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Can Behavioral Economics be Discussed from a Divine Perspective in the Age of Artificial Intelligence?

Yapay Zekâ Çağında Davranışsal Ekonomi İlahi Bir Perspektiften Tartışılabilir mi?

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ABSTRACT

The concept of the rational individual in economics has started to be versatile with the behavioral economics (BE) paradigm, which explains how the decision-making mechanisms of economic actors are affected by social, cultural, religious, and emotional values. The behavioral disorder is the main obstacle to society's convergence around common goals and rational decisions & actions. People can even make non-rational decisions based on perceptional engineering, communal pressure, religious beliefs, personal ambitions & fears, and social class needs. With the rapid advancement of innovative technology, artificial intelligence (AI) is also being used to provide reasonable controls over behavioral disorders and irrational expectations in many financial transactions such as information asymmetry, perception engineering, stock market index prediction, bankruptcy prediction, or bond market. Here, it is argued that since the condition of maximizing interests (revenue, benefits, reputation, etc.) arises from materialistically rational individual selfishness, the Islamic economy is an economic model as an exception to expected behaviors of homoeconomicus. We have made discussions over concerns in the literature and conducted risk analysis and risk assessment methods to produce prudent model with suggestions to the policy makers.

Keywords: Behavioral Economics, Artificial Intelligence, Perception Engineering, Islamic Economics

ÖZET

İktisatta rasyonel birey kavramı, ekonomik aktörlerin karar alma mekanizmalarının sosyal, kültürel, dini ve duygusal değerlerden nasıl etkilendiğini açıklayan davranışsal iktisat (BE) paradigması ile çok yönlü olmaya başlamıştır. Davranış bozukluğu, toplumun ortak hedefler ve rasyonel kararlar ve eylemler etrafında yakınlaşmasının önündeki en büyük engeldir. İnsanlar, algısal mühendislik, toplumsal baskı, dini inançlar, kişisel hırslar ve korkular ve sosyal sınıf ihtiyaçlarına dayalı olarak rasyonel olmayan kararlar bile alabilirler. Yenilikçi teknolojinin hızla gelişmesiyle birlikte, bilgi asimetrisi, algı mühendisliği, borsa endeks tahmini, iflas tahmini veya tahvil piyasası gibi birçok finansal işlemde davranış bozuklukları ve irrasyonel beklentiler üzerinde makul kontroller sağlamak için yapay zekâ (AI) da kullanılıyor. Burada çıkarların (gelir, fayda, itibar vb.) maksimize edilmesi koşulunun materyalist olarak rasyonel bireysel bencillikten kaynaklanması nedeniyle, İslam ekonomisinin homoekonomikus'tan beklenen davranışların bir istisnası olarak bir ekonomik model olduğu savunulmaktadır. Politika yapıcılara ihtiyatlı bir model ve öneriler üretmek için literatürdeki endişeler üzerine tartışmalar yaptık ve risk analizi ve risk değerlendirme yöntemleri gerçekleştirdik.

Anahtar Kelimeler: Davranışsal İktisat, Yapay Zekâ, Algı Mühendisliği, İslam İktisadı

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1. INTRODUCTION

Empirical investigations have consistently indicated that individuals frequently manifest non-rational conduct and engage in activities that deviate from the premises of the rational behavior theorem within the realm of economic decision-making. This phenomenon is exacerbated by the observation that economic choices, even within well-known, recurrent, or anticipated scenarios, often assume a multifarious character, yielding disparate outcomes due to inherent ambiguities. Predominantly, the primary determinant for these disparities can be traced back to the idiosyncrasies of individual physiognomy. The diversification in behavior is mediated through a multitude of biological factors, encompassing but not limited to gender, age, stature, complexion, cranial pilosity, physique, facial morphology, and societal mores. However, the intricacy of this behavioral matrix transcends mere biological determinants, encompassing a complex tapestry woven from geographical location, environmental influences, prevailing social norms, popular culture, educational background, attitudes, religious affiliations, and personality attributes. Furthermore, a susceptibility to emotional impulsivity or involuntary responses to unforeseen stimuli compounds the uncertainty surrounding individual conduct.

The inability of neoclassical models to provide comprehensive elucidation of crises across their multifaceted dimensions has prompted a reassessment of the veracity of axioms such as asymmetric and incomplete information, transaction costs, the prisoner's dilemma, and the rationality underpinning the decision-making mechanism. Behavioral economics (BE), the interdisciplinarity conceived convergence between economics and psychology borne out of the transformative evolution of psychological paradigms and the embrace of interdisciplinary methodologies, endeavors to proffer a cogent account of the actions undertaken by individuals constrained by cognitive and psychological limitations, resorting to heuristic strategies in their decision-making processes.

The empirical scrutiny of individual choices, coupled with rigorous experimentation, has compellingly advanced the proposition that rational decision-making remains an elusive ideal. Rather, it has been empirically ascertained that decisions are profoundly influenced by a panoply of variables including, but not confined to, cultural predispositions, religious affiliations, intuitive inclinations, and environmental contexts. The individual, when confronted with diverse decisional alternatives, is notably swayed by their relative positioning vis-à-vis peers, the impetus to safeguard their extant status quo, the formidable challenges posed by extensive data analytics, the heightened likelihood of appraising novel information, or the propensity to draw inferences from frequently encountered experiences while evading active information-seeking endeavors. It is, therefore, reasonable to surmise, in consonance with numerous studies within the BE corpus, that the premise of human rationality may be a fallible conjecture.

1.1. Problem Statement

With the advancements in technology, AI applications are now capable of providing clearance of big data analytics problems and perception engineering of economic trends and predictions. However, the traditional economic theory assumes people to be purely rational in their financial decisions, which is not always the case. Therefore, there is a need to understand the factors that affect economic behaviors, discuss the behavioral economics with risk aversion, economic forecasting and expectations of crisis with artificial intelligence, and BE from an

Islamic perspective to bridge the gap between the traditional economic theory and real-world decision-making processes.

1.2. Assumptions

Based on the literature ant theoretical knowledge we assume the following as a priori:

- Individuals exhibit non-rational behaviors and activities during the economic decision-making phase.

- Economic decisions turn into different forms and cause results that are not the same every time due to unclear situations.

- The individual does not actually make rational decisions, but rather based on varying cultural, religious, intuitive, and environmental conditions.

- The condition of maximizing interests arises from materialistically rational individual selfishness.

- The market system does not always lead to prominence in the economy and create all balances in the economy at the best level.

- Mutual trade does not always increase the well-being of all according to Ricardo's Theory of Comparative Advantages.

- The flaws of the Expected Utility model have been the subject of much research in economics, and its assumptions and conclusions are flexible and challenging to disprove.

- Decisions made at risk do not necessarily provide maximum benefit, and individuals are not always rational when making decisions.

1.3. Hypothetical assertions

Based on the literature and theoretical knowledge, this study asserts that behavioral economics provides insights into how individuals, constrained by cognitive limitations, employ shortcuts influenced by cognitive, psychological, cultural, and religious factors when making decisions. Moreover, the Islamic economy serves as a model that aligns with sacred and communal welfare principles, incorporating a secondary rationality that includes the maximization of interests.

Since AI applications can now provide both clearance of big data analytics problems and perception engineering of economic trends and predictions, behaviors of economic agents and their rational expectations needs to be studied as well. Here, it is argued that the condition of maximizing interests (revenue, benefits, reputation, etc.) arises from materialistically rational individual selfishness. Therefore, as an exception to expected behaviors of homo-economicus, the Islamic economy is undoubtedly an economic model in compliance with holy and common-good parameters including secondary rationality of maximizing interests. Therefore, using a multidisciplinary approach, we start with definitions from literature and research problem setting; understanding the factors that affect economic behaviors; discussing the behavior economics with risk aversion; economic forecasting and expectations of crisis with artificial intelligence and finally BE from an Islamic perspective with conclusion.

Dependent Variable:

Behavioral Economic Decision (BED): Represents the outcome of economic decisions influenced by cognitive, psychological, cultural, and religious factors.

Independent Variables:

Cognitive Limitations (CL): Factors limiting rational decision-making abilities, including emotional impulsivity and heuristic strategies.

Psychological Factors (PF): Influences such as emotional responses to stimuli and societal norms.

Cultural Affiliations (CA): Cultural predispositions affecting decision-making.

Religious Values (RV): Moral and ethical considerations impacting economic choices.

Environmental Context (EC): External factors shaping decision-making processes.

Coefficient Parameters:

$\alpha1$, $\alpha2$, $\alpha3$, $\alpha4$, $\alpha5$: Coefficients representing the impact of cognitive limitations, psychological factors, cultural affiliations, religious values, and environmental context respectively on behavioral economic decisions.

$\beta1$: Coefficient representing the impact of AI applications on perception engineering and economic predictions.

$\gamma1$: Coefficient representing the deviation from traditional economic theory assumptions due to non-rational behaviors.

Formal Function Formula:

$$BED = \alpha1 \cdot CL + \alpha2 \cdot PF + \alpha3 \cdot CA + \alpha4 \cdot RV + \alpha5 \cdot EC + \beta1 \cdot AI + \gamma1$$

BED (Behavioral Economic Decision): This formula synthesizes the influence of various factors (CL, PF, CA, RV, EC) on economic decisions, augmented by the effects of AI in perception engineering and the deviation from traditional economic rationality ($\gamma1$). The formula illustrates how economic decisions are not purely rational but are influenced by cognitive, psychological, cultural, and religious factors ($\alpha1$-$\alpha5$). Additionally, AI ($\beta1$) plays a role in shaping perceptions and predictions, further complicating traditional economic models. This formula can be applied to analyze and predict economic behaviors under diverse conditions, including scenarios where AI is employed to manage information asymmetry or predict market trends. It aligns with the interdisciplinary approach of behavioral economics, considering both psychological insights and technological advancements.

2. LITERATURE REVIEW

When searched in the Scholar database with the keywords of this study, it is found around 17.000 articles and with the title of the study the numbers are found to be around 12.000 articles but none of them have used the words in *allintitle.*

BE is a relatively new discipline. The generally accepted economic theory is based on the principles of capitalism. According to the general acceptance:

1)   People are pure rational. In their financial decisions, they choose the right and the most useful.
2)   The market system leads to prominence in the economy.
3)   As a requirement of the invisible hand theory, the market system creates all balances in the economy at the best level.

4)   According to Ricardo's Theory of Comparative Advantages, mutual trade increases the well-being of all.

In the obscure treatise titled "The Theory of Moral Sentiments" (1759), individual comportments serve as windows into psychological principles and serve as observatories for economic phenomena (Camerer & Lowenstein, 2004; Dumludağ & Ruben, 2015; Thaler, 2016). Although the systematic amalgamation of psychology and economic sciences initiated with Herbert Simon's postulation of "finite rationality" during the 1950s, it did not permeate academic discourse until the 1970s. Smith's oeuvre herein proffers a psychological dissection of individual conduct, accentuating the paramount of sympathy. In his second magnum opus, "The Wealth of Nations," the foundational underpinnings of economics become evident through the lens of human egoistic behavior. Consequently, an exploration of human psychology has been a continuous theme since the era of Adam Smith (Barros, 2010; Dumludağ & Ruben, 2015). Despite the malleability of its suppositions and conclusions, rendering them somewhat impervious to disproof, the Expected Utility model has undergone extensive scrutiny within the realm of economics. Post-1950s, numerous experimental inquiries have castigated the Expected Utility Theory, with the Allais and Ellsberg paradoxes emerging as paramount. The elucidations put forth by Markowitz (1952), Ellsberg (1961), and Allais (1990) delineated deviations in the preference mechanisms advocated within the purview of expected utility theory, but remained ensconced within the academic canon as anomalies before their import became wholly manifest. In their investigations, Tversky and Kahneman (1974, 1981 & 1986) achieved prodigious acclaim by demonstrating the indispensability of psychological analysis in economic deliberations. Decisions under risk do not invariably optimize utility, and individuals do not consistently comport rationally when confronted with decisions. These endeavors culminated in the conferment of the Nobel Prize in Economics in 2002 upon these luminaries.

Kahneman and Tversky's seminal and oft-cited treatise, "Decision Making in Uncertainty: Shortcuts and Biases," published in 1974, expounds upon the heuristics and biases underpinning intuitive cognition, buttressing their assertions through a compendium of approximately twenty experimental paradigms. In their Nobel Prize commendation, they were lauded for the seamless integration of psychological research into economics, particularly in elucidating human judgment and decision-making under conditions of uncertainty. Vernon L. Smith (1962; 1976; 1994), an economist distinguished for his empirical economic analyses, played an instrumental role in elevating Behavioral Economics (BE) to a respected and influential discipline. The 2002 Nobel Prize in Economics was also bestowed upon him for his pioneering use of laboratory experiments as a methodological tool (Yavuzaslan, 2018). BE's ascension continued with the endeavors of Rabin (2001), a luminary in the "New Behavioral Economics" epoch. Another pivotal milestone in BE during the 2000s transpired through the research conducted by Andrei Shleifer (2000) on securities markets and the government's regulatory role in fostering economic growth. Shleifer (2000) advanced behavioral finance as an alternative to the long-standing dominance of the "Efficient Market Hypothesis" in financial markets. In his examination of behavioral finance, Shleifer indicted both the conventional presumption of perfect rationality and the oversimplifications inherent to the efficient market hypothesis as contributory factors to arbitrage failure in financial markets due to erroneous price adjustments (Zouboulakis, 2014).

In the contemporary world, pervaded by neoclassical policies predicated upon the ideal of rational agents devoid of imperfections, errors, and moral scruples, it behooves economic discourse to pivot towards the adoption of production and consumption principles grounded in fundamental needs, rather than the relentless pursuit of profit maximization and capital

accumulation. In this paradigm, the emphasis shifts towards satisfying the essential requirements of the less privileged, eschewing excess and extravagance in favor of prudent resource utilization, thereby affording greater protection to finite natural resources and mitigating the unjust disparities in income and wealth distribution on a global scale (Karagül, 2018).

A plethora of literature has furnished ample evidence affirming the inherent imperfection of human rationality, delineating a consistent pattern of fallacious decision-making among individuals (Can Amber, 2018). As humanity is neither wholly selfish nor universally rational, emotional, belief-driven, and culturally imbued factors frequently exert an influential sway over economic decisions. In the realm of BE, financial choices are posited as the province of these veritable individuals. Nevertheless, the disjunction between the common populace and economic agents was hitherto considered inconsequential within the trajectory of economic inquiry (Sent, 2004). The incongruities manifest within economic theories have furnished the substrate upon which BE has germinated, marking the confluence of economics with the discipline of psychology. Once the imperative of incorporating psychological processes into decision-making analyses under conditions of risk and uncertainty was apprehended, its incorporation began to garner acceptance (Eser & Toigonbaeva, 2011). Most economists, custodians of traditional economic paradigms, had hitherto excluded behavioral processes from their models, deeming the modeling of psychological constraints superfluous during hypothesis testing (Dumludağ & Ruben, 2015). BE approaches and policy recommendations have matured to a stage where they confer discernible advantages upon policy practitioners (Riedl, 2015). A nuanced understanding of economic choices is attainable through the observation of how individuals allocate their finite temporal, pecuniary, and tangible assets. Many studies posit BE as an ancillary discipline that illumines the circumstances and rationales underlying deviations from rationality in human behavior, thereby elucidating their failure to act in strict alignment with their self-interests (Ghisellini and Chang, 2018). Efe (2023) argued that perception engineering has become easy and widespread in this new age of cyber-capitalism in which artificial intelligence (AI) based Management Information Systems (MIS) and IoT tend to dominate pervasively for economic, political or religious reasons and asserted that investment decisions, political tendencies and economic preferences may not be rational due to exposure to perception engineering through innovative technology of algorithms and social media.

Studies emanating from a behavioral vantage not only perturb the established economic paradigm but also invigorate it with renewed vigor (Seçilmiş, 2019). Consequently, familiarity with the human attributes alone remains insufficient. The quest for a unified conceptual characterization of BE constitutes the bedrock of one of the most momentous schisms in the annals of economics (Rehman, 2018). BE, while investigating the influences of psychological, cognitive, emotional, cultural, and social factors on the preferences of economic decision-makers, concurrently lays bare the inadequacies of traditional economic frameworks (Teitelbaum & Zeiler, 2018). The ascendancy of BE and the deepening of scholarship in this arena emanate from a fundamental paradigm shift in economics, underscored by the acknowledgment that BE has bequeathed substantial contributions to the field of economics, igniting debates regarding its status, purpose, and overall contributions (Heukelom, 2014).

3. THE KEY FACTORS THAT AFFECT ECONOMIC BEHAVIORS

Economic decision-making is not solely predicated on the maximization of material utility, as human existence is inherently finite, with the paramount value being the allocation of

one's lifetime. The fragility of life, characterized by an average daily occurrence of unexpected mortality affecting approximately 155,000 individuals, renders all material investments ultimately inconsequential. In the wake of resolutions originating in Western thought, two pivotal factors have assumed prominence in the quest for sociological, economic, and political supremacy. The conventional economic paradigm positing that human behavior is driven by rationality and the maximization of utility functions inadequately explains the multitude of economic behaviors exhibited by individuals. Emotions and affections constitute an integral facet of human existence (Pieters & van Raaij, 1988). Research corroborates that religious affiliation exerts a discernible impact on economic and demographic conduct, owing to its sway over the costs and benefits underpinning interconnected life-cycle decisions. Furthermore, religious affiliation assumes significance in the context of behaviors within marital relationships, as it represents a complementary attribute within matrimony. An additional dimension of religiosity underscores its influence on economic and demographic outcomes, partly due to its accentuation of disparities by religious affiliation and partly due to the generally salutary effects of religious involvement on health and well-being (Lehrer, 2004).

1. Behavioral Anomalies

2. Erosion of Social Solidarity

An alternative conceptualization of behavior, encompassing the mental, sensory, and physiological responses of all organs in response to external stimuli, posits that they collectively constitute both active and passive reactions to specific triggers. Behavioral anomalies, scientifically denoted as impediments to socially healthy relationships, represent a principal impediment to the convergence of society toward common objectives. Psychoanalysts have discerned a penchant for asserting superiority and projecting strength when investigating deviations from normative human behavior. The complex of inferiority that crystallizes in individuals unable to attain their desired status emerges as a pivotal factor precipitating behavioral irregularities. These considerations engender thought-provoking inquiries:

- How do social media and perception engineering exert influence over economic behaviors?

- Can human behaviors, along with the motivations underlying them, be implicated as causal factors in societal crises?

- Do individuals perpetually render decisions that exclusively optimize utility?

Presently, the field of economics alone remains insufficient to address these questions adequately. Consequently, psychology has incrementally permeated the domain of economics, particularly within the microeconomic sphere. Subsequently, a distinct economic paradigm, Behavioral Economics (BE), has arisen. Foremost among its endeavors lies the investigation into the impact of human psychology on financial decision-making. Classical economists contended that rationality safeguarded the interests of individuals, thereby ensuring judicious expenditure of their resources. However, the advent of Behavioral Economics has unveiled the human capacity for irrational decision-making under the influence of external pressures, ambitions, fears, and social context. For instance, individuals may eschew the sale of assets at their zenith valuation, even as prices soar, driven by a perception of inadequacy and an aversion to purchases during market troughs.

Therefore, the interplay between human psychology and economic decisions has become a focal point of inquiry, expanding our comprehension of the multifaceted determinants that shape economic behaviors.

Figure 1. Key elements affecting consumer and investor behaviors

People are constantly affected by different economic and financial nudges. When buying a good and service, even though the goods and services are the same, they can pay higher with the brand's attractiveness. When people make decisions about economics and finance, psychological evaluations and economic valuations are prevented. The difference between spending the money earned and the hard-earned money is the difference. Difficult winners are much more affected by short-term and long-term risks and cut their spending in fluctuations in the economy. People will be able to get rid of the adverse impact of the 'behavioral economy' if they can stop and think. However, stopping and thinking is something people rarely do.

4. RISK ANALYSIS AND RISK ASSESSMENT

We can use the following elements in risk analysis of behavioral economics:

• The expected utility model of choice has problematic issues with accurately describing economic behavior.

• The pain of losing is more significant than the pleasure of winning, which affects economic decision-making.

• Perception is a decisive factor in risk-taking.

• Investors have different risk perceptions that are logical or unreasonable to them.

• Financial professionals have discretion in relaying information about financial product risk to clients.

• Market trends are strongly driven by increased levels of risk.

Risk assessment: We can make an assessment using the above-mentioned drivers as such:

• Behavior economics with risk aversion is a significant risk factor in economic decision-making.

• Artificially forming economic preferences through social media may have potential risk factors in influencing economic behavior.

- Religion and belief may play a role in determining socio-psychological paradigms that affect economic behavior.

- Financial professionals must effectively relay information about financial product risk to clients to avoid potential risks.

- Market trends can have potential risks for investors, especially those who are unaware or indifferent to risk.

Therefore, the risk assessment suggests that economic behavior is influenced by multiple factors, including perception, psychology, and socio-economic paradigms. Financial professionals must relay accurate information about financial product risk to avoid potential risks, and market trends can pose potential risks for investors who are unaware or indifferent to risk. Therefore, it is important to consider various risk factors when making economic decisions.

Economists employ a simple and elegant explanation for risk aversion that derives from the concavity of the utility-of-wealth function within the expected-utility framework (Rabin and Thaler, 2001). Risk aversion derives from diminishing marginal utility for wealth (or marginal utility for aggregate consumption). The standard approach in economics has been to utilize the expected utility model to capture a risk-averse behavior. However, economists and psychologists have identified various problematic issues with expected utility as a descriptive model of choice (O'Donoghue and Somerville, 2018). Economic decision theory suggests that value, risk, and risk-averse influence choice of behavior. Although previous studies identified neural correlates of decision parameters, the contribution of these correlates to actual choices is unknown (Christopoulos *et al.,* 2009). The findings of behavioral economists on risk aversion can best be summarized by specifying "losses larger than the gains." From a behavioral perspective, the pain of losing is always more significant than the pleasure of winning. Here are the questions that stir our minds:

▪ Can the behaviors that determine economic preferences be artificially formed through social media?

▪ If expectations and behaviors severely affect economic life, how do religion and belief determine these socio-psychological paradigms?

The behavioral economy examines economic behavior rather than a microeconomic approach. Economic agents are not considered beneficiaries or rational. Instead, their decisions are parsed for tips on the right choices and prejudices. People make numerous economic decisions informed by psychology rather than numbers. Prospect theory is one of these areas. It challenged the concept of neoclassical economics by documenting the tendency for people to behave differently at risk due to their potential loss or potential gain (Kenton, 2020). According to the Prospect theory, the decision-making at stake is a two-stage process. First, the decision is organized or simplified regarding potential gains and losses.

Figure 2. Key factors affecting attitude towards risk taking or averse

Many different variables determine how investors should behave in the face of danger. Fearful people avoid trouble, while angry people are as comfortable as people who are happy about risk. The decisive factor in risk-taking is perception. Afraid investors feel insecure and think that they are not in control. Angry investors identify the enemy and feel they control the situation. As they are more confident in their positions, they keep their shares in their hands. As a result, while the markets are falling, fearers tend to sell.
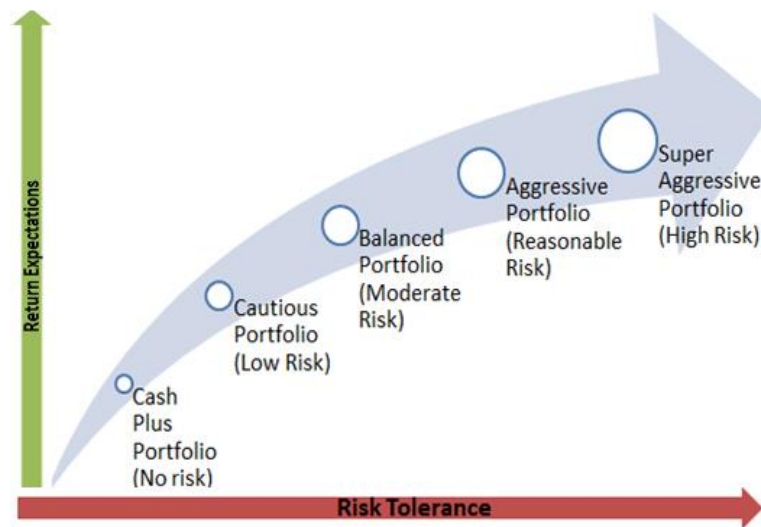
Figure 3. Risk levels as a function to risk tolerance and opportunities

Overall, there are three types of investors. In general, one can argue the following hypothesis but, actually they all depends on their own circumstances in which both objective and subjective variables play:

- Elderly investors tend to take a higher risk than young investors.
- Retired investors tend to take higher risks than workers' investors.
- Investors at a high level of education take more risks than those receiving undergraduate and graduate education.
- undergraduate degree graduates have a lower risk perception than graduate students.
- Female investors tend to take risks lower than male investors.
- Investors who love chance are investors who do not like risk and unregistered investors against risk.

4.1. Investors with Risk

Financial professionals have a great deal of discretion concerning how to relay information about the risk of financial products to their clients (Kaufman *et al*., 2012). The expected benefit of investment for risk-loving investors is greater than the expected benefit of investment. Even if the risk increases more than the expected return, they do not hesitate to invest and tend to take risks. Therefore, the marginal utility of this investor is positive. Risk-loving investors will prefer to invest in higher-yielding shares or instruments instead of fixed-return investments.

4.2. Risk-Free Investor

The risk-free rate is an important input in one of the most widely used finance models: the Capital Asset Pricing Model. For a risk-free investment, the return realized should be equal to the expected return. No security is truly risk-free, but Treasury securities are normally used as the closest proxy for a risk-free security because they have practically no default risk (Mukherji, 2011). An investor who does not like the risk; is afraid of taking risks and do tend to prefer the most risk-free investments. The marginal benefit of money for the investor who does not like the risk is negatively inclined. Investors who do not like the risk will invest their money in instruments with lower returns rather than in the stock exchange or risky places. Time

deposits or government bonds can be cited as examples. Many different derivative instruments can be used today for investors who want to avoid risk. Investors can diversify their portfolios from derivatives to assets and minimize their risks or eliminate them. Fear prevents most investors from taking optimal market risks. People are terrified of the adverse events they expect or anticipate and start selling more as the event approaches. We can say "risk perception" in the financial language of fear. Investors have many different risk perceptions that are logical or unreasonable to them.

4.3. Unaware risk prone Investor

Market trends are strongly driven by increased levels of risk, especially policy risk and exposure to revenue risk (Karneyeva and Wüstenhagen, 2017). For the indifferent investors of risk, which investment is chosen and how dangerous is the threat is not very important. They do not avoid taking chances with the increase in parallel with the trouble. For such investors, the marginal benefit of money is one. On the other hand, naive investors are not interested in risk. It is not essential to choose which investment for these people. Therefore, those kinds of investors are indifferent between risks and benefits.

5. ECONOMIC FORECASTING AND EXPECTATIONS OF CRISIS WITH ARTIFICIAL INTELLIGENCE

Risk categories of investors are closely related with their confidence on the level of information they have. can AI provide faster and more accurate information on big data and provide the best projections? BE and rational expectations theories now must consider artificial intelligence, which can have both positive and negative effects in the analysis of economic decisions and behaviors. While discussing the results of artificial intelligence, Penrose also discussed it in the context of robotics, expert systems and its effects in psychology (Penrose, 1997, 12). While there is a great deal of literature about AI for mass appraisal, there is relatively little work on how it can be applied in real estate forecasting (Rossini, 2000). Nowadays, many current real financial applications have nonlinear and uncertain behaviors which change over time. Therefore, the need to solve highly nonlinear, time-variant problems has been overgrowing. These problems and other traditional models caused a growing interest in artificial intelligent techniques (Bahrammirzaee, 2010). The potential of modeling human behaviors with AI and the possibility of going into the details of the human mind and thinking processes with this potential should be accepted as important contributions of AI. An important potential contribution of AI to economics is the economic modeling of human behavior. Marwala (2015) discusses the potential impact of AI on economics through limited rationality, efficient market hypothesis and expectation theory. According to Marwala (2015), AI provides a limiting possibility for limited rationality. Economic forecasting is an essential aspect that policymakers in financial and corporate organizations rely on. AI helps them determine future events that might infringe some hardship on the economy and the citizens (Paruchuri, 2021).

Financial crises can be expressed as severe economic problems resulting from extreme price fluctuations in financial markets or excessive increases in non-returning loans in the banking system. Understanding financial problems require understanding macro-financial interconnections, which are complex and challenging. Financial emergencies can be challenging to characterize using a single indicator, as they are multifaceted events. Although fundamental factors such as macroeconomic imbalances, internal or external shocks are generally observed, many questions remain about the exact causes of crises. Financial crises often precede asset and credit bubbles and can eventually collapse (Pacifico, 2021). The

dynamics of macroeconomic and financial variables within the framework of crises have been extensively studied in the literature. Empirical studies have expressed various stages of financial crises, from small-scale economic disruptions to large-scale national, regional, and even global crises (Claesens & Kose, 2013). the International Monetary Fund (IMF) has classified financial crises mainly as Currency Crises, Banking Crises, Systematic Financial Crises, and External Debt Crises. Suppose a speculative attack on the exchange value causes the currency to depreciate, causes a significant decrease in foreign exchange reserves to prevent this situation, or causes enormous interest rates. In that case, this situation is called a currency crisis. If a banking crisis occurs at most two years before or at most two years after a currency crisis, this is referred to as a twin crisis. Before 1980, the Turkish economy experienced several varying duration and severe crises. After 1980, the Turkish economy used an export-based development model came to the point of facing shocks outside of its intervention, and the number and severity of the crises experienced by the country increased. Turkey, which became a country of chronic inflation in the post-1980 period, faced crises more frequently with the addition of the political instability factor after the 1990s. Different crises have occurred from the 1990s to the present, including the 1994 Crisis, the 2000-2001 Crisis, the 2008 Global Economic Crisis and post-COVID crises of inflation.

AI prediction techniques can help forecast different kind of crisis. It is possible to determine the predictability of the currency crises in Turkey by using Artificial Neural Networks (ANN), and Adaptive Network-Based Fuzzy Inference System (ANFIS) methods from AI methods (Söller & Kızılkaya, 2019). AI is used in many financial transactions such as stock market index prediction, bankruptcy prediction, or bond market. AI is used even in daily index changes in the markets. AI can perform better than humans in market changes that are difficult to predict due to complex financial data. Artificial intelligence, which is used in stock price behavior, is now at the investor's service in forecasting the economy's future.

BlackRock's G7 Growth GPS[2] aligns with analysts' expectations, indicating steady and above the overall trend. Eurozone growth prospects also show results in line with the recovery in economic activity despite the political recession in Spain and Italy. Looking at China, the composite data gives the same results as GPS in the range. Automated trading, or algorithmic trading, which has been used for many years in stock trading and futures and options market transactions, has accelerated the development of robots working for money markets. Indicators are valuable information for investors and traders on where to direct their money. Indicators are necessary to understand both the past and the future. Based on this, BlackRock uses Macro GPS to improve economic forecasting based on economic indicators. Incorporating *'big data*,' BlackRock deepened the use of GPS by using the numerical data provided by the Systematic Active Equity team. With Macro GPS using AI robots, BlackRock offers future economic forecasts that investors can use to act. With this tool, the gross domestic product (GDP) expectations for the next 12 months within three months are shared with the investor. Thus, an early warning system for potential economic changes is created for the investor. BlackRock brings together many macroeconomic data such as realized activities, employment, investor perception survey results. Big data, which brings together countless data, creates economic analyzes and tries to provide more efficient information on the short-term evolution of the economy compared to traditional methods. The BlackRock GPS app is currently being used in the USA, UK, Germany, France, Italy, Spain, Japan, and Australia.

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[2] For detailed information of the technique, see: https://www.blackrock.com/us/individual/insights

More hidden patterns and more information can be accessed, enabling people to make more rational decisions in their decision-making processes. As the trading actors in the markets are equipped with more and more powerful AI systems, they can enable the markets to be effective or they can be used to adapt people's decisions and behaviors to the strategies of a particular interest group. When it is not only humans who make economic decisions, but humans with machines equipped with AI, this may have different consequences for the rational expectation theory. All these can be grouped as possible theoretical effects of AI on economics. Another aspect is the use of AI in economic activities in practice. Today, AI finds application in the fields of e-commerce, health, communication, human resources, cyber security, transportation and supply chain, industrial production and retail (Öztürkmen, 2021).

6. BE FROM MORAL AND RELIGIOUS PERSPECTIVES

The social sciences, which are the key to understanding human economic preferences and social behaviors, are the basis of self-definition, understanding the past and today, and establishing good connections with the future. Before the technological leap in the agricultural society, industrial society, and information society transition, social sciences changes had been realized. Today, the new technological leaps are passed through social sciences, where we recognize the information age. For this reason, a unique understanding of social science is of vital importance to our society since social scientists have always played a significant role in the development and civilization of a country. So, it adds a historical and behavioral point of view.

Social sciences are academic domains that deal with humans and society, examine human-human, human-society, and human-goods relations, produce information in a systematic and scientific methodology, and present information made in scientific disciplines. With the advent of AI that can also make decisions, the new paradigm for the social sciences is human-machine relationships. The main fields of social sciences are Islamic Sciences, History, Psychology, Sociology, Philosophy, Geography, Anthropology, Political Science, International Relations, Linguistics, Philology, Communication Science, İndustry 4.0, Economics, and Law.

The functions of social sciences can be listed as follows.

- Produces culture, builds civilization.

- Relate the past to the present and the future.

- It is the basis of human and society relations.

- Lead to social changes.

The functions and importance of social sciences also make social scientists necessary. We can say that a social scientist has more power to change the whole world and shape society than a positive engineer. The Prophets and Saints are all social scientists since religion and faith are covered under the social sciences. For example, Jean Jacques Rousseau's ideas are the essential elements that directly affect the realization of the French Revolution. In the same way, the ideas of social scientists like Ibn Khaldun, Adam Smith, Max Weber, and Karl Marx influenced the masses in the world. We can say that social sciences and technical sciences interact and complement each other. To give a simple example, the technical person makes the button, and the social scientist decides whom to press the button. The most fundamental difference between these two areas is that social scientists cannot be imported against the fact that technical personnel can be provided from different societies. In need, engineers,

technicians, doctors, or teachers can be brought from other countries, but we cannot talk about such a practice in social sciences. Every society must raise its social scientists. Every society's political scientist, sociologist, or lawyer must get out of that society to have unique conditions. More importantly, it is comparative learning of the local and universal social sciences.

Let us consider the moral and religious perspectives of BE. Many people are not initially aware of the fact that the irreversible and intangible life capital is being consumed like the flowing of a flood. All left another giant year behind with its pain, sweetness, joy, sadness, sin, and goodness, and we entered a new year. All got older by another year. It is one more year behind the lifetime capital of all. So, we can ask some key questions:

- Every day, every minute, while bringing us closer to death, how much could we prepare for the end of this year while optimizing our risk and resources for possible investments?

- Are we risking our life capital for nothing like a super risk-prone idiot entrepreneur?

No matter what age we are, as we have left another year of our life capital, we all must make our annual accounting by judging actual and petential profits and loss. The proverb "*Take yourself into account and self-auditing before being taken into account and auditing*" let us think like this: The past flew from our hands with time, money, and other belongings. Our life may not be available tomorrow. However, there is no guarantee for reaching tomorrow and preserving all our investment, stakes and accumulated wealth. So, we should use our time by processing good deeds. By thinking in this way, we must know the value of every moment by processing acts that follow God Almighty's will. God swears on time, draws our attention to times, and makes us evaluate the time we live in the best way and send them to work for "*righteous deeds*" and live in the right and the truth without taking an unreasonable risk using all the capital for transient affairs. In the Qur'an, it is stated as follows: "*swear for the century, man is really in harm. But those who believe and commit righteous deeds and recommend each other righteousness and patience are exceptional*" (Quran, Surah Asr).

Time is one of the greatest blessings God has bestowed on man. The important thing is to evaluate it by knowing the fate of this blessing. To assess time is by using it in a measured and conscious way. The way to do this is to arrange the daily lifetime within a discipline by dividing the time into work, worship, and resting hours. Apart from that, humans do not have free time to waste. According to the point of view of true faith, since our life is limited and not infinite, achieving unlimited and endless rewards and being successful in worldly life is to use lifetime correctly and efficiently. Today, many people complain about lack of time and hasty usage of timing. The most important things like visiting a relative, reading a few pages of books, chatting with his family for three or five minutes, or being busy with his children are neglected under the pretext of "*I do not have time.*" If we cannot find time for the most necessary jobs, are we spending the rest of our time on more important things or ephemeral and transient things? If we consider the answer to this together and review our daily life thoroughly, we will see how much space occupies things that do not benefit our world and the hereafter.

While many lost things like wealth and money can be compensated by time, the outgoing time and life capital never return. Moreover, time is our sole capital. We earn whatever we will gain for the world and the hereafter by spending the few minutes of life. So, let us pay attention to where we spend our life capital, which is the most precious over everything. If we know our goal of being sent to the world and set short and long-term goals for ourselves in our lives, we can achieve great things by making good use of our time. Everybody would testify

that we waste plenty of time for nothing when we hit the profit, figures that will not be underestimated. Yes, thanks to the prayer performed for a lifetime, we can receive the provision of worship with a good intention. So, prayer is a soul that make other good deeds of life turn into worship when it enters a person. The issue that we want to focus on here is the expression "*with a good intention.*" Because the return of prayer works to worship is bound to a good intention condition together with prayer.

It is like when someone enrolls in the military, he is a soldier now. His military service is valid for when he wears his uniform and for all times. He is a soldier in civilian clothes, a soldier on holiday, a soldier in his sleep, a soldier on his leave. His salary is given by calculating the hours he wears a military uniform and by accepting soldiers for a whole month. Yes, maybe he just served eight hours a day; but the salary is given for twenty-four hours, not for these eight hours. All his rest times are counted from military service. Prayer is such an army uniform who wears this uniform, becomes a soldier, and even under the title of military service, even regular daily works are accepted from military service. The same analogy applies to all deeds of both a consumer and entrepreneur.

A consumer who maximizes utility operates within four dimensions: moderation, extravagance, waste, and niggardliness. These dimensions take different meanings in each social stratum. A complicating factor is the context of consumption which could be individual, social, or public. These dimensions have different meanings for each social stratum and context (Khan, 2020). The Quran and Sunnah have laid down the guiding principles in consumption that would form the framework for consumption behavior in an Islamic economic perspective (Furqani, 2017). Neoclassical-Economist with the assumption that rational individuals are concerned with personal desires, Economists of Behavior with the theory of Bounded-Rationality, and Islamic Economists with the argument that the primary goal of humans is God (Abbas, 2020).

BE was born in response to the assumptions of the neoclassical economic school that dominated the mid-19th century and the intensive use of mathematics. After neoclassical economics, mathematics was used extensively in Keynesian economics thought and other economic schools. For this, the spiritual structure, religious factors, and cultural components of the human being, the leading actor of economics, are pushed behind mathematics. BE theorists examine how emotions such as belief, motivation, happiness, fear, and risk aversion can shape economic decisions while highlighting the human factor. These studies, which are based on qualitative and quantitative observations and experiments, have attracted more attention in recent years and caused the reliability and adequacy of the dominant mathematical economic view. This is the result of social sciences becoming popular again.

Since the beliefs in society affect the person's decision-making, it is possible to change their decisions by changing the person's ideas in an organization. For this, beliefs determine which way a person will go in society. Personal thoughts become cultural patterns when they begin to be in the community. It becomes social judgment. If 60-70% of a thousand people adopt a specific belief pattern, it has become a social belief. Thus, when we change the opinions of society, we change social behavior. This is called mass effect, mass sociopsychology. Some areas hold the masses together. The common belief patterns of persons are social behavior areas. It also creates social reaction areas. For this, when this is broken, social schizophrenia occurs. If some society sees the other part as an enemy, there is a disorganized, inconsistent relationship. In society, when one section says, "*Let us go in the direction of A*" and "*let us go in the direction of B*," it is necessary to call it social schizophrenia. So, amid beliefs in society, everyone can believe in different things. A community of 1000 people may have a thousand thoughts.

However, if there is a merger in the minimum area, a common language is created in that society. The economic principles implemented by Muslims differs from other materialistic systems in three main points. The first is the prohibition of interest that is the usury. The second is trying to ensure a fair distribution of income through zakat which is the share of poor in the wealth of riches. The third is the Divine norms that constitute Muslim behavior, Islam's view of man, life, and other creatures. A Muslim person should have morals, earns halal profit, attaches importance to spirituality, is just, contented, and aims for social benefit. Its Islamic aspect encourages people to avoid extravagance, show off and inefficient use of resources, promote generosity, work hard, and behave well to all. The Muslim assumes no harm in acquiring wealth if it does not lead to gambling, hoarding, and destructive competition (Akdoğan, 2012:47). Unlike the capitalist spirit, Ibn Khaldun says work is not an end between Islam and economics. Still, a means to gain the consent of Allah and to mature the religious life (Kaya & Özçim, 2020).

7. ARTICULATIONS OF LOTTERY THEORY

In the literary oeuvre of Bediuzzaman Said Nursi, an insightful analogy akin to a "Lottery Theory" emerges, offering a profound lens through which to apprehend rational decision-making and ethical comportment. To illustrate this allegory, consider a locale where ominous gallows loom conspicuously alongside a lottery establishment boasting the allure of substantial prizes, notably, opulent apartments. In this scenario, we, a group of ten individuals, find ourselves inexorably summoned to this precipice of choice. Importantly, the summons remains cloaked in temporal obscurity, thereby endowing each passing minute with an existential dichotomy: either an inexorable ascent to the gallows, metonymically emblematic of impending doom, or the serendipitous acquisition of a golden ticket promising untold riches.

Amidst this suspenseful tableau, the narrative takes an unexpected turn, as two individuals materialize at the threshold. One, an alluring yet disrobed lady, presents a beguiling confection with nefarious intent concealed within her hand. The other, a somber and resolute figure, devoid of deceit or susceptibility to deception, follows her into the scene. He proclaims, "I bring you a talisman, a lesson. With this talisman, you shall secure the coveted bonus ticket. Should you read this, you shall be absolved from the impending gallows, provided you abstain from partaking in those treacherous sweets" (Nursi, 1960).

Here, the gallows present themselves as a tangible locus of peril, wherein those who succumb to the allure of honeyed indulgence are destined to endure agonizing torments, akin to the affliction borne from the consumption of poisoned halva, prior to their inevitable demise. Conversely, those who have procured the prized jackpot ticket bear no outward sign of exultation, their demeanor mirroring the impending scaffold. Yet, an assemblage of myriad witnesses attests unequivocally that their fate diverges dramatically from the gallows bound. Conceivably, they traverse a swift passage to the enigmatic bonus chamber, thereby evading the specter of the gallows. This phenomenon is accentuated when gazing through the windows, where eminent dignitaries and luminaries associated with this enigmatic undertaking vociferously proclaim and disseminate, for all to witness, the irrefutable truth: those who find themselves in route to the gallows undoubtedly possess these talismans.

The metaphorical lottery ticket becomes emblematic of the eternal paradise bestowed upon the faithful, a reward in exchange for unwavering faith and righteous deeds in the mortal realm. In this allegorical framework, the gallows symbolize the grave, and the act of hanging represents mortality itself. Given the insufficiency of mundane actions, such as procuring a

mere ticket, to lay claim to such celestial wealth, this celestial fortune assumes the character of a lottery prize. Every act of devotion undertaken parallels the purchase of a ticket, the nexus between earthly rituals and the promise of an everlasting utopia.

It is incumbent upon us to discern that the term "lottery" in this context should not be misconstrued as a mere game of chance, a notion incongruent with the underlying veracity. Paradise is not a domain attained haphazardly; nor is eternal happiness forfeited arbitrarily. Faith and virtuous conduct are the conduits that usher individuals into the realm of paradise, while disbelief and rebellion presage a different trajectory – that of perdition.

As delineated in our exposition, conferring paradise as a reward for acts of worship is tantamount to a fortuitous windfall through the lottery. Such acts of devotion, however commendable, are inherently insufficient to gain admittance to the heavenly abode, which is an exclusive province of divine benevolence and grace. For the faithful, the grave does not symbolize the gallows but rather the genesis of an eternity suffused with felicity, a threshold leading to the radiant expanse of paradise, the inaugural step towards celestial sanctity.

The grand prize materializes in the form of a certificate of salvation bestowed upon an individual during the reckoning, akin to the symbolic bestowal of the book of deeds to the righteous. This constitutes the ultimate boon, a peerless treasure granting access to the realm of eternal bliss. It is substantiated through multiple sources that this certificate stands as the key to the inexhaustible treasury of everlasting happiness, corroborated by the teachings of prophets, saints, and religious luminaries. Notably, a common thread unifies these divine messengers and the adherents of truth: an unequivocal assertion that admission to paradise is an exclusive prerogative of the faithful, and the apportionment of ranks therein is contingent upon virtuous conduct.

CONCLUSION

In the annals of behavioral economics (BE), the prevailing paradigm underscores the inherent irrationality of the human cognitive architecture. In stark contrast to classical economic doctrines, this literature unequivocally asserts the irrationality of human comportment. Delving into the domain of utility maximization, it becomes imperative to underscore the pivotal determinants herein. To elucidate this point, consider the propensity of individuals to willingly expend substantial pecuniary resources on items and services they perceive as valuable, juxtaposed with their readiness to allocate considerably lesser pecuniary resources for items of commonplace or facile accessibility. It is worth noting that the definition of preciousness therein may exhibit a universal character, encompassing singularly unique entities such as gemstones and antiquities. Nonetheless, the notion of preciousness can, at times, be fashioned according to individual idiosyncrasies, as exemplified by a cherished familial heirloom, perhaps an antiquated timepiece. In such instances, the manifestation of human conduct may deviate conspicuously from normative expectations. The underpinning of this variance in behavioral trajectories invariably resides within the precincts of the human cerebral apparatus and its intricate psychological dynamics.

Indeed, an illustrative case in point substantiating the confluence of religion and its discernible ramifications upon individual and consumer behavior emerges from various scholarly investigations. The phenomenon of profligacy, characterized by the superfluous expenditure of resources, be it labor, temporal resources, or monetary assets, is unequivocally denoted as an overtly censurable comportment within the purview of religious dogma.

Regrettably, examinations of economic behaviors seldom extend their gaze towards the realm of religion, and conversely, studies of religious phenomena rarely intersect with the domain of economic activities. A generation ago, the scholarly exploration of the interplay between faith and economic praxis in Western contexts predominantly adhered to a paradigm emphasizing institutional differentiation and secularization. It merits attention that on a global scale, there exists a constellation of financial institutions, operating in numerous nations, that adhere to interest-free principles aligned with Islamic economics. Furthermore, the landscape of economic conduct, during the pre-capitalist era, unfolded within the ambit of religiously ordained norms, albeit the advent of capitalism ushered in a gradual detachment from these religious underpinnings, resulting in the gradual emancipation of the economic sphere. This process ultimately culminated in the marginalization of the nexus between economics and religiosity, even within the rubric of modernization theory.

The concept of the rational individual, an enduring topic of contemplation since the inception of economics as a discipline, continues to engender vigorous debate within contemporary discourse. In the prevailing milieu, the closer the rational agent approximates the archetype of the average individual, the more economics metamorphoses into a social science. In the realm of mathematical and statistical scrutiny within the ambit of social sciences, the individual is oft portrayed as a rational actor singularly driven by the pursuit of utility maximization. It is worth positing that, within the purview of behavioral economics, some inroads have been made towards transcending this reductive characterization. The notion of the rational individual in the economic domain has begun to embrace a more multifaceted complexion through the prism of BE. Against this backdrop, an exploration of religiosity and its intersection with Islam unearths the Islamic economy as a distinctive economic model anchored upon religious precepts. Upon scrutiny of the individuals encapsulated by this paradigm, it becomes discernible that they are predisposed towards prioritizing collaborative endeavors and espousing social values, rather than adhering to a dogmatic pursuit of individual self-interest, characteristic of the conventional rational actor. In this context, the individual envisaged within the contours of the Islamic economic paradigm emerges as one characterized by limited rationality rather than pristine rationality. Consequently, it stands to reason that the conundrums that besiege the domains of behavioral economics and Islamic economics necessitate the formulation of distinctive analytical models, divergent from the canons of conventional economic theory.

Therefore, in the annals of BE, the prevailing paradigm underscores the inherent irrationality of human cognitive architecture, challenging traditional economic doctrines that assume pure rationality in decision-making. This literature asserts that economic decisions are influenced by a myriad of factors, including cognitive limitations, psychological factors, cultural predispositions, religious values, and environmental contexts. The proposed function formula encapsulates these influences:

Formal Function Formula:

$$BED = \alpha1 \cdot CL + \alpha2 \cdot PF + \alpha3 \cdot CA + \alpha4 \cdot RV + \alpha5 \cdot EC + \beta1 \cdot AI + \gamma1$$

Theoretically and conceptually, this formula elucidates how individuals navigate economic choices under the influence of diverse societal contexts and technological advancements, particularly artificial intelligence (AI). The integration of AI into economic analyses introduces both opportunities and complexities, especially in perception engineering and predictive analytics.

Islamic economics presents a contrasting model that integrates ethical principles and communal welfare, challenging the conventional rational actor model. This approach posits that economic decisions are shaped not only by utility maximization but also by considerations of social responsibility and collective well-being.

From this analysis, it is evident that policy interventions should embrace interdisciplinary approaches, fostering collaboration between economics, psychology, and AI research. Educational initiatives are essential to promote awareness of behavioral economics and its implications for policymaking, ensuring ethical considerations in economic governance.

Recommendations crystallize into several key directives:

1. Fostering Interdisciplinary Synergies: Promote collaborative research to enhance understanding of economic behavior.

2. Augmenting Education and Awareness: Educate stakeholders on behavioral economics and AI's impact on decision-making.

3. Advocating for Ethical Paradigms: Promote transparency and ethical conduct in economic practices.

4. Supporting Islamic Economics: Highlight the ethical framework of Islamic economics as a model for inclusive economic development.

In conclusion, navigating the complexities of behavioral economics and AI requires a nuanced approach that acknowledges the diversity of human motivations and societal influences. By embracing these complexities, policymakers can develop strategies that promote sustainable economic practices and equitable societal outcomes. By adopting such a multifaceted approach, policymakers can promulgate effective policies that not only uphold ethical conduct and social welfare but also take cognizance of the intricate tapestry of factors that modulate economic decision-making.

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