear stable.



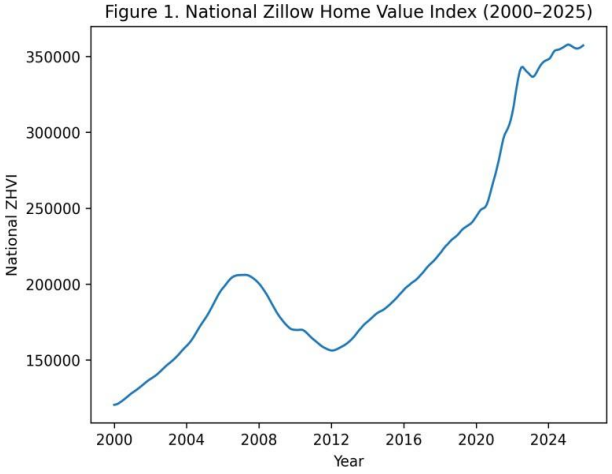
This pattern supports H1, which predicts that local housing price dynamics exhibit substantial cross-market dispersion. The observed heterogeneity indicates that sellers in different markets face meaningfully different local price signals despite exposure to the same national price information.

Regime-Like Behavior in National Price Expectations (H2)

Figure 1 plots the national ZHVI from 2000 to 2025. The series displays clear regime- like behavior, including a sustained appreciation phase in the early 2000s, a pronounced contraction during the Great Recession, a gradual recovery beginning around 2012, a sharp acceleration during 2020–2022, and a subsequent deceleration. These extended phases suggest that national

housing price expectations evolve episodically rather than through continuous, high-frequency adjustment.

Figure 1. National Zillow Home Value Index (2000–2025)



This pattern supports H2, which predicts that national housing price expectations follow distinct regimes. The persistence of these regimes implies that shared price narratives remain salient over extended periods, reinforcing stable reference points for belief formation.

Persistence of Local Dispersion Across National Regimes (H3)

The dispersion documented in Figure 2 is not confined to a single phase of the national housing cycle. Instead, wide variation in local price growth persists across periods of national appreciation, contraction, and recovery. Even during regimes characterized by strong national growth, some metropolitan areas experience stagnation or decline, while others appreciate rapidly.

This persistence supports H3, which predicts that local price dispersion remains a structural feature of housing markets across national price regimes. The coexistence of shared national narratives and heterogeneous local dynamics indicates that divergence is not merely a transient response to macroeconomic shocks.

National Deceleration and Salience of Local Divergence (H4)

Periods of national price deceleration, as observed following the Great Recession and after the 2020–2022 acceleration, coincide with increased visibility of local divergence. As national growth slows or reverses, differences in metro-level price dynamics become more pronounced relative to the aggregate trend. This shift increases the informational contrast between national price narratives and local market conditions.

This pattern is consistent with H4, which predicts that local divergence becomes more salient during periods of national price deceleration. While the analysis does not directly measure belief updating, the results indicate that the informational conditions under which belief persistence and forecast misalignment may emerge are particularly pronounced during these periods.

Summary

Taken together, the results establish three key empirical regularities. First, local housing price dynamics exhibit substantial dispersion across markets. Second, national housing price expectations evolve in distinct, persistent regimes. Third, local heterogeneity persists across these regimes and becomes more salient during periods of national deceleration. These findings document the informational structure necessary for algorithmic price forecasts to function as belief anchors, reinforcing shared expectations even as local conditions diverge.

Discussion

This research examines the informational structure of housing markets to understand how algorithmic price forecasts may shape belief formation and persistence. Rather than testing causal effects on downstream outcomes, the study documents three structural regularities: substantial dispersion in local housing price dynamics, regime-like evolution in national price expectations, and the persistence of local heterogeneity across national regimes. Together, these findings provide empirical grounding for the view that algorithmic price forecasts function as shared belief anchors within markets characterized by heterogeneous local conditions.

Algorithmic Forecasts as Components of the Informational Environment A central contribution of this work is to shift attention from algorithmic accuracy to algorithmic salience. Prior consumer research on algorithmic advice focuses primarily on reliance, trust, and error tolerance at the individual level. The present findings extend this literature by showing how algorithmic forecasts operate as ambient information cues embedded in the market environment. National housing price indices and platform- provided valuations evolve slowly and persistently, creating stable reference points that shape expectations over time.

The coexistence of smooth national price narratives and dispersed local price dynamics suggests that consumers are routinely exposed to information that is simultaneously coherent and incomplete. In such environments, belief updating may lag behind local fundamentals, not because consumers ignore information, but because salient, widely shared signals dominate interpretation. This perspective aligns with classic anchoring and adjustment theory while extending it to market-level belief systems.

Belief Persistence and Market-Level Heterogeneity

The persistence of local price dispersion across national regimes has important implications for understanding belief persistence. If local deviations were short-lived or synchronized with national cycles, belief updating would be relatively straightforward. Instead, the results indicate that local heterogeneity is a structural feature of housing markets. This structure creates ongoing opportunities for misalignment between shared expectations and local conditions.

From a consumer research perspective, this finding underscores that belief persistence is not merely an individual bias, but can emerge from the interaction between shared informational signals and heterogeneous environments. Markets thus become arenas in

which collective belief dynamics unfold, even in the absence of explicit coordination among actors.

Expectation Regimes and State Dependence

The regime-like behavior of national housing price expectations highlights the importance of state dependence in belief formation. During periods of sustained national appreciation, local divergence may be discounted or rationalized as temporary. In contrast, during periods of national deceleration, divergence becomes more salient, potentially increasing uncertainty and tension between beliefs and local signals.

This state dependence suggests that the behavioral influence of algorithmic forecasts is not constant over time. Instead, their role as belief anchors may be particularly consequential during market transitions, when consumers seek stable reference points amid changing conditions. This insight contributes to a growing literature on how macro- level narratives shape micro-level judgment and decision-making.

Implications for Consumer Research

More broadly, this research extends consumer research into the domain of market-level outcomes shaped by belief systems. By focusing on informational structure rather than transactions alone, the study highlights how shared signals can influence coordination, waiting behavior, and adjustment dynamics. Inventory accumulation and delayed market clearance (though not directly tested here) can be understood as downstream manifestations of the belief persistence documented in this analysis.

The findings also have implications beyond housing. Algorithmic forecasts are increasingly embedded in consumer-facing platforms across domains such as labor markets, financial investing, and digital marketplaces. In each case, consumers encounter persistent, salient predictions that summarize complex environments. Understanding how these signals shape belief formation is critical for evaluating the broader consequences of algorithmic transparency.

Limitations and Future Research

The study has several limitations that suggest directions for future research. First, the analysis is descriptive and does not establish causal effects of algorithmic forecasts on specific market outcomes. Future work incorporating listing data, inventory measures, or experimental manipulations of forecast salience could directly test the downstream consequences of belief anchoring. Second, while the housing market provides a rich and consequential context, additional research is needed to examine whether similar informational structures operate in other consumer domains.

Finally, future studies might explore how forecast design, uncertainty communication, or alternative framing strategies influence belief persistence. If algorithmic forecasts function as anchors, subtle design choices may meaningfully affect how consumers interpret and update beliefs over time.

2. CONCLUSION

This research examines the informational structure of housing markets to understand how algorithmic price forecasts shape belief formation at scale. Using national and metro- level housing price data spanning 2000–2025, the study documents three core features of the market environment: persistent dispersion in local price dynamics, regime-like evolution in national housing price expectations, and the coexistence of shared national narratives with heterogeneous local conditions. Together, these features establish the structural conditions under which algorithmic price forecasts can function as belief anchors.

By shifting focus from transactional outcomes to informational structure, the study advances consumer research on algorithmic decision environments. Rather than treating algorithmic forecasts as neutral summaries of information, the findings suggest that they operate as salient reference points that stabilize expectations over time. In markets characterized by slow-moving national narratives and localized variability, belief updating may lag behind local fundamentals even in the absence of explicit biases or strategic behavior.

The contribution of this research lies in reframing market frictions as emerging from belief persistence shaped by shared informational cues. Although the analysis does not test downstream outcomes such as inventory accumulation or market clearance, it provides a necessary foundation for understanding how such outcomes may arise. By conceptualizing housing markets as collective belief systems, the study connects micro- level theories of judgment and anchoring with macro-level market dynamics.

As algorithmic forecasts become increasingly embedded in consumer-facing platforms, understanding their broader behavioral consequences is essential. The findings caution that greater transparency does not necessarily imply faster adjustment or improved efficiency. Instead, persistent and salient forecasts may reinforce shared expectations, shaping market dynamics in subtle but consequential ways. Future research can build on this foundation by directly examining how belief anchoring translates into behavioral and market outcomes across diverse domains.

Ethics Statement

This study did not involve human participants, animals, or sensitive personal data. As such, no ethics approval or informed consent was required. The analyses relied exclusively on publicly available, non-identifiable secondary datasets from Zillow and the Federal Reserve Economic Data (FRED).

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