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Behavioral Macroeconomics: A Systematic Review for Policy Insights

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Abstract
This article explores the evolution of Behavioral New Keynesian (BNK) models with a focus on non-rational, heterogeneous expectations and heuristic-based decision-making. By reviewing foundational frameworks from Brock and Hommes (1997) and De Grauwe (2012), to recent advancements by Hommes (2021) and De Grauwe and Ji (2024). The review highlights the critical role of cognitive limitations, animal spirits, and adaptive learning in shaping macroeconomic outcomes. A central focus is on policy applications, analyzing how behavioral macroeconomic models offer unique insights into forward guidance, inflation targeting, and fiscal interventions. In particular, it explores how these models address challenges like zero lower bound constraints and expectation-driven liquidity traps, emphasizing the importance of central bank credibility and institutional trust in stabilizing economic outcomes.

JEL Classification: D84, E32, E58, E62, E7

Keywords
behavioral macroeconomics — heterogeneous expectations — heuristics — policy applications — Central Bank credibility — inflation targeting — zero lower bound

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Premise

When reviewing the introduction of Deak et al. (2023), which references Sims' (2003) cautionary remark about the risks of moving away from rational expectations models – stating that there are "infinite ways to be wrong but only one way to be correct" – this claim may initially evoke skepticism. However, upon closer reflection, the metaphor of the iceberg appears particularly fitting in the context of behavioral macroeconomics. It is not merely about what is visible above the surface but rather about the complexities that lie beneath.

This survey article aims to guide readers through the segment of the Behavioral New Keynesian (BNK) model that focuses on non-rational heterogeneous expectations, with particular attention to behavioral heuristic rule switching and policy applications.[1] Furthermore, we will briefly explore studies in which agents consistently maintain their forecasting strategies, whether through fixed proportions or algorithmically determined ratios.

The discussion is divided into five parts: Second section delivers insights of behavioral features introduced into macroeconomics modeling. Third section focuses on behavioral macroeconomics modeling. Fourth section explores policy applications. Fifth section examines present challenges and advances. Sixth section presents the Conclusive Remarks.

Cognitive Limitations and Behavioral Features into Macroeconomic Models

Cognitive limitations have been introduced in macroeconomic modeling through various frameworks. One approach describes the "inattentive agent", who is slow to incorporate information about macroeconomic conditions, even when the information is publicly available. This idea aligns with "sticky information" models, where agents update their information sporadically rather than continuously.

Sims (2003) highlights this limitation by describing humans as having a limited channel for absorbing information. Similarly, Ball (2000) notes that agents optimally use all information from the past values of that variable but fail to incorporate information from other variables. Building on this, Mankiw and Reis (2002) suggest that there is a constant probability that a person updates his information set. Finally, Farmer and Platonov (2019) explain that agents are rational and have rational expectations but are sometimes unable to

[1] Nonrationality (Baddeley, 2017): Herbert Simon describes human beings as exhibiting *bounded rationality*, where decision-making is constrained by cognitive limitations, such as memory, processing power, and access to information. Vernon L. Smith builds on this by introducing the concept of *ecological rationality*, suggesting that rationality is shaped by the specific contexts in which decisions are made, often relying on quick, adaptive choices rather than fully rational processes. Similarly, Gerd Gigerenzer emphasizes *practical rationality*, where humans decide "quickly and frugally", a method that can work well but also leads to systematic behavioral biases. Harvey Leibenstein complements these views with his concept of *selective rationality*, where individuals sometimes act rationally but often remain in inert areas, sticking to the status quo either because changing seems too costly or due to apathy and laziness.

coordinate on a socially efficient outcome. Therefore, in their view, the most relevant problem is not obtaining information but processing it.

All these frameworks and methodologies introducing behavioral features into the model maintain the rational expectation and representative agent assumption.

Behavioral Macroeconomics

Sims was not mistaken, as for today, there is a substantial body of research in the literature that explores deviations from the full-information rational expectations (FIRE) framework and examines their macroeconomic implications. Notable examples include the imperfect information framework (Mankiw and Reis, 2007), the complex systems / animal spirits / heuristics perspective (Branch and McGough, 2010; 2018; Brock and Hommes, 1997; De Grauwe, 2012a; De Grauwe and Ji, 2019; Hommes, 2021), the sticky information model (Coibion, 2006; Mankiw and Reis, 2002; 2007), the adaptive learning approach (Evans and Honkapohja, 2001), rational inattention (Sims, 2003), cognitive limitation (Angeletos et al., 2018; Gabaix 2020; 2023), and agent based models (Duffy, 2006; Baghestanian et al., 2015; Dawid and Gatti, 2018; Attanasi et al., 2021; Hansen et al., 2024), among others.

Brook and Hommes (1997) are credited with the first significant contribution to a new economic framework by introducing a heterogeneous strategy-switching model. In their work, agents dynamically select forecasting rules based on their recent relative performance. These rules range from simple, low-cost heuristics like naive expectations to more sophisticated rules such as rational expectations or statistical learning, which are costly due to information-gathering requirements. The framework employs an endogenous switching mechanism,[2] driven by "survival of the fittest", where agents adopt better-performing strategies as measured by utility, profits, or forecasting accuracy. This creates a balance between destabilizing naive expectations, which push prices away from equilibrium, and stabilizing rational expectations, which guide prices back toward a steady-state equilibrium, generating complex, evolutionary market dynamics (Hommes, 2013; 2021; Jump and Levine, 2019).

Another important contribution is the study by Evans and Honkapohja (2001) on adaptive learning, sometimes also referred to as statistical learning, widely used in behavioral models. Agents adapt their beliefs over time by updating the parameters of their perceived law of motion according to some learning scheme as additional observations become available.[3]

Early applications of heterogeneous expectations in New Keynesian models, along with the introduction of endogenous switching between heterogeneous predictors, were pioneered by Branch and McGough (2009; 2010). In the 2009 article, the authors introduce a New Keynesian framework that incorporates agents with differing expectations. They assume a fixed distribution of agents between those with rational expectations and those with adaptive expectations. In the 2010 article, they introduce a dynamic component to the selection of forecasting models by agents, thereby allowing agents to switch between predictors based on their past performance. Other main frameworks include De Grauwe (2011; 2012a) and Anufriev et al. (2013).

Jump and Levine (2019, p. 19) brilliantly synthesize the basic different BNK models under the nonrational heterogenous expectations: "This has been done using Euler learning alongside rational expectations, as in Branch and McGough (2010), internal rationality alongside rational expectations, as in Hommes et al. (2017),[4] and Euler learning alongside a set of misspecificed predictors, as in De Grauwe (2011)."

As previously mentioned, the main criticality of mainstream macroeconomics are the assumptions of the representative agent and rational expectations (Hommes, 1997; 2013; 2021). The basic behavioral model utilizes a stylized Dynamic Stochastic General Equilibrium (DSGE) version, a canonical DSGE model with aggregate demand and supply, and a Taylor rule. As for the representative agent, heterogeneous beliefs are considered. There are several agents who do not share a single, uniform view about the current and future state of the economy, such as inflation, output growth, or interest rates; for all these indexes, agents have diverse and sometimes conflicting expectations. The second mainstream macroeconomic assumption is rational expectation which requires cognitive ability that individual agents lack: agents rely on different heuristic or simple rules of thumb to make decisions. In particular, two simple heuristic rules are used to forecast the output gap and inflation. Fundamentalist (Chartist) agents predict the future output gap by assuming it will return to its steady state. In contrast, extrapolative agents base their expectations for the future output gap on past observations. Similarly, when forecasting inflation, fundamentalist agents align their expectations with the central bank's inflation target, while extrapolative agents project future inflation based on its past behavior.[5]

Agents use heuristic rules not because they are irrational, but rather because the complexity of the world is overwhelm-

[2] A very interesting experiment was conducted by Baghestanian et al. (2015), investigating how different types of traders – noise traders, fundamental traders, and speculators – contribute to the formation, dynamics, and eventual crash of price bubbles in experimental asset markets. This study provides insights into the mechanics of bubble formation and offers a robust empirical framework for studying speculative behavior, challenging the assumptions of homogeneous rational agents typically found in traditional economic models. The authors' findings on trader heterogeneity and market dynamics in experimental settings provide direct behavioral validation for the switching mechanisms of Brook and Hommes (1997).

[3] As relevant example of the most recent evolutions of this concept (e.g., genetic algorithm), see Hommes (2013; 2021) and Hommes et al. (2017).

[4] Hommes mostly uses heuristic set of rules: see Hommes (2011; 2013; 2021) and Hommes et al. (2005).

[5] For De Grauwe (2012a), the forecasting rules are imposed ex post on demand and supply, rather than being derived from micro-level foundations (see also De Grauwe and Ji, 2019, p. 113). For a discussion of the literature, see Evans and Honkapohja (2001).

ing.[6] The utility of using one or another rule depends on how well they remember the previous forecasting mistake with that specific rule, with the assumption that agents tend to forget (De Grauwe, 2012a). The extent to which agents rely on past information when forming their forecasts depends on their 'willingness to learn'. While their expectations may not be fully rational, they adopt a trial-and-error approach to minimize systematic errors, as emphasized by De Grauwe and Ji (2019).

De Grauwe (2011; 2012a) posits that different (fundamentalist vs. extrapolative) expectations give rise to animal spirits, which are collective waves of optimism or pessimism that influence economic outcomes, while adaptive learning process generates endogenous waves of animal spirits,[7] where optimism and pessimism drive the business cycle in a self-fulfilling manner. When agents become optimistic, they predict higher future growth, leading to increased investment and consumption, which in turn raises output. Conversely, during periods of pessimism, agents forecast lower growth, reducing economic activity and deepening recessions. This creates a two-way causality: optimism (or pessimism) boosts (or depresses) output, and changes in output further reinforce agents' optimism or pessimism.[8] A second contribution concerns the underlying cause of serial correlation between inflation and output. Traditional macroeconomic models account for this correlation externally by assuming serial correlation in the exogenous shocks affecting the economy. In contrast, behavioral macroeconomic models explain this correlation internally, attributing it to inertia in agents' beliefs (timing).[9]

Policy: How can Behavioral Macroeconomic help?

Behavioral Insights into Monetary Policy: Balancing Inflation Targeting and Output Stabilization

The BNK model reveals a non-linear tradeoff: while some output stabilization reduces both inflation and output volatility, excessive focus on it raises inflation variability. Behavioral models suggest that strict inflation targeting is suboptimal; a flexible approach balancing inflation and output stabilization is more effective. Output stabilization helps mitigate biased belief cycles, reducing waves of optimism and pessimism and limiting extreme events like booms and busts. Moreover, it decreases higher moment volatilities, such as fat tails in the output gap. Thus, central banks should prioritize credible inflation targets while actively stabilizing output to enhance policy effectiveness (De Grauwe, 2012b; De Grauwe and Ji, 2020).[10][11]

Hommes et al. (2019b)[12] reach a similar conclusion: inflation volatility can be reduced when the Central Bank responds to the output gap, even if its primary objective is price stability. Stabilizing the output gap can have a calming effect on the economy. Hommes et al. (2019b) introduce a "selection mechanism" through which agents choose simple heuristic rules based on their own past actions and a degree of memory. With their memory influenced by their "willingness to learn" from past mistakes. Kukacka and Sacht (2023) argue that in highly uncertain environments characterized by volatile output gaps and unpredictable inflation dynamics, agents are less inclined to change their forecasting heuristics. In contrast, in low-volatility conditions where economic variables are more stable, the likelihood of switching heuristics increases.

De Grauwe and Ji (2023) examine the effectiveness of current data (hard data) vs. forward-looking data (soft data) in monetary policy through the lens of a behavioral macroeconomic model. The model contrasts two key regimes: strict inflation targeting (SIT) and the dual mandate (DM) framework, focusing on how these regimes influence the performance of Taylor rules obtained with hard or soft data. In SIT, forward-looking rules tend to amplify output and inflation volatility due to heightened animal spirits, especially during economic booms and busts. In other words, for a central bank primarily focused on inflation targeting, it is more effective to concentrate on current inflation and output levels, due to the role of animal spirits. Indeed, central banks that use market expectations will make many policy errors that have to be corrected afterwards. Conversely, the DM regime stabilizes these dynamics more effectively, but the choice between stabilizing inflation vs. output is insignificant. Henceforth, when the central bank gives enough importance to stabilize output gap, the nature of the data (hard/soft) and the specific Taylor rule

[6] Brocks and Hommes (1997) and De Grauwe (2012a) both operate within a framework of adaptive belief systems, where agents are heterogeneous in their expectations and select forecasting rules based on past performance. However, for the former the decision-making process is formalized using a discrete choice framework, which introduces a probabilistic element to switching behavior, while the latter focus on behavioral macroeconomic dynamics driven by "animal spirits", hence the switching process is more explicitly tied to sentiment and psychological behavior. Therefore, while Brock and Hommes (1997) provide a more mechanistic, utility-oriented approach to expectation formation and market dynamics, De Grauwe's (2012a) framework leans into the psychological foundation of economic behavior, offering a narrative where sentiment plays a central role in driving macroeconomic instability.

[7] "... beliefs change as a result of an accumulation of evidence that other beliefs do better". (De Grauwe and Ji, 2019; p. 63)

[8] For De Grauwe (2012b) and De Grauwe and Ji (2019) animal spirits are not merely peripheral but act as an essential driver of the model, producing the kind of persistent booms and busts that traditional rational expectations frameworks struggle to explain. This feedback loop between expectations and real economic outcomes underscores the model's ability to capture complex, real-world economic dynamics.

[9] Serial correlation primarily arises from the way agents form their expectations, making it unnecessary to rely on structural inertia or highly autocorrelated error terms – for distinctions between structural inertia and belief inertia, see De Grauwe and Ji (2019).

[10] The behavioral model shows that ignoring output stabilization not only increases the variability of inflation and output but also leads to higher moment volatilities, such as fat tails in the distribution of output gaps. These fat tails signify a higher probability of extreme events, such as booms or busts, which are not adequately addressed by strict inflation targeting alone. See De Grauwe (2012b) and De Grauwe and Ji (2018; 2019).

[11] Di Bartolomeo et al. (2016) find that in a model with a fixed ratio of rational and bounded-rational expectation agents, monetary policy can reduce consumption variability more effectively by prioritizing the reduction of cross-sectional variability of expectations.

[12] The authors employ a set of heuristic rules, including adaptive learning, a weak trend-following rule, a strong trend-following rule, and the anchoring and adjustment rule.

become uninfluential. De Grauwe and Ji (2023) also highlight the potential of nowcasting to reduce data noise and improve policy outcomes, particularly under SIT, emphasizing its critical role in mitigating the volatility associated with extreme economic cycles.[13]

Central Bank Credibility, and the Zero Lower Bound

Behavioral macroeconomic literature underscores the critical importance of inflation target and central bank credibility in maintaining economic stability, particularly to face the zero lower bound (ZLB).

De Grauwe and Ji (2018; 2019; 2019b) highlight that setting inflation targets too close to zero can trigger "chronic pessimism", characterized by prolonged periods of negative animal spirits, which amplify recessions and depress economic activity. This leads to skewed distributions of the output gap, with more frequent and severe downturns. The authors suggest that raising the inflation target to a range of 3-4% improves economic stability by enhancing the effectiveness of monetary policy and reducing the likelihood of hitting the ZLB. In this higher inflation target regime, the economy recovers more quickly from negative demand shocks, and self-fulfilling pessimism is less likely to dominate.

Interestingly, while using methods that only partly align with the aforementioned works, Deak et al. (2023)[14] arrive to similar conclusions on the ZLB: to reduce the likelihood of hitting the ZLB, a higher steady-state inflation target is recommended. The authors also posit that a robust optimal rule suggests that an annual net inflation target at 3-4% ensures greater stability and reduces the risks associated with hitting the ZLB.

Moreover, Hommes and Lustenhouwer (2019a) introduce the concept of "endogenous credibility". This reflects the trust in the central bank and focuses on credibility of the central bank's target values of inflation and output gap, and not about the credibility of its future policy actions. Credibility, in this context, hinges on the central bank's historical ability to achieve these targets. The conjunction of heuristic heterogeneity, low or no credibility of the central bank, and self-fulfilling low expectations can make the ZLB constraint binding. In such scenario, a one-period shock that would naturally resolve itself under a rational expectations model may not do so in a heterogeneous framework, leading instead to a self-fulfilling deflationary spiral. To prevent such outcomes, the authors propose a combination of aggressive monetary easing and an increase in the inflation target. This approach aims to counteract expectation-driven liquidity traps that can occur by addressing deflationary pressures early.[15] However, higher output mobility may be a result of these policy approaches.

The effectiveness of forward guidance critically hinges on the credibility of the central bank and the public's trust in its commitments. De Grauwe and Ji (2024) argue that forward guidance may fail to stabilize the economy if agents do not fully trust the central bank's ability to deliver on its promises. Similarly, Goy et al. (2022) study the role of forward guidance. Under endogenous central bank credibility, they introduce forward guidance by allowing the central bank to publish its own forecast and to commit to a future path of the nominal interest rate – Delphic and Odyssean guidance. Both types of forward guidance increase the likelihood of recovery from a liquidity trap, while the latter alone appears more powerful at the cost of more volatility and less welfare.[16]

Fiscal Policy and the Role of Expectations

The importance of public debt and the role of animal spirits vary significantly between high- and low-interest rate regimes. In a high-interest rate environment, fiscal policy faces limitations both when stabilizing output and when controlling debt sustainability due to heightened pessimism. In such cases, policymakers must carefully balance the trade-off between output stabilization and debt sustainability, making fiscal interventions less effective. Here, the responsibility for economic stabilization should primarily fall on monetary policy, even if central banks are reluctant to take on this role. In contrast, under low-interest rate regimes, fiscal policy becomes a more potent tool. With borrowing costs reduced, fiscal measures can be deployed in an anti-cyclical and highly effective manner. Once more, the role of animal spirits is highlighted: the effectiveness of fiscal policy, as measured by the fiscal multiplier, depends on their intensity. In periods without extreme waves of optimism or pessimism, fiscal interventions yield moderate outcomes. However, in the presence of strong animal spirits, fiscal multipliers can vary widely, either amplifying or diminishing the impact of fiscal measures (De Grauwe and Ji, 2019).

Additionally, De Grauwe and Foresti (2020) determine that the short run spending multiplier is characterized by substantial volatility and state-dependency, i.e., it depends on the state of the business cycle and the animal spirits. One important policy implication is that implementing austerity measures during periods of severe economic downturns has a disproportionately negative effect on output. On these findings, De Grauwe and Foresti (2023) suggest that to mitigate the negative impacts of fiscal dominance. Governments under a regime of fiscal dominance should prioritize stabilizing public debt, while delegating the stabilization of output and inflation to the monetary authority.

[13] Another important aspect is the role of macroprudential policies. De Grauwe and Ji (2019) demonstrate that in a behavioral framework with banks, enforcing minimum capital requirements significantly reduces the volatility of output, inflation, and stock prices.

[14] They provide a general framework exploring four distinct types of New Keynesian models to assess their robustness in macroeconomic policy design. They consider the standard rational expectation as benchmark, an Euler learning with a simple adaptive expectations heuristic rule (model EL-SAE), an Euler learning with the general rule (model EL-GAE) and the Gabaix bounded rational (BR) model.

[15] For example, by lowering interest rates when inflation falls below a certain threshold and raising the coefficient in the Taylor rule to anchor expectations and restore economic stability.

[16] Refer to Hommes et al. (2019a) for a comprehensive analysis of monetary and fiscal policy design at zero lower bound.

Building on the frameworks developed by De Grauwe and Foresti (2023), Barbier-Guachard et al. (2023) analyze the interplay between fiscal policy credibility and the role of expectations.[17] Their findings suggest that fiscal multipliers are state-dependent, varying with the degree of optimism/pessimism regarding the expected output gap and the public debt level. In addition, they introduce a fiscal credibility indicator, which measures the alignment between agents' expectations and actual fiscal outcomes. This effectively captures the level of trust in government (policy) and highlights its importance in fiscal policy effectiveness. High fiscal credibility, as they show, enhances the impact of fiscal policy by mitigating Ricardian effects, enabling more expansive fiscal measures without causing significant increases in public debt. Barbier-Guachard et al. (2023) emphasize that uncertainty about future public finance is essential in analyzing the effects of fiscal policy shocks over the business cycle.[18] Ultimately, Barbier-Guachard et al. (2023) underscore the critical role that agents' expectations and institutional credibility play in the successful resolution of economic challenges.

Finally, Kronick and Petersen (2024) recently designed a lab experiment to identify whether policy conflict worsen economic outcomes. They find that the consequences of policy conflict are less severe, and the benefits of coordination between fiscal and monetary policies are diminished. They find that historical experience significantly influences participants' inflation expectations. Interestingly, government debt only has a minor impact on these expectations. This impact is deflationary, with a 1% increase in government debt leading to 0.25% decrease in inflation expectations. Contrary to conventional belief, policy conflict strengthens rather than undermines the central bank, particularly in its ability to achieve its inflation target. Unlike De Grauwe and Foresti (2023), Kronick and Petersen (2024) find that government spending and debt do not play an important role in agents' beliefs on inflation expectations, while instead the credibility of the central bank does play a role. This finding aligns with the conclusions of earlier studies (see De Grauwe and Foresti, 2020, and follow-up papers). In other words, expectations do not fuel extreme boom-bust cycles, but as previously mentioned, the central bank's credibility must remain high. This is crucial because, in situations where central bank credibility is low – such as in many emerging economies – debt shocks have a stronger impact on inflation expectations.

[17] Barbier-Guachard et al. (2023) depart from the original model of De Grauwe and Foresti (2023) by introducing an endogenous tax rate, henceforth allowing for Ricardian behavior.

[18] Attanasi and Montesano (2012) and Attanasi et al. (2014) explore ambiguity aversion by studying decision-making under uncertainty. Each study proposes a different framework on the behavior of agents under uncertainty that may be useful for applications to decision-making under uncertainty about future public finance.

Challenges and Advances in Estimating Behavioral Macroeconomic Models: Empirical Validation, Parameter Identification, and Policy Implications

As accounted by Hommes and Levine (2019), BNK models lack empirical validation. Kukacka and Sacht (2023) have recently started to fill this gap by introducing a novel Simulated Maximum Likelihood (SML) estimation method to tackle the challenge of identifying behavioral parameters in these models,[19] which standard econometric tools often struggle to estimate reliably. They focus on estimating parameters, such as the intensity of choice of macroeconomic forecasters forming expectations about the future output gap and inflation rate,[20] which governs how agents switch between different forecasting heuristics based on their past performance. With this, the study by Kukacka and Sacht (2023) is a first bridge between macro lab experiments and empirical estimation of behavioral macroeconomic models.

Several studies question why should central banks utilize BNK models without empirical basis (see, e.g., Jump and Levine, 2019). In line with this, Lux (2024) stresses that BNK modeling lack identifiability of their "deep" parameters. The parameters governing behavioral components of these models are often not well-identified when applied to realistic macroeconomic sample sizes. These parameters often lack sufficient convergence due to the flatness of the likelihood function, making it difficult to estimate true parameter values accurately. Kukacka and Sacht (2023) develop an alternative approach to ensure parameter identification by fixing a significant number of model parameters. However, this method potentially oversimplifies the model, undermining its ability to capture dynamic interactions between parameters effectively.

Pedemonte et al. (2023) address a related issue, namely understanding how inflation expectations are formed heterogeneously across different cohorts, and their macroeconomic implications. They propose a diagnostic expectations-augmented Kalman filter to model the inflation expectation formation process: agents underreact to recent changes in the inflation rate, giving positive weight to their past inflation experiences. Consequently, agents who have lived through periods of high inflation are more likely to predict higher future inflation rates than those who have encountered periods of low inflation.[21] The authors stress out that – due to this long memory after negative supply or positive demand shock – the central bank should be swift to control inflation in order to prevent agents from incorporating high-inflation episodes into their memories. As a relevant example, Pedemonte et al. (2023) argue that the 2021 high-inflation episode, even though it may be transitory, could have long-lasting effects, as agents incorpo-

[19] A model *à la* De Grauwe (2012a) with three different kinds of backward-looking forecasting rules: adaptive expectations, trend following, and a LAA (Learning Anchoring and Adjusting) heuristics.

[20] They estimate the behavioral parameters of the US economy.

[21] Anchoring-to-the-past mechanism in the expectations-formation process.

rate both shared current information and individual memory of past inflation.

To conclude, few words must be said on a significant emerging stream of literature: AI-driven behavioral macroeconomics. The convergence of artificial intelligence, behavioral economics, and macroeconomics offers promising ways to tackle the concerning inherent complexity of behavioral macroeconomics systems without the need of oversimplification, as well as empirically validate behavioral macroeconomic theories and account for estimation requirements of highly non-linear models. Interesting surveys on the topic are those of Aoujil et al. (2023) and Aoujil and Hanine (2024).

Conclusive Remarks

Recent advancements in Behavioral New Keynesian (BNK) models for policy application have been explored, with a focus on non-rational, heterogeneous expectations and heuristic-based decision-making. That policy environments are complex is not a new topic, nor is the insight that simple heuristic solutions might work best in some complex situations (Mousavi, 2018). Design of governmental interventions in the recent years has been increasingly influenced by insights gained from behavioral sciences (Mousavi and Kheirandish, 2017).

The critical reviews that this article provides contributes to the literature by spanning fiscal and monetary applications with a focus on output stabilization, fiscal interventions, and the role of endogenous credibility of the central bank and agent's expectation, at the same time addressing challenges like zero lower bound constraints and expectation-driven liquidity traps. Additionally, insights are offered into new literature on empirical validation, on the formation of inflation expectations, and on AI-driven behavioral macroeconomics.

This survey article provides a macroeconomic perspective on current and future policy implications, drawing from broader frameworks already implemented, such as McCormick (2018), which integrates the psychologically and sociologically grounded Duesenberry's Relative Income Hypothesis.[22] In boom-and-bust scenarios its underlying role becomes apparent. Furthermore, McCormick delves into the well-known herd behavior or bandwagon effect.[23] As previously discussed in this article, collective waves of optimism and pessimism drive the business cycle in a self-fulfilling manner, and herd behavior significantly amplifies this phenomenon.

In these collective waves of varying expectations, the hoarding effect, as explained by Baddeley (2020b), must also be considered. This includes behaviors such as households stockpiling goods or investors hoarding gold. Baddeley's analysis draws parallels between hoarding during the COVID-19 pandemic and a bank run, emphasizing that the credibility of government communication plays an essential role in managing such scenarios, especially when idiosyncratic hoarding patterns stem from agents' emotional distress, as it occurred during the COVID-19 outbreak (Alifano et al., 2020; Baddeley, 2020a). From a behavioral macroeconomic perspective, institutional credibility takes on even greater importance, as the representative agent assumption no longer applies. Instead, the focus should shift to the presence or absence of cooperative behavior among agents. As Mekvabishvili (2023) empirically demonstrates, with weak institutions, individuals are more likely to behave opportunistically and make less efficient adjustments to government policies.

Building on this, the credibility of the central bank is closely linked to shifts in confidence regarding the success of inflation targeting. Consequently, ambiguity – whether in or about expectations – for both consumers and institutions becomes a critical factor influencing the effectiveness of monetary and fiscal policies. As highlighted by Borozan et al. (2022), ambiguity aversion has been documented in real-world scenarios and extensively analyzed across various economic domains, including its effects on financial investments, wage-setting and contracting, voting behavior, and macroeconomic policymaking. As for the latter, ambiguity attitudes have been modeled to be state-contingent, endogenously inducing pessimism in recessions and optimism in booms; this model empirically captures several asset price and debt cycle facts (Bassanin et al., 2021). This is a further relevant example of the importance of a behavioral macroeconomic approach in policy analysis and decision-making.

[22] Relative income (to others), rather than absolute income, plays a crucial role, as consumption utility depends on how much and what one consumes in comparison to others. This is why low-income households often feel persistent pressure to spend more and save less. Additionally, saving is influenced by both past and current income levels (McCormick, 2018).

[23] A common sentiment often expressed is: "If others believe it is good (or not), then it must be."

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