Journal of Agricultural and Resource Economics 50(4):804–829 ISSN: 1068-5502 (Print); 2327-8285 (Online)

doi: 10.22004/ag.econ.369144

The Behavioral Revolution in Agricultural and Resource Economics: A Perspective on the Past and the Future

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This paper traces the past 50 years of evolution of behavioral economics within agricultural and resource economics, documenting how applied economists' empirical observations of farmer behavior, environmental valuation anomalies, and food choice patterns contributed foundational insights to behavioral theory. The field's practical orientation led to early identification of key anomalies, including the endowment effect, adoption patterns, peer effects, other-regarding behavior and stigma effects. Through analysis of publication trends across five leading journals, we demonstrate steady growth in behavioral research. Finally, we examine institutional developments, including specialized research centers and policy applications, while acknowledging ongoing challenges regarding replication, external validity, and the limitations of nudge interventions, which provides fertile grounds for future research.

Key words: experimental economics, food choice, publication trends, technology adoption

Introduction

Over the course of the last 50 years, the disparate works of a small and once obscure group of economists and psychologists have redefined the field and become the foundations for what has become known as *behavioral economics*. These foundational works—including those of Herbert Simon, Amos Tversky, Daniel Kahneman, Vernon Smith, Richard Thaler, and George Loewenstein (and eventually many others)—argued for an economic field that was more grounded in experimental work and open to using psychological and social phenomena to explain behavior. While at the outset, works that did not neatly build upon neoclassical first principles were quite challenging to publish in mainstream economics journals, behavioral work now dominates the top journals and is the focus of several dedicated journals. Even as late as 2000, one would be hard-pressed to find an undergraduate or graduate course in behavioral economics. This was true even in prominent departments featuring top behavioral researchers, such as the UC Berkeley Department of Economics. Yet now the vast majority of departments boast at least one class in behavioral economics; many have minors, majors, or whole degrees oriented toward behavioral economics; and behavioral content is found in many of the core classes in the curriculum. The influence on the discipline has been nothing short of a revolution.

From the very beginning, there has been a special relationship between agricultural and resource economics and behavioral economics (Wuepper et al., 2023). This relationship has developed for

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Funding for this research came from the USDA Economic Research Service (#59-1000-4-0058), the National Science Foundation (#2446056), and the Walton Family Foundation (#110121).

Review coordinated by Simanti Banerjee .

two reasons. First, agricultural and resource economists are applied economists who work primarily on policy and management issues as they arise from empirical observations. This emphasis on interpreting data generated from actual human decisions and applied work forced agricultural and resource economists to grapple with empirical results that appeared to be in disharmony with theory to a degree that is uncommon in the field (e.g., farmer responses to risks, sharing of common-pool resources, the behavioral response to environmental contamination or people's willingness to spend money to protect natural resources). Second, the connection of agricultural economics to marketing and distribution systems led to a focus on business marketing practices, raising direct questions about consumer behavior that went well beyond simple price responsiveness. For these reasons, hipster agricultural economists make the claim that agricultural economists were doing behavioral economics before behavioral economics was cool. Indeed, in the 1950s, a decade before Vernon Smith's pioneering work on experimental economics, agricultural economists were conducting consumer choice studies on apples to determine the impact of bruising on value (Stanton, 2001).

One key contribution of behavioral economics is the introduction of behavioral models: models that describe an observed behavioral relationship that do not have their roots solely in utility or profit maximization. Although the term *behavioral model* was not coined until much later, agricultural economists had long used such models to describe farm management rules (Schultz, 1939) and adoption behavior (Griliches, 1957a,b). These arose largely out of the need to anticipate farmer behaviors that were either too complex to model using classical profit maximization or where it was clear that farmers were using rules-based decision-making rather than global optimization. The practical needs of agricultural economists drove the use of such behavioral models in a range of early applications, priming the pump for broader acceptance of the behavioral models of modern behavioral economics.

Behavior in common-pool and public good settings, for example, has shown systematic levels of cooperation inconsistent with the pure selfish models of classic microeconomic theory. While free-riding and suboptimal provision of public goods certainly exist, the level of altruism, fairness concerns, and other types of other-regarding behavior consistently arise, prompting economists to set out on quests for factors that could help mitigate this "disturbing" trend of nonself behaviors.

The practical and historical development of modern agricultural economics made for a fertile seedbed for the development of behavioral applications and the discovery of several key behavioral anomalies, which are at the foundation of modern behavioral economics. A behavioral anomaly is identified when researchers find systematic and replicable behavior that appears to contradict the rational model of decision-making. These anomalies are used as the stylized facts that inform models of decision-making, which may then be used to test for potential mechanisms and explanations.

The most important anomaly discovered in connection with applied economic research is perhaps the most foundational anomaly in all of behavioral economics: the endowment effect. Environmental and resource economist Jack Knetsch is often credited with identifying the anomaly. Resource economists involved in valuing parks and other nonmarket goods had frequently noted a discrepancy between estimates generated by asking for participants' willingness-to-pay (WTP) for an improvement in environmental quality and those asking for participants' willingness-to-accept (WTA) for a degradation of environmental quality. Knetsch helped pioneer the experiments to demonstrate the systematic discrepancy (Kahneman, Knetsch, and Thaler, 1990) that solidified the concept of loss aversion and prospect theory as applicable in choices that involved both certainty and uncertainty. But this was just one of many such anomalies discovered in the wake of bread-and-butter applied economic research. Similar stories could be told regarding the discovery of projection bias (Baumeister, 2002; Gilbert, Gill, and Wilson, 2002), hot and cold state decisions (Read and Van Leeuwen, 1998; Metcalfe and Mischel, 1999), the impact of cognitive load (Shiv and Fedorikhin, 2002), and variety seeking bias (Read and Loewenstein, 1995), each applied originally in the context of food choice decisions. tunneling (Mani et al., 2013) was discovered in the context of agricultural household decision-making in a developing country, as was some of the first evidence of overweighting low probabilities (Sillers III, 1980). Similarly, stigma effects were

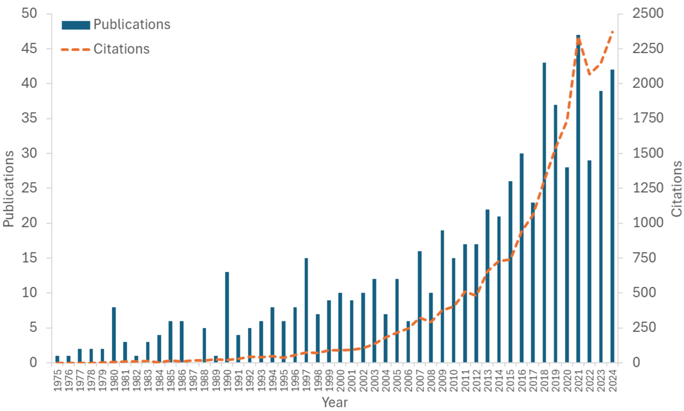

Figure 1. Publications and Citations in All Five Journals, 1975–2024

studied by environmental economists to explain why property values did not immediately recover once neighboring toxic waste sites were cleaned (Messer et al., 2006), culminating in behavioral experiments examining the impact of stigma on drinking water (Kecinski et al., 2016; Kecinski and Messer, 2018) and food produced through various methods that were viewed skeptically by the population (Messer, Costanigro, and Kaiser, 2017), such as genetic engineering (aka bioengineering) (Huffman and Rousu, 2006), the use of rBST in milk production (Kanter, Messer, and Kaiser, 2009), the use of recycled irrigation water (Savchenko et al., 2019), and efforts to mitigate these stigmas (Ellis, Savchenko, and Messer, 2022). In each case, practical considerations and observations led to behavioral discoveries that have had a broader impact on the field of economics.

This paper documents the history and joint influence of behavioral economics and agricultural and resource economics. We focus on applications of behavioral economics in field-related journals since the turn of the century as well as discussions around the institution and organizational impacts of behavioral economics in agricultural and resource economics academic departments and societies. Finally, we provide a discussion of the current direction of research and implications for policy-relevant research in the near future.

The Growth of Behavioral Economics in the Agricultural and Resource Economics Literature

To examine the impact of behavioral economics on the peer-reviewed literature in agricultural and resource economics over the past 50 years, we conducted a historical analysis of five leading journals: the *Journal of Agricultural and Resource Economics* (*JARE*), the *American Journal of Agricultural Economics* (*AJAE*), *Food Policy*, the *Journal of Environmental Economics and Management* (*JEEM*), and the *Journal of the Association of Environmental and Resource Economists* (*JAERE*). We investigated the prevalence and evolution of 30 key terms associated with behavioral economics in the titles, abstracts, and keywords of published manuscripts (see the supplemental materials for details). Using these data, we constructed figures to illustrate trends in the frequency of these terms and their citation impact over time.

The literature search was conducted using the Web of Science All Database Collection, chosen for its robust keyword search capabilities, extensive coverage of peer-reviewed journals, and high-quality citation indexing. While no search strategy is flawless, we made efforts to minimize the risk of overlooking relevant studies by including variations of key terms in our search queries. For instance, we used “WTP-WTA Contrast” as a variant of the “WTP/WTA Dichotomy.” Additionally, we searched for both base terms (e.g., “nudge”) and their common derivatives (such as “nudges” and “nudging”). The complete syntax query used is provided in the supplemental materials.

The search query yielded a total of 2,943,719 articles across all journals. These results were then filtered to focus on the five journals of interest, resulting in 673 articles. Relevant information for

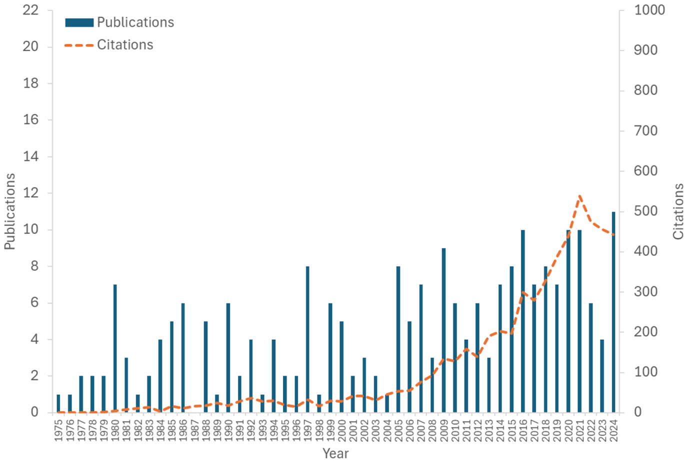

Figure 2. Publications and Citations in the *American Journal of Agricultural Economics*, 1975–2024

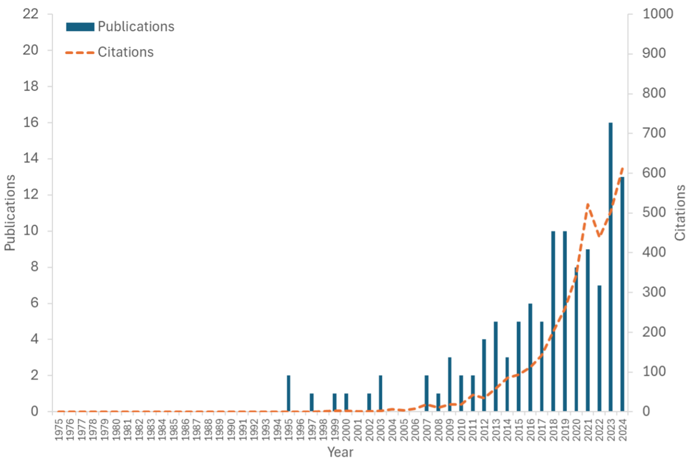

Figure 3. Publications and Citations in *Food Policy*, 1975–2024

these articles was subsequently exported to Excel, with key fields including article title, abstract, author keywords, source title (journal), publication year, citation count, authors, and DOI.

As illustrated in Figure 1, the number of published articles related to behavioral economics per year across all five journals has steadily increased over time. Publications related to behavioral economics were virtually nonexistent in 1975 but have grown to over 40 per year in recent years. Similarly, the number of yearly citations of these behavioral economics articles has also shown an upward trend, with these articles now receiving approximately 2,500 citations annually.

While similar trends are observed across specific journals, there are some notable differences. For example, as shown in Figure 2, the number of behavioral economics articles per year in *AJAE* has increased, but not as significantly as in other journals. Interestingly, the highest number of behavioral economics articles published in a single year was 11 in 2024. However, several individual years in the 1980s, 1990s, 2000s, and 2010s had maximum article counts that were within just a couple of articles of this maximum. Additionally, 2023 saw only four articles published related to behavioral economics. As is typical with citation trends, the number of citations for these articles has generally increased over time.

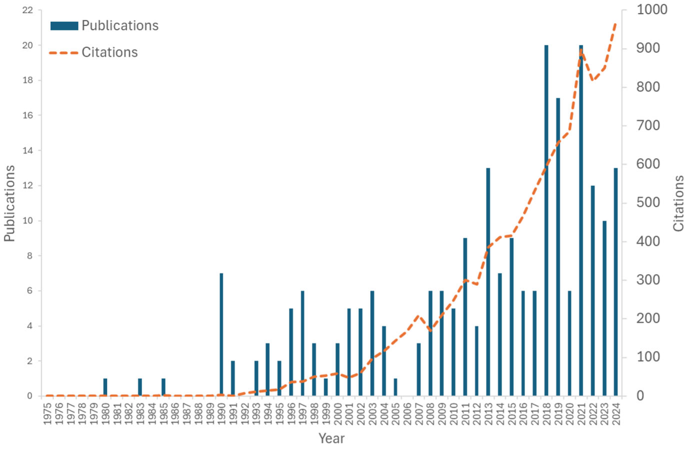

Figure 4. Publications and Citations in the *Journal of Environmental Economics and Management*, 1975–2024

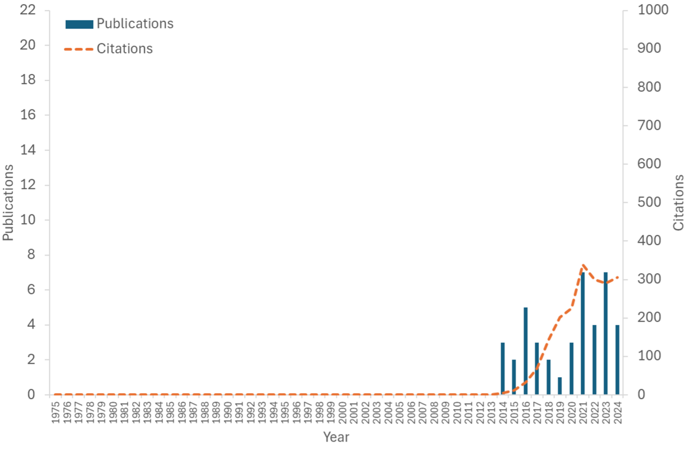

Figure 5. Publications and Citations in the *Journal of the Association of Environmental and Resource Economists*, 1975–2024

In contrast, *Food Policy* (Figure 3) has experienced a steady rise in both the number of articles published annually and the number of citations. In 2023, the journal published 16 articles related to behavioral economics

The trend in environmental and resource economics mirrors that seen in agricultural and food-related journals. However, as shown in Figure 4, the number of articles in *JEEM* is significantly higher. In contrast, articles in *JAERE* tend to be fewer (Figure 5). The citation count for *JAERE* is also lower, partly due to the relatively recent establishment of that journal.

Finally, the trend at *JARE* appears to differ from that of the other journals (Figure 6), both in terms of the number of behavioral economics articles published annually (approximately one to four articles annually) and the citation trends over time. The reasons for this deviation are unclear.

Figure 7 presents a heat map displaying the top 15 keyword mentions per year. This visualization highlights the persistence of specific terms over time, offering insights into the evolution of key behavioral economics concepts and current trends. The figure shows the number of articles that mention the keyword per year. Certain keywords have been more prominent in the literature than others: The top five keywords were related to discounting, ambiguity, peer effects, nudges, and social norms, and the use of these words generally has increased over time.

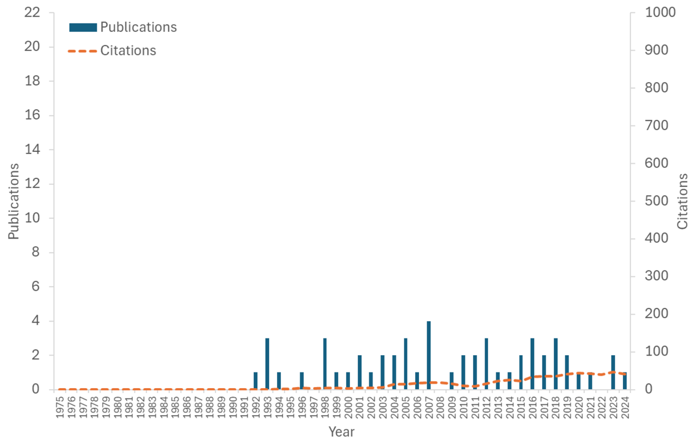

Figure 6. Publications and Citations in the *Journal of Agricultural and Resource Economics*, 1975–2024

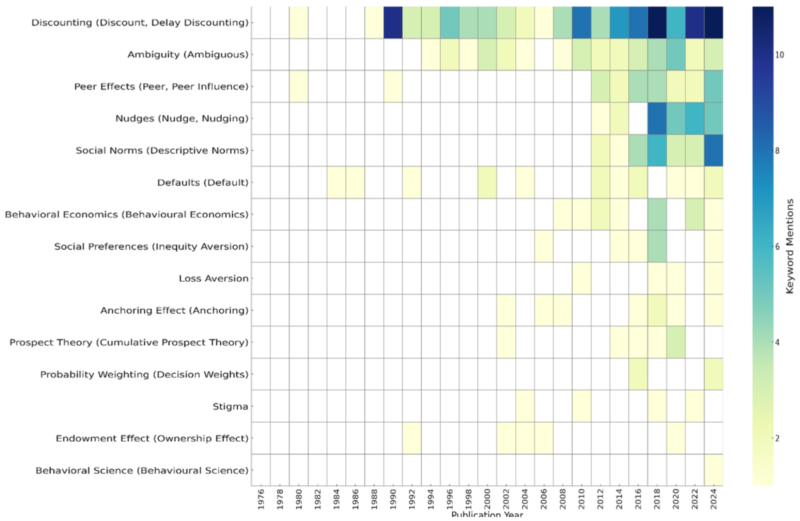

Figure 7. Heatmap for 15 Most Frequently Mentioned Keywords

Historical Perspective the Impact of Behavioral Economics

The behavioral literature in agricultural and resource economics is multifaceted, containing several prominent and distinct strands of research. We will classify these strands based upon their application to either agricultural production, environmental and resource management, or food and consumer demand. In each of these, the introduction of behavioral economics arose naturally out of the important foundational research questions that characterize these subfields more generally (Wuepper et al., 2023).

Agricultural Production

Zvi Griliches' early work on the adoption of hybrid corn is among the clearest early examples of a behavioral model in the field of agricultural economics. As described in his dissertation, and later publication in *Econometrica* (Griliches, 1957a,b), after plotting the percentage of farmers adopting over time by state, he saw clear patterns of s-curves appear, with farmers in "corn" states adopting earlier than states where corn is a less prominent crop. This plot led him to the conclusion that he was observing points along an adjustment path rather than equilibria that may or may not be affected by changes in the common *ceteris paribus* assumptions. He estimated logistic functions to explore the shape of these adjustment paths primarily because they seemed to fit the behavior. Indeed, he found that the peak and slope of the diffusion function was related to profitability, though he did not model the outcomes as the result of a purely rational process. Later work would relate this curve to social network effects, education, aversion to risk, and several other factors that influence behavior.

The parallels between the agricultural adoption and behavioral literatures have long been recognized, though much of the adoption literature predates the formal behavioral economics literature (Streletskaya et al., 2020). For this reason, the adoption literature will often make use of key behavioral concepts without directly identifying them with the familiar modern behavioral terminology. More recent literature directly incorporates behavioral economic concepts such as loss aversion (see Foster and Rosenzweig, 2010; Brick and Visser, 2015), uncertainty and learning (Chavas and Nauges, 2020), the impacts of social connections (Maertens and Barrett, 2013; Wang, Lu, and Capareda, 2020), or even drawing more heavily from psychology and behavior change literatures (Adnan et al., 2019).

Agricultural economists have long been interested in risky choice. Indeed, the management of risk and use of insurance and government subsidies to manage risk is touched on in Nourse's (1916) paper defining the field of agricultural economics.[1] With a heavy focus on risky choice that has continued to the present time, it is not surprising that agricultural and resource economists would take a significant interest in behavioral models of risky choice as this literature evolved. Lin, Dean, and Moore (1974) show that while farmers behaved more closely in line with expected utility maximization than simple profit maximization, neither performed particularly well. This poor fit was clearly demonstrated in Just and Peterson (2003, 2010), where it is shown that the only utility functions that rationalize observed farmer decisions and estimated profit distributions must be negatively sloped over certain segments of wealth.

Patrick et al. (1985) pick up on the evidence of a poor fit for expected utility models in light of the then-emerging behavioral evidence against expected utility theory. Using exploratory surveys, they find the dimensionality of risk considerations in farming businesses to be vastly greater than is typically modeled. While weather, output, and input prices are significant sources of risk, other important sources include family plans and government regulation, among many others. Additionally, they find the strategies farmers use to manage risk were much more numerous than are generally considered and that decisions were seldom based on some sort of rational optimization. Rather, they find that many farmers base their decisions on decision rules akin to a safety-first principle (Roy, 1956). Similar work from this era explores how farmers understand the distributions of prices and yields in ways that are decidedly behavioral (Young, 1979). Buschena and Zilberman (1994) highlight the long history of behavioral risk models in agricultural economics in the form of safety rules (e.g., Roy, 1956) and argue for a more thorough integration of the nonexpected utility models in agricultural economics. More recent work has often embraced the use of prospect theory or other behavioral models of risk aversion (e.g., Babcock, 2015).

The use of behavioral or ad hoc rules is not limited to the management of risk. In the heyday of farm management, agricultural economics research often used behavioral rules or ad hoc comparisons to grapple with the complex problem of maximizing profits in an agricultural production setting. Nix (1979) details the evolution of the farm management literature, specifically noting how the use of simple indexes of efficiency won out over full cost accounting measures in practice due to the relatively light recording and calculation burden. Beginning in the 1950s, farm management studies began to make simple comparisons of practices and outcomes, then converting these results into simple rules to be applied by practitioners. Notably, the audience for

[1] Interestingly, Nourse makes a substantive case for the notion that economics evolved out of agricultural economics and not the other way around.

such work was considered to be the smaller farms that could not easily make use of information produced by commodity associations (Just et al., 2002). These efforts later gave way to linear programming models that sought to provide better informed decision rules based on abstract information about the farming operation (Clarke and Simpson, 1959). More generally, agricultural economists have regularly used behavioral models to describe farm management behaviors. This includes the extensive use of fixed proportions technologies (Yotopoulos and Wise, 1969), reliance on learning-by-doing and learning-by-using models of adoption, and other ad hoc models of learning in the context of adoption (Feder, Just, and Zilberman, 1985), policy adaptation (Just, 1975) and market response (Waugh, 1964).

Finally, a small but important strand of literature acknowledges the importance of human relationships in agricultural practices. While discussions of family farming have always had a strong hint of the importance of the relationships involved, open discussion of the role of families in shaping the operations of farms really arose in response to considerations about farm succession (see Haws, Just, and Price, 2025, for a review). This discussion arises more formally as Williamson's construction of institutional economics comes to prominence (Pollak, 1985). For example, Feder (1985) demonstrates how family supervision of labor can impact farm productivity, ostensibly due to the distinct motivations that family relationships place on the individual. More recently, a series of papers outlines how family relationships can impact the value of farmland at trade (Perry and Robison, 2001; Robison, Myers, and Siles, 2002). Farmland is observed to trade at below market rates between family members, and farmers list vastly different acceptance prices for land to be sold to a friend, family member, or an unfriendly neighbor (Robison, Myers, and Siles, 2002). This phenomenon demonstrates how such relationships can not only affect how transactions are conducted but can also embed relational values into the underlying goods being traded.

Resource Management and Environmental Valuation

The integration of behavioral economics into resource and environmental economics over time represents a significant evolution in how economists understand and address environmental challenges. This development is still underway, but it has already fundamentally transformed our approach to designing policies and programs aimed at managing natural resources and mitigating environmental damage.

The roots of this integration can be traced back several decades, though the formal recognition of behavioral anomalies in resource economics emerged gradually. As Poe (2016) documents, the journey began with early observations that actual human behavior consistently deviated from the predictions of traditional economic theory. These deviations, initially dismissed as mere aberrations, eventually became recognized as systematic patterns worthy of serious study. By the 1970s, researchers like Brown and Hammack (1973) were documenting significant disparities between WTP and WTA compensation in environmental contexts—disparities that traditional economic theory suggested should not exist.

The 1980s and 1990s marked a key period in the development of behavioral environmental economics. Knetsch and Sinden (1984) and others brought together previously isolated research streams—contingent valuation studies in environmental economics and behavioral experiments in psychology—demonstrating that the WTA–WTP disparity was not merely a survey artifact but reflected fundamental aspects of human decision-making. This period also saw the emergence of Kahneman and Tversky's prospect theory (1979) and its application to environmental issues, with resource economists recognizing that loss aversion and reference-dependent preferences could explain many puzzling observations in environmental valuation studies (Poe, 2016). Most prominently, Jack Knetsch's work on WTP–WTA disparities were key to the development of theories of loss aversion (Kahneman, Knetsch, and Thaler, 1990) and the ascendance of prospect theory. Other research on people's reluctance to live next to areas that were associated with environmental contamination or nuclear power plants illustrated prospect theory's focus on the overweighting of low-probability events (Kunreuther et al., 1990; McClelland, Schulze, and Hurd, 1990).

In a similar vein, hedonic pricing studies revealed unusual behavior, such as property values near contaminated sites continuing to decline even *after* environmental remediation was completed—an observation that puzzled researchers at the time. These persistent valuation losses were later recognized as stigma effects, reflecting lingering public perceptions of risk and contamination that standard economic models initially failed to capture (Slovic et al., 1991; Hunsperger, 2001; Messer et al., 2006).

Another important frontier of behavioral economics emerged in the realm of adoption of environmentally friendly methods. As Streletskaya et al. (2020) observe, the literature on producer behavior and technology adoption has long engaged with behavioral ideas, even when not couched in behavioral language. Farmers' decisions about adopting new practices or technologies frequently involve uncertainty, time delays, social influence, and risk—all domains where behavioral economics has strong explanatory power. Patterns of conformity, trust in neighbors, and hesitancy to deviate from community norms were evident long before formal behavioral frameworks were applied.

The integration of behavioral economics in resource economics was certainly fueled by the introduction of experimental economics. Cherry, Kroll, and Shogren (2007), Shogren and Taylor (2008), and Palm-Forster and Messer (2021) emphasize that laboratory and field experiments allowed resource economists to test behavioral hypotheses under controlled conditions. As a revealed preference method, economic experiments brought enhanced empirical rigor and helped validate behavioral theories in ways that purely observational studies or stated (hypothetical) preference methods could not. Experiments exposed the limits of traditional assumptions—showing, for instance, how endowment effects, loss aversion, and framing shape real decisions about conservation, valuation, and resource use.

An area where behavioral economics reshaped resource economics is in the study of the provision of public goods and behavior in relation to common-pool resources (CPRs). Early theoretical models—grounded in rational actor assumptions—predicted chronic underprovision of public goods and overextraction of CPRs due to free-riding and tragedy-of-the-commons dynamics. However, experimental economics challenged this pessimism (e.g., Marwell and Ames, 1979; Kim and Walker, 1984; Isaac, Walker, and Thomas, 1984; Isaac, McCue, and Plott, 1985). Voluntary contribution mechanism (VCM) and provision point mechanism (PPM) experiments repeatedly revealed that individuals often contribute more to public goods than predicted by Nash equilibrium, especially in early rounds or under conditions of group cohesion, communication, defaults, or leadership (Ledyard, 1995; Isaac, Schmidtz, and Walker, 1989; Messer, Schmit, and Kaiser, 2005; Messer et al., 2007). While much of this literature has been devoted to exploring the causes for and limits of other-regarding preferences (i.e., market experience, List, 2006, warm glow, Andreoni, 1995, communication and voting, Kecinski and Messer, 2018, subject types, Marwell et al. 1981), the foundational observations were driven by behavioral observations in a policy context. The behaviors observed in these settings suggested the importance of social preferences (e.g., pure and impure altruism, reciprocity, conditional cooperation, and inequality aversion). Moreover, CPR experiments—most notably those popularized by Ostrom and others—demonstrated that norms, trust, and communication can dramatically reduce overharvesting, even in the absence of formal enforcement.

The 2000s witnessed an acceleration in both theoretical and applied behavioral work. Thaler and Sunstein's (2008) popularization of nudging brought behavioral economics to the forefront of public discourse, and environmental economics quickly became a fertile ground for applying nudge-style interventions. Palm-Forster et al. (2019) document how agri-environmental programs began integrating behavioral elements (e.g., default options, social norms, and strategic message framing) to influence participation and compliance. Experimental trials demonstrated that relatively low-cost interventions could dramatically improve the uptake of conservation practices—especially when aligned with farmers' cognitive tendencies and social environments. These approaches have been endorsed in reports by the National Academy of Sciences, Engineering, and Medicine (National Academies of Sciences, Engineering, and Medicine et al., 2023) and created new guidance for the development and evaluation of environmental programs that are grounded in behavioral science and designed for real-world policy, such as the CREDIBLE framework and its seven principals—cost-effectiveness, replicability, evidence-based design, durability, impact, behavioral insights, and learning orientation (Messer, Ganguly, and Xie, 2025).

Other studies have used behavioral economics and experiments to investigate key topics in resource economics, such as how payment for environmental services programs can be designed to be cost-effective and increase spatial coordination (Parkhurst et al., 2002; Parkhurst and Shogren, 2007; Banerjee, Kwasnica, and Shortle, 2012; Banerjee et al., 2017; Banerjee, 2018) and how policies can be designed to reduce nonpoint source pollution from farms (Vossler et al., 2006; Vossler, Suter, and Poe, 2013; Suter et al., 2008; Suter and Vossler, 2014). The behavioral lens also enriched the understanding of risk and uncertainty in agricultural decisions. Liu (2013) and Bocquého, Jacquet, and Reynaud (2014) provide field-based evidence that farmers are not risk-neutral agents but display behaviors like loss aversion and probability distortion, consistent with prospect theory. Duflo, Kremer, and Robinson (2011) show that present bias contributed to underinvestment in fertilizer among Kenyan farmers, a finding echoed in US-based studies by Duquette, Higgins, and Horowitz (2012) on time preferences and the slow diffusion of best management practices. Maertens and Barrett (2013) illustrate how peer networks and informal social learning shape the diffusion of agricultural technologies. Shogren and Taylor (2008) highlight how environmental economists came to appreciate behavioral insights by confronting the failures of classical theory to predict real-world outcomes. They argue that while behavioral approaches were initially viewed as "soft" or auxiliary, they now form a central part of environmental economics' empirical and theoretical toolkit. The authors point to a growing consensus that policy must be designed with bounded rationality, social preferences, and context-dependence in mind.

As the field moves forward, the key challenge is balancing scientific rigor with practical relevance. Methodological gaps and concerns remain—particularly regarding statistical power, external validity, and generalizability across contexts (Cason and Wu, 2019; Palm-Forster et al., 2019; Shukla, Messer, and Ferraro, 2023). These challenges limit both the explanatory power of research and its relevance for designing more effective, behaviorally informed policies. Yet the broader trajectory is clear: Behavioral economics is no longer a peripheral curiosity but a core pillar of how resource and environmental economists understand and influence the world. What began as a set of anomalies in valuation surveys and hedonic studies has blossomed into a robust, interdisciplinary program of research with clear policy implications.

Food and Consumer Demand

As agricultural economists began to explore areas of nutrition, food assistance, and health, rational approaches were found to be both powerful and inadequate to address the observed issues. Some of the most powerful approaches include those using Lancaster (1966) models to describe the response of demand for nutrients and substitution behavior between foods as prices change. For example, LaFrance (1983); Beatty and LaFrance (2005) uses such a model of demand for macronutrients, examining the implications for substitution effects and the impact of agricultural policy. This approach provides substantially more structure to the problem and identifies that individuals do not purchase or consume individual nutrients but complete foods that have specific proportions of nutrients—a behavioral observation. However, this approach still requires the consumer to be quite sophisticated, both in their knowledge of the food products they buy and in their level of self-control, which does not seem congruent with an ever-flourishing diet and weight-loss industry.

Most people have occasions where they regret their food consumption choices (e.g., Ássimos, França, and Pinto, 2024), which is decidedly contrary to the rational model of consumption.

Food choices can be impulsive and often show that those with the greatest desire to restrict their consumption are the ones most likely to indulge (Linardon, 2018; Zhang et al., 2021). Much research shows that individuals have a difficult time monitoring their consumption volume (Klesges, Eck, and Ray, 1995; Davidson et al., 2019) and often end up severely underestimating the amount of their consumption (Wang and Begho, 2024). Simple instruments that enable the monitoring of consumption are often credited with reducing overall consumption, though some recent evidence calls this into question (Just and Gabrielyan, 2025).

Early work in food and consumer behavior grew out of agribusiness marketing work, which have been credited with some of the earliest recorded economic experiments (Brunk and Federer, 1953). From humble beginnings experimenting on grocery shoppers with randomly assigned produce conditions, a vast literature primarily using choice experimentation has grown to explore food consumer preferences and choice. This work directly influences the large body of literature featuring the work of names like Lusk, Nayga, Caputo, McCluskey, Grebitus, and McFadden, among many others. Much of this work examines how the presentation of information, the labeling or framing, impacts willingness to pay—often finding decidedly behavioral results. For example, traffic light labels appear to be more effective at encouraging healthy eating than standard nutrition labels that contain more information, perhaps due to their ability to attract consumer attention and the light demands on attention required to understand them (Van Loo et al., 2018). Simple and prescriptive information is generally more persuasive than detailed information that is cognitively demanding.

This body of choice experiments is also responsible for identifying halo effects (Roe, Levy, and Derby, 1999). A halo effect occurs when an observable attribute influences perceptions of unobservable attributes in predictable ways. For example, food consumers believe that organic foods are healthier, more nutritious, less caloric, and taste better (Nadricka, Millet, and Verlegh, 2020; Durand et al., 2025), despite the fact that organic status has no particular statistical relationship with any of these other attributes. Similar effects have been found to be at work in assessing branded products (e.g., Kind Bars versus Sunbelt granola bars).

Many food policy issues arising in the early 2000s lent themselves to such behavioral exploration. One of the largest among these was the issues of labeling various food processes. While the history of certifying and labeling foods has a long history stretching back to kosher and halal labels, the past decades have brought forth a wide range of process labels, ranging from shade-grown coffee to cage-free eggs. Most prominent of these process labels was those for bioengieered foods (aka GMO labeling). Dozens of studies of food choice have contrasted food framed as GMO versus GMO free, GMO free versus unlabeled (Costa-Font, Gil, and Traill, 2008), or GMO versus GMO free versus unlabeled (Huffman et al., 2003). Many of these studies explicitly approach the issue by drawing on the larger literature of framing and choice (Kahneman and Tversky, 1979).

The number of options found in a standard grocery store, and the amount of attribute information embedded in each of those options, is immense. This raises significant questions about how a human processes such information in order to make choices. Key work in this area shows that given too many choices, individuals are less likely to buy and more likely to regret whatever they do buy (Iyengar and Lepper, 2000). Similar work has been shown to influence food choices in a variety of circumstances (e.g., Streletskaya, Weerasekara, and Li, 2023). This general overload of information is often credited with putting consumers in a state where behavioral suggestions are more salient (Just and Gabrielyan, 2018), so that even very simple suggestions can have a powerful impact on behavior (Payne et al., 2014, 2015).

Behavioral issues have also taken a leading role in research on food assistance in the US. Enrollment in SNAP (previously the Food Stamp Program) has always lagged behind eligibility (Figueroa et al., 2025), with approximately 16% of those who qualify not enrolling. There may be many reasons for nonenrollment, but social stigma associated with participation was among the earliest hypotheses (Pinard et al., 2017). Later work examined the drivers of such stigma, finding that economic shocks shared within a community can lead to higher enrollments than personal shocks (Nooney et al., 2013). SNAP has also been the subject of work on mental accounting and hyperbolic discounting. Based on the observation that most SNAP recipients spend other money on food in addition to SNAP benefits, the USDA experimented with providing fungible cash instead of benefits that were restricted to eligible food items (Fraker, Martini, and Ohls, 1995). The results of this cashout experiment demonstrated that individuals would spend more on food when receiving a restricted benefit than when receiving cash, suggesting a behavioral effect similar to mental accounting (see Just, 2014, p. 43). Moreover, the long-observed monthly cycle of SNAP spending appears to demonstrate behavior consistent with hyperbolic discounting (Wilde and Ranney, 2000; Just, 2006). Both spending and calorie consumption are much higher in the initial days after benefit distribution than later in the month, leading some to suggest adjusting the benefit schedule.

Finally, a robust literature has arisen exploring the potential use of nudges to influence food choices among those receiving food assistance. While this work originated in the school lunch setting (Just and Gabrielyan, 2016), the work has been extended to food pantries (Feeding America, 2016; Wilson et al., 2017) and SNAP/WIC recipients (Just and Gabrielyan, 2018). These nudges generally use convenience, visibility, or priming to encourage food choice and consumption.

Behavioral Economics' Impact on Our Field, Research Institutions, and Public Policy

Impact on Our Field

Since 2000, agricultural and resource economics has seen a growing influence of behavioral economics on the institutional structure of the field. The first grand indication of this movement was the founding of the Institutional and Behavioral Economics Section of the Agricultural and Applied Economics Association (AAEA) in 2002. This section grew out of discussions and a series of AAEA sessions led by Allen Schmid, Gary Lynne, Fredrick J. Hitzhusen, Lindon Robison, and several others. These sessions, beginning around the late 1980s, took note of the series of stylized facts that seemed central to agricultural and rural life and behavior but absolutely foreign to economic theories. The purpose was to provide a home for alternative philosophies and models of economic behavior until behavioral models were "deemed on par with the contemporary mainstream" (Lynne and Hitzhusen, 2002, p. 3). In many ways, this group not only created such a home but also forced the AAEA into creating the section structure that thrives to this day, ensuring a stable home for a variety of economic explorations.

Impact on Institutions

This early group of behavioral economists consisted mostly of lone wolves acting by themselves within their departments. As behavioral economics grew in influence, several departments took note and invested heavily. Cornell University was among the earliest to build capacity in behavioral economics, beginning with the hire of William Schulze in 1994. These hires built on a recognized strength throughout the campus, with Richard Thaler, Jay Russo, Robert Frank, and other generalists helping to create a strong core of behavioral work. Schulze not only advocated strongly for investing in behavioral economics within the Department of Applied Economics, he also introduced the first undergraduate courses in behavioral economics and graduate courses in experimental economics at Cornell.

While experimental economics within the field grew in acceptance much more quickly than behavioral economics more generally, similar specialization arose at institutions throughout the country. The University of Delaware is perhaps one of the keenest examples of this specialization, with a relatively small Department of Applied Economics and Statistics that houses nine applied economics faculty, eight of whom are oriented towards experimental and behavioral economics. With only an MS graduate program and a large number of externally funded grants supporting postdoctoral researchers, the University of Delaware boasts of having the world's largest cluster of PhD-trained economists working on agricultural and resource economics questions through the lens of behavioral and experimental economics. Behavioral labs became key assets at several schools, including Texas A&M, where Marco Palma has pioneered the use of neuroeconomic measures in applied economics work.

The USDA Economic Research Service (ERS) played a significant role in the expanding influence of behavioral economic research in both academic and policy spheres. Beginning in 2002 (perhaps influenced by their hire of Lisa Mancino), ERS put out a call for proposals emphasizing behavioral approaches to studying diet and food assistance. This led to a series of workshops, ERS reports, and small conferences, culminating in the 2010 funding of the Cornell Center for Behavioral Economics in Child Nutrition Programs (BEN). This center was envisioned as a hub for funding and extension focused on applied behavioral economics and the National School Lunch Program. BEN hosted annual conferences for grantees, leading to dozens of published papers using nudge experiments in a school lunch setting to encourage more nutritious food choices. This work was widely distributed through state consortia providing training to school lunch practitioners in more than a dozen states.

Following the model of BEN, the USDA founded two additional centers. One was a short-lived center housed jointly at the University of North Carolina and Duke University examining food retail spaces and SNAP/WIC program participants. Another center was the Center for Behavioral and Experimental Agri-Environmental Research (CBEAR, www.centerbear.org), which started in 2014 as a partnership with the USDA to apply behavioral science and experimental methods to conservation program design and delivery. These partnerships resulted in operational trials—such as behavioral nudges embedded in USDA outreach letters (Wallander, Ferraro, and Higgins, 2017; Wallander et al., 2023; Ferraro et al., 2021)—that tested means of increasing participation and retention in conservation programs without altering the core incentive structures. Through randomized controlled trials mostly in the United States, CBEAR demonstrated how low-cost, behaviorally informed interventions could yield substantial improvements in both administrative efficiency and environmental effectiveness (Ferraro et al., 2024).

To help bridge the expertise of behavioral economists working on environmental issues throughout the country, CBEAR structured itself as a coalition of "CBEAR Fellows" from dozens of institutions across the US. The CBEAR's coalition approach has been adopted by the Research Network on Economic Experiments for the Common Agricultural Policy (REECAP) in Europe—a similarly missioned network advancing behavioral and experimental agri-environmental research for EU policy. Together, CBEAR and REECAP represent an emerging global infrastructure for advancing the behavioral science of conservation through field experimentation, institutional collaboration, and knowledge translation.

Impact on Public Policy

With the explosion of prominent applied work in behavioral economics, we have seen a demonstrable impact on policy. Work originating with the BEN center was embraced by the National School Lunch Program, with USDA's Food and Nutrition Service providing rewards and incentives to schools that adopted specific behavioral strategies. At the last measure, 29,000 schools nationwide (out of approximately 100,000) had adopted at least some of the behavioral strategies (Just and Gabrielyan, 2016). Related work (Hanks, Just, and Brumberg, 2016) led to the licensing of Sesame Street characters for the marketing of fruits and vegetables to children (The White House, 2013).

Behavioral experiments also helped shape federal laws regarding the labeling of GMOs. The vast majority of experimental studies demonstrated the potential for foods labeled as containing GMOs to create a framing effect, where substitutes without the label were favored perhaps because they were perceived as less suspect (Huffman and Rousu, 2006). Alternatively, when these experiments framed the alternative in terms of traditional technologies (e.g., using pesticide instead of a pest-resistant strain of a crop) consumers preferred the GMO (Heiman, Just, and Zilberman, 2000). While federal policy originally opted not to label, eventually, state law in Vermont forced labeling of products containing GMOs. Importantly, the consumer response to these labels was substantively different from those predicted by isolated experiments (Adalja et al., 2023). This case has been noted as one demonstrating the tremendous difficulty of establishing both internal and external validity in behavioral economics (Just and Jiao, 2025).

Despite the growing body of evidence supporting the effectiveness of behavioral interventions in resource and environmental contexts, their application within conservation programs has notably lagged (Ferraro et al., 2023). As Ferraro and Messer (2025) argue, while behavioral nudges and experimental interventions have shown clear promise in improving participation and environmental outcomes in USDA's agri-environmental programs, scaling these innovations remains a major hurdle. The reasons behind this gap are complex but not entirely opaque. One reason, as Höhler et al. (2024) emphasize, is the lack of participatory mechanisms and co-design processes that would build buy-in among stakeholders and implementers. Similarly, Rosch et al. (2021) underscore the cultural inertia within public agencies, where staff often prioritize compliance and procedural consistency over experimental innovation. Many US conservation programs are federally funded yet administered through chronically understaffed local offices, where field staff often face pressure to deliver services efficiently under rigid timelines and resource constraints. In such environments, even modest innovations can be perceived as burdensome disruptions. Furthermore, program administrators often lack financial or professional incentives to experiment with untested behavioral designs and may fear political or reputational backlash if an intervention is seen as manipulative or fails to deliver. Studies by Messer, Allen, et al. (2016a); Messer, Kecinski, et al (2016b); and Grand, Messer, and Allen (2017) document widespread reluctance among conservation program administrators to try new, cost-effective approaches, especially when they deviate from established protocols or potentially involve more effort. This risk aversion has been further magnified in recent years by an increasingly polarized political climate, in which even small missteps can attract outsize scrutiny.

These findings suggest that while academic research has made significant strides, the bridge to policy implementation is still under construction, with many promising behavioral tools stuck at the pilot stage. To address this institutional inertia, CBEAR leaders and senior USDA economists propose the creation of Behavioral Science Advisory Boards—similar to the natural science advisory boards commonly used in federal agencies such as the US Fish and Wildlife Service—to provide credible, nonpartisan guidance on how behavioral insights can be responsibly and effectively integrated into conservation policy (Messer et al., 2024). As a result, while behavioral economics has transformed the way researchers think about conservation policy, its implementation continues to be hampered by institutional inertia, administrative disincentives, and political risk sensitivity.

Discussion: Opportunities and Challenges

While some of the initial excitement surrounding behavioral economics has dissipated and several important criticisms of behavioral work have gained credence, behavioral work continues to wield an important influence on the field. Elements of behavioral economics are now discussed even in many of the basic principles courses and texts (e.g., Frank and Cartwrights's (2010) text). Behavioral concepts are now referenced generally in the field of economics and applied economics, and even the staunchest traditionalist will generally acknowledge the contributions of behavioral work in addressing at least some of the failings of neoclassical theory.

Taking stock of the current state of behavioral work especially in a policy context, the National Academy of Sciences, Engineering and Medicine in 2023 published a *Consensus Study Report* that notes the general importance of five behavioral effects in particular (National Academies of Sciences, Engineering, and Medicine et al., 2023): limited attention and cognition, inaccurate beliefs, present bias, reference dependence and framing, and social preferences or social norms. While they acknowledge that many other effects may be important, these effects are the best documented and those for which we have observed wide applicability to date. Moreover, they conclude:

> Core principles of behavioral economics have been tested repeatedly across six domains—health, retirement benefits, social safety net benefits, climate change, education, and (to a lesser extent) criminal justice—and the evidence for their importance and value in the design of policy interventions is well established. (National Academies of Sciences, Engineering, and Medicine et al., 2023, p. 3)

In many ways, one could say we have seen the fulfillment of the original vision articulated by Lynne and Hitzhusen (2002), referenced earlier. While exposure to some behavioral work is nearly universal, it is noteworthy that the primary text used to educate PhD students in microeconomics was published prior to most of the behavioral revolution (Mas-Colell, Whinston, and Green, 1995) and provides essentially no exposure to behavioral theory.[2] Many programs supplement with some minimal coverage of behavioral work in the first year.

At the same time, the criticisms of behavioral work have also matured and command attention. Many of these critiques are focused on the clumsy transition between the discovery of behavioral effects and their eventual application. Establishing convincing evidence of a behavioral effect and its importance in policy is extremely difficult (Roe and Just, 2009; Just and Byrne, 2020; Just and Jiao, 2025; Krasovskaia and Just, 2025), with virtually any study suffering from serious limitations. Often these limitations have been ignored or minimized by authors, leading to claims that are overstated, and subsequent applications that are not useful. While the sources of such limitations are too many to name here, a few key limitations deserve mention.

Behavioral effects are primarily identified in experimental settings, where causality can be convincingly established. However, due to funding and practical constraints, experiments tend to be short-term, leading to the potential that any demonstrated effect is short-lived and only observed because of the short window of observation. Such novelty effects would not be useful in policy contexts where long-term behavioral change is necessary (e.g., food choice impacts on obesity or health). Some of this could be overcome with the funding of longer-term studies and a willingness of researchers to test the limits of their interventions.

Funding may also contribute to a tendency for behavioral anomalies to be discovered in underpowered studies. When too few observations are obtained to reliably estimate the causal effect, observed anomalies could simply be the expression of random chance. While these issues could be remedied with fully powered replication studies, there is often a tendency for researchers and policymakers to skip that step and move directly to application. Behavioral insights groups, established in many countries to test the use of behavioral interventions on a national scale, have often found null results once they test these interventions at scale. Such observations are so routine that John List (2022) now refers to effects vanishing at scale as the *voltage effect*.

Replication itself is a challenge, a theme that has been established as the *replication crisis*. Only about 36% of behavioral findings replicate when tested (Open Science Collaboration, 2015), a number well below what standard power analyses would suggest. Some of this is clearly due to publication bias or poor documentation of methods. At least some may be due to poor quality control or inappropriate statistical practices (Lybbert and Buccola, 2021) or fraud (Gino and Ariely, 2012). Moreover, it is natural when trying to first establish an effect that one would test using highly controlled conditions and interventions that are perhaps stronger than would be desirable or possible in the field (List, 2022). Some of the ways such interventions may be amplified may be difficult to fully reflect in the write up. A developing literature and corresponding set of research practices are still being developed to address these key weaknesses. Preregistration, open data and code availability, the review and acceptance of papers prior to results being known, and publication of replication studies have all been part of the response to the replication crisis (Tincani and Travers,

[2] The closest it comes is a brief discussion of risk aversion in competitive markets, where it explicitly argues against the widely accepted reality of risk averse behavior by firms (see Just and Cao, 2018).

2019). However, the uptake of these approaches has been surprisingly slow. As noted by Shukla, Messer, and Ferraro (2023), even in a special issue focused on behavioral economics in agricultural and resource economics in one of field's leading journals (*Food Policy*), only 11% of studies were preregistered, fewer than 9% conducted power analyses, and merely 8% applied appropriate statistical corrections. One glimmer of hope was that accepted papers performed somewhat better across these metrics.

Nudges, while prominent in the public eye, have been the subject of increasing scrutiny. This critique is best articulated by Loewenstein and Chater (2017), who decry the hubris that has surrounded the notion that we could use nudges to achieve virtually any behavior change and fine-tune those changes to target specific demographics without interfering with the choice of others. This was clearly overpromising. Simple environmental interventions, such as framing, have limits to their influence and can produce a noisy effect. As a science, we have difficulty demonstrating that an effect occurs, much less finding ways to tune the size of the effect and the specific audience. The fact that nudges cannot possibly live up to the early-phase boasts, however, should not overshadow the importance of behavioral interventions more generally. Nudges are perhaps among the most narrowly defined group of interventions—those that exclude all traditional economic levers of behavior. In truth, most behavioral interventions are designed to complement traditional means (information, incentives, or restrictions) in order to make them more effective or efficient. Thus, the importance of broadening the scope of behavioral research to collaborating more seamlessly with traditional economics.

Conclusions

The past 50 years have witnessed a remarkable transformation in agricultural and resource economics through the integration of behavioral insights, evolving from scattered observations of anomalies to a robust body of literature that both fundamentally challenges and enriches traditional economic theory. As our analysis demonstrates, behavioral concepts now permeate our field's leading journals, with applications spanning agricultural production, environmental protection, and food choice. Yet despite this intellectual revolution, the institutionalization of behavioral economics within our discipline remains incomplete. Most critically, doctoral programs continue to rely too heavily on traditional microeconomic theory in their core curricula and qualifying examinations, with behavioral concepts relegated to supplementary or elective coursework. This unfortunate pedagogical lag perpetuates a disconnect between the theoretical frameworks we teach and the empirical realities we observe in our research, limiting our ability to prepare the next generation of applied economists who can integrate behavioral and neoclassical approaches to address complex policy challenges.

Looking forward, our field must embrace more rigorous methodological standards to ensure that behavioral insights translate effectively into policy applications. The replication crisis has exposed the fragility of many behavioral findings, underscoring the urgent need for pre-analysis plans, adequate power analyses, and systematic replication studies as standard practice rather than exceptional virtue. Moreover, as behavioral interventions move from academic curiosity to policy implementation, establishing Behavioral Science Advisory Boards within federal agencies could provide the institutional infrastructure necessary to integrate these insights into program designs.

Our hope is that through these efforts, our field can bridge the persistent gap between research findings and policy practice, ensuring that the behavioral revolution in agricultural and resource economics fulfills its promise of creating more effective, efficient, and human-centered policies for managing our food systems and natural resources.

[First submitted August 2025; accepted for publication September 2025.]

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Supplemental Materials

For the figures, we searched to see if any of the following terms were in the title, abstract or keywords of published manuscripts. The 30 terms were as follows:

1. Ambiguity (Ambiguity Aversion)
2. Anchoring Effect
3. Behavioral Economics
4. Behavioral Science
5. Choice Architecture
6. Choice Overload
7. Cognitive Load
8. Defaults
9. Discounting
10. Endowment Effect
11. Hot-Cold State
12. Impulse Eating
13. Independence Axiom Violation
14. Loss aversion
15. Nudge (nudging, nudges)
16. Overweight low probability
17. Probability Weighting
18. Peer Effects
19. Projection Bias
20. Prospect Theory
21. Regret
22. Regret Theory
23. Social Norms
24. Social Preferences
25. Status Quo Bias
26. Stigma
27. Time Discounting
28. Tunneling
29. WTP/WTA Difference (WTP/WTA Dichotomy)
30. Variety Bias

The query syntax used in the Web of Science (WoS) advanced search tool was: TS=(ambiguity OR ambiguous) OR TS=("ambiguity aversion" OR "ambiguity averse" OR "ambiguity-averse") OR TS=("anchoring effect" OR anchoring) OR TS=("behavioral economics" OR "behavioural economics") OR TS=("behavioral science" OR "behavioural science") OR TS=("choice architecture") OR TS=("choice overload") OR TS=("cognitive load" OR "mental load") OR TS=(default*) OR TS=(discount* OR "time discounting" OR "delay discounting") OR TS=("endowment effect" OR "ownership effect") OR TS=("hot-cold state" OR "hot-cold empathy gap") OR TS=("impulse eating" OR "impulsive eating") OR TS=("independence axiom violation" OR "independence axiom" OR "Allais paradox") OR TS=("loss aversion") OR TS=(nudge*) OR TS=("overweight low probability" OR "rare event overweighting") OR TS=("probability weighting" OR "decision weights") OR TS=(peer* OR "peer effects" OR "peer influence") OR TS=("projection bias") OR TS=("prospect theory" OR "cumulative prospect theory") OR TS=(regret* OR "anticipated regret") OR TS=("regret theory") OR TS=("social norms" OR "descriptive norms") OR TS=("social preferences" OR "inequity aversion") OR TS=("status quo bias") OR TS=(stigma*) OR TS=("time discounting" OR "temporal discounting") OR TS=(tunneling OR "narrow focus") OR TS=("WTP/WTA difference" OR "WTP-WTA gap") OR TS=("WTP/WTA dichotomy" OR "WTP-WTA contrast" OR WTP-WTA OR WTP/WTA OR "WTP WTA") OR TS=("variety bias"); Timespan: 1975-01-01 to 2024-12-31 (Publication Date), where "TS" refers to Topic Search, covering title, abstract, and author keywords.