The Limited Scope of Economic Science in Explaining Altruism

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ABSTRACT

This paper explores the concept of altruism within economic systems, defined here as actions that consciously act against one's own economic self-interest. We begin with a review of economic literature where altruism is scarcely mentioned but indirectly addressed in discussions of regulatory frameworks, property rights, and market dynamics. Biological theories of altruism, specifically inclusive fitness, are then examined to highlight how evolutionary biology explains self-sacrificial behavior, such as kamikaze and suicide attacks, in ways that contrast sharply with economic models based on rational self-interest. Using a Nash Equilibrium model, we predict how altruism functions in real-world economic transactions, outlining interactions between fake altruism, semi-altruism, and pure altruism, and demonstrating that pure altruism leads to consistent economic losses for the altruistic individual. Simulation results show that injecting 30% altruism into a scarcity-driven economy results in widespread poverty for most participants, confirming that pure altruism is unsustainable in such environments. However, cultural conditioning, as demonstrated through Hofstede's model of national cultures, suggests that altruism is a more complex and variable phenomenon than simple economic or biological models account for. This paper concludes that more research is needed to incorporate cultural, psychological, and environmental factors into the study of altruism in economic science, as current models oversimplify the nuanced landscape of altruistic behavior.

I. INTRODUCTION

In modern economic theory, altruism—understood here as the conscious decision to act against one's own economic self-interest—is a concept often neglected in the traditional framework of economic analysis. While not explicitly addressed, several foundational economic texts provide indirect insights into behaviors and market structures that could foster or impede altruistic actions.

Regulation of Innovation in Pharmaceuticals (Peltzman, 1974): Sam Peltzman's analysis of the 1962 amendments to the Food, Drug, and Cosmetic Act emphasizes the role of regulatory frameworks in shaping market behavior, particularly in terms of innovation. The regulatory environment incentivizes companies to delay new product introductions, reflecting a tension between maximizing profits and potentially benefiting public health through faster drug availability.[1] While Peltzman does not mention altruism, the analysis touches on the broader theme of how regulatory systems could suppress altruistic innovation—where firms might otherwise act in ways that benefit consumers at the expense of short-term profits.

The Jitneys and Urban Transportation (Eckert and Hilton, 1915). Eckert and Hilton's study of early urban transportation highlights how spontaneous market entries, like jitneys, disrupted entrenched monopolies in the streetcar industry.[2] While the jitney drivers acted primarily out of self-interest, their services inadvertently benefited society by providing cheaper, more flexible transportation. Altruism,

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1 Sam Peltzman, *Regulation of Pharmaceutical Innovation: The 1962 Amendments* (American Enterprise Institute for Public Policy Research, 1974).

2 Ross D. Eckert and George W. Hilton, "The Jitneys," *The Journal of Law and Economics* 15, no. 2 (October 1972): 293–325, https://doi.org/10.1086/466738.

although not explicitly discussed, can be interpreted in the drivers' willingness to risk penalties for the benefit of the urban poor who could not afford the streetcar.

Agricultural Labor in the USSR: This study focuses on labor dynamics within the Soviet Union's planned economy.[3] The economic structure, emphasizing collectivism over individual gain, indirectly promotes altruistic behavior. The forced migration of labor from rural to urban settings could be seen as an imposition of state-mandated altruism, though the workers themselves did not benefit directly from this sacrifice. Thus, the study highlights the tension between enforced collective welfare and individual economic losses.

Incentives in the United States (Meckling and Alchian, 1960): This work explores the broad theme of incentives in economic behavior, stressing how individuals pursue personal gain based on cost-benefit analyses.[4] Altruistic actions, in this context, represent deviations from the traditional incentive structure, as they imply individuals incur costs without expectation of reciprocal benefits. The authors note that incentive structures are key to guiding behavior, implying that systems designed around self-interest may inherently suppress altruistic actions unless altruism is directly incentivized.

Toward a Theory of Property Rights (Demsetz, 1967): Demsetz's seminal work introduces the concept of property rights and their economic significance.[5] Property rights, by their nature, incentivize individuals to act in their own interest, but they also provide a framework for understanding altruism within the market. The notion of "externalities," where actions affect others without compensation, parallels the concept of altruism—particularly in how individuals may forego personal gain for communal benefit.

Uncertainty and Economic Evolution (Alchian, 1950): In his exploration of uncertainty and economic evolution, Alchian discusses how market outcomes are shaped by behaviors that deviate from profit-maximizing norms.[6] This discussion indirectly touches on altruism, as uncertainty can sometimes prompt actions that benefit the group, even if they are not individually rational in the short term. Evolutionary principles suggest that altruism may have a long-term payoff, even if it results in immediate economic loss.

While none of these works explicitly focus on altruism, they collectively offer a backdrop for understanding how economic systems and market structures influence behavior that may be interpreted as altruistic. These studies demonstrate that, while traditional economics prioritizes self-interest, there are spaces within regulatory, labor, and market dynamics where altruism can emerge, often overlooked or suppressed by prevailing economic incentives.

II. Biological Theories of Altruism: Inclusive Fitness and Suicide Attacks

Altruism, particularly as it pertains to evolutionary biology, is often framed within the concept of inclusive fitness. This theory posits that individuals may act in ways that reduce their direct fitness

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3 V. Katkoff, "Agricultural Labor Force in the USSR," *Journal of Farm Economics* 39, no. 1 (1957): 128–39.

4 William H. Meckling and Armen A. Alchian, "Incentives in the United States," *The American Economic Review* 50, no. 2 (1960): 55–61.

5 Chennat Gopalakrishnan, ed., *Classic Papers in Natural Resource Economics* (London: Palgrave Macmillan UK, 2000), https://doi.org/10.1057/9780230523210.

6 Armen A. Alchian, "Uncertainty, Evolution, and Economic Theory," *Journal of Political Economy* 58, no. 3 (June 1950): 211–21, https://doi.org/10.1086/256940.

(such as self-sacrificing behaviors) if it increases the survival and reproductive success of their kin, thus indirectly ensuring the passage of shared genetic material. However, such explanations face challenges when applied to extreme behaviors like suicide attacks, especially those that appear to offer little to no genetic benefit to the attacker.

Inclusive Fitness Theory and Suicide Attacks

Inclusive fitness theory is a key biological explanation for altruistic behavior, where individuals act to benefit their relatives even at personal cost, as their actions indirectly propagate shared genes. This theory, however, struggles to fully explain altruistic behaviors that appear entirely self-sacrificial, particularly in cases like kamikaze pilots or suicide bombers. Both kamikaze pilots during World War II and modern suicide bombers engage in behaviors that end their own lives, seemingly providing no direct opportunity for genetic fitness or survival.

In exploring these phenomena, we must acknowledge the limits of inclusive fitness theory within modern evolutionary biology, where kin selection typically assumes that altruism results in some genetic benefit to close relatives. Orbell and Morikawa (2011) provide a framework for understanding kamikaze attacks by analyzing the cognitive and emotional processes that led pilots to participate in such missions. They argue that while such behavior can be viewed through the lens of evolutionary psychology, it transcends simple kin selection mechanisms and extends into culturally evolved motivations for group survival.[7]

Suicide attacks, such as those orchestrated by terrorist organizations, are similarly difficult to explain through the lens of inclusive fitness. Qirko (2009) notes that these attacks are often framed as acts of ultimate self-sacrifice, benefiting a larger group or ideological cause rather than kin. He highlights that although some organizations provide financial rewards to the bomber's family, the motivations of attackers cannot be fully captured by economic or inclusive fitness benefits. Instead, these acts are more complex, involving cultural, religious, and organizational pressures.[8]

Challenges in Economic and Biological Compatibility

The inclusive fitness framework faces significant challenges when reconciled with traditional economic science, which assumes rational actors pursuing self-interest. Economic models, such as those based on Nash Equilibrium, predict that altruism is irrational, as it often results in net losses for the altruistic individual. In contrast, biological models like inclusive fitness suggest that self-sacrifice can be adaptive if it increases the fitness of related individuals.

For example, Taylor et al. (2007) explore the mathematical underpinnings of inclusive fitness and how it can be used to model altruistic behavior within structured populations. They note that relatedness, while important, often interacts with competitive dynamics, meaning that altruistic actions may be

7 John Orbell and Tomonori Morikawa, “An Evolutionary Account of Suicide Attacks: The Kamikaze Case,” *Political Psychology* 32, no. 2 (April 2011): 297–322, https://doi.org/10.1111/j.1467-9221.2010.00808.x.

8 Hector N. Qirko, “ALTRUISM IN SUICIDE TERROR ORGANIZATIONS,” *Zygon*® 44, no. 2 (June 2009): 289–322, https://doi.org/10.1111/j.1467-9744.2009.01001.x.

discouraged if competition between kin is too high.[9] This presents a stark contrast to economic models, where competition and self-interest are core assumptions.

Furthermore, Van Veelen (2009) emphasizes the limitations of inclusive fitness in explaining all forms of altruism, particularly in larger groups where competition or non-linear dynamics obscure the benefits of altruistic acts.[10] These findings suggest that while inclusive fitness offers a compelling biological explanation for kin-based altruism, it does not align neatly with economic theories, which struggle to account for the self-sacrificial behaviors observed in extreme cases like suicide attacks.

Conclusion: Circumstantial Evidence for Altruism's Economic Impact

Although inclusive fitness theory provides a compelling explanation for certain types of altruism, its application to suicidal behaviors such as kamikaze and terrorist attacks suggests that there are limits to its explanatory power. These extreme behaviors often involve complex cultural, psychological, and organizational factors that are not fully accounted for by traditional biological or economic models.

Despite this, inclusive fitness theory offers circumstantial evidence that altruism—broadly defined—has measurable impacts on economic systems that are often ignored by economists. In scenarios where individuals act against their immediate economic self-interest, such as through communal support or self-sacrifice for a larger cause, these actions can reshape the distribution of resources and power within societies. The tension between self-interest and altruism, explored through both biological and economic lenses, suggests a need for more nuanced models that can bridge these divergent theoretical frameworks.

III. Nash Equilibrium Analysis of Altruism

To predict how altruism manifests in real-world economic interactions, we model three types of altruistic behavior: fake altruism, semi-altruism, and pure altruism. We use a payoff matrix to represent the outcomes of various interactions between individuals exhibiting these behaviors, and we analyze the resulting Nash Equilibria.

Model Assumptions

Fake Altruism: This strategy mimics altruistic behavior but is ultimately self-serving. The individual gains at the expense of others when possible, but avoids significant personal cost.

Semi-Altruism: This strategy entails some degree of sacrifice, but the individual expects a moderate benefit either for themselves or for others.

Pure Altruism: In this scenario, the individual sacrifices a significant portion of their resources or well-being for the benefit of others, without expecting any personal gain.

Payoff Matrix

9 Peter D. Taylor, Geoff Wild, and Andy Gardner, "Direct Fitness or Inclusive Fitness: How Shall We Model Kin Selection?," *Journal of Evolutionary Biology* 20, no. 1 (2007): 301–9.

10 Matthijs Van Veelen, "Group Selection, Kin Selection, Altruism and Cooperation: When Inclusive Fitness Is Right and When It Can Be Wrong," *Journal of Theoretical Biology* 259, no. 3 (2009): 589–600.

We will now describe the outcomes of interactions between two parties (Party A and Party B) engaging in the different types of altruistic behavior:

Party A \ Party B	Fake Altruism	Semi-Altruism	Pure Altruism
Fake Altruism	+20 / +20	+20 / -10	+20 / -50
Semi-Altruism	-10 / +20	+50 / +50	-5 / -50
Pure Altruism	-50 / +20	-50 / -5	-50 / -50

Nash Equilibrium

A Nash Equilibrium occurs when neither party has an incentive to unilaterally change their strategy, given the strategy of the other party. In this model, we aim to identify stable points where both players have optimized their outcomes, and any deviation would result in a worse payoff.

To mathematically describe this, let us denote:

- P_A as the payoff for Party A,
- P_B as the payoff for Party B,
- $S_A \in \{\text{Fake Altruism, Semi-Altruism, Pure Altruism}\}$ as Party A's strategy,
- $S_B \in \{\text{Fake Altruism, Semi-Altruism, Pure Altruism}\}$ as Party B's strategy.

The goal is to find combinations (S^*_A,S^*_B) such that no party can improve their payoff by unilaterally changing their strategy. Specifically, we seek S^*_A and S^*_B where:

$$P_A(S_A^*, S_B^*) \geq P_A(S_A', S_B^*) \quad \forall S_A' \neq S_A^*,$$

$$P_B(S_A^*, S_B^*) \geq P_B(S_A^*, S_B') \quad \forall S_B' \neq S_B^*.$$

Given the payoff matrix, we analyze the conditions for Nash Equilibrium:

1. Fake Altruism vs. Fake Altruism: Neither party has an incentive to deviate, as both are receiving the optimal payoff (+20). Any shift to semi-altruism or pure altruism would result in a net loss. Thus, (Fake Altruism, Fake Altruism) is a Nash Equilibrium.

2. Semi-Altruism vs. Semi-Altruism: Both parties are gaining +50, which is higher than any alternative strategy combination. Neither would benefit from switching to pure or fake altruism, making (Semi-Altruism, Semi-Altruism) another Nash Equilibrium.

We can formalize the Nash Equilibrium conditions using the following notation for payoffs:

Let $u(S_A,S_B)$ represent the payoff function for Party A,
Let $v(S_A,S_B)$ represent the payoff function for Party B.

The general Nash Equilibrium condition is given by:

$$u(S_A^*, S_B^*) \geq u(S_A', S_B^*) \quad \forall S_A' \neq S_A^*,$$

$$v(S_A^*, S_B^*) \geq v(S_A^*, S_B') \quad \forall S_B' \neq S_B^*.$$

For specific strategies:

Fake Altruism vs. Fake Altruism:

$$u(\text{Fake}, \text{Fake}) = 20, \quad v(\text{Fake}, \text{Fake}) = 20.$$

Neither party benefits from switching strategies, confirming (Fake, Fake) as a Nash Equilibrium.

Semi-Altruism vs. Semi-Altruism:

$$u(\text{Semi}, \text{Semi}) = 50, \quad v(\text{Semi}, \text{Semi}) = 50.$$

Again, neither party benefits from deviating, making (Semi, Semi) another Nash Equilibrium.

Implications of the Model

Our Nash Equilibrium analysis suggests that individuals engaging in fake altruism or semi-altruism are likely to reach stable outcomes. Pure altruism, however, results in consistent losses, making it an unsustainable strategy in a Nash framework. Therefore, in competitive environments, altruistic actions may tend to evolve into semi-altruism or fake altruism rather than pure altruism.

IV. Altruism Under Extreme Scarcity: Simulation Results

Our working assumption is that altruistic behavior increases during conditions of extreme scarcity, at least for a limited time. Individuals who have little to lose may be more willing to engage in altruistic acts, as the marginal cost of giving up resources is reduced when those resources are already sparse.

Simulation Overview

In this simulation, we injected 30% altruism into 20,000 simulated transactions. The wealth of 10 agents was tracked over 21 steps (sampled from the 10,000 transactions), and their wealth fluctuations were recorded. The source code for the program was written in COBOL and will be posted shortly.

Results (S_ is the transaction number, followed by the wealth of each of the ten simulated agents)

S_0001,00060,00110,00060,00110,00060,00110,00000,00050,00000,00050
S_0494,00000,00050,00490,00540,00490,00540,00040,00090,00040,00090
S_0988,00050,00100,00930,00980,00930,00980,00030,00080,00090,00140
S_1485,00060,00110,00500,00550,00490,00540,00100,00150,00030,00080
S_1982,00020,00070,01010,01060,00900,00950,00060,00110,00040,00090
S_2477,01420,01470,00030,00080,00030,00080,01310,01360,00050,00100
S_2972,02770,02820,00030,00080,00030,00080,02660,02710,00050,00100
S_3461,00000,00050,00050,00100,00050,00100,00040,00090,00520,00570
S_3949,00020,00070,00050,00100,00060,00110,00010,00060,00920,00970
S_4442,00020,00070,00470,00520,00470,00520,00000,00050,00000,00050
S_4937,00020,00070,00920,00970,00920,00970,00000,00050,00000,00050
S_5433,00020,00070,00520,00570,00410,00460,00070,00120,00050,00100
S_5930,00080,00130,00930,00980,00920,00970,00070,00120,00070,00120
S_6427,00050,00100,07360,07410,07440,07490,00010,00060,00040,00090
S_6924,00070,00120,16010,16060,16010,16060,00020,00070,00060,00110
S_7423,00500,00550,00060,00110,00010,00060,00410,00460,07360,07410
S_7923,00880,00930,00050,00100,00000,00050,00890,00940,16000,16050
S_8420,00050,00100,07290,07340,07370,07420,00060,00110,00090,00140
S_8918,00010,00060,15870,15920,15950,16000,00090,00140,00060,00110
S_9417,00420,00470,00060,00110,00010,00060,00430,00480,07260,07310
S_9916,00890,00940,00040,00090,00050,00100,00900,00950,15850,15900

Interpretation of Data Points

Each step in the simulation corresponds to the agents' wealth after a certain number of transactions. For example:

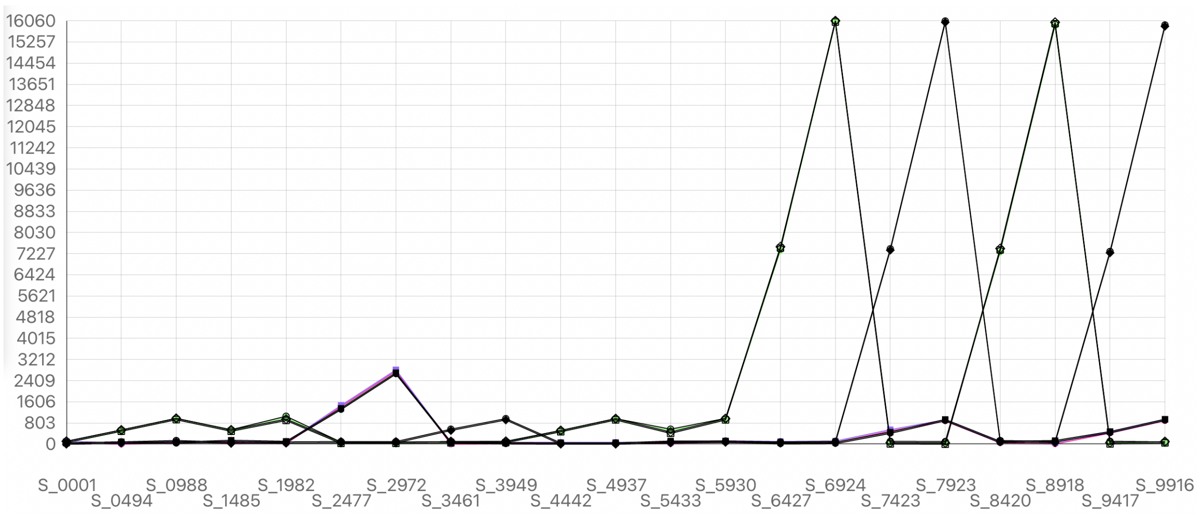
S_0001 shows the initial wealth distribution of the agents.
S_0494, S_0988, S_1485, etc. reflect the evolution of wealth as transactions continue, where some agents gain wealth while others lose or stagnate.

Trends and Insights

Initial Conditions: The simulation begins with all agents having similar small wealth values (between 0 and 110 units). This indicates an initial condition where scarcity is evenly distributed among the agents.

Wealth Accumulation by a Few: As the simulation progresses (e.g., around steps S_6427, S_6924, S_7423), we observe significant wealth accumulation for some agents (up to 16,060 units), while others remain with very low wealth (near 0). This reflects a concentration of wealth, even with altruism injected into the system. This outcome suggests that altruism under scarcity does not prevent wealth consolidation by certain agents.

Economic Net Loss for Most Participants: By the end of the simulation, the majority of agents are still poor, with wealth concentrated in the hands of a few. This supports the hypothesis that pure altruism, especially in extreme scarcity conditions, results in economic losses for most participants. The altruistic behavior of giving resources without expectation of return leads to wealth depletion for the givers, while the takers accumulate wealth.



V. CONCLUSION

The model demonstrates that even with altruistic behavior present, the economic system under extreme scarcity tends to result in wealth consolidation for a minority, with the majority of participants remaining impoverished. The simulation aligns with the theory that pure altruism leads to a net economic loss for most participants, as resources flow from givers to takers without reciprocal benefit.

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