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Housing Market Dynamics and Macroeconomic Stability are Based on Agent's Operations Research Decision-Making Methodology

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Research Paper

Abstract*: The interplay between the housing market and the macro-economy is a complex and dynamic phenomenon influenced by various factors. Consequently, conducting an exhaustive examination of this relationship is imperative for devising pragmatic plans aimed at sustaining both social economic well-being and housing market stability. This study centers on the housing market and macro-economy as its focal points, employing an Agent decision-making model rooted in operational research decision-making theory. Within the confines of policy constraints, this model scrutinizes the enduring and fleeting impacts of housing market structure, potential, and stimulus policies on the stability of the macro-economy. The findings reveal that economic policies and stimulus strategies can foster the stable evolution of the macro-economy, albeit without maximizing the benefits accrued to the housing market, substantiating the validity of hypothesis 1. Furthermore, the study asserts that the structure and potential of the housing market exert a persistent positive influence on macroeconomic stability. Simultaneously, judiciously implemented stimulus strategies demonstrate a short-term stimulating impact, corroborating the veracity of hypotheses 2, 3, and 4. Notably, market freedom emerges as a variable influencing macroeconomic stability, characterized by considerable randomness. Hence, a comprehensive consideration of the housing market's structure and potential, coupled with the judicious application of economic policies and stimulating strategies, assumes paramount importance in upholding macroeconomic stability over the long and short term. The elucidated case study herein serves as a theoretical reference, offering insights for devising macroeconomic strategies and adjusting the housing market structure within the realm of housing policies.*

Keywords*: Housing Market, Dynamic Constraints, Macroeconomics, Stability, Agen, Modeling, Decision-Making Schemes.*

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1. Introduction

Shelter constitutes a fundamental human necessity, and the progression of its market holds intrinsic connections with both social and economic equilibrium, as well as the enhancement of individuals' quality of life. The robustness of the housing market emerges as a pivotal determinant crucial to fostering economic advancement (Aghabegloo et al., 2023). The housing market is subject to diverse indicators, necessitating a strategic approach to circumvent risk factors and discern the optimal development plan. The current managerial objective in overseeing the housing market economy lies in the adept navigation of these risk indicators. This pursuit stands as a focal point not only for domestic but also international scholars. Given the notable uncertainties inherent in the housing market, the regulatory framework governing it is susceptible to challenges associated with excessive management (Akram et al., 2023). Due to pronounced fluctuations in the housing market, employing dynamic decision theory from operations research is crucial for selecting optimal market solutions. Active management decisions necessitate defined constraints, ensuring the implementation of economic stimulus and market freedom plans to attain stable macroeconomic development. Hence, certain scholars integrate uncertainty decision-making concepts from operations research to determine the most rational operational research decision-making scheme, considering the interplay between housing market dynamics and macroeconomics. Presently, the nationwide housing market stock stands at 7.23 trillion yuan, distributed across the country.

The execution of decision-making strategies across different localities proves inefficacious, thereby impeding the developmental prospects of local economies (Alyami et al., 2023). Owing to variations in scale, policies within the housing market, and the impact of macroeconomic development and strategy (Azizi et al.). The overarching development trend is marked by complexity, encountering challenges in negative growth and a feeble market potential. This amplifies the uncertainty in scheme selection and raises the complexity of an uncertain model (Bajpai, Misra, & Kim, 2023). In response to the aforementioned scenario, certain academics contend that employing a deterministic model is imperative for addressing market development challenges. Concurrently, leveraging risk models facilitates a comprehensive analysis of multiple influencing factors (Barbara et al., 2023), subsequently, the uncertainty model is applied to discern decision-making strategies aimed at realizing the objective of stable macroeconomic development. Certain scholars posit that the agent modelling method exhibits comprehensive attributes and phased program analysis capabilities (Becerril-Montekio et al., 2023). Furthermore, it can serve as a model for the analysis of macroeconomic stability. Nevertheless, scepticism among certain scholars surrounds the agent modelling method, contending that it possesses solely theoretical feasibility and lacks practical case guidance (Chikweche, Lappeman, & Egan, 2023). Hence, this study employs operations research theory to validate the agent modelling method, contributing to the augmentation of decision-making components within the operations research framework. The pivotal criteria in the selection of plans encompass the stimulus policy and market freedom, thereby giving rise to a formulated decision-making plan grounded in the convergence of both factors. Furthermore, the analysis of decision-making plans in this study is conducted through the lens of the dynamic evolution of the housing market, considering the housing market and macroeconomic constraints as conditions and macroeconomic stability as the ultimate objective.

2. Method Description

2.1 Theories of Housing Market Management

In the realm of housing market management, predecessors in operations research melded optimism criteria, risk considerations, and the pursuit of maximum returns, integrating them with probabilistic theoretical frameworks and intelligent algorithms. This amalgamation facilitated an examination of both theoretical viability and practical applications (Cole & Wightman, 2023). Simultaneously, housing market management employs Bass, extended, S-shaped curve analyses for assessing marginal benefits or critical impact indices to identify crucial impact indicators. Nevertheless, as previously mentioned, decision-making lacks dynamism, involving numerous stakeholders and intricate calculations, diverging significantly from the goal of macroeconomic stability. Certain scholars contend that the structure and developmental potential of the housing market offer illuminative insights into housing market evolution and the formulation of macroeconomic policies (Colombari & Neirotti, 2023). Furthermore, certain scholars enhance the agent modelling approach, examining housing market management through the lens of both housing market stimulus policies and dynamic metrics, while assessing the macroeconomic stability objective (Cooper et al., 2023). Nonetheless, due to the extended life cycle and heightened uncertainties associated with housing, coupled with substantial upfront investments, there exists a paucity of long-term practical cases for support. Subsequently, a theoretical feasibility analysis of the agent modelling method is presented, yielding the following outcomes

(1) The dynamic effect of the housing market

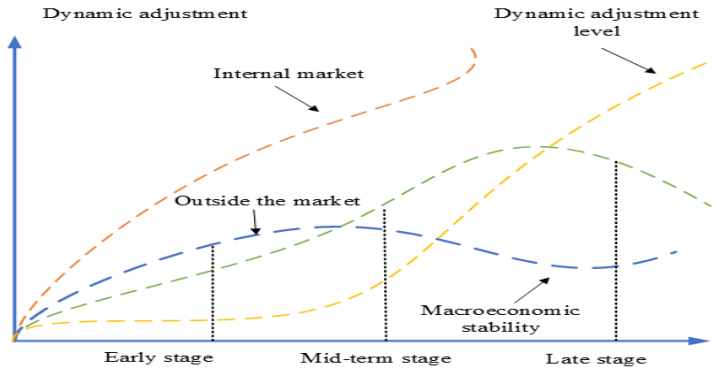

Figure 1: Dynamic Adjustment Process of The Housing Market.

During the dynamic analysis, the optimistic and pessimistic criteria of operations research are employed to choose housing policies and economic regulation strategies. The assessment of various probabilities in fostering housing market development is conducted, and the resultant probability judgment manifests an "S"-shaped trend (de Andrade et al., 2023). Initially, the agent model leverages dynamic effects to establish the foundation for data collection. Within this context, the collected data encompasses various indicators, including: Internal market structure, market potential, and related indicators, as well as external stimulus policies, macro policies, and associated indicators, are incorporated into the data collection process. All stakeholders employ

selective judgment, adopting a binary approach wherein optimism is assigned the value of 1 and pessimism is denoted by 0 (Dong, 2023). The housing market undergoes dynamic adjustments achieved through iterative modifications, precise optimization, and the execution of adjustment policies, as illustrated in Figure 1.

Figure 1 delineates that the housing market is subject to incentives stemming from both economic policies and stimulus policies (Dong et al., 2023b). This optimization, facilitated by economic policies and stimulus measures, serves to refine the market structure and enhance its developmental prospects. Nevertheless, as the implementation duration of economic policies prolongs, the efficacy of housing market optimization diminishes, potentially impeding market development. Consequently, this may compromise the precision of the dynamic adjustments within the housing market (Fahmi et al., 2023). To address this, it becomes imperative to examine the interconnection between the two entities through the lens of dynamic adjustment and stability, with the objective of identifying the optimal macroeconomic stability plan.

(2) Stabilization Effect

Certain scholars have explored the correlation between the dynamics of the housing market and macroeconomic stability, observing that the probability distribution of their alignment follows a normal distribution. This enables the analysis of decision-making scheme selection (George et al., 2023). Nevertheless, it is imperative to compute the optimal probability value between the two. For instance, stimulus policies may propel housing market development and augment its potential, with the probability of the former being less than 50% (Girardi et al., 2022). Consequently, the transitional policy stimulus may manifest in low-price competition, exerting an impact on the enduring trajectory of the housing market and potentially impeding the growth of the real estate market (An et al., 2023). Hence, the judicious calculation of the likelihood of promoting housing market development holds paramount importance for economic policy. The establishment of a probability threshold serves as a prerequisite for program decision-making and selection, representing a crucial condition for housing market development, as depicted in Figure 2.

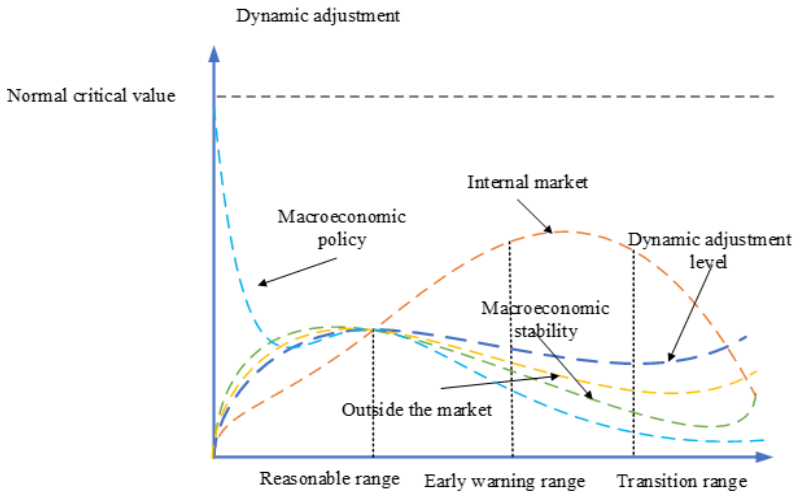

Figure.2: housing Market Development Process.

(3) Agent Model

The agent model, as a dynamic analytical framework, computes the probability of prospective alterations by leveraging historical data from the housing market. This process aids in uncovering the developmental potential of the market and gauging the macroeconomic implementation effects of diverse schemes (Dong et al., 2023a). Within this context, the acquisition of extensive housing market data, coupled with the intricate calculation of data probabilities, constitutes essential components (Gostoli & Silverman, 2023). This aspect is pivotal to the application of the Agent model, emphasizing the necessity not only to compute the development probability of the housing market but also to assess probabilities related to market price changes (Lei, 2023). This involves calculating not only the probability of development potential and market competition homogenization but also the probability of macroeconomic impact. This encompasses factors such as the probability of the macroeconomic development direction, the practical feasibility of stimulating strategies, and the likelihood of strategy alignment. Consequently, through a comprehensive probability analysis of multiple indicators, the Agent model is aptly positioned to make informed selections for dynamic adjustments in the housing market. This facilitates the analysis of macroeconomic stability outcomes and the identification of a system with the highest probability of attaining set objectives. Such a meticulous approach ensures the healthy development of the housing market and the stable operation of the macroeconomy. The present study primarily integrates historical data from the housing market and macroeconomy, leveraging the Agent model to compute the intricate relationship between the two and ultimately selecting the optimal decision-making scheme.

3. Agent Model Design of Housing Market and Macroeconomy

3.1 Research Objectives and Hypotheses

The objectives of this study are to safeguard macroeconomic stability, foster the robust development of the housing market, and undertake probabilistic assessments of diverse scenarios. Historical data pertaining to the housing market, forecasts regarding development potential, the implementation of stimulus strategies, and the trajectory of economic policies constitute viable options influencing macroeconomic stability (Li, 2023). The current research objective revolves around the selection of stimulus strategies and monetary policy options, along with the computation of the housing market's impact on macroeconomic stability (Mansurov et al., 2023). Prior to initiating the targeted analysis, it is imperative to articulate the following assumptions: Hypothesis 1: Economic policies and stimulus strategies can maximize the benefits of the housing market and promote the stable development of the macroeconomy; Hypothesis 2: The structure and potential of the housing market are the influencing factors of the dynamic growth of the housing market; Hypothesis 3: Housing market dynamics affect macroeconomic stability; Hypothesis 4: The housing market structure is a long-term decision-making plan for stable macroeconomic development, and a reasonable

stimulus strategy is a short-term decision-making plan for sound development.

3.2 Mathematical Description of the Agent Model

The agent model is constructed as an iterative closed loop, encompassing a series of random time steps to calculate the implementation probability of various schemes. This framework is delineated into three phases: initial acquisition of data pertaining to housing market dynamics, followed by the computation of indicators such as housing market structure, stimulus strategy, economic policy, and housing market potential, as illustrated in Figure 3.

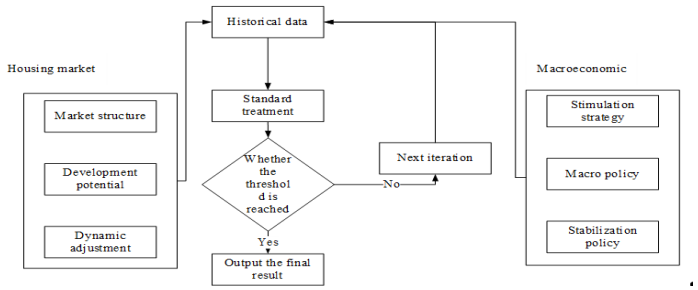

Figure 3: Agent Calculation Flowchart.

As depicted in Figure 3, the initiation phase involves the commencement of historical data collection for the housing market, wherein all relevant historical data is systematically gathered as $set = \sum_{i,j}^{n} x_i \cdot y_j$ (i is the year, j is the month). Within this framework, the data pertaining to housing market potential is specifically characterized as the housing market potential data, while the structural data of the housing market entails computations with a designated quantity denoted as n = 100, from which the average of the calculated indicators is derived. Table 1 provides a detailed description of the remaining parameters incorporated in the agent model.

Table 1: Specific Parameters for Each Indicator.

Parameter	Type	Parameter Description
N	constant	Housing market data
n	constant	Housing market adjustment rate >95%, calculation stops
C	constant	Dynamic adjustment
c	constant	Fixed adjustments
$P(i)$	constant	The sensitivity of the housing market to the macroeconomy
$N(i)$	constant	Adjust the range
L	constant	Market freedom
M	constant	market structure
G	constant	Market development potential
f	The amount of output	Adjustment amplitude
a	The amount of output	Adjustment rate
b	The amount of output	Adjust the factor
q	The amount of output	Economic policy
p	The amount of output	Stimulation strategies
w	The amount of output	Macroeconomic stabilizing effects
s	The amount of output	Number of economic policies

As illustrated in Table 1, the degree of freedom within the housing market is

denoted as L, subject to potential influences from economic policies, $\vec{L}$ scheme based on market freedom will be formulated. During the dynamic adjustment of the housing market decision-making plan, the macroeconomy will instigate market adjustments, exerting influence on both market structure and potential. This, in turn, facilitates modifications to the decision-making plan. Among them, the scheme's external influence coefficient is *f*, the scheme's internal influence coefficient is $\alpha \leq 0.3$, and the dynamic adjustment $\beta \leq 0.2$ of the scheme is carried out by adjusting the magnitude.

3.3 Mathematical Description of Dynamic Selection of Housing Market Decision-Making Schemes

The dynamic selection of housing market decision-making schemes is influenced by both internal and external factors (Mazhar & Kausar, 2023). Market structure and potential serve as internal driving forces for program adjustments. Alterations in market structure contribute to the adjustment of decision-making schemes in the housing market, influencing macroeconomic stability and giving rise to an "S" curve (Platas-López et al., 2023).

Hypothesis 1: If any housing market adjustment scheme isN_i, which is subject to internal and external influences, the adjustment process is shown in equation (1).

$$N_i = \sum n_i \cdot t \tag{1}$$

Among them $t$is the adjustment time of the market decision-making scheme.

Hypothesis 2: The degree of influence of stimulus on housing market dynamics is *C*, and the optimal scenario between stimulus strategy and housing market is *R*, then the optimal scenario is calculated as shown in equation (2).

$$R = \sum P_i \cdot C_i \tag{2}$$

Within this context, the optimal scheme for housing market transformation and the pivotal stimulus strategy is derived through a straightforward logical connection, necessitating conditional constraints such as the structure and potential of the housing market to yield calculation outcomes aligned with objective reality. Consequently, under these constraints, equations (1) and (2) can transition into equations (3).

$$P(i) = f \cdot \frac{\sum R \cdot N(i) \cdot \alpha \cdot \beta}{C_i} \tag{3}$$

Among them, α and β are the constraints for the dynamic selection of the housing market decision-making plan, are the structure and potential of the housing market.

3.4 Mathematical Description of The Best Solution Selection by The Agent Model

In accordance with economic policies, the agent model outlines the program selection to attain macroeconomic stability. Hypothesis 3: Under reasonable economic conditions, the housing market is dynamically adjusted, and the best adjustment plan will be obtained, the weight of the scheme will be assigned, and the best adjustment plan will be selected. Subsequently, the selection of the optimal adjustment plan is delineated through the representation provided in equation (4).

$$\max P(i) = \frac{\sum R \cdot \min[\beta - N(i)]}{\min[\alpha - C_i]} \cdot s \quad (4)$$

Among them, the number of programs and the plan's adjustment coefficient are αcombined with $\beta$the historical market data, the frequency of market adjustments, and stimulus policies. To enhance the precision of the agent model in selecting schemes, a subjective adjustment coefficient (b) is incorporated into the equation, resulting in the transformation of equation (4) into formula (5).

$$\max P(i) = \frac{p \cdot q \sum R \cdot \min[\beta - N(i)]}{\min[\alpha - C_i]} \cdot s \quad (5)$$

It can be seen from Formula (5) that ifα the housing market is dynamically adjusted and β is greater than 0, suggesting a limited development potential for the housing market, macroeconomic adjustments are warranted. Entry of additional housing investors into the market should be curtailed. If the housing marketα is dynamically adjusted and β less than 0, it indicates a specific potential for developing the housing market, and the market structure needs to be changed. If the sum $p$and $q$is greater than 0. This suggests a lack of stability in economic policy, necessitating the consideration and selection of alternative stimulus and regulatory policies. Alternatively, the continual implementation of economic policies is anticipated. Furthermore, it is imperative to account for the dynamics of the housing market and carefully observe the sequential implementation of pertinent policies and adjustment plans.

3.5 Description of Alternative Choices between Housing Market and Macroeconomics

Upon establishing the dynamics of the housing market and indicators of macroeconomic stability, it becomes imperative to validate both the adjustment scheme and its accuracy (Wang, Rong, & Yang, 2023). The verification outcomes for various schemes need to be computed, and the computational procedure is delineated in Formula (6).

$$\max(w, s) = \frac{p \cdot q \sum R \cdot \min[\beta - N(i)]}{\min[\alpha - C_i]} \cdot s \Leftrightarrow \sum P(i) \quad (6)$$

where， $P(i) \neq P(i-1)$， and $i \in N, n$。

As the computation process of the Agent model falls within the domain of dynamic probability calculation, it is imperative to establish exit conditions to avoid output-related issues or diminished accuracy in scheme selection. Drawing upon historical housing market data, this study computes the dynamic adjustment outcomes of the optimal real estate scheme under the specified conditions :$\max P(i) < 95\% \cdot \max(w, s)/(\text{“}mean\text{”}\ P(i))$。 In the course of continuous probability analysis, an index coincidence rate of 95% signifies system effectiveness. Consequently, the pivotal indicators are expounded upon, and the specific outcomes are delineated in Table 2.

Table 2: Description of Crucial Indicators.

KPI	Official	Description of the Metric
Lev	*n/N*	Housing market adjustment rate.
Spe	Max(*t*)	Optimal housing market structure.
Fir	S(*t=0)*	The number of housing markets.
Pin	Sum(*n*)	In the process of overall adjustment, the housing market is combined.
Cpin	Sum[(n-t), *(*N-t*)*]	Under different policies, the housing market is aggregated.
Clev	Cpin/Pin	The rate of structural adjustment in the housing market.
CSpe	|Cpin/Pin|	The rate of potential improvement in the housing market.

The data presented in Table 2 illustrates that the Key Performance Indicator (KPI) index

predominantly relies on historical housing market data, with its overarching objective being the attainment of stable macroeconomic development. Within this framework, the constraint condition pertains to the structure and potential of the housing market, and the detailed scheme probability calculation process is elucidated in Figure 4.

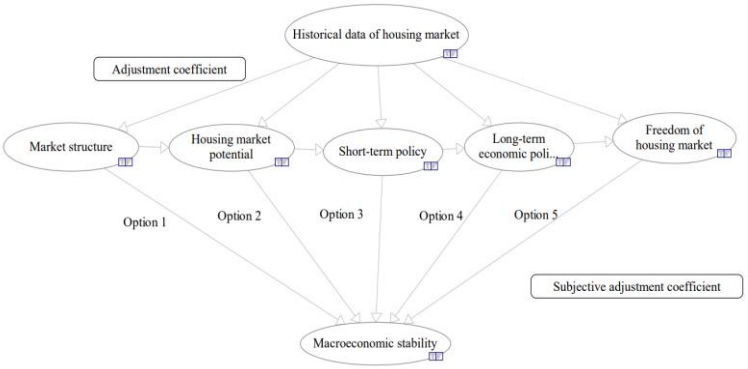

Figure 4: Probabilistic Calculation Process of Dynamic Adjustment of Housing Market Plan.

As depicted in Figure 4, the dynamic adjustment scheme for the housing market program is categorized into five systems, encompassing market structure, market potential, economic policy, among others. Each plan is probabilistically calculated based on historical data, with the overarching objective of achieving macroeconomic stability.

4. 4Case Studies of Housing Market Dynamics and Macroeconomics

4.1 Simulation Environment for Case Implementation

The focus of this study is the dynamic selection of the agent model for housing market decision-making schemes to attain macroeconomic stability. Consequently, it becomes essential to initially ascertain the adjustment plan for the housing market and conduct an analysis of macroeconomic stability types, stability objectives, and stability durations. Notably, the degree of freedom within the housing market, along with factors such as market structure and development potential, will significantly influence the selection of solutions. To enhance clarity in the study, eight predefined schemes are introduced for analysis, as delineated in Table 3.

Table 3: Different Preset Schemes.

Hypothesis	Preset Schemes	Description
Hypothesis 1:	M	Basic situation: reasonable housing market
	MI	Increased potential.
Hypothesis 2:	MG	Market restructuring.
	ME	Market structure adjustment + increased potential
Hypothesis 3:	C	Basic context: macroeconomic interventions.
	THERE	Macro policy.
Hypothesis 4:	CG	Stimulate policy interventions
	MEAT	Stimulus + macro policy.

As illustrated in Table 3, the scenario variations span from M to C, effecting the dynamic transition from the housing market to the macroeconomy. Excluding the considerations of liberalization costs, the computed results from diverse scenarios are juxtaposed to validate the efficacy of the agent model. Specifically, the number of iterations for different methodologies is set at 100, with a threshold of 95%. The housing market data is computed as the average over the preceding three years, with reference standards established from the "Guidance on Dynamic Adjustment of Housing Market (2010~2022)" and "Guidance on Macroeconomic Stability (2010~2022)". Under the prevailing scenario, computations are conducted for two results (target and time), entailing the specification of the macroeconomic intervention's timing and duration. The dynamic adjustment outcomes of the housing market are thus calculated to leverage the simulation capabilities inherent in the Agent model. The implementation conditions for the pre-set scenario are detailed in Table 4.

Table 4: Adjustment Factors Under Constraints.

Adjust the Factor	Description
P-	Housing market adjustment rate > 50%
P+	Housing market adjustment rate < 50%
N-	Macroeconomic strategies > 10
N+	Macroeconomic strategies < 10 articles
HIS	The housing market matches the macroeconomy > 95%

The NetLogo 5.1 simulation platform serves as the simulation tool for the agent model. Parameters from Tables 2 to 4 are configured, enabling the computation of the housing market and macroeconomy matching outcomes. The average effect derived from 100 iterations is then calculated, yielding the ultimate result.

4.2 Key Indicators

Within a liberalized and judiciously competitive housing market, all enterprises exhibit flexible entry and exit dynamics, facilitating a comparative analysis of diverse market structures and degrees of freedom. The resultant KPI indicators are documented in Table 5.

Table 5: Changes in KPI indicators.

Situation	Lev (%)	Spe(second)	Fir (NO.)	Pin (NO.)	Cpin (thousand dollars)	Clev (thousand dollars)	CSpe(thousand dollars)
M	86	71	5	4	831	349	497
MI	73	54	1	10	708	518	851
MG	66	59	8	7	543	861	363
MIG	88	46	7	7	401	362	662
C	77	46	1	3	428	665	768
CI	77	60	3	9	378	618	836
CG	67	72	9	6	645	914	528
CIG	90	62	4	3	587	450	927

Observing Table 5 reveals that the KPI analysis outcomes for the eight predefined scenarios exhibit characteristic "S" curves. Nevertheless, notable disparities exist in the dynamic adjustment effects within the housing market, specifically in the cases of Lev, Spe, and Fir. Notably, significant discrepancies are evident in the Lev results

between C and CI scenarios, underscoring the substantial impact of macroeconomic interventions on the housing market. Furthermore, the discernible indirect effects of Spe on C and CI emphasize the significance of strategic content and intervention timing in macroeconomic measures. Conversely, the marginal difference in Fir between C and CI suggests that the number of enterprises exerts a comparatively lesser influence on the macroeconomy.

4.3 Results of Adjustments to Housing Market Decision-Making Programs

Market freedom, market structure, and market potential constitute the primary components of housing market dynamics, with the alterations in the eight scenarios outlined as follows.

(1) Solutions Based on Market Freedom

In a monopoly market, dynamic adjustments to the macroeconomy are unattainable, thereby rendering the degree of market freedom a crucial parameter for assessing market conditions. Moreover, it serves as a prerequisite for market structure adjustments and the development of market potential. The results of market freedom analysis conducted by the Agent model are depicted in Figure 5.

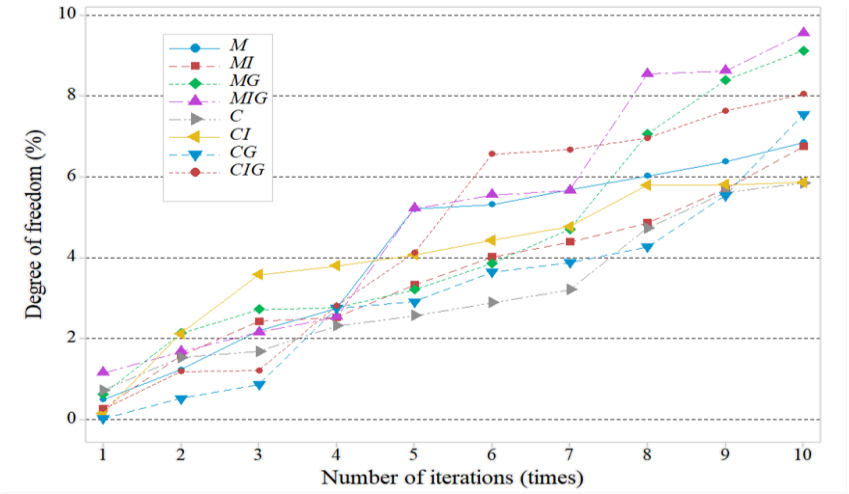

Figure 5: The Analysis of Market Freedom of Different Decision Schemes.

As illustrated in Figure 5, under the M scheme, the degree of freedom reaches 60% after six probability calculations, with the probability calculation attaining 80%, representing a 33.4% increase. The independent testing of market data in this study indicates a higher adjustment effect in the housing market under the M scheme. Conversely, the market freedom of Plan C exhibits minimal changes, primarily attributable to the delayed impact of economic policies, resulting in a relatively sluggish adjustment effect on housing market dynamics. This suggests a discernible lag in the influence of economic policies on the housing market, necessitating internal adjustments within the housing market to mitigate the adverse effects of this delay. Consequently, the hypothesis that economic policies have a partial impact holds true.

(2) Solutions based on market structure

Under the influence of macroeconomic factors, the housing market is also affected by market structure, as depicted in Figure 6.

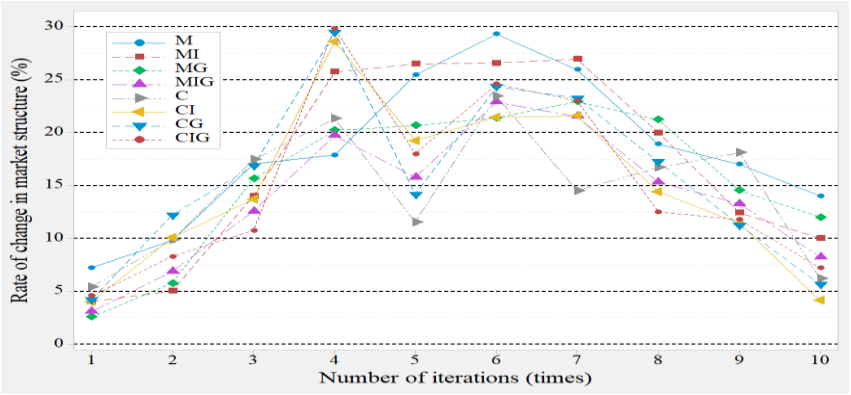

Figure 6: The Comparison of Market Structure Change Rate of Different Schemes.

As evident from Figure 6, in the competitive market, there is a substantial alteration in indicators for both the M and C schemes, spanning ten stages from 70% to 90%. Notably, during the 5th and 6th stages, the housing market indicators exhibit a slight decline, primarily attributed to a minor delay in the adjustment of economic policies, resulting in a significant change in market structure. However, the subsequent introduction of economic policies enhances the optimization of the housing market structure, exemplified by indicators like MI, MIG, CI, and CG. This underscores the staged role of economic policies in promoting the housing market, with notable improvements in the promotional effect. The interaction between the two factors is substantial, affirming the validity of hypothesis 2.

(3) Schemes grounded in the development potential of the housing market yield outcomes as depicted in Figure 7.

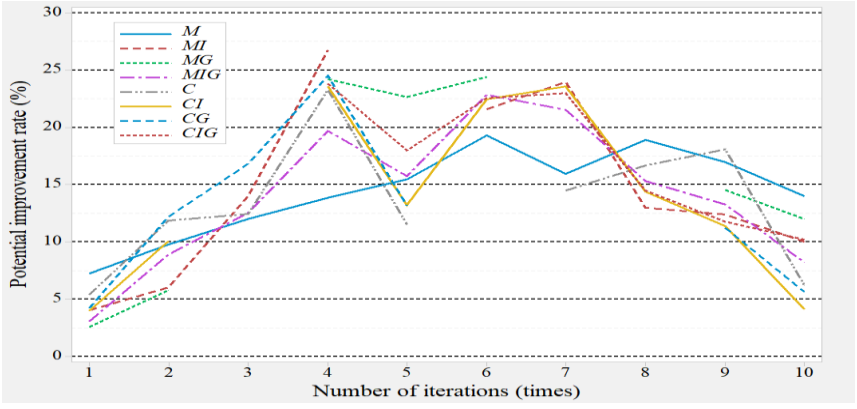

Figure 7: Housing Market Potential Improvement Rate Of Different Schemes.

Figure 7 illustrates that economic policies have the capacity to enhance market potential and foster reasonable competition within an affordable housing market. The data presented in the figure indicates that economic policies can elevate market potential, resulting in a 5% to 20% increase in housing prices. Notably, in the M, MI, and MG scenarios, financial guidelines exhibit a more pronounced impact, substantially augmenting the competitive potential of the housing market. Thus, hypothesis 2 is corroborated.

(4) The comprehensive impact of combining macroeconomic strategies

The macroeconomic impact of housing market policy-making programs is complex, necessitating a comparison of the outcomes of individual economic policies with those of combined economic policies. The comprehensive results are presented in Table 5.

Table 6: Combined Impact of the Program Under Different Constraints [unit: %].

Condition Parameters	Under The Constraints Of Short-Term Economic Policies				Long-Term Economic Policy Constraints			
	M	MI	MG	ME	M	MI	MG	ME
P-	29	27*	21	25	53	61	74	85
P+	36	27	33	20	45	52	73	58
N-	38*	34*	41*	25	57	64	77	82
N+	43	36*	41*	53	58	61	41	72
HIS	51	36	45*	28	45	50	77	47
	Overall stability = 75.36				Overall stability = 86.96			

Note: * represents indicators with significant differences

As per the data presented in Table 5, the macroeconomic impact of various programs under the constraints of long-term macroeconomic strategies is notably pronounced at 86.96%, surpassing the efficacy of short-term economic policies. Specifically, substantial differences are observed between P-MI, N-MI, N+MI, N+MG, N-MG, N-MG, and SA MG, suggesting that long-term economic policies exert a significant influence on the aforementioned indicators. Therefore, hypotheses 3 and 4 are substantiated.

5. Discussion

5.1 Economic Policies Restrict the Adjustment of The Real Estate Market

Throughout the investigation, it was observed that the degree of freedom across various schemes reached 60%. This implies that the real estate program can effectively address the majority of market data analysis requirements, facilitating comprehensive data planning and yielding superior adjustment effects in the real estate market. However, there exists a delay in the impact of economic policy on real estate, resulting in a slower adjustment effect. This delay underscores a lag in the influence of economic policy on the real estate market. Nevertheless, it also indicates that economic policy can achieve structural optimization of the real estate market, instigate long-term adjustments, and constrain the overall development direction, ideas, and behaviours within the real estate market. This capacity enhances the potential of the real estate market, sustains its long-term stable operation, and fosters its return to a trajectory of healthy development.

5.2 A financial approach can optimize the real estate market

As a supportive measure, the development of the real estate market serves a short-term adjustment role to enhance the impact of economic policy. Financial policy, acting as an auxiliary tool, not only identifies the development potential of the real estate market but also ensures market stability. It timely corrects the development direction of the real estate market in response to fluctuating market conditions. In the ever-changing market environment, economic policies may struggle to respond effectively. Financial policy, however, effectively mitigates the external environment's impact on the real estate market, ensuring the successful implementation of real estate economic policy through a combination of short-term adjustments and long-term planning.

5.3 Long-Term Strategy Has a Greater Impact on the Macroeconomy

The long-term development strategy constitutes a strategic measure crafted at the national level within the real estate market. With a duration surpassing that of economic policies, it wields greater macro influence. This strategy primarily serves as an effective tool from the standpoint of national economic policy, aiming to recalibrate the relationship between the real estate market and other industries while implementing judicious management practices. Operating at the macro level, the development strategy can both stimulate and restrain the real estate market, ensuring a more rational adjustment of its share in the GDP. The research findings of this paper underscore the profound and enduring impact of the long-term development strategy on the real estate market, fostering developer confidence and optimizing resource allocation to align with national macroeconomic development needs. Simultaneously, the long-term development strategy exhibits a degree of influence on macroeconomic policy, engendering potential contradictions. Consequently, the formulation of macroeconomic policies should be harmonized with the goals and direction of long-term development, prompting the proposal of diverse optimization schemes.

6. Conclusion

This research advances a decision-making model for agents grounded in operational research decision theory. The investigation scrutinizes the repercussions of housing market dynamics on macroeconomic stability, employing housing market structure, potential, stimulus policies, and judicious macroeconomic policies as key indicators. The findings indicate that while the structure and potential of the housing market can foster macroeconomic development, their impact on macroeconomic stability is constrained, validating the first hypothesis. The enduring influence of housing market structure and potential on macroeconomic development is affirmed, while the efficacy of rational stimulus strategies is confirmed in the short term, corroborating hypotheses 2, 3, and 4. Notably, market freedom, viewed as a stochastic indicator, exerts a limited influence on macroeconomic stability, necessitating a comprehensive consideration. Consequently, recalibrating the housing market structure, harnessing market potential, and formulating judicious stimulus strategies emerge as imperative measures for sustaining macroeconomic stability. The paper conducts a thorough analysis of the nexus between housing market dynamics and

macroeconomic stability, exploring dimensions such as market structure, potential, and policy. However, certain limitations are acknowledged, primarily stemming from the dynamic interplay between the housing market and macroeconomy, necessitating a nuanced consideration of feedback effects in future research. Enhancing the feedback coefficient, fortifying the bidirectional dynamics between the housing market and macroeconomics, and expanding the research sample size are proposed as avenues for future exploration. Limitations in the current study are further underscored in terms of data collection, given the extensive scope of the real estate market and the associated challenges in comprehensively analysing voluminous data. The paper underscores the need for vigilant data tracking and refinement to address potential shortcomings in data analysis arising from the use of key indicators.

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