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**ALTRUISTIC ARBITRAGE AND CLIMATE
CHANGE MITIGATION:
RETHINKING THE ROLE OF CAP AND TRADE
POLICIES**

FATJON KAJA*

MATTHEW G. NAGLER**

ABSTRACT.

We examine the implications for efficient public goods provision by exploring the relationship of altruism to the endowment effect, focusing our analysis on the problem of climate change mitigation. We argue that the reduction in distortionary valuation (i.e., willingness-to-accept departing from willingness-to-pay) experienced by altruistic market participants implies an ability to mediate ignored trades and extract the gains from trade — an activity we call “altruistic arbitrage” — thereby improving the efficiency of markets. This activity, broadly speaking, restores the Coase Theorem in the context of WTA-WTP disparities. Moreover, it leads to previously unidentified benefits to when markets are employed to protect and foster public goods. On the basis of our findings, we recommend that market maker licenses be auctioned as a novel means to implement cap and trade markets for reducing the long-term effects of climate change.

Keywords: endowment effect, Coase Theorem, altruism, cap and trade, climate change.

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** Professor of Economics, The City College of New York, and The Graduate Center, City University of New York. We thank Adam Feher, Maria Kostopoulou, Edoardo Martino, Karoline Ströhlein, Lia van Wesenbeeck for helpful discussions about this project. All errors, if any, are ours.

I. INTRODUCTION

In modern industrial societies, there is a pervasive notion that individuals behave based on pure self-interest. The notion is reinforced not only by concepts at the core of traditional economic theory¹ but also references in popular culture, such as the iconic “Greed is Good” speech of Gordon Gekko in the 1987 movie *Wall Street*.² Legal scholars have similarly embraced the notion that individuals seek to maximize self-interest when they make decisions.³ Hence, it comes as no surprise that when we experience cases of altruism, we are in awe. TikTok videos of “Double it and give it to the next person” became a worldwide phenomenon in 2023, with videos quickly reaching millions of views and the financial stakes quickly skyrocketing into the thousands.⁴

Such social experiences beg the following two questions: (1) since these individuals are giving away prospective income – money that they did not have to begin with but could potentially have within their reach – would their behavior differ if they first received the money and then were asked if they want to keep it or give it to the next person, and (2) if individuals are willing to give away money – one of the most sought out commodities in our lives – would they be willing to give away other tangible goods or their own legal entitlements?

Both questions are partially answered, with economic scholarship focusing more on the former question and legal scholarship focusing more on the latter. On the one hand, a rich literature in economics has examined altruism by way of an experimental set-up called the dictator

1. See, e.g., ADAM SMITH, *THE WEALTH OF NATIONS* (1776). Smith’s work has been cited extensively as the leading source.

2. *Wall Street* (20th Century Fox 1987); see e.g., AYN RAND, *ATLAS SHRUGGED* (1957).

3. See Bruce Chapman, *The Rational and The Reasonable: Social Choice Theory and Adjudication*, 61 U. CHI. L. REV., 41, 41 (1994), (“[A] rational person should never (or does never) choose anything that she values less than other available alternatives.”); Amos Tversky and Daniel Kahneman, *Rational Choice and the Framing of Decisions*, 59 J. BUS. 4, 251, 253 (1986) (“[P]erhaps the most obvious principle of rational choice: if one option is better than another in one state and at least as good in all other states, the dominant option should be chosen.”); FRANCESCO PARISI & VERNON L. SMITH, *THE LAW AND ECONOMICS OF IRRATIONAL BEHAVIOR* (2005). *But see* Russel B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CALIF. L. REV. 4, 1051 (2000) (stating that the field of law and economics could benefit from a renewed and more nuanced understanding of the rational choice theory where the rationality assumption is loosened under certain contexts).

4. See Owen, *Double It And Give It To The Next Person*, KNOW YOUR MEME (Sep. 7, 2022) <https://knowyourmeme.com/memes/double-it-and-give-it-to-the-next-person> (showing a video where the host asks a stranger if they want \$1 or rather double it and give it to an unknown next person, the video lasts until one stranger accepts the final amount of money).

game⁵ in which one participant (the dictator) is endowed with a certain amount of money and asked to decide how much to allocate between themselves and a passive player (the receiver).⁶ Replications of this game reveal that “dictators” give on average about 28% of their endowed money to the receiver, as reported by a recent meta study.⁷ On the other hand, legal scholarship has explored the interconnections between individuals and legal entitlements, evaluating the efficiency of legal systems in their distribution of legal entitlements.⁸

New avenues of legal scholarship have also benefited from developments in the field of economics, with behavioral law and economics taking center stage when it comes to analyzing legal entitlements.⁹ In particular, legal scholars have tried to understand the impact of the endowment effect (i.e., “a good’s value increases once it becomes part of an individual’s endowment”)¹⁰ towards the efficient allocation of legal entitlements.¹¹ This has led to a plethora of research

5. See Catherine C. Eckel & Philip J. Grossman, *Altruism in Anonymous Dictator Games*, 16 GAMES AND ECON. BEHAV. 2, 181–191 (1996); John A. List & Todd L. Cherry, *Examining the Role of Fairness in High Stakes Allocation Decisions*, 65 J. ECON. BEHAV. AND ORG. 1 (2008); Subhasish M. Chowdhury & Joo Young Jeon, *Impure Altruism or Inequality Aversion?: An Experimental Investigation Based on Income Effects*, 118 J. PUB. ECON., 143 (2014).

6. See generally Christoph Engel, *Dictator Games: A Meta Study*, 14 EXPERIMENTAL ECON., 5 (2010) (summarising the evidence of over a hundred dictator game experiments that have been published); see also John A. List, *On the Interpretation of Giving in Dictator Games*, J. POL. ECON. 31, 482–493 (2007) (examining the dictator game, revealing that fewer agents transfer money when taking is an option, and highlights the importance of institutions).

7. See *id.* at 7 (reporting average generosity in dictator game across 616 treatments).

8. See generally Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. ECON., 1–44 (1960); Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 6 (1972); Elizabeth Hoffman & Matthew L. Spitzer, *Willingness To Pay vs. Willingness To Accept: Legal and Economic Implications*, 71 WASH. U. L. Q., 59–114 (1993).

9. See Jennifer Arlen et al., *Endowment Effects within Corporate Agency Relationships*, 31 J. LEGAL STUD., 1 (2002).

10. Richard Thaler, *Toward a Positive Theory of Consumer Choice*, J. ECON. BEHAVIOR AND ORG., 39 (1980); List, *infra* note 45.

11. See, e.g., *id.*; Amos Tversky and Daniel Kahneman, *Loss Aversion in Riskless Choice: A Reference-Dependent Model*, 106 Q.J. ECON. 4, 1039–61 (1991); Hoffman & Spitzer, *supra* note 10; Samuel Issacharoff, *Can There Be a Behavioral Law and Economics?*, 51 VAND L. REV. 1729, 1734 (1998); Russel B. Korobkin, *Wrestling with the Endowment Effect, or How to Do Law and Economics without the Coase Theorem*, in THE OXFORD HANDBOOK OF BEHAV. ECON. AND THE LAW 300–34 (Eyal Zamir & Doron Teichman eds., 2014); Jennifer Arlen & Stephan Tontrup, *Does the Endowment Effect Justify Legal Intervention? The Debiasing Effect of Institutions*, 44 J. LEGAL STUD. 143 (2015); see also Gregory Klass & Kathryn Zeiler, *Against Endowment Theory: Experimental Economics and Legal Scholarship*, 61 UNIV. OF CAL., LOS ANGELES L. REV. 2 (2013) (describing a critical review of findings on the impact of the endowment effect on legal scholarship); see also Jeffrey J. Rachlinski & Forest Jourden, *Remedies and the Psychology of Ownership*, 51 VAND. L. REV. 333, 1541 (1998).

articles that often offer puzzling results. Contrary to what Coase would have predicted, the results tend to suggest that entitlements often remain with original owners, although other parties which value them more exist.¹²

Yet, a research gap remains at the intersection of altruism and the endowment effect, particularly as it relates to the distribution of legal entitlements. This is highly relevant, as the two areas are clearly intertwined: the willingness to freely relinquish money or entitlements, as altruists do, may reasonably correlate with the willingness to part with entitlements in trade. Such a relationship could have important implications for public policy and the law. Our aim in this article is to explore the aforementioned gap by focusing on one of the most salient public policy issues of the twenty-first century: climate change.

The United Nations (“UN”) defines climate change as “long-term shifts in temperatures and weather patterns”¹³ driven by human activity, whereas the National Aeronautics and Space Administration (“NASA”) states it as “a long-term change in the average weather patterns that have come to define [the] Earth’s local, regional, and global climates.”¹⁴ While the framing of climate change may vary slightly across organizations,¹⁵ the growing (albeit still incomplete) consensus among policymakers, scientists, business community, and the general public is that something needs to be done to address this issue due to its devastating impact to the planet and to human resources.¹⁶ In particular, there has been a recent uptick in interest for

12. Thaler, *supra* note 12.

13. *What Is Climate Change?*, UNITED NATIONS, <https://www.un.org/en/climatechange/what-is-climate-change> (last visited on September 25, 2024).

14. *What Is Climate Change?*, NAT’L AERONAUTICS AND SPACE ADMIN., <https://climate.nasa.gov/what-is-climate-change/> (last visited on September 25, 2024).

15. See Charlotte Werndl, *On Defining Climate and Climate Change*, 67 BRITISH J. PHIL. SCI. 2, 337–364 (2016) (highlighting the ongoing challenges in both public and scientific discourse to define climate change clearly).

16. See *Causes and Effects of Climate Change*, UNITED NATIONS, <https://www.un.org/en/climatechange/science/causes-effects-climate-change> (last visited Sept. 25, 2024) (highlighting the devastating impact that climate change has on the planet); see also *Impacts of Climate Change*, EPA (Nov. 29, 2023), <https://www.epa.gov/climatechange-science/impacts-climate-change> (discussing the effects of climate change across various sectors); see also *Facts About the Climate Emergency*, UNITED NATIONS ENVIRONMENT PROGRAMME, <https://www.unep.org/facts-about-climate-emergency> (last visited Sept. 25, 2024) (emphasizing the critical actions governments must take to meet global climate goals).

climate change research among both economists¹⁷ and legal scholars.¹⁸

Addressing climate change fundamentally involves lowering carbon emissions.¹⁹ Calls for governments to take action consistent with this goal have been rampant.²⁰ Various governments have pledged a net zero transition in the coming decades.²¹ While such pledges often lack granularity,²² the current framework in economic theory provides

17. See Lydia DePillis, *We're All Climate Economists Now*, N.Y. TIMES (Jan. 23, 2024), <https://www.nytimes.com/2024/01/23/business/economy/climate-change-economics.html?searchResultPosition=1> (discussing the growing focus of economists on climate change in their research).

18. See, e.g., Chiara Armeni, *The Responsibility of Legal Scholars in a Time of Climate Change*, REV. EUROPEAN ADMIN. L. BLOG (Feb. 17, 2023), <https://realaw.blog/2023/02/17/the-responsibility-of-legal-scholars-in-a-time-of-climate-change-by-c-armeni/>; See e.g., NEIL GUNNINGHAM ET AL., SMART REGULATION: DESIGNING ENVIRONMENTAL POLICY (1998); Alessio M. Paces, *Sustainable Corporate Governance: The Role of the Law*, EBI STUDIES IN BANKING AND CAP. MKT. L., 151–174 (2021); Alessio M. Paces, *Will the EU Taxonomy Regulation Foster Sustainable Corporate Governance?*, 13 SUSTAINABILITY, 1–21 (2021); Melek Redzheb and Fatjon Kaja, *Barbarians at the Gate or Angels at the Crossroads? Examining the Impact of the UK Green Taxonomy on Private Equity Firms*, 1–3 (Amsterdam Center for Law & Economics, Working Paper No. 2023–11, 2023). See also, Sarah E. Light & Christina P. Skinner, *Banks and Climate Governance*, 121 COLUM. L. REV., 1895 (2021); Sierra Anderson, *Criminalizing ESG: A Framework to Hold Corporations Accountable for Incorrect ESG Disclosures*, 113 J. CRIM. L. & CRIMINOLOGY 174 (2023); Gideon Parchomovsky & Endre Stavang, *The Green Option*, 99 MINN. L. REV. 967 (2015).

19. *The Sectoral Solution to Climate Change*, UNITED NATIONS ENV'T PROGRAMME, <https://www.unep.org/interactive/sectoral-solution-climate-change/> (last visited July 19, 2024); Kevin M. Stack & Michael P. Vandenbergh, *The One Percent Problem*, 111 COLUM. L. REV. 1385, 1385–1443 (2011) (addressing climate change fundamentally involves lowering carbon emissions. “One percent arguments,” where parties claim minor contributions to the problem, hinder comprehensive solutions. The global nature of climate change allows many to exploit these arguments. This paper delves into this root cause and the gap in U.S. climate legislation); Alan Carlin, *Global Climate Change Control: Is There a Better Strategy than Reducing Greenhouse Gas Emissions?*, 155 U. PA. L. REV. 1401, 1401–1497 (2007) (concluding that lowering carbon emissions plays a vital role, however not sufficient on its own. It advocates for a broader, more integrated approach).

20. See Alec Tyson and Brian Kennedy, *Two-Thirds of Americans Think Government Should Do More on Climate*, PEW RESEARCH CENTER (June 23, 2020), <https://www.pewresearch.org/science/2020/06/23/two-thirds-of-americans-think-government-should-do-more-on-climate/>; André Luiz Campos de Andrade, *Governments at All Levels Must Work Together to Solve the Climate Crisis*, LOOP, <https://theloop.ecpr.eu/governments-at-all-levels-must-work-together-to-solve-the-climate-crisis/>.

21. *Net Zero Coalition*, UNITED NATIONS, <https://www.un.org/en/climatechange/net-zero-coalition> (last visited July 20, 2024).

22. *Climate Plans Remain Insufficient: More Ambitious Action Needed Now*, UNITED NATIONS CLIMATE CHANGE (Oct. 22, 2022), <https://unfccc.int/news/climate-plans-remain-insufficient-more-ambitious-action-needed-now>; Lindsay Maizland, *Global Climate Agreements: Successes and Failures* (Dec. 5, 2023), COUNCIL ON FOREIGN RELATIONS, <https://www.cfr.org/background/paris-global-climate-change-agreements> (stating that “[m]ost experts say that countries’ pledges are not ambitious enough and will not be enacted quickly enough to limit global temperature rise to 1.5 [degrees] C”).

essential guidance on how to approach this massive challenge. In terms of economics, carbon emissions – the negative byproduct of human activity – are an externality, representing “the biggest market failure the world has seen.”²³ The classical go-to economic response to the problem of externalities has historically been taxation.²⁴ Conceptually, if regulators levy a tax on tortfeasors that produced the externality, then the emitters will internalize the damages and rethink their behavior.²⁵ The tax on each unit of pollution needs to be equal to the marginal social damages at the efficient level of pollution for it to be effective: this follows naturally from the economic principle that for any activity to be provided at an efficient level the private costs of its provision must equal its social cost.²⁶

While Pigouvian taxation works well in concept, politics have rendered it difficult to put into practice in the United States.²⁷ Ronald Coase’s groundbreaking work was among the first to propose new alternatives for addressing the problem of externalities.²⁸ At its core, Coase argued that the market and free bargaining of parties will lead to their efficient final allocation regardless of the initial allocation of rights, if: (1) property rights are well-defined and tradeable, and (2) transaction costs are minimal or non-existent.²⁹ As the optimal

23. Nicholas Stern, *The Economics of Climate Change*, 98 AM. ECON. REV. 2, 1–37 (2008).

24. See William J. Baumol, *On Taxation and the Control of Externalities*, 62 AM. ECON. REV. 307 (1972) (analyzing the use of taxation as a mechanism to address externalities and its implications for economic efficiency); see also Jonathan S. Masur and Eric A. Posner, *Toward a Pigouvian State*, 164 U. PA. L. REV. 93 (2015) [hereinafter Masur & Posner, *Toward a Pigouvian State*] (arguing that regulators have legal capacity to create Pigouvian taxes to combat climate change) But see Dennis W. Carlton & Glenn C. Loury, *The Limitations of Pigouvian Taxes as a Long-Run Remedy for Externalities*, 95 Q.J. L. & ECON. 559 (1980). (arguing that the usage of Pigouvian taxes will not in general lead to an efficient allocation of resources in the long run).

25. See Heidi Li Feldman, *Harm and Money: Against the Insurance Theory of Tort Compensation*, 75 TEX. L. REV. 1567 (1997) (explaining the concept of corrective justice which can be applied to this economic situation).

26. See ARTHUR PIGOU, *THE ECONOMICS OF WELFARE* (1920) (analyzing the optimal use of taxation to equate social and private costs); see also Robert W. Hahn & Robert N. Stavins, *The Effect of Allowance Allocations on Cap-and-Trade System Performance*, 54 J.L. & ECON. S267 (2011) (establishing that the market equilibrium in a cap-and-trade system will efficiently equate social with private costs).

27. Masur & Posner, *supra* note 26; see, e.g., Market Choice Act, H.R. 6463, 115th Cong. (2018).

28. FRANCESCO PARISI, *THE LANGUAGE OF LAW AND ECONOMICS: A DICTIONARY* (1st ed. 2013).

29. See, e.g., Ronald. H. Coase, *The Problem of Social Cost*, 3 J.L. ECON. 1 (1960); GEORGE JOSEPH STIGLER, *THE THEORY OF PRICE* (2nd ed. 1966); Harold M. Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347 (1967); Guido Calabresi, *Transaction Costs, Resource Allocation and Liability Rules - A Comment*, 11 J.L. & ECON. 67 (1968); Francesco Parisi, *Political Coase Theorem*, 115 PUB. CHOICE 1 (2003); Francesco Parisi, *The Fall and Rise of Functional*

allocation of scarce resources is paramount to economics,³⁰ Coase's theorem highlights the potential for market-based solutions to achieve efficiency without heavy-handed regulation.³¹

As global warming has increasingly been recognized as “an inconvenient truth,”³² new market-based approaches³³ for addressing climate change based on Coase's principles have gained popularity – in particular, cap and trade systems.³⁴ At its core, a cap and trade system works by the government capping the total amount of pollution permitted per business.³⁵ If a company pollutes less than the permitted cap, then it has an excess allowance which can be sold to someone else.³⁶ Interested buyers – most likely other companies that also need

Property, in PROPERTY RIGHTS DYNAMICS: A LAW AND ECONOMIC PERSPECTIVE (Donatella Porrini & Giovanni Ramello ed., 2007).

30. See, e.g., HOLDEN ET AL., ALLOCATING SCARCE INFORMATION, 2022–36 (2022) (building on the concept that Economics is the study of scarce resource allocation); see also JON M. CONRAD & COLIN WHITCOMB CLARK, NATURAL RESOURCE ECONOMICS: NOTES AND PROBLEMS 1–61 (1987) (defining economics as the study of resource allocation).

31. Coase, *supra* note 31.

32. See, e.g., *Do scientists agree on climate change?*, NAT'L AERONAUTICS AND SPACE ADMIN, <https://climate.nasa.gov/faq/17/do-scientists-agree-on-climate-change/> (last visited Feb. 7, 2024) (illustrating the scientific consensus on climate change).

33. See *Transforming Energy Demand*, WORLD ECON. F., (Jan. 8, 2024), <https://www.weforum.org/publications/transforming-energy-demand/> (outlining the need and possibilities of enhancing energy efficiency, reducing energy demand and consumption, including, carbon and energy taxes, tax relief on energy efficiency investments, and built-in tax relief on investments into energy efficiency, like faster equipment amortization); Carbon Exposure Project, *COP28 UAE Special - Mark Kenber (Executive Director at VCMJ)*, YOUTUBE (Jan. 11, 2024), <https://www.youtube.com/watch?v=QsF9G-EAa0k> (showing an opportunity for businesses to make a high-integrity carbon claim which aims to help with the issue of greenwashing through transparency); UBS Ctr., *Nobel laureate William Nordhaus: The economics of climate change*, YOUTUBE (Jan. 28, 2020), <https://www.youtube.com/watch?v=5DG5i8BGaXo> (emphasizing the need for one global carbon price, high enough to reduce emissions); *Take climate action by supporting green projects*, UNITED NATIONS, <https://offset.climateutralnow.org/> (last visited Feb. 14, 2024) (providing a platform to purchase offset emissions or in support of UNFCCC certified projects that reduces, avoid, or remove greenhouse gas emissions from the atmosphere).

34. Variations of cap-and-trade programs have flourished around the world. The longest running program is the European Union's Emissions Trading System (“ETS”), which became operational in 2005.

Tools of the trade: A Guide for Designing and Operating a Cap and Trade Program for Pollution Control, ENV'T PROT. AGENCY, (June 2003), <https://www.epa.gov/emissions-trading-resources/tools-trade-guide-designing-and-operating-cap-and-trade-program>; See also *Welcome to the ICAP ETS Map*, INT'L CARBON ACTION P'SHIP, <https://icapcarbonaction.com/en/ets> (last visited Sept. 27, 2024) (providing an overview of all the cap-and-trade systems in force or under consideration).

35. See Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENV'T. L. REV. 293 (2008).

36. See ANDREW LILICO & DEBORAH DRURYM, THE EU EMISSIONS TRADING SYSTEM:

to abide by the cap – could purchase excess allowances if they predict that they will not meet the cap requirements.³⁷

Figure 1 provides an illustration of cap and trade in which hypothetical Company A sells its excess allowance to Company D, which has excess emissions as shown. (Companies B and C use their exact allowances so they are neither buyers nor sellers in the market.) In theory, a trade will occur between Companies A and D at a positive price less than or equal to the cost to D of violating the cap because A’s value of an unsold allowance is zero; gains from trade are then split between A and D based on the agreed-upon price.³⁸

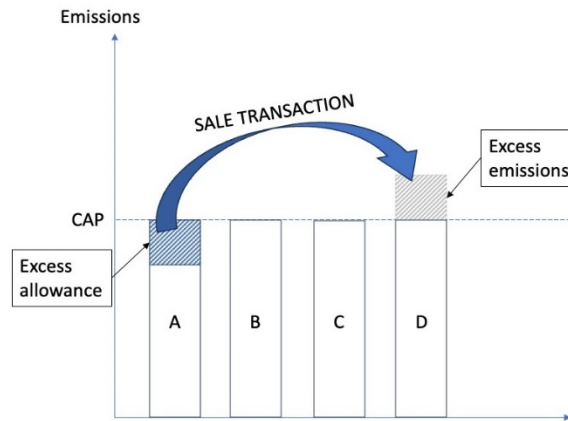


Figure 1. A graphical representation of cap and trade.

As observed earlier, a cap-and trade system provides a setup consistent with the Coase Theorem (1960) in which, as Hahn and

METHOD AND EFFECTS OF FREE ALLOWANCE ALLOCATION 9 (2023) (stating “if firms in receipt of free allocation allowances succeed in reducing emissions, they gain the benefit of being able to sell their ‘spare’ allowances”), available at [https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA\(2023\)755098_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA(2023)755098_EN.pdf).

37. Ann E. Carlson, *Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies*, 49 HARV. J. ON LEGIS. 207 (2012); see also Richard Schmalensee & Robert Stavins, *Lessons Learned from Three Decades of Experience with Cap-and-Trade*, 11 REV. ENVTL ECON. & POL’Y 59, 62 (2017), (stating “[i]f emissions at a regulated facility were below its allowance allocation, the facility owner could sell the extra allowances or bank them for future use”).

38. *Cap and Trade Basics*, CTR. FOR CLIMATE AND ENERGY SOLS., <https://www.c2es.org/content/cap-and-trade-basics/> (last visited Feb. 6, 2024).

Stavins (2015) note, “the market equilibrium. . .will be cost effective and independent of the initial allocation of tradable rights (typically referred to as permits or allowances).”³⁹ However, the introduction of the endowment effect⁴⁰ into such a scenario – where the allowable entitlements would remain with the original owners and would not be traded⁴¹ – has major implications for its outcomes. Evidence suggests that the valuation disparity implicit in the endowment effect would cause the holder of an emission entitlement to value it more, all else equal, than someone not currently holding the entitlement.⁴² For a pressing issue such as climate change, this could be catastrophic. In this article, we explore evidence that altruistic behavior reduces the endowment effect, whereby altruism has the potential to restore the efficient functioning of the markets with improved gains from trade.

At the center of this proposition is the ability of altruists to arbitrage missed opportunities for gains from trade. This implies both that they benefit from such arbitrage and that they, in turn, increase welfare. These results arise in the general equilibrium analysis of an exchange economy that intermingles agents who exhibit the endowment effect with those who do not.⁴³

Our analysis leads to the following conclusions. First, public goods are buttressed: altruists act individually to promote public goods provision, so the fact that altruists are favored by markets (i.e., they benefit from opportunities for arbitrage) means market economies promote public goods provision in ways not previously recognized.⁴⁴ Second, when markets are *explicitly* employed to protect and foster public goods, the benefits to public goods provision are greater than previously believed because altruists are likely to plow the excess

39. Hahn & Stavins, *supra* note 28, at 267.

40. Thaler, *infra* note 65; Arlen et al., *supra* note 11.

41. Jones & Brosnan, *infra* note 69.

42. The endowment effect has been observed for intangible entitlements such as public goods; environmental, health and safety regulations, and intellectual property. See Guido Ortona & Francesco Scacciati, *Endowment Effect, Status Quo Bias, and Contingent Valuation*, 111 RIVISTA INTERNAZIONALE DI SCIENZE SOCIALI 397 (2003) (discussing the existence of an endowment effect for public goods); Christopher Buccafusco & Christopher Sprigman, *Valuing Intellectual Property: An Experiment*, 96 CORNELL L. REV. 1 (2010) (observing the existence of an endowment effect for intellectual property); JUDD HAMMACK & GARDNER M. BROWN JR., WATERFOWL AND WETLANDS: TOWARD BIOECONOMIC ANALYSIS (2016) (observing the existence of an endowment effect for environmental regulations).

43. John A. List, *Does Market Experience Eliminate Market Anomalies?*, 118 Q.J. ECON. 41, 41 (2003).

44. See *id.* at 69 (explaining the tendency of markets to favor unaffected arbitrageurs under the endowment effect),.

returns from participating in these markets back into public goods provision.⁴⁵ For example, cap and trade policies—because they create markets that altruists can exploit through arbitrage—carry added public benefits. Third, altruistic arbitrage restores the Coase Theorem: entitlements should be allocated efficiently (i.e., to those who value them most).⁴⁶ This paper argues in favor of legislative and judicial “mimicking the market” and using private valuations to allocate entitlements.⁴⁷

Our theory and findings contribute to academic and public policy debates.⁴⁸ To our knowledge, there is no legal study to date that analyzes the connection among altruistic behavior, the endowment effect, and market-maker public policies. Specifically, the introduction of the role of altruism to the discussion will, we predict, have noteworthy implications for behavioral law and economics. From a broader perspective, our results underscore an important tension in existing governmental policies concerning climate change: that while the public widely believes that climate change is real and believes in the importance of taking action to combat it,⁴⁹ a cynicism (particularly in the United States) concerning the effectiveness of public sector action has inhibited progress.⁵⁰ As such, a distinctive role for individual

45. The standard economic theory of public goods provision assumes that the willingness of individuals to pay for public goods is derived from the marginal utility of the good in the individual’s utility function. Donald J. Roberts, *The Lindahl Solution for Economies with Public Goods*, 3 J. PUB. ECON. 23 (1974). Therefore, altruism represents a separate influence on the allocation.

46. List, *supra* note 45, at 70.

47. *But see* Cass R. Sunstein, *Legal Interference with Private Preferences*, 53 U. CHI. L. REV. 1129 (1986) (offering a generous overview of the relationship of private preferences and government intervention and arguing that the legal system should not take private preferences as exogenous variables); Russel B. Korobkin, *The Endowment Effect and Legal Analysis*, 97 NW. U.L. REV 1227, 1258 (2003) (discussing the reliance of the law on private valuations in regulating the consensual exchange of entitlements).

48. UNITED NATIONS, *supra* note 15; Werndl, *supra* note 17.

49. *What the Data Says About Americans’ Views of Climate Change*, PEW RESEARCH CENTER (Aug. 9, 2023), <https://www.pewresearch.org/short-reads/2023/08/09/what-the-data-says-about-americans-views-of-climate-change/>.

50. *See* Delger Erdenesanaa, *The Changing Focus of Climate Denial: From Science to Scientists*, N.Y. TIMES (Feb. 8, 2024), <https://www.nytimes.com/2024/02/06/climate/climate-michael-mann-defamation-trial.html?searchResultPosition=1> U (discussing the persistence of attacks on climate scientists, indicating a shift towards discrediting individuals rather than disputing scientific evidence by shifting from the “Old Denial”—global warming is not happening—to the “New Denial”—attacking scientists and climate change solutions); *see also* Tony Romm et al., *Most Disapprove of Biden’s Handling of Climate Change, Post-UMD Poll Finds*, WASH. POST (Aug. 7, 2023), <https://www.washingtonpost.com/climate-environment/2023/08/07/biden-white-house-climate-policy/> (noting distrust in Biden’s administration to tackle issues of climate change and Republicans, who deliberately impede or reverse the progress made in

altruistic behavior, coupled with public sector administration of markets, promises to become a novel dimension in the widening discourse. Incorporating altruism has the potential to leverage individual impetus to solve the problem of externalities, reducing the necessity of relying upon public hierarchies which have sometimes been criticized as inefficient and distortionary.⁵¹ As we navigate the complexities of environmental governance, integration of our findings into the academic debate paves the way for a more nuanced approach to climate change mitigation.⁵²

This article proceeds as follows: Section 2 presents a literature review of the academic debate on altruism, the endowment effect and the law, whereas Section 3 presents our new perspective on altruistic arbitrage and its implications. In Section 4, we advance a new policy proposal for designing and implementing cap and trade policies with a focus on altruistic arbitrage.

II. LITERATURE REVIEW

The phenomenon of altruism has posed a unique challenge for economists.⁵³ Defined formally as “behavior that reduces the actor’s

addressing climate change, such as through rescinding funding into climate projects or cancelling climate related tax programs).

51. See, e.g., Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J.L. ECON. 211 (1976).

52. See *The IMF’s Climate Change Debate*, INT’L MONETARY FUND, <https://www.imf.org/en/Publications/fandd/issues/2024/06/The-IMFs-Climate-Change-Debate-Masood-Ahmed> (last visited July 19, 2024) (situating the debate within a broader international context where climate change is acknowledged as a critical issue requiring global cooperation and substantial financial investment); see also *The Fervent Debate Over the Best Way to Confront Global Warming Undark Magazine*, UNDARK, <https://undark.org/2022/08/12/the-fervent-debate-over-the-best-way-to-confront-global-warming/> (last visited July 19, 2024) (discussing the division in addressing global warming between reducing carbon emissions (mitigation) and preparing for inevitable climate impacts (adaptation)). Cf. Art Dewulf, *Contrasting Frames in Policy Debates on Climate Change Adaptation*, 4 WILEY INTERDISC. REVS. 321 (2013) (discussing the debate on climate change mitigation, focusing on framing issues such as the tension between adaptation and mitigation, technical versus governance challenges, and differing views on state versus human security, which influence the perception and effectiveness of climate change adaptation strategies).

53. See generally John Haltiwanger & Michael Waldman, *The Role of Altruism in Economic Interaction*, 21 J. ECON. BEHAVIOR & ORG. 1 (1993); James Andreoni, *Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence*, 97 J. POL. ECON. 1447 (1989); Gary S. Becker, *A Theory of Social Interactions*, 82 J. POL. ECON. 1063 (1974); B. Douglas Bernheim, *On the Voluntary and Involuntary Provision of Public Goods*, 76 AM. ECON. REV. 789 (1986); Neil Bruce & Michael Waldman, *The Rotten-kid Theorem Meets the Samaritan’s Dilemma*, 105 Q.J. ECON. 155 (1990); Robert H. Frank, *If Homo Economicus Could Choose His Own Utility Function, Would He Want One with a Conscience?* 77 AM. ECON. REV. 594 (1987).

fitness while enhancing the fitness of others,”⁵⁴ altruism directly opposes the presumed self-interest of economic agents, which is a central tenet of traditional theory. As such, economists have tended to dismiss the presence of altruism in daily human decision-making,⁵⁵ labeling it an outlier that didn’t warrant significant attention.⁵⁶

It was only with the rise of behavioral economics and new experimental techniques in the field of economics that a renewed interest in altruism emerged.⁵⁷ Indeed, this renewed focus is driven partly by the growing impact that the field of behavioral economics has had,⁵⁸ thanks to the increasing body of empirical evidence that contradicts the canonical model of human decision-making.⁵⁹ An abundance of experimental studies employing various approaches (e.g., the ultimatum game, the dictator game, variations of the public goods game, etc.) reveal that altruism is a robust, consistent, and replicable characteristic of routine human behavior.⁶⁰ Legal scholars have been quick to take notice, as they have seen the benefits of altruism as a substitute for legal methods in addressing externalities.⁶¹

54. Herbert A. Simon, *Altruism and Economics*, 83 AM. ECON. REV. 156 (1993) (noting a theory of how bounded rationality gives rise to altruism in human individuals).

55. See ERIK ANGNER, A COURSE IN BEHAVIORAL ECONOMICS 241 (3rd ed. 2021) (explaining that the traditional economic modeling construct representing individual interests—the utility function—allows for the inclusion of the utility of other individuals as a means of representing altruism).

56. See e.g., ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 270 (9th ed. 2018) (explaining how microeconomic theory has traditionally suggested that firms that put other goals before profit maximization will be displaced quickly in a competitive market).

57. See, e.g., William M. Landes & Richard A. Posner, *Salvors, Finders, Good Samaritans, and Other Rescuers: An Economic Study of Law and Altruism*, 7 J. LEGAL STUD. 83 (1978).

58. See, e.g., RICHARD H. THALER, MISBEHAVING: THE MAKING OF BEHAVIORAL ECONOMICS (2015).

59. See John Haltiwanger & Michael Waldman, *The Role of Altruism in Economic Interaction*, 21 J. ECON. BEHAV. AND ORG. 1 (1993) (examining the limitations of the assumption of narrow self-interest in economic theory and exploring the role of altruism in economic interactions).

60. See, e.g., Catherine C. Eckel & Philip J. Grossman, *Altruism in Anonymous Dictator Games*, 16 GAMES AND ECON. BEHAV. 2, 181 (1996); John A. List & Todd L. Cherry, *Examining the Role of Fairness in High Stakes Allocation Decisions*, 65 J. ECON. BEHAV. & ORG. 1 (2008); Subhasish M. Chowdhury & Joo Young Jeon, *Impure Altruism or Inequality Aversion?: An Experimental Investigation Based on Income Effects*, 118 J. PUB. ECON. 143 (2014). Furthermore, experimental results, including those from studies by Ernst Fehr & Simon Gächter, *Altruistic Punishment in Humans*, 415 NATURE 137 (2002); Frank et al., *Does Studying Economics Inhibit Cooperation?* 7 J. ECON. PERSPS. 2, 159 (1993) (indicating that pure altruism persists even in simple one-shot games where participants are aware they will not interact again which challenges the notion that economic interactions are always self-serving, particularly in anonymous or one-time interactions).

61. Landes & Posner, *supra* note 59 (stating that “[a]ltruism may be an inexpensive substitute for costly legal methods of internalizing external benefits- though this depends, of

As research in the field of behavioral law and economics has progressed, an additional challenge to the rational-agent model has surfaced. Evidence suggests that parties exhibit divergent behavior regarding their willingness to pay (WTP) and their willingness to accept (WTA) in trades relating to the same product.⁶² In 1980, Richard Thaler coined the term “endowment effect” to describe this phenomenon, which identifies the WTA-WTP disparity with “a good’s value increas[ing] once it becomes part of an individual’s endowment.”⁶³ The endowment effect has been observed in studies across numerous and diverse scenarios, from the trading of baseball cards to more complex negotiations in undergraduate law and economics classes.⁶⁴

While “the existence and magnitude of the endowment effect is context dependent,”⁶⁵ its implications for the legal realm are profound and merit further consideration.⁶⁶ First, the presence of the endowment effect *de facto* implies that the traditional methods of assessing damages or compensation might be inadequate,⁶⁷ as they do not consider the value that individuals place on their possessions. At the very least, this could lead to under compensation in many situations.⁶⁸ Second, the law might not help allocate resources efficiently, as an initial owner might keep a particular legal entitlement, despite another individual potentially valuing the entitlement more.⁶⁹ In extreme

course, on the degree to which altruism will actually motivate rescue.”). *But see* Carrie Menkel-Meadow, *Is Altruism Possible in Lawyering*, 8 GA. ST. U. L. REV. 385 (1992) (questioning whether the legal profession and altruism can go hand and hand); Jeffrey L. Harrison, *Egoism, Altruism, and Market Illusions: The Limits of Law and Economics*, 33 UNIV. OF CAL., LOS ANGELES L. REV. 1309 (1985) (using altruism to critique the law and economics movement).

62. Elizabeth Hoffman & Matthew L. Spitzer, *Willingness-To-Pay vs. Willingness-To-Accept: Legal and Economic Implications*, 71 WASH. U. L.Q. 1, 59 (1993).

63. Richard Thaler, *Toward a Positive Theory of Consumer Choice*, 1 J. ECON. BEHAV. AND ORG. 39 (1980); List, *supra* note 45.

64. Arlen et al., *supra* note 11; List, *supra* note 45; Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325 (1990); Jeffrey J. Rachlinski & Forest Jourden, *Remedies and Psychology of Ownership*, 51 VAND. L. REV. 6, 1541 (1990).

65. *See generally* Jennifer Arlen, *The Future of Behavioral Economic Analysis of Law*, 51 VAND. L. REV. 1765, 1777–81 (1998); Cass R. Sunstein, *Behavioral Analysis of Law*, 64 U. CHI. L. REV. 1175, 1180 (1997); *see also* Arlen & Tontrup, *supra* note 13 (arguing that legal intervention to address the endowment effect is rarely needed because of the debiasing effect of institutions).

66. Korobkin, *supra* note 49.

67. *See, e.g.*, Owen D. Jones & Sarah F. Brosnan, *Law, Biology, and Property: A New Theory of the Endowment Effect*, 49 WM. & MARY L. REV. 1935 (2008).

68. McCaffery et al., *Framing the Jury: Cognitive Perspectives on Pain and Suffering Awards*, 81 VA. L. REV. 1341 (1995).

69. Graham Loomes & Robert Sugden, *Regret Theory: An Alternative Theory of Rational*

scenarios, an initial owner who has many legal entitlements could hoard much-needed resources or entitlements, potentially creating inefficiencies and imbalances in resource distribution.⁷⁰ Third, ongoing transactions between parties would inevitably become costlier, as the initial owner would not want to depart with the legal entitlement easily because there is an increased reluctance to trade.⁷¹

Beyond this, the divergence between WTA and WTP has been quite problematic for lawmakers because it has challenged the traditional economic assumption of rational decision-making on which considerable jurisprudence is based.⁷² For instance, the determination of damages in tort cases or compensation in eminent domain proceedings relies on the idea that WTP and WTA are aligned.⁷³ If WTP and WTA are not aligned, then the implications are profound, as a fair and an efficient allocation of resources through legal means becomes more challenging.⁷⁴

If the endowment effect is always present and salient, then its impact in pressing social issues would be devastating as well. For example, individuals who possess certain legal entitlements relating to pollution may resist environmental regulations or changes due to an overvaluation of the existing state.⁷⁵ While the impact may not be felt immediately on an individual level, such behavior impedes collective efforts to address urgent environmental concerns effectively.⁷⁶

Yet the implications of the endowment effect for public goods consist in more than the direct effect of a WTA-WTP divergence on the transaction of legal entitlements between individual sellers and buyers. Our contribution to this area recognizes recent research connecting the endowment effect to altruism and the implications of that association. While probability of transaction by individual traders

Choice Under Uncertainty, 92 *ECON. J.* 368, 805 (1982) (identifying this phenomenon as regret theory).

70. See Deby L. Cassill & Alison Watkins, *Mogul Games: In Defense of Inequality as an Evolutionary Strategy to Cope with Multiple Agents of Selection*, in 7 *ADVANCES IN AUSTRIAN ECON.* 35 (Roger Koppl ed., 2005) (arguing that hoarding is advantaged by evolution).

71. Kahneman et. al, *supra* note 66.

72. See *Oncale v. Sundowner Offshore Serv.*, 523 U.S. 75, 81 (1998)(using the reasonable person standard in the analysis of a negligence claim).

73. John K. Horowitz & Kenneth E. McConnell, *A Review of WTA/WTP Studies*, 44 *J. OF ENV'T ECON. AND MGMT.*, 426, 426–447(Nov. 2002), <https://doi.org/10.1006/jeem.2001.1215>.

74. Jones & Brosnan, *supra* note 69.

75. Raquel Fernandez & Dani Rodrik, *Resistance to Reform: Status Quo Bias in the Presence of Individual-Specific Uncertainty*, 81 *AM. ECON. REV.* 1146, 1146–55 (1991).

76. Lang et al., *Status Quo Bias and Public Policy: Evidence In The Context Of Carbon Mitigation*, *ENV'T RSCH. LETTERS* (2021).

of entitlements might be adversely influenced by the endowment effect, the presence of other agents who are affected to a differing extent by this phenomenon can have an important impact on the market for entitlements and the societal (and, consequently, legal) consequences thereof. It is this potentiality to which we now turn.

III. ALTRUISTIC ARBITRAGE

A. Background

The differential extent to which individuals are influenced by the endowment effect⁷⁷ has important implications for markets, as List broadly discussed.⁷⁸ Using a simple general equilibrium model standard in economics,⁷⁹ List introduces trading inertia to a segment of market agents, while assuming other agents suffer no such inertia.⁸⁰ The utility (i.e., satisfaction) levels differ only to a small extent between the two groups of agents given the trading inertia, but the overall effects on the economy are large: significant gains from trade are lost because agents who have an excessive WTA hold goods and refuse to trade them at the WTP offered by other agents.

List then cites real-world examples as showing a way by which the unaffected agents can, in this context, engage in arbitrage to extract the lost gains from trade for themselves. He relates the following simple example to illustrate:⁸¹

Assume Gary's WTA and WTP for a lamp are \$200 and \$50, whereas Milton's WTA and WTP are \$160 and \$40. These numbers suggest that if Gary (Milton) initially owns the lamp he would only be willing to part with it for \$200 (\$160); yet at most Gary (Milton) would offer \$50 (\$40) if Milton (Gary) initially owned the lamp. One can readily see that Coase's invariance result is disturbed in such a

77. See e.g., Maddux et al., *For Whom is Parting with Possessions More Painful? Cultural Differences in the Endowment Effect*, PSYCH. SCI. (2010) (finding evidence for differential endowment effects across individuals as a consequence of cultural background); Apicella et al., *Evolutionary Origins of the Endowment Effect: Evidence from Hunter-Gatherers*, AM. ECON. REV. (2014) (noting differences across stages of societal development); Lin et al., *The Role of Emotions in the Endowment Effect*, J. ECON. PSYCH. (2004) (noting differences across temporary emotional states).

78. List, *supra* note 45.

79. See *id.* (citing George A. Akerlof & Janet L. Yellen, *Can Small Deviations from Rationality Make Significant Differences to Economic Equilibria?*, 75 AM. ECON. REV. 4, 708 (1985) for the general framework that he applies to an economy consisting of a mix of "sophisticated" and "unsophisticated" agents).

80. *Id.*

81. List, *supra* note 45, at 69.

situation: the allocation of initial property rights will determine who ultimately owns the lamp. A profit-maximizer, however, could alter this scenario considerably. For example, assuming that John knew the value structures of Gary and Milton, and Milton initially owned the lamp, John could purchase the lamp from Milton for \$160 and allow Gary to use the lamp as if he owned it. If this action raised Gary's WTP to WTA, which is consistent with many of the empirical findings on instantaneous endowment effects for inexperienced consumers, then John could receive \$200 from Gary in exchange for the lamp. In this sense, John has made a considerable profit and the highest valued consumer ultimately owns the good (restoring Coase's invariance result.) Of course, if Milton was a sophisticated consumer and knew what John knew, then he could carry out this profitable strategy himself.

There are two implications of this dynamic. The first relates to the marketwide outcome: agents unaffected by the endowment effect act to eliminate lost gains from trade, thus eradicating welfare losses and restoring the efficient function of the market.⁸² The second relates to the distribution of gains among agents within the market: the unaffected agents extract the benefits of the arbitrage for themselves and prosper in relation to other agents compared to a scenario in which no agents were afflicted by the endowment effect.⁸³

Figure 2 displays the demand and supply curves for a market, similar to that which List depicts, in which all the consumers are influenced by the endowment effect. If the endowment effect did not exist, the market equilibrium would occur at the intersection of the demand curve marked "WTA" and the supply curve, resulting in the quantity Q^* being traded, with P^* being the transacted price. However, consumers influenced by the endowment effect are willing to pay a lower amount than the value they would place on the product once they possessed it: this is reflected by the demand curve marked "WTP" which lies below the WTA demand curve. Because of this lower willingness to pay, a smaller quantity Q_{EE} is transacted at a lower price P_{EE} .

82. List, *supra* note 46.

83. List, *supra* note 45.

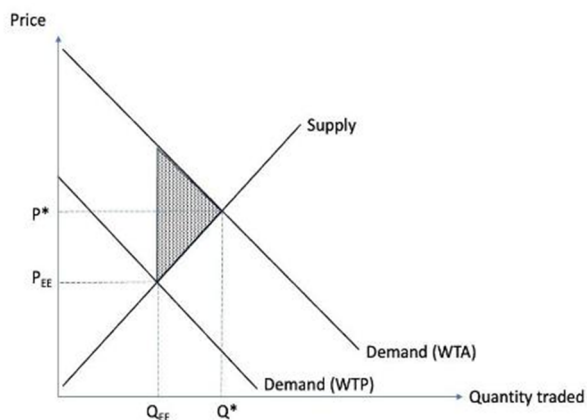


Figure 2. Altruistic Arbitrage of the Endowment Effect.

But we have not yet accounted for the effects of the arbitrage List describes. Agents who, like John in the List scenario, are unaffected by the endowment act as special intermediaries with the ability to induce buyers to pay them for the product the amount reflected on the WTA demand curve. This ability makes it profitable for them to serve all the consumers in the interval between Q_{EE} and Q^* : for each such consumer, as intermediaries they pay the price reflected on the supply curve while collecting the price reflected on the WTA curve. Thus, arbitrageurs can 1) expand the market from Q_{EE} to Q^* , restoring the efficient outcome (i.e., the outcome at which all transactions occur for which the value of the product in use exceeds its value to the supplier); and 2) extract profits for themselves, equal in the aggregate to the shaded triangle in the figure.

List applies this analysis to the case suggested by his own experimental work: that experienced traders manifest a reduced endowment effect relative to inexperienced traders.⁸⁴ That being said, the analysis applies equally well to any scenario in which agents in the

84. See, e.g., John A. List, *Neoclassical Theory Versus Prospect Theory: Evidence from the Marketplace*, 72 *ECONOMETRICA* 2, 615 (2004); Dirk Engelmann & Guillaume Hollard, *Reconsidering the Effect of Market Experience on the "Endowment Effect"*, 78 *ECONOMETRICA* 6, 2005 (2010); Luke Lindsay, *Adaptive Loss Aversion And Market Experience*, 168 *J. ECON. BEHAV. & ORG.*, 43 (2019); Jiqiang Wang et al., *An Endowment Effect Study in the European Union Emission Trading Market based on Trading Price and Price Fluctuation*, 17 *INT'L J. ENV'T RSCH. PUB. HEALTH* 9, 3343 (2020).

market are differentially affected.⁸⁵

Recent work suggests that differences in altruistic behavior may represent a source of differential endowment effects to which the analysis might be applied. Foster et al (2023)⁸⁶ studied the relationship between giving behavior and the WTA/WTP disparity. The researchers had experimental participants play a dyadic dictator game, a workhorse experimental setup in which one player (the “dictator”) is endowed with a certain amount of money and is then told they may give a portion of their choosing to a passive “receiver.”⁸⁷ Following several rounds of this game in which participants practiced both dictator and receiver roles with randomly-paired others, a random allocation of dictator and receiver roles was made for a round that would “count” (i.e., earn the participants real money).⁸⁸ Following the role allocation, dictators (receivers) were given the opportunity to sell (buy) the role to (from) someone else, before playing the final round.⁸⁹ WTA and WTP from participants’ offers were recorded, allowing a measure of the endowment effect.⁹⁰ Researchers found that participants who had given more as the dictator in practice rounds manifested significantly lower endowment effects than those who had given less.⁹¹

The results were not demonstrably causal. It is equally possible that a generous disposition or trait in certain participants caused both the greater giving and the lower endowment effect as the giving itself led to the lower endowment effect. However, the mere *association* between giving and the endowment effect clearly indicates altruism as a factor separating people into groups with differential endowment effects — the precondition for the arbitrage possibilities that List identified.⁹²

85. Maddux et al., *supra* note 79.

86. Foster et al., *Incumbency, Generosity, and the Valuation of Power: An Experimental Analysis* (Working Paper, 2020).

87. *Id.*

88. *Id.*

89. *Id.*

90. *Id.*

91. *Id.*

92. In ongoing work, Benjamin Ho and Matthew G. Nagler are studying experimentally the causal mechanism relating altruism to the endowment effect, as well as the key mediators and pathways governing the relationship. For additional information, contact Matthew G. Nagler directly.

B. General Implications

If altruists routinely take advantage of arbitraging lost gains from trade and internalize these lost gains within the market, then the two implications noted above with respect to List's dynamic apply to altruists as a class of individuals.

First, *markets benefit altruists*. This fact may prove to be the key to a long-standing puzzle⁹³ of why altruism should survive at all. Quasi-altruistic actions that have an obvious expectation of reciprocation contribute plausibly to the survival of the actor.⁹⁴ Moreover, individuals who act in the collective interest, whatever their motivations, will often prosper in situations where coordinated action leads to improvements for all.⁹⁵ Along these lines, models have suggested that unilateral behavior which reduces the fitness of the actor but benefits others outperforms selfish behavior by impelling self-interested reciprocation by other individuals, resulting in a net benefit to the actor.⁹⁶ But altruistic behaviors not subject to reciprocation are frequently observed (e.g., people tip in restaurants they will never visit again and give anonymously to charities) with no obvious mechanism to indicate why their perpetrators are favored by nature to propagate their genes.⁹⁷

Second, *altruists benefit markets*. This represents a previously unrecognized welfare contribution accruing to altruism, completely distinct from benefits that accrue to aiding coordination, and one that is quite remarkable given the recent history of Western ideological thought concerning altruism.⁹⁸ For the better part of the twentieth

93. See, e.g., W.D. Hamilton, *The Genetic Solution of Social Behaviour*, 7 J. THEORETICAL BIOLOGY 1, 1 (1964); Samuel Bowles & Herbert Gintis, *The Evolution of Strong Reciprocity: Cooperation in Heterogeneous Populations*, 65 THEORETICAL POPULATION BIOLOGY 1, 17, (2004); and Stuart A. West & Andy Gardner, *Altruism, Spite and Greenbeards*, 327 SCI. 1341 (2010).

94. Becker, *supra* note 55.

95. Simon, *supra* note 54.

96. Becker, *supra* note 55.

97. See Ernst Fehr & Urs Fischbacher, *The Nature of Human Altruism*, 425 NATURE 785 (2003) (explaining that among animals, fitness-reducing acts that confer benefits on others are largely restricted to close kin); see also Simon, *supra* note 54 (showing that altruism directed at close kin can survive as a trait from an evolutionary perspective because siblings and children share a large fraction of the genes from the altruist and can propagate these.); see also Kenichi Aoki, *A Condition for Group Selection to Prevail Over Counteracting Individual Selection*, 36 EVOLUTION 4, 832 (1982) (explain that although genetic selection of altruistic traits is plausible in groups not consisting of close kin, it is considered unlikely to occur empirically due to the possibility of migration of non-altruists between groups and their within-group fitness advantage over altruists).

98. Ronald Cohen, *Altruism: Human, Cultural, or What?*, 28 J. SOC. ISSUES 3, 39–57 (1972).

century, individualistic thinking presupposed that altruism interferes with the efficiency of markets and, more broadly, the provision of optimal effort by individuals.⁹⁹ The philosopher Ayn Rand called altruism “incompatible with freedom, with capitalism, and with individual rights,” perceiving that altruism encouraged individuals to subjugate their will to the will of others.¹⁰⁰ Such views were mirrored in popular culture, as the character of Gordon Gekko from the movie *Wall Street* illustrates.¹⁰¹

It is essential we recognize that the notion of altruism benefitting markets has existed previously, most notably in Adam Smith’s *The Theory of Moral Sentiments*.¹⁰² Smith observed that individuals must show moral behavior if society were to function properly and that moral principles must further be enshrined in legal institutions.¹⁰³ More recently, economists have engaged along similar lines with the question of how a liberal society based on markets can avoid degenerating into a “rent-seeking society.”¹⁰⁴ The direct means by which altruism might increase the efficiency of the market mechanism is, to our knowledge, a novel concept, however.

C. Implications for Public Policy and the Law

To be sure, these findings are interesting, but what of specific significance to public policy and the law? Several important implications of altruistic arbitrage emerge, to which we now turn.

It is characteristic of people with altruistic intentions that they act individually to promote public goods provision.¹⁰⁵ Since they internalize the public interest, altruists act, out of their own personal preference, to ameliorate the commons.¹⁰⁶ Because markets favor

99. Serge-Christophe Kolm, *Altruism and Efficiency*, 94 ETHICS, 18 (1983).

100. Gary Galles, *Ayn Rand’s Misunderstood Position on Altruism*, L.A. DAILY NEWS (Feb. 2, 2020 at 7:06 P.M.), <https://www.dailynews.com/2020/02/02/ayn-rands-misunderstood-position-on-altruism/>.

101. *Wall Street*, *supra* note 2.

102. ADAM SMITH, *THE THEORY OF MORAL SENTIMENTS* (1759).

103. *Id.*

104. See Anne O. Krueger, *The Political Economy of the Rent-Seeking Society*, AM. ECON. REV., 291–303 (1974) (defining and analyzing “rent-seeking”); BUCHANAN ET AL., *TOWARD A THEORY OF THE RENT-SEEKING SOC’Y* (1980) (analyzing the economic effects of rent-seeking behaviors); and ROWLEY ET AL., *POL. ECON. RENT-SEEKING* (2013) (examining the various economic and political aspects of rent-seeking behavior).

105. Mark Bagnoli and Barton L. Lipman, *Private Provision of Public Goods Can Be Efficient*, PUB. CHOICE (1992).

106. Ma et al., *Altruism and Voluntary Provision of Public Goods* Economics Bulletin, Working Paper no. 31 (2002).

altruists by providing them with an asymmetric ability to prosper relative to non-altruists, market economies therefore provide altruists with more resources than would occur but for this effect, thereby promoting the public goods provision in a way not previously recognized. This recognition runs against the traditional logic of the “tragedy of the commons,” which holds that public goods are underprovided and under-maintained under private provision.¹⁰⁷

To the extent that those who internalize the values of the commons are market-favored, the market may have its own built-in mechanism for internalizing the externalities associated with public goods.¹⁰⁸ The strength of this internalization mechanism is an empirical question, dependent in part upon whether the decision to be altruistic causally induces a reduced endowment effect, which would in turn imply that the market incentivizes altruism.¹⁰⁹ The answer has implications for the degree to which the government is required to intervene in the economy to ensure the provision of public goods. Consider, for example, institutions such as a National Endowment for the Arts and the National Endowment for the Humanities. These represent instances in which the Federal government steps into the economy to subsidize a public good.¹¹⁰ If the incentives of philanthropists to endow the arts and humanities out of private funds are larger than previously believed in view of opportunities for altruistic arbitrage, then such public institutions may be less essential to the stimulation of the relevant public goods than previously believed. Costly public resources may be reallocated at the margin to areas of greater social need, increasing the overall benefits to the public.

It must be emphasized that, independent of the question of whether discretionary altruism is actively *incentivized* by the market, the fact that the market *rewards altruists* still implies a presumptive boost to the private provision of public goods. Every altruist, by

107. Oakland, *Theory of Public Goods*, in HANDBOOK OF PUBLIC ECONOMICS, Vol. 2. 485–535 (1987).

108. It must be noted that there is no reason to believe that the externalities associated with public goods will be completely internalized. Rather the externalities will be reduced, all else equal.

109. If, in deciding to be more altruistic, an individual can expect to have a lower endowment effect and thereby be more capable of extracting surplus in the market, then markets incentivize altruism.

110. Other instances include the United States Armed Forces, the Federal Bureau of Investigation, the Central Intelligence Agency, the National Institutes of Health, and the National Park Service.

definition, is a partisan for a certain public good or goods.¹¹¹ To the extent altruists benefit from altruistic arbitrage, these individuals will act based on their desire to promote their preferred public good(s) by plowing their surplus into its (their) provision.¹¹² For example, would-be patrons of the arts will naturally perform more effectively in the market than people with no intention of giving to the arts. Such people will naturally obtain more surplus from participating in the market and, being altruistic, will naturally give more to the arts. Contributions to the arts are therefore increased relative to what would be predicted without altruistic arbitrage.

An additional implication of altruistic arbitrage for public policy and the law implicates the Coase Theorem. As discussed earlier, taking the endowment effect into account, the valuation of entitlements depends upon their initial assignment, which implies that the Coase Theorem fails.¹¹³ Initial holders of entitlements may cling to them even if they do not put them to the highest socially valued use.¹¹⁴

It is, however, precisely this problem which altruistic arbitrage remedies. The process described by List indicates that enterprising altruists can take advantage of the possibility of gains from trade in order to correct the misallocation of entitlements.¹¹⁵ Where an entitlement might find a higher valued use elsewhere in the economy, the altruist—unafflicted by the endowment effect—sees an opportunity for gain.¹¹⁶ In taking advantage of that opportunity, the entitlement is reallocated. Only when entitlements are assigned to their highest valued uses will such trade opportunities cease to exist.¹¹⁷ Thus altruistic arbitrage has the potential to fully restore the Coase Theorem to the extent that altruists do not at all exhibit the endowment effect. If altruists merely exhibit a reduced endowment effect, we should expect the allocation of entitlements to be improved, albeit the Coase Theorem will not be fully restored.

111. *Public Good*, Oxford English Dictionary (Sept. 2024), <https://doi.org/10.1093/OED/5004796276> (defining public goods as “a commodity or service provided, without profit, to all members of a society (whether by the government or privately).”). As such, any goods or services provided by a person for the benefit of others is definitionally a public good.

112. *Id.*

113. Fernandez & Rodrik, *supra* note 77; Lang, *supra* note 78.

114. *Id.*

115. List, *supra* note 45.

116. *Id.*

117. *Id.*

D. Case Study: Cap and Trade Policies and Altruistic Arbitrage

One of the assumptions of the Coase Theorem is that markets for entitlements will spontaneously arise to correct allocations, leading to the efficient outcome.¹¹⁸ For various reasons, however, some such markets do not spontaneously arise. For example, markets for the trading of carbon do not arise unless governments agree to cap and track carbon emissions.¹¹⁹ As a policy initiative, the effectiveness of “cap and trade” has been questioned.¹²⁰ We suggest, however, that the full benefits and effectiveness of cap and trade policies have been underestimated because the policy evaluation has failed to take account of both the endowment effect and altruistic arbitrage. A reconsideration of cap and trade may well be warranted in view of heretofore missing elements in the analysis.

As discussed in our literature review, the standard assumption about cap and trade implementation is that once carbon is “capped” at a certain level and entitlements to emit carbon are available for open trading on the market, these entitlements will find their way to the highest valued use.¹²¹ This “Coasean” presumption, of course, fails because of the endowment effect: the initial holders of emission credits will be more likely to continue holding them, all else equal, as the endowment effect suppresses trading.¹²²

This situation creates opportunities for altruists to arbitrage the credits. The altruists most likely to participate will be those with a direct interest in the market, as they will have both informational advantages over other participants and an elevated interest in the outcome.¹²³ This suggests climate change activists will tend to participate as the primary arbitrageurs.¹²⁴ These activists, being altruistic partisans for climate change mitigation, will plow excess

118. Francesco Parisi, *Coase Theorem*, in NEW PALGRAVE DICTIONARY OF ECONOMICS (Lawrence E. Blume and Steven N. Durlauf, eds., 2007).

119. Without a carbon cap, there is no incentive to trade in carbon emission rights, since the right would be *per se* free.

120. *Cap and Trade Is Supposed to Solve Climate Change, but Oil and Gas Company Emissions Are Up*, PROPUBLICA (Nov. 15, 2019), <https://www.propublica.org/article/cap-and-trade-is-supposed-to-solve-climate-change-but-oil-and-gas-company-emissions-are-up>.

121. Korobkin, *supra* note 49.

122. Arlen & Tontrup, *supra* note 13.

123. Peltzman, *supra* note 53.

124. Wang et al., *supra* note 86 (finding that an endowment effect in the European Union emission trading market. However, this study did not track trader information in a way that would enable us to determine, per our prediction, whether climate change activists extracted a super-normal share of the gains from trade).

returns back into mitigation.¹²⁵ Notably, the surplus obtained by the altruistic arbitrageurs active in the market for carbon trading will come at least in some measure from polluters, as it is the polluters who will pay to purchase carbon credits. Thus, relative to a cap and trade market operating without endowment effects, an actual cap and trade market will generate surplus transfers from polluters to the cause of climate mitigation. This is roughly equivalent to the incremental imposition of a Pigouvian tax on carbon, as such a tax generates government revenues that would be applied to climate change mitigation, and renders climate mitigation relatively more effective than the cap-and-trade policy in isolation.¹²⁶

Figure 3 illustrates the classic treatment of a market subject to Pigouvian taxation, which we propose as a model of the market for carbon should a carbon tax be imposed. Relative to the unregulated market, a smaller amount of carbon is emitted (i.e., $Q_T < Q^*$) because the carbon is taxed (at per unit amount, t). The tax revenues, amounting to the rectangular shaded area, $Q_T \times t$, are then available to the government to invest in mitigation projects, such as wind and solar subsidies.

125. It might be argued that a failure of arbitrageurs to take advantage of gains from trade in the carbon market would be a preferable outcome, as emission entitlements would go unused, further advancing the cause of mitigating climate change relative to the arbitrated outcome. However, a more holistic welfare analysis recognizes that the private gains accruing to arbitrage outweigh the public detriment of increased emissions. Put simply, the altruistically arbitrated outcome is the more efficient outcome and, hence, the one most conducive to the public good.

126. Gilbert E. Metcalf & David Weisbach. *The design of a carbon tax*, 33 HARV. ENVTL. L. REV. 499, 499 (2009).

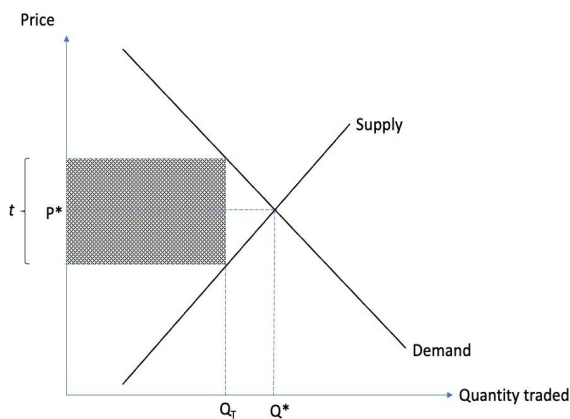


Figure 3. Pigouvian Taxation and Associated Tax Revenue.

In contrast with this, consider again Figure 2, presented earlier in the section, now useful to us as an illustration of a market for carbon emission credits in which the endowment effect influences the equilibrium but in which arbitrageurs are active. In this rendition, the market equilibrium does not display the amount of carbon emitted, which may be presumed fixed, but rather the amount of carbon emission credits traded: any carbon credits that are not traded, it may be assumed, result in carbon emission by the initial owner of the credit. Thus, the emission of carbon has not been limited by taxation, but by a cap, which is set to some level greater than Q^* .

The graph in Figure 2 shows that the allocation of carbon credits in a cap and trade market subject to the endowment effect is inefficient, prior to arbitrage. Consistent with the discussion earlier in this section, arbitrage restores the efficient equilibrium and results in profits to the arbitrageurs equal to the area of the shaded triangle. But we observe here that those profits, inasmuch as they accrue to altruistic partisans, will likely be invested in mitigation projects, just as government revenues from Pigouvian taxation would be.¹²⁷ This boost to mitigation efforts is above and beyond the benefits normally expected to accrue by setting a cap on carbon and allowing for agents to trade.

127. Bagnoli & Lipman, *supra* note 107.

IV. POLICY RECOMMENDATION

In view of the preceding discussion about the implications of altruistic arbitrage, we propose that cap and trade markets be implemented by way of an auction of market maker licenses.¹²⁸

The economics of such a plan are relatively straightforward. A fair and open auction naturally allocates resources to the party with the highest private valuation, while allowing the auctioning agency to collect that value in full.¹²⁹ The proceeds of the auction, in turn, can be allocated by the public entity conducting the auction to a purpose deemed socially valuable. In the case of a market maker auction, it might make sense to allocate the auction proceeds to carbon offsets.¹³⁰

Meanwhile, the private valuations which drive the bidding can include anything that parties value for idiosyncratic reasons, meaning an auction will not necessarily allocate the market maker role to the individual who is best able to extract gains from trade from the market. To clarify, consider a situation in which Person A and Person B are competing to be the market maker. Both are altruistic so both can extract gains from trade from the market for carbon credits through altruistic arbitrage. Person A can realize \$6 million through this process. Person B experiences a greater endowment effect than Person A and so is able to realize only \$5 million; however, Person B obtains altruistic satisfaction worth \$2 million from performing the market maker role and being personally responsible for the carbon offsets that the auction generates. In total, Person B's total private valuation is \$7 million, compared to \$6 million for Person A. Therefore, Person B wins the auction and takes on the role, despite not being as "functionally" efficient a market maker as Person A. That being said, the \$2 million private worth that Person B derives (and which Person A does not) is real social value. Thus, it is efficient to allocate the license to Person B.¹³¹

128. Allocating via auction the role of market maker for a pollution credit market, as we propose, is distinct from allocating pollution credits via auction. The latter process has been utilized previously in the EU ETS market. Edwin Woerdman and Andries Nentjes, *Emissions Trading Hybrids: The Case of the EU ETS*, 15 REV. LAW ECON. 1 (2014). We believe our proposal to be novel.

129. PAUL KLEMPERER, *AUCTIONS: THEORY AND PRACTICE* (2004).

130. More holistically speaking, the auction proceeds should be allocated to the highest public-valued use.

131. Incorporated into such calculations will be the perceived social value of the bidders of removing emission credits from circulation. Because the endowment effect prevents trades from occurring, it will, in the context of a pollution credits market, result in less carbon being emitted. If the highest value arbitrageur perceives the value of removing credits from trade to be greater at the margin than the value extractable through arbitrage—even accounting for how the

One problem with auctions is that the privately efficient outcome is not necessarily socially efficient.¹³² That is, the highest private value bidder might not be the highest social value bidder, because external effects are, by definition, external to the private valuations that drive the bids. Specifically, external costs or benefits associated with the market maker role can drive a wedge between private and social valuations. If the market maker behaves altruistically (e.g., they work longer hours to combat climate change more effectively) but their personal valuation of their accomplishments is less than their social values, the market maker's private valuation of being in the role will fall short of their participation's social value.

There is no certainty that benefits from altruistic actions which diverge from the altruist's private valuation of the same will be related to climate change versus other social causes, however. Market-making may attract altruists with interests other than climate change, purely because their altruism renders them more effective at arbitraging the gains from trade. That said, informational advantages¹³³ may make it more likely that the market maker is a climate change activist, as discussed above.¹³⁴

A causal link between altruism and the endowment effect, if such exists, would affect the outcome by providing an additional incentive to be altruistic.¹³⁵ This would allow an agent to obtain greater gains from trade and extraction of returns from the market maker role, all else equal. Moreover, if the auction proceeds are allocated to combat climate change, this could further encourage climate change altruists to be the highest bidders. In doing so, the altruistic valuation by these bidders would be "baked into" the private value they express through the bid.

extracted gains might be reinvested in climate change mitigation—then that individual, as market maker, will accordingly leave trades certain unexecuted.

132. See e.g., Dan Levin & James L. Smith, *Equilibriums in Auctions with Entry*, 84 AM. ECON. REV. 3, 585 (1994), (noting that entry into auction participation can affect social welfare.); Renato Paes Leme et al., *Sequential Auctions and Externalities*, PROC. 23RD ANN. ACM-SLAM SYMP. ON DISCRETE ALGORITHMS, 869 (2012); Michal Feldman et al., *Simultaneous auctions are (almost) always efficient*, PROC. 45TH ANN. ACM SYMP. ON THEORY COMPUTING (2013); Yingjie Wang et al., *An Optimization and Auction-Based Incentive Mechanism to Maximize Social Welfare for Mobile Crowdsourcing*, 6 IEEE TRANSACTIONS ON COMPUTATIONAL SOC. SYS. 414 (2019).

133. Larson, Nathan, *Private Value Perturbations and Informational Advantage in Common Value Auctions*, GAMES AND ECON. BEHAV. 65, n. 2 (2009).

134. Additionally, a more holistic public benefit perspective recognizes that there could conceivably be higher public-valued uses of altruistic effort than the mitigation of climate change.

135. Fehr & Fischbacher, *supra* note 109.

A measure of the private value offered by the winning market maker is provided by the difference between the bid price and the fee, if any, that the market maker is permitted to charge. This private value can include specific efficiencies from capturing gains from trade through arbitrage and any idiosyncratic private value that motivates the market maker. Suppose a city government decides to allocate via auction a monopoly concession to provide 10,000 ride-sharing transactions within the city limits. The government stipulates that the winning concessionaire may charge a \$1 fee per ride-share transaction it facilitates; however, it also stipulates that the concessionaire is free to collect money from the buyers of rides at whatever they are willing to pay and sell those rides to drivers at whatever they are willing to accept. Suppose Uber issues the winning bid of \$50,000. Since Uber will clearly collect \$10,000 in flat fees, we can assume — unless Uber has a non-pecuniary interest in facilitating rides — that it expects to collect \$40,000 through arbitrage, that is, through the difference between what the drivers take and what the riders pay.

V. CONCLUSION

In this article, we have proposed that altruistic individuals, who have been shown to exhibit a smaller endowment effect than other people (all else equal), are likely to engage in altruistic arbitrage. Specifically, they will extract gains for themselves by facilitating efficient trades which would otherwise be overlooked by market participants. This behavior implies a previously unrecognized value to public policies that make use of markets: they benefit altruists who, in turn, will plow a portion of the surplus into support of public goods provision. Applied to the problem of climate change, our findings support wider implementation of cap and trade policies—in particular, by means of auctioning off the role of market maker. Such an approach will effectively put altruism to work in support of this important policy goal, which would, based upon economic theory, be expected to have a greater impact on climate change than a traditional analysis of cap and trade would have anticipated.

Our legal analysis is necessarily limited by certain unknowable quantities. The extent to which altruists, as opposed to other individuals who experience a smaller endowment effect (e.g., experienced traders), would be the ones to capture gains from trade is an empirical question. Accordingly, we cannot know without further study the actual extent to which markets lead to side benefits for public goods provision; and, in particular, we cannot know the full measure of

additional benefit attributable to a cap and trade market maker auction of the type we are recommending here. Focused research on cap and trade systems, perhaps through field or laboratory experiments, can elucidate the latter issue.

More broadly, much additional research is needed. Apart from implications for climate change policy, a clear empirical understanding of the effect of altruism on markets is necessary if policymakers and legal experts are to recommend precise regime changes relating to the administration of public goods and the allocation of legal entitlements. Experimental research focused on entitlement allocation, in particular, could help us to understand the scope of altruism for resolving failures of Coase's predictions in the wake of the endowment effect.

What is clear, however, is that altruism's implications for the law by way of the endowment effect are far-reaching. The identification and development of new policy and legal approaches—both for climate change and more broadly—show considerable promise.