

Markets and Prosociality

A Theoretical Synthesis and Meta-Analysis

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Abstract

In this paper, I seek to clarify the ambiguities and resolve the apparent contradictions on the relationship between markets and prosociality by assembling a theoretical framework and conducting a meta-analysis of the experimental evidence. Using a theoretical synthesis of evolutionary theory, game theory, and political economy, I argue that markets represent social, psychological, and economic situations that influence both the evolution and the behavioral expression of social preferences. I compile the findings of 242 experiments and employ a meta-regression approach to analyze the within-study effects of anonymity, ephemerality, market framing, and country-level market exposure on prosociality. The meta-data reveal a negative effect of market-related contexts on prosociality but no effect of market exposure. Anonymity erodes empathy, and ephemerality undermines reciprocity. Market framing also tends to elicit self-interested behavior, perhaps due to the adaptation of market behavior to the societally predominant market environment. The null market exposure results may indicate a lack of cultural coherence at the country level or the absence of a unidirectional cultural effect of market exposure. Lastly, I suggest future avenues of research to fill in the gaps of the experimental literature and explore potential interactions between contextual and cultural effects. *JEL* Codes: C72, C73, D91, D64, Z13

1 INTRODUCTION

The debate over the effects of markets on prosocial and moral behavior is long and contested (e.g., Bowles, 1998; Hirschman, 1982; Marx & Engels, 1906; Montesquieu, 1748). Do markets promote moral universalism, peace, and civility? Or do they foster self-interest, greed, social fragmentation? The evidence from experimental economics is mixed. Henrich and his coauthors, in their seminal field experiments in 24 small-scale societies, find that prosocial and fairness-oriented behavior increase with market exposure (2004; 2010). In contrast, a number of studies show that market contexts diminish prosociality in the experimental setting (Bartling et al., 2015; Ellingsen et al., 2012; Falk & Szech, 2013; Hoffman et al., 1994; Kay et al., 2004; Liberman et al., 2004; Pillutla & Chen, 1999; Roth et al., 1991). I contend that a theory of dual cultural and contextual effects of markets can account for these apparently incongruous patterns.

In the 1998 paper, “Endogenous Preferences,” Bowles argues that markets shape preferences through cultural transmission and the evolution of norms, through intrinsic and extrinsic motivations, and through the learning and situation construal effects of economic tasks and environments. He characterizes “ideal” markets as anonymous and ephemeral and argues that these qualities undermine the evolution of “nice traits” (p. 94). I similarly argue that the typical attributes of market exchange exert evolutionary and contextual forces on prosociality. Specifically, anonymity, ephemerality, and competition select against prosociality, and mutualism selects against antagonism.

These effects are complicated by the evolution of large-scale societies, where prosociality in anonymous and ephemeral interactions may be key to collective survival and propagation (e.g., Boyd & Richerson, 2005; Harari, 2015; Henrich, Ensminger, et al., 2010). Group selection, then, is likely to stimulate the development of mechanisms that support anonymous prosociality. This does not imply though that large-scale societies are more prosocial. The prevalence of prosociality (or any behavior) in a society is the product of both preferences and environments, so societies with more anonymous environments and preferences that support prosociality in such environments may, from the bird’s eye view, be more or less prosocial than less anonymous societies devoid of mechanisms supporting anonymous prosociality.

In this paper, I synthesize across the theoretical insights of evolutionary theory, game theory, and political economy. I then conduct a meta-analysis of the evidence from experimental economics.

A number of previous meta-studies and surveys of economic experiments have explored the effects of context and culture on prosociality (e.g., Balliet, 2010; Bradley et al., 2018; Cochard et al., 2021; Dal Bó & Fréchette, 2018; Engel, 2011; Jin et al., 2025; Oosterbeek et al., 2004; Sally, 1995; Spadaro, Graf, et al., 2022). These existing meta-studies provide several relevant observations: behavioral observability and subject identification have a weak positive affect on prosociality (Bradley et al., 2018; Engel, 2011); communication increases prosociality (Balliet, 2010; Jin et al., 2025; Sally, 1995); ephemerality tends to reduce prosociality (Dal Bó & Fréchette, 2018; Jin et al., 2025, study 2); national economic development is weakly negatively related to dictator giving (Cochard et al., 2021; Engel, 2011). The meta-analyses of Jin et al. (2025) and Spadaro et al (2022) are closest to the one I present here. They examine the effects of situational context and societal institutions, respectively, on prosociality in prisoner’s dilemmas and public goods games among strangers. My method, however, is differentiated by the inclusion of dictator and ultimatum games, the focus on within-study effects, and the measures of market-related contexts and market exposure.

I compile studies of prisoner’s dilemmas, public goods games, dictator games, and ultimatum games that vary market-related contexts (anonymity, ephemerality, and explicit market or money framing) and cross-country studies that allow me to test for cultural effects of market exposure. I measure market exposure using the prevalence of wage labor and log GDP per capita. In my main analysis, I focus on within-study variance by including study fixed effects in the meta-regressions. I find large, significant negative effects of anonymity and ephemerality on prosociality and smaller, less consistent negative effects of explicit market frames on prosociality. I find no relationship between country-level market exposure and prosociality.

The structure of the rest of the paper is as follows: in section 2, I develop my theoretical framework; in section 3, I present my methods; in section 4, I report results; and in section 5, I interpret the results and suggest directions for future research.

2 THEORETICAL FRAMEWORK

Before I delve into a meta-analysis of the experimental evidence, it is important to lay out the possible channels through which various types of markets may shape the evolution and behavioral expression of prosociality. In this section, I review the theoretical literature on the evolutionary origins of prosociality, explore the various contextual attributes of markets and their potential behavioral consequences, discuss theories of the effect of markets on cultural evolution, and present experimental games as a tool for testing

the hypothesized relationship between markets and prosociality. The theoretical framework developed here structures the empirical analysis and interpretation of results.

2.1 THE EVOLUTION OF PROSOCIALITY

In this paper, prosociality refers to behavior that benefits others. The costs and consequences of prosocial behavior range widely from holding a door for a stranger or giving a complement to saving someone from a burning building or raising a child. Prosociality may be driven by intrinsic social preferences such as altruism, propiety and socially strategic self-interest, or externally enforced social norms. Our capacity for prosociality has been instrumental to our success. We are a social species, and collective action problems (where the pursuit of the common good is individually costly) are endemic to our societies. Whether in the context of mammoth hunts, wars, or climate change, our individual and collective survival and spread has, throughout history, depended on effective cooperation. But how can this behavior evolve if, at the individual level, the benefits are separated from the costs?

Before delving into the evolutionary origins of prosociality, let us consider one of the fundamental features of human behavioral ecology: our dual inheritance of genes and culture (Boyd & Richerson, 2005; Henrich & Muthukrishna, 2021). Unlike most animals, much of our behavior is socially learned. Preferences and beliefs diffuse and transmit within and across generations, cohering along group lines due to conformism, forming what we refer to as culture. Culture accumulates and mutates and evolves, each trait persisting and spreading with differential success on an adaptive landscape shaped by our social, economic, built, and natural environments. Genes and culture co-evolve. Our genetic inheritance shapes the evolution of culture, and our cultural inheritance shapes the evolution of genes.

There are three evolutionary mechanisms that can produce prosociality: group selection, assortment, and discrimination. Each of these mechanisms can operate along the genetic or the cultural dimensions of human behavioral ecology. The fundamental logic of group selection is simple: if the collective benefits of prosocial behavior exceed the individual costs, groups with more prosociality will be more successful than groups with less (Boyd & Richerson, 2005; Kropotkin, 1902). This differential success might manifest in differential persistence and/or differential spread and may or may not be at the expense of other groups. Group selection alone can explain prosociality if the selection at the group level, where prosociality yields a higher average payoff, is stronger than the selection at the individual level group-level selection, where self-interest yields a higher average payoff.

But prosociality can also evolve if the benefits of prosocial actions fall disproportionately on other prosocial actors—i.e. if the benefits of prosociality are sufficiently concentrated among prosocial individuals. This can occur via assortment if prosocial individuals are more likely to interact with other prosocial individuals (the second mechanism) or via discrimination if prosocial individuals can identify one another and limit their prosocial behavior to interactions with other prosocial individuals. These mechanisms can manifest in many forms, including empathy, where prosociality is contingent on social proximity (Garrison, 2026), direct reciprocity, where prosocial behavior is contingent on past interactions (Axelrod, 1984; Trivers, 1971), indirect reciprocity, where prosociality is contingent on reputation (Nowak & Sigmund, 2005), kin-based altruism, where prosociality is contingent on kinship (Hamilton, 1964), parochial altruism, where prosociality is reserved for the in-group (J.-K. Choi & Bowles, 2007), and social networks, which can pro-

duce assortment through social learning and endogenous group formation (McPherson et al., 2001; Rand et al., 2011, 2014).

These mechanisms help us postulate how markets might shape prosociality. Variation in prosociality may arise from both cultural differences (different learned preferences) and contextual differences (different behavioral expressions of preferences). Individuals from different cultural backgrounds may behave differently in a given context, and any given individual may behave differently in different contexts. Markets—like any environment—may exert a selection force (on which preferences evolve) as well as a contextual force (on how those preferences are expressed as behavior). Thus, holding context constant, individuals from societies with different degrees of market exposure might exhibit different levels of prosociality; and holding culture constant, individuals from the same society might express different degrees of prosociality in different market-related contexts.

Crucially, the effects of markets on behavior and the difference between cultural and contextual effects depends on the degree of context-dependency of behavior. Consider the extreme cases. If behavior is perfectly context-dependent, then there would be no evolutionary spillover effects of, for example, supermarkets on behavior in farmer’s markets or coffee shops. Each context-specific behavior would evolve based on the social, psychological, and economic characteristics of that context. In this case, cultural and contextual effects are identical. At the other extreme, if behavior is not context-dependent, then every situation exerts some small pressure on the evolution of a universal utility function, and behavior is thus a product of the “average” social, psychological, and economic attributes of society, weighted by the relative contribution of each societal situation to cultural and genetic fitness. In this case, there are only cultural effects. Actual human behavioral ecology lies somewhere in between these extremes, so markets must have distinguishable cultural and contextual effects.

2.2 MARKET CONTEXTS AND MARKET CULTURES

What exactly constitutes a market? The task of defining the term might seem trivial. Definitions of markets typically describe a place for or process of monetary transaction, commercial exchange, or buying and selling (Lane, 1991, pp. 10–11; “Market (Economics),” 2026; Merriam-Webster, n.d.; Polanyi, 1944, p. 56; The CORE Econ Team, 2024; Weber, 1921/1978, p. 634). Market interactions are often characterized in their “ideal” form as mutualistic (The CORE Econ Team, 2024), competitive (Hirschman, 1982; Lane, 1991; Weber, 1921/1978), impersonal (Bowles, 1998; Graeber, 2014; Hirschman, 1982; The CORE Econ Team, 2024; Weber, 1921/1978), and ephemeral (Bowles, 1998; Hirschman, 1982; Weber, 1921/1978). In reality, the ethnographic and historical record reveals considerable diversity in the form and societal niche of markets (Graeber, 2014). The historical specificity of capitalism, for example, rests on the novel role of markets, which, with proletarianization, transformed from an opportunity for exchanging surplus to an imperative of survival (Wood, 2002). Even within modern, capitalist settings, market interactions may be personal (e.g., farmer’s markets) or impersonal (e.g., grocery stores), ephemeral (e.g., online shopping) or durable (e.g., employment).

Different forms of markets distinguished by different economic incentives and reservation options, social-economic relationships, and social-psychological situations may shape the evolution and expression of prosociality in different ways. I consider here the potential effects of anonymity, ephemerality, competition, and mutualism as well as the broader effects on cultural evolution in complex society.

2.2.1 *Anonymity*

Market interactions are often characterized as impersonal or anonymous (Bowles, 1998; Graeber, 2014; Hirschman, 1982; The CORE Econ Team, 2024; Weber, 1921/1978). The precise meaning of these attributes varies across sources; impersonality and anonymity between market interactors may refer to a lack of identification, a large social/cultural distance, or simply the irrelevance of social relationships. I will use these terms to refer to a lack of social relationships—i.e. an anonymous interaction takes place between strangers. While there are, of course, numerous examples of personal market interactions, market interactions might tend to be anonymous for several reasons. Large social, cultural, and geographical distances may correspond to large differences in ecological, physical, and human capital, such that the gains from trade between strangers are especially large. Additionally, if market exchanges are characterized by the use of money, the association might arise based on the especial advantages of money in socially disembedded contexts. Social obligation may be sufficient to facilitate exchange between familiars, but money may be necessary when the exchange takes place between strangers (Graeber, 2014).¹

Several important forms of prosociality tend to diminish with anonymity. Kin-based altruism, empathy, and parochial altruism promote prosocial behavior contingent on genetic, social, psychological, and cultural proximity (J.-K. Choi & Bowles, 2007; Cialdini et al., 1997; Davis, 2015; Garrison, 2026; Hamilton, 1964; Preston & Waal, 2002). These strategies of conditional prosociality concentrate the benefits among family, friends, and the in-group, who, due to genetic and cultural transmission of traits, are likely also prosocial individuals. But, consequently, in interactions among strangers, they produce little to no prosociality.

2.2.2 *Ephemerality*

The ephemeral quality of market interactions derives from the nature of monetary transactions. In a market exchange, money is used to immediately settle debts. Compare this to gift exchange, which, like market exchange, facilitates the transfer of material goods, but, unlike market exchange, is drawn out by social debt obligations. Durable economic interactions like gift exchange shape and are shaped by the social relationships they are embedded within; ephemeral economic interactions like market transactions preclude the development of such parallel relationships (Graeber, 2014; Kimmerer, 2024). Of course, not all market interactions are ephemeral, and in durable market interactions such as employment, social relationships often do form.

Repeated interactions allow for reciprocity to function. Reciprocity is prosociality conditioned on past behavior. Direct reciprocity occurs when the same partners interact repeatedly and condition their behavior on the history of the interaction (Bowles & Gintis, 2011; Trivers, 1971). Indirect reciprocity occurs when the interactors change but reputational information on their behavioral tendencies is available (Nowak & Sigmund, 2005). These forms of conditional prosociality succeed by concentrating the benefits of prosociality among prosocial actors. Ephemerality undermines reciprocity by limiting both the information on past behavior and the potential to reap future benefits from present prosocial action.

¹ Graeber argues that taxation ensures a universal demand for coins, enabling them to function as a medium of exchange between strangers.

Although I analyze anonymity and ephemerality separately, they often covary in the real world. Accordingly, empathy and reciprocity often co-occur and influence each other. Both mechanisms of prosociality operate on the basis of social relationships, which exemplify the personal and the durable, and both are therefore undermined when the interaction is socially disembedded.

2.2.3 *Competition*

Competition arises among actors on the same side of the market. Buyers compete with buyers and sellers with sellers. Competition and reservation options drive bargaining power in markets. Those with better reservation options and fewer competitors claim a larger share of the surplus. Increasing the number of competitors or heightening the stakes intensifies competition. Under capitalism, firms compete for customers and investors, and workers compete for jobs. The stakes here are high. Firms rely on customers and investors to survive. Workers rely on wages to survive.²

Since competition shapes bargaining power, market actors are incentivized to manipulate the competitive environment. Workers and capitalists may clash over unionization and collective bargaining and over free trade agreements that expand the reserve army of labor. Firms may engage in anti-competitive behavior in pursuit of monopoly rents while consumers support antitrust laws to maintain firm competition. In this way, each side of the market seeks to undermine its own competition while promoting competition on the opposite side. This makes for a sort of meta-competition—a competition over competitive environments. Since the difficulty of collective action rises with the size of the collective, the winner of the meta-competition may be the side with fewer actors. But let us return to the simpler case where the competitive environment is held constant.

In terms of evolutionary selection, increasing individual-level competition selects against prosociality. Even if there are potential gains from prosociality, the separation of such benefits from the cost-bearing actor means that (in the absence of the evolutionary mechanisms of assortment or discrimination) self-interested behaviors yield higher average payoffs. Competition may also describe an environment where there are no potential gains from prosociality. This can be represented as a zero-sum game where one player's gain is the other's loss. Similarly, in ecology, competition refers to a negative interspecific interaction where if one species is removed, the other species is better off. In these contexts, prosociality is maladaptive.

The tendency of competitive environments to erode morality, fairness, and prosociality in a “race to the bottom” is well-documented across disciplines. In economics, Shleifer shows how market competition can incentivize child labor, corruption, disproportionate executive salaries, corporate earnings manipulation, and university involvement in commercial activities (2004), and Fehr and Schmidt show how a competitive environment can interact with a heterogeneous pool of self-interested and fairness-oriented preferences to yield an equilibrium dominated by self-interested behavior (1999). In social psychology, the classic Robber's Cave experiment observed that a competitive environment provoked antagonism among competing children while a cooperative environment promoted prosociality (Sherif et al., 1954/1961). In the literary classic, *The Grapes of Wrath*, Steinbeck illustrates how a competitive niche with stark reservation options can provoke self-interested behavior in his description of a tractor driver taking three dollars per

² This is the market imperative that Wood describes as specific to capitalism (2002).

day to knock down his neighbor's house so he can feed his own kids (1939, Chapter 5). In sum, competition is, in many ways, antithetical to prosociality.

2.2.4 *Mutualism*³

Market interactions are voluntary (though engagement in the market as a whole may not be). The payoff of an interaction then must be at least as good as the interactors' reservation options. Thus, market exchange implies the existence of surplus. In this sense, market interactions are inherently mutualistic. Using the ecological definition, mutualism means that if one actor is removed, the other is worse off. But mutualism, then, is the opposite of competition. So how can markets be both mutualistic and competitive? Mutualism in markets arises from the existence of a surplus, in the mutual gains of interacting parties; competition arises on each side of the market among actors competing for the opportunity to exchange, and competition arises across opposite sides of the market over how the surplus, once created, is divided.

I distinguish here between mutualism—which might be modelled as an invisible hand game—and costly cooperation or collective action—which might be modelled as a prisoner's dilemma. In the former, the dominant strategy for self-interested players is to cooperate, which also maximizes the surplus; in the latter, their dominant strategy is to defect though mutual cooperation maximizes the surplus. Individual and collective payoffs are aligned in the former but not the latter. Thus, in the case of mutualism, prosociality is unnecessary to maximize the surplus, so evolution is likely to select for self-interest. Smith points this out when he describes how the mutualistic environment of markets, self-interest promotes collective well-being as if “led by an invisible hand” (1776/1976, pp. 477–478). Similarly, Montesquieu argues that “the spirit of trade” is contrary to both “robbery” (antagonism) and moral norms of prosociality (1748, Chapter 2). The political philosophers agree with the evolutionary theory. Mutualism might select against antagonism, but there is not clear reason why it would select for prosociality.

2.2.5 *Large-scale society, market exposure, and cultural evolution*

For much of our evolutionary history, we lived in relatively small groups of fewer than a hundred members (Hill et al., 2011). These environments likely selected for prosocial behaviors such as empathy and reciprocity that could facilitate collective action among familiars. With the rise of large-scale societies, the role and importance of markets grew in tandem with specialization and division of labor (e.g., McNeill & McNeill, 2003; Smith, 1776/1976). Economic interaction spheres expanded beyond the bounds of personal social networks, increasing the frequency and consequence of anonymous, ephemeral interactions. In these new environments, the sorts of collective action problems that all societies face—maintaining civil order, providing for public goods, coordinating production, managing common resources, cooperating in defense or conquest of territory—would have been difficult to resolve with the prosocial behaviors adapted to small-scale society. While some of these collective action problems could be restructured into mutualistic interactions through enforceable laws and contracts (“mutual coercion mutually agreed upon” (Hardin, 1968)), others would be less amenable to this solution.

³ The framework presented here in terms of evolutionary game theory overlaps significantly with the insights and observations of social interdependence theory (e.g., D. W. Johnson & Johnson, 2005).

Societies that managed to foster prosociality among strangers and solve these large-scale collective action problems were more likely to persist and spread. Examples of successful large-scale cooperation and anonymous prosociality can be found in the laboratory (e.g., cooperation in anonymous, one-shot prisoner's dilemmas), in modern society (e.g., tax compliance), and throughout history (e.g., wartime military service). Scholars debate the relative theoretical and historical importance of various potential mechanisms such as shared myths and expansive group identities (Harari, 2015), all-seeing, moralizing gods (Henrich, Ensminger, et al., 2010), and the evolution of norms of altruistic punishment (Boyd & Richerson, 2005).

We might then expect to find that individuals enculturated in large-scale societies are more prosocial in anonymous settings than individuals enculturated in small-scale societies (Henrich, Ensminger, et al., 2010). Even if this is the case, though, it does not mean that prosociality in general is more prevalent in large-scale societies. Consider two hypothetical societies, one where all economic interactions and collective action problems are socially embedded and the other where all such interactions are impersonal and ephemeral. The social society does not need the anonymous prosociality traits that the asocial society does, so constituents of the former would likely act less prosocially in an anonymous setting than constituents of the latter. However, this does not imply that the general prevalence of prosociality in the asocial society exceeds that of the social society. The function of the anonymous prosociality adaptation is to mitigate the damaging effects of impersonality and ephemerality on prosociality. So, even in the boundary case, where mitigation is complete, the prevalence of prosociality in the two societies would be equal. And if anonymous prosociality is less effective than personal prosociality, then the social society wins the prosociality prize.

Note that the relationship I hypothesize here between markets and anonymous prosociality is not causal. Rather, markets and anonymous prosociality are both important to the functioning of large-scale societies, so we might expect them to be associated—i.e. individuals from large-scale societies are exposed to more markets and have learned to act prosocially toward strangers. It is worth asking then whether there might be any direct causal effects of markets on the evolution of prosociality.

As discussed earlier, the mutualistic interactions of markets (the invisible hand) are likely to select against antagonism (*doux commerce*), but the competitive interactions of markets are likely to select against prosociality. The logical implication of these postulations is that markets as a whole select for self-interest. It is important to qualify that the argument here applies to self-interest in the context of the market. It does not necessarily imply a spillover into other domains of society. For example, members of a market-exposed society may behave strictly according to self-interest in the context of markets but highly prosocially in community interactions.

Additionally, this selection effect may be moderated by the predominant characteristics of the market. Market interactions in small-scale societies may be more personal, more durable, and less competitive on average than market interactions in large-scale societies. Consequently, markets in small-scale societies may even select for prosociality. In this way, the cultural and contextual effects of markets may depend on the scale of the society.

In conclusion, three important questions help us think about the cultural effects of markets on prosociality. 1. How context-dependent is prosociality? If it is highly context-dependent, we would expect less spillover of evolutionary effects across contexts—i.e. markets would influence only market behavior. If prosociality is not very context-dependent, we would expect prosocial behaviors in all settings to be im-

pacted by cultural exposure to markets. 2. How important are markets in society? The importance of markets corresponds to the prevalence of market behavior in society (which matters more if prosociality is more context-dependent) and to the cultural strength of selection of markets relative to other societal situations (which matters more if prosociality is less context-dependent). 3. What are the predominant social, psychological, and economic characteristics of markets in society? In the high context-dependency scenario, the predominant market context directly shapes the evolution of market-specific behavior; in the low context-dependency scenario, the predominant market context determines the direction of the selection effect on prosociality.

2.3 TESTING THE THEORY: EXPERIMENTAL GAMES ACROSS CONTEXTS AND CULTURES

Economic experiments provide a method for testing theories of human behavior. Experimenters can manipulate the interaction context and incentives and observe how real people respond to these changes. In particular, experimental games have been used to explore the nature of human prosociality and its prevalence and variance across individuals, cultures, and contexts. Economic experiments are well-suited to the question of contextual effects but not as well-suited for the question of cultural effects. Context can be easily manipulated in an experimental setting. Enculturation cannot. Still, variance in context-specific behavior across different subjects from different societal backgrounds provide clues.

In this paper, I apply the technique of meta-analysis to the experimental evidence from prisoner's dilemma games, public goods games, dictator games, and ultimatum games to test some of the hypotheses laid out in this section. Specifically, I analyze the effects of varying anonymity, ephemerality, and market framing on prosociality in the experimental setting. Explicit market frames may reveal context-specific cultural effects of markets since individuals enculturated in an environment with markets may behave differently in settings explicitly framed as market interactions. I also examine the relationship between societal market exposure and prosociality by analyzing the variance in behavior of individuals from different countries. I am unable to explore the effects of competition and mutualism or the interaction of cultural and contextual effects due to the dearth of relevant studies, but I review the sparse existing evidence and suggest future studies in the discussion section.

2.3.1 *Game descriptions*

The most common games employed in experiments to investigate prosocial behavior are the prisoner's dilemma, the public goods game, the dictator game, and the ultimatum game. I restrict my analysis to these four games. The prisoner's dilemma (PD) is a symmetric game with a binary action set (cooperate or defect) and a payoff structure that yields a singular inefficient Nash equilibrium (defect, defect). The public goods game (PGG) is similar to the prisoner's dilemma but with a continuous choice set.⁴ In the PGG, players receive an endowment which they must split between a public and a private fund. All contributions to the public fund expand in value but are divided among all PGG players such that the dominant strategy is to

⁴ Others have distinguished between the PD and PGG based on the number of players (i.e. the PGG is an n-person PD), but I distinguish between them based on whether the action set is binary or continuous. This makes the measures of prosociality more commensurable within these games (percent cooperation for PD and percent of endowment contributed for the PGG).

contribute nothing, but the efficient outcome is to contribute everything. Both the PD and the PGG are social dilemmas. The dictator game (DG) is an asymmetric game where one player (the dictator) is given an endowment which they may share with another (passive) player (the recipient). The ultimatum game (UG) is similar to the DG in that one player (the proposer) is given an endowment with the task of dividing it between them and a recipient (the responder) except in the UG, the responder chooses either to accept or reject the proposer’s offer. If the responder accepts the offer, the players each receive their agreed-upon share of the endowment; if the responder rejects the offer, both players get nothing.

In all four of these games, the behavior of experimental subjects tends to deviate significantly from the predictions of traditional economic theory. The self-interested *homo economicus* always defects in the PD, contributes nothing in the PGG, gives nothing in the DG, and offers the smallest possible share in the UG (which the *homo economicus* responder accepts). Real human subjects, however, cooperate, contribute, give, offer, and reject in substantial numbers and to substantial degrees. This discrepancy between experimental behavior and theoretical predictions demonstrates that the behavior of *homo sapiens*—unlike that of *homo economicus*—is shaped by social preferences and fairness norms. The magnitude of the deviation from theoretical predictions based on self-interest corresponds to the magnitude of prosociality. While this deviation from *homo economicus* is near universal, economic experiments reveal considerable variation in prosocial behavior across contexts and cultures. The meta-analysis presented here interrogates this inter-contextual and inter-cultural variance for signs of a relationship between markets and prosociality.

3 EMPIRICAL METHOD

To investigate the relationship between markets and prosociality, I compile a meta-dataset from the results of economic experiments that vary anonymity, ephemerality, or market framing in the experimental context or include subjects from multiple societies. I estimate the effects of market contexts and market exposure on prosociality using meta-regressions with study fixed effects. In this section, I describe the search process and inclusion criteria for identifying relevant studies, the measures of anonymity, ephemerality, market framing, and market exposure, and the meta-regression method.

3.1 SEARCH PROCESS AND INCLUSION CRITERIA

I identify studies first by combing the meta-datasets of previous meta-analyses and literature surveys (Andreoni & Croson, 2008; Balliet, 2010; Bradley et al., 2018; Cochard et al., 2021; Dal Bó & Fréchette, 2018; Doñate-Buendía et al., 2022; Engel, 2011; Oosterbeek et al., 2004), the references of seminal papers, and the Cooperation Databank (Spadaro, Tiddi, et al., 2022), a repository of experimental studies. I then searched EconLit and Google Scholar for relevant keywords.⁵ I exclude studies of games played for hypothetical

⁵ For anonymity studies, I searched for (prisoner’s dilemma OR public good OR dictator OR ultimatum) AND “game” AND (“social distance” OR identification OR communication OR non-anonymous); for ephemerality studies, (prisoner’s dilemma OR public good OR dictator OR ultimatum) AND “game” AND (repetition OR (“one-shot” AND repeated) OR (stranger AND partner) OR “shadow of the future”); for market framing studies, (prisoner’s dilemma OR public good OR dictator OR ultimatum) AND “game” AND (market frame OR money prime); and for cross-cultural studies, (prisoner’s dilemma OR public good OR dictator OR ultimatum) AND “game” AND (“cross-cultural” OR “cross-country” OR “cross-societal”).

money⁶, games played against simulated opponents programmed by the experimenters, games with sanctioning or punishment, games where anonymity, ephemerality, or partners are chosen by the subjects, games where dictator or public goods contributions are given to charities rather than to the subjects, and games where the dominant strategy of the stage game is not defection (for the PD) or contributing 0 (for the PGG and DG). Some of the PGG, DG, and UG studies I include constrain the players' choices to a discrete set, but I exclude all such studies which limit the choice set to three or fewer options. While the majority of papers included are published in peer-reviewed journals, I also include the results from a number of working papers. Table 1 summarizes the resulting meta-dataset. Table A3 in the Appendix lists all studies included. As usual, university students comprise a large portion of the subject pool although a number of the more recent studies have employed online polling platforms and panel providers to recruit a representative sample of the population (e.g., Dorrough & Glöckner, 2019; Fiedler et al., 2018). In general, the representativeness of the subject pool varies widely across the collected studies, and so does the experimental setting (online, lab, or field), but this between-study variance does not pose an issue since my analysis is within-study.

Table 1: Descriptive statistics of meta-data

	Anonymity	Ephemerality	Market frame	Cross-country	Total
Studies	111	41	21	79	242
Treatments	412	148	81	356	993
Obs.	31642	12529	6899	42771	93561
Year					
min	1966	1966	1994	1988	1966
median	2010	2012	2013	2010	2010
max	2025	2025	2024	2026	2026

Notes: Throughout this paper, an observation refers to one subject in one treatment condition in which the subject may make one or more game choices.

3.2 MEASURES OF MARKET CONTEXTS AND MARKET EXPOSURE

3.2.1 Anonymity

To measure the effects of anonymity on prosociality, I compiled studies that varied players' identification, social distance, or opportunity to communicate. Identification studies vary whether or not players' names and actions are shared with each other (e.g., Charness & Gneezy, 2008; Rege & Telle, 2004) or whether they can see each other's faces (e.g., Rankin, 2006). Social distance studies examine differences in prosocial behavior toward friends, acquaintances, and strangers (e.g., Brañas-Garza et al., 2010; Chandrasekhar et al., 2018; Goeree et al., 2010). Communication studies vary whether the players can communicate face to

⁶ In most of the studies I include, the game payoffs are converted directly into real currency. Sometimes, one round of the game is chosen randomly to determine the payment the subject receives. I also include several studies with children in which the material incentives are toys or candy rather than money.

face or by exchanging messages (e.g., Frey & Bohnet, 1997; Greiner et al., 2014; Orbell et al., 1988; Roth, 1995). I code these treatments as anonymous or non-anonymous. In anonymous treatments, thus, players are strangers who do not know each other's names, cannot see each other's faces, and cannot communicate, and in non-anonymous treatments, players are family, friends, or acquaintances (social distance ≤ 2), their identities are revealed to each other, or they can communicate (one- or two-way). I did not include studies examining the degree of anonymity from the experimenter (e.g., Hoffman et al., 1996) or studies which simulated surveillance with eye spots (e.g., Haley & Fessler, 2005).

3.2.2 *Ephemerality*

To analyze the effects of ephemerality, I compiled studies that varied the repetition of game interactions. Repeated games can be "finite" with a fixed number of rounds or "infinite" where the interaction continues from round to round with a fixed probability. Theoretical predictions diverge for these two cases, but both represent important forms of repetition, so I include both in my meta-data. In the context of prisoner's dilemmas, the effect of repetition on cooperation (often referred to as "the shadow of the future" (Axelrod, 1984)) has most often been tested by varying the continuation probability of infinitely repeated games (e.g., Bó, 2005). In the literature on public goods games, repetition effects have been most often tested in finitely repeated games where subjects are either matched with the same partner(s) throughout the game (partners matching) or with different partners each round (strangers matching) (e.g., Andreoni, 1988; Keser & van Winden, 2000). I searched for studies of dictator and ultimatum games with varied repetition and alternating roles but found none.⁷ The ephemerality variable employed in the meta-regressions is the reciprocal of the expected number of rounds played by a fixed pair or group of subjects. For games that continue stochastically, this is equal to the termination probability in any given round (i.e. $1 - \text{the continuation probability}$). The outcome variable for prosociality in each game is obtained by averaging actions across all rounds.

3.2.3 *Market framing*

To investigate the situation construal effects of markets, I compiled studies that tested for market framing and money priming effects. Studies of market framing effects vary the name of the game (e.g., calling the PD the "The Stock Market Game" or "The Community Game" (Lieberman et al., 2004)), the name of the actions (e.g., telling the UG proposer to "divide" or to "exchange" (Hoffman et al., 1994)), or the name of the roles (e.g., calling PGG players "buyers" or "members" (Cherry et al., 2013)). Studies of money priming effects prime the treated subjects with a money-related task prior to the game (e.g., Gasiorowska et al., 2016). For the meta-regressions, I employ a simple indicator variable for explicit market framing. Several

⁷ Alternating roles allows for reciprocity. There are a few studies of repeated dictator games with alternating roles, such as Ben-Ner et al. (2004) and Diekmann (2004), but Ben-Ner et al. conceal the repetition of the game from the first-round dictators, and Diekmann programs the behavior of the initial (simulated) dictator. Some studies also compare dictator games to trust games, but the comparison is imperfect since trust game transfers expand in value while dictator game gifts typically do not. Nonetheless, this comparison is considered in the discussion section. As for the ultimatum game, the only experiment I found with varied repetition was Sauermann (2019), but although the game is repeated, the roles of the players do not alternate.

relevant studies are excluded due to severely limited choice (Gasiiorowska et al., 2012), nonstandard game structure (Vohs et al., 2006), or varied game structure (as opposed to just varied framing) (Roth et al., 1991). This broader literature on market framing will be examined in the discussion section.

3.2.4 Societal market exposure

To analyze the cultural effects of societal market exposure, I compiled studies that compared behavior of subjects from different countries. I then retrieved data on GDP per capita and the percentage of individuals working wage labor jobs for each country in each study for the year closest to the study’s publication date. These variables serve as proxies for national market exposure.⁸ The meta-data cover 78 different countries and 31 distinct years, resulting in 226 unique country-year pairs within the 356 treatments.

The field experiments Henrich and his coauthors conducted in 24 small-scale societies (2004; 2010) provide valuable data on non-WEIRD cultures (Henrich, Heine, et al., 2010). I include these data in my cross-country analysis, and I also report their results on the effects of market exposure alongside my own results (Table 3). Although their subject pools are relatively small, their measures of market exposure are more granular than the country-level proxies I employ. In their first wave of experiments (2004), they rank the societies according to the frequency of market exchange, and in the second wave (2010), they measure the percentage of food purchased in a market. In my summary of their results, I standardize these two measures then pool the data from both waves. Henrich and a number of others have also explored whether intra-societal variance in prosociality is associated with differences in individual and village market exposure (Gurven et al., 2008, 2015; Henrich et al., 2004; Lamba & Mace, 2011; Rustagi et al., 2010; Rustagi, 2024). These intra-societal effects are not included in my main analysis, which focuses on inter-societal effects, but I survey the findings of this literature in the discussion section.

While the market context variables represent experimental manipulations, the market exposure variables do not. Consequently, the market context effects can be interpreted as causal, but the market exposure effects can be interpreted only as associations.

3.3 REGRESSION SPECIFICATION

I apply the technique of meta-regression to the meta-dataset of experimental studies to estimate the effects of markets on prosociality. Since between-study effects may be biased by idiosyncrasies of the experimental setting that are difficult to control for (such as the phrasing of game instructions, the method of subject recruitment, and experimenter social cues), I employ study fixed effects to isolate within-study effects (Bland, 2026). Equation 1 conveys the regression model:

$$y_{t,s} = \alpha + \beta \cdot m_{t,s} + FE_s + \varepsilon_{t,s} \quad (1)$$

⁸ These data come from the World Bank’s databank of World Development Indicators. GDP per capita is in constant 2015 USD (Code NY.GDP.PCAP.KD). The wage worker values are calculated as Wage and salaried workers (% of total employment) (Code SL.EMP.WORK.ZS) $\times$ Employment to population ratio, 15+, total (%) (Code SL.EMP.TOTL.SP.ZS) $\times$ 100. I also retrieved the urban population (% of total population) (Code SP.URB.TOTL.IN.ZS), so I could, as a robustness check, analyze the effects of market exposure, controlling for urbanization.

For each treatment t and study s , $y_{t,s}$ is the measure of prosociality in percentage terms (mean cooperation rate in the PD, mean contribution in the PGG, mean gift in the DG, and mean offer in the UG), $m_{t,s}$ is the variable for market-related context (anonymity {0,1}, ephemerality (0,1], or market frame {0,1}) or market exposure (log GDP per capita or percentage wage workers), FE_s is the study fixed effects, and $\varepsilon_{t,s}$ is the error term. β , the effect of markets on prosociality, represents the coefficient of interest. I estimate this model through weighted least squares, using the number of observations (subjects) per treatment as the weight.⁹ For each market variable (anonymity, ephemerality, market frame, log GDP per capita, and wage labor), I estimate this model for the PD, the PGG, the DG, and the UG as well as for a pooled meta-dataset of all games. In the pooled all-game regressions, I add game fixed effects to the model to account for the handful of studies which include more than one game.

I conduct three robustness tests as well. First, I estimate the model without weights, using OLS. Second, I add a control for urbanization to the cross-country regressions and re-estimate the model. Third, I pool my meta-data with PD and PGG experiments from the Cooperation Databank that fulfill my inclusion criteria but do not contain within-study variance of market exposure, and I re-estimate the regression model without study fixed effects for this combined meta-dataset, controlling for game and publication year. Without study fixed effects, the coefficients represent the pooled within- and between-study effects. While the idiosyncrasies of the experimental setting remains a concern, the sample size increases substantially when I include single country studies from the Cooperation Databank.

4 RESULTS

In this section, I present the meta-regression results. Overall, I find strong, negative effects of anonymity and ephemerality on prosocial behavior in the experimental setting and weaker evidence for a negative effect of market framing. The effects of market-related contexts are largest for the prisoner’s dilemma. I find little evidence of a relationship between market exposure and prosociality at the country level. For comparison, I also present the results of Henrich and his coauthors (2004; 2010) on the positive relationship between markets and prosociality across small-scale societies. All coefficient estimates (besides those from Henrich et al.’s results) are within-study effects.

Table 2 reports the estimates of the effects of market-related contexts. Anonymity between players (no identification, familiarity, or communication) decreases prosociality by 17 percentage points on average compared to non-anonymity (identification, familiarity, or communication) ($p < 0.01$). This effect is aggregated from a 27 percentage point difference in the PD cooperation rate, a 21 percentage point difference in PGG contributions, a 12 percentage point difference in dictator game gifts, and a 3 percentage point difference in UG offers. Each of these game-specific effects is significant at 1% level. The ephemerality regression results show that prosociality decreases by 21 percentage points on average when the game is one-shot compared to when the game is infinitely repeated ($p < 0.01$).¹⁰ This effect is 28 percentage points for the PD

⁹ As a robustness check, I also estimate the model with ordinary least squares. The estimates of these unweighted regressions are reported in Table A1 of the appendix.

¹⁰ Obviously, there are no observations of infinitely repeated games, but this interpretation of the ephemerality coefficient is based on the limit as the termination probability approaches 0 (i.e. as the continuation probability approaches 1).

($p < 0.01$) and 14 for the PGG ($p < 0.01$). As discussed in the empirical method section, there are no DG or UG observations on the effects of ephemerality. As for the situation construal effects of markets, cooperation rates in the PD decline by 11 percentage points on average when the game is framed in market-related terms ($p < 0.01$), but this effect does not appear in PGG or DG experiments, and although the effect does seem to be present in the two UG studies I found, the small sample size undermines the statistical significance of the meta-regression coefficient estimate. Across all games, explicit market frames are associated with a 3 percentage point decrease in prosociality ($p = 0.03$).

Table 3 reports the estimates of the effects of societal market exposure. As noted in the method section, while the market context effects can be interpreted as causal, the market exposure effects cannot since market exposure is not an experimental manipulation, and “all else” is not held constant. The GDP per capita and wage labor regressions show no association between market exposure and prosociality at the country level. For each game and across all games, the coefficient estimates for log GDP per capita are highly insignificant. Wage labor is slightly positively correlated with PGG contributions ($p = 0.04$) but slightly negatively correlated with DG gifts ($p = 0.04$). Pooling across all four games, wage labor has no effect on prosociality. In contrast with these cross-country null results, the results from Henrich et al.’s cross-cultural experiments show a significant positive relationship between market exposure and prosociality among the small-scale societies studied. A standard deviation increase in market exposure is associated, on average, with a 4 percentage point increase in prosociality in these data ($p < 0.01$).

The results from the OLS estimations are reported in Table A1 of the Appendix. The coefficients from these unweighted estimations do not change much in terms of magnitude or (in)significance except in the case of market framing effects, which are larger in magnitude and more significant. Controlling for urbanization does not alter the results on the effects of market exposure much for the within-study analyses (Table A2). However, the pooled within- and between-study effects for the combined meta-data provide some evidence of a positive relationship between market exposure and prosociality when urbanization is controlled for (Table A2).

Table 2: The effects of market-related contexts on prosociality

		Prosociality				
		PD	PGG	DG	UG	All
Anonymity	β	-27.14*** (3.57)	-21.09*** (2.10)	-11.97*** (1.92)	-3.13*** (0.90)	-17.28*** (1.32)
	Studies	28	47	30	8	111
	Treatments	92	183	105	32	412
	Obs.	6439	8574	14517	2112	31642
Ephemerality	β	-28.01*** (5.35)	-13.86*** (2.80)	NA	NA	-20.93*** (3.28)
	Studies	17	24	0	0	41
	Treatments	84	64			148
	Obs.	8379	4150			12529
Market frame	β	-10.60*** (2.66)	0.05 (2.23)	-0.89 (3.05)	-10.60 (5.30)	-3.37** (1.56)
	Studies	6	9	5	2	21
	Treatments	26	31	20	4	81
	Obs.	1820	3295	1712	72	6899

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. β represents the within-study effects of market-related contexts on prosocial behavior in the experiment (standard errors in parentheses). The regression model with study fixed effects is estimated via weighted least squares (weighting by the number of observations per treatment). Each observation corresponds to one subject in one treatment condition (which may include one or more game choices). The all-game regressions include game fixed effects. The anonymity variable {0,1} indicates whether or not the interaction occurs anonymously, among strangers, and without communication. The ephemerality variable (0,1] is calculated as the reciprocal of the expected number of game rounds. For treatments where continuation is random, this is equivalent to $1 - \text{the continuation probability}$. The market frame variable {0,1} indicates whether or not the game has an explicit market framing.

Table 3: The effects of societal market exposure on prosociality

		Prosociality				
		PD	PGG	DG	UG	All
log GDP per capita	β	-0.31 (3.82)	0.21 (0.62)	-0.64 (0.69)	-0.19 (0.75)	-0.14 (0.44)
	Studies	12	42	19	13	79
	Treatments	30	190	80	57	356
	Obs.	6406	18518	15643	2235	42771
Wage labor	β	0.54 (0.33)	0.11** (0.06)	-0.13** (0.06)	0.01 (0.07)	0.04 (0.04)
	Studies	12	42	19	13	79
	Treatments	30	190	80	57	356
	Obs.	6406	18518	15643	2235	42771
Market exposure in small-scale societies (Henrich et al., 2004; 2010)	β	NA	2.71 (6.56)	4.58*** (1.32)	3.68** (1.43)	3.66*** (1.17)
	Studies	0	1	2	2	2
	Treatments		7	17	30	53
	Obs.		331	513	988	1801

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. β represents the within-study effects of market-related contexts on prosocial behavior in the experiment (standard errors in parentheses). The regression model with study fixed effects is estimated via weighted least squares (weighting by the number of observations per treatment). Each observation corresponds to one subject in one treatment condition (which may include one or more game choices). The all-game regressions include game fixed effects. GDP per capita values (2015 USD) and wage labor values (wage and salaried workers, % of population 15+) are obtained from the World Bank for each country in each study for the year closest to the study's publication. The small-scale society market exposure data comes from Henrich et al. (2004 and 2010). For these regressions, I use standardized versions of Henrich et al.'s market exposure variables, and I do not include study fixed effects.

5 DISCUSSION

The results of the meta-regressions reveal strong negative effects of anonymity and ephemerality, weak negative effects of market framing, and no effects of GDP per capita or wage labor on prosociality in the experimental setting. With the inclusion of study fixed effects, the effects of market-related context can be interpreted as causal, since all else is held constant. In this section, I interpret these results, discuss relevant studies that I excluded from the meta-dataset, propose areas for future research, and consider the implications of the findings.

5.1 MARKET CONTEXTS

The strong negative effect of anonymity suggests that empathy (prosociality contingent on social proximity) is an important driver of prosociality. These results come from the most common manipulations of anonymity—identification, communication, and social network distance—using the most common games—the PD, PGG, DG, and UG—and real incentives. Findings from studies of group identification (Baldassarri & Grossman, 2013; Habyarimana et al., 2007), studies of other types of games (Andreoni et al., 2017; Charness et al., 2007; G. S. Choi & Storr, 2020; de Oliveira et al., 2014; Glaeser et al., 2000; Ostrom et al., 1992), and studies of hypothetical games (B. A. Jones, 2022; B. A. Jones & Rachlin, 2009; B. Jones & Rachlin, 2006; Kardos et al., 2024; Locey et al., 2011, 2013; Osipiński, 2009; Rachlin & Jones, 2008; Vekaria et al., 2017) reinforce the conclusion that prosociality decreases with increased social distance.

The ephemerality results from PD and PGG experiments indicate the importance of reciprocity in explaining prosocial behavior. Parallel evidence can be found in studies that ask subjects to record how much they would contribute in a PGG for different levels of contribution from the rest of the group (Fischbacher et al., 2001; Thöni & Volk, 2018). These studies find that a large proportion of subjects—around 60% (Thöni & Volk, 2018)—can be described as “conditional cooperators” who condition their contributions on the contribution of their partners. Similarly, reciprocity strategies like tit-for-tat and grim reaper are common in infinitely repeated PD experiments, and the proportion of subjects playing these strategies increases with the gains to cooperation and the continuation probability (Dal Bó & Fréchette, 2019). I found no studies of dictator games or ultimatum games that manipulated repetition while alternating the roles (such that reciprocity could function). Some games compare dictator game gifts to trust game transfers. This is not a perfect comparison because, in most dictator games, the value of the gift does not expand as the transfer does in the trust game. Still, the striking difference between the average dictator gift—just under 30% (Doñaate-Buendía et al., 2022; Engel, 2011)—and the average trust game transfer—50% (N. D. Johnson & Mislin, 2011)—hints at the importance of reciprocity. Additionally, a few studies comparing trust game behavior to dictator game behavior do expand the gift value for comparability, and the average transfer remains significantly larger than the average gift (Ambec et al., 2019; Ashraf et al., 2006; Cox, 2004).

A negative effect of market framing is apparent in the PD and UG experiments I found. The effect disappears though for the PGG and the DG. These null results are attributable to a couple of large studies that found no effect (Cartwright & Drouvelis, 2024; Columbus et al., 2020) and one large study that found a positive effect (Dufwenberg et al., 2022). A number of other studies with different game structures (Bartling et al., 2015; Gasiórowska et al., 2012; Vohs, 2015; Vohs et al., 2006) find that market frames or money primes decrease prosociality. Several studies explore the effects of bilateral market or auction contexts on individuals’ willingness to accept payment to forego prosocial behavior. The most prominent of these is Falk and Szech’s “Morals and Markets,” in which subjects are made to choose between a monetary payment and the life of a mouse (2013). They find that more people sacrifice mice for money in bilateral and multilateral market environments than in a non-market environment. However, surplus size, competition, and repetition vary across their treatments in addition to the market framing, muddling the causal interpretation. A number of similar experiments have tested individuals’ willingness to accept payment to forego other prosocial acts (such as donating to a charity or avoiding a negative externality), some of which found a negative effect of market contexts (Bartling et al., 2015; Irlenbusch & Saxler, 2019; Kirchler et al., 2016; Ziegler et al., 2024) and some of which did not (Bartling et al., 2023). Overall, the effects of explicit

market framing—though far from ubiquitous—tend to be negative. This evidence of a context-specific cultural effect of markets aligns with the theoretical prediction that the market environment selects for self-interest.

The experimental literature on the effects of competition is too sparse to include in the meta-analysis, but the available evidence suggests that individual-level competition tends to promote self-interest. In the UG, competition among proposers or responders heavily skews the resulting distribution of the endowment against the competitors, shifting behavior toward the equilibrium predicted of self-interested players (Fehr & Schmidt, 1999; Fischbacher et al., 2009; Roth et al., 1991). In a DG experiment where dictators with larger than average payoffs were rewarded with an additional round, the average gift decreased, revealing how competition for survival depresses prosociality (Schotter et al., 1996).¹¹ In an experiment where subjects could pay a point to reduce another’s payoff by four points, a monetary prize for the highest earners in a group induced increased expenditure on “burning” their partners—i.e. competition prompted antagonism (Barker & Barclay, 2016). On the other hand, intergroup competition in PGG earnings tends to increase contribution (e.g., Rapoport & Bornstein, 1987; Tan & Bolle, 2007), as the evolutionary theory predicts. Even when no monetary incentives are attached, public rankings of the highest earners or the most altruistic (Duffy & Kornienko, 2010) can drastically affect prosocial behavior. Competition and market framing do not, however, necessarily erode away all prosociality (e.g., Bartling et al., 2015).

Experimental evidence on the effects of mutualism is also scant. A couple of studies find that positive market interactions are associated with increased prosociality in subsequent games (G. S. Choi & Storr, 2020; Dufwenberg et al., 2022). Also, subjects who play a cooperative video game together are less antagonistic (Jerabeck & Ferguson, 2013; Velez et al., 2016) and sometimes more prosocial (Waddell & Peng, 2014) in subsequent experiments than those who play competitive or separate video games. These scattered findings do not allow for us to weigh in on the effects of mutualism with much confidence, but they do present some evidence of a negative effect on antagonism (in line with theoretical predictions) and a positive effect on prosociality (contrary to theoretical predictions). Notably, all these effects are observed in the context of repeated interactions.

5.2 MARKET CULTURES

Across my main analyses and robustness checks, only one of six regression specifications show any effect of GDP per capita and the prevalence of wage labor on prosociality (Table A2).¹² At the country level, modern degree of market exposure appears unrelated to prosociality. This contrasts strongly with Henrich et al.’s findings that markets are strongly positively associated with prosociality in small-scale societies (2004; 2010).¹³ There are several potential explanations of the null result.

¹¹ Schotter et al. also observe a small effect in an ultimatum game, but only the proposers faced the competitive selection pressure.

¹² The only specification where the null is rejected is the pooled regression of within- and between-study effects using a larger meta-dataset including studies from the Cooperation Databank where I control for urbanization (but not for the interaction of market exposure and urbanization).

¹³ This discrepancy is at least partly explained by the different measures of market exposure. When I constrain my cross-country regression to Henrich et al.’s data, the positive effects of markets vanish.

Most obviously, it could indicate that markets have no cultural effects on prosociality in the experimental setting. If behavior is highly context-dependent, market exposure will only affect the evolution of market behavior; in this case, the null result could indicate that subjects recognize the experimental game as a non-market environment. Alternatively, the null result could be attributable to heterogeneous effects pushing in different directions. The results of the alternative regression specifications in Table A2 provide some limited evidence of this. When study fixed effects are omitted and urbanization is included, prosociality increases (decreases) with market exposure (urbanization). So, perhaps the anonymity of modern society pushes prosociality down, but the mutualism of markets pushes it up (contrary to the theoretical prediction). These effects are not present though in regressions of within-study effects.

Another potentially important source of heterogeneity is the social, psychological, and economic attributes of the markets that different subjects in different countries are exposed to. If the market interactions of villagers in Henrich et al.'s experiments (2004; 2010) tend to be personal and durable than the market interactions of urbanites in WEIRD countries, then these different types of markets may exert different pressures on social preferences. Subjects from different countries may also associate the game with different real-life situations (e.g. food sharing, resource management, markets), leading to noisier results. For instance, villagers who rarely use money might be especially prone to associate games that have monetary payoffs with markets whereas the sociality of the game environment may be a more salient cue for urbanites who are habituated to the use of money. Each of these possible confounding factors could be tested using games that vary both context and culture, as I discuss the following subsection.

Aside from these potential sources of heterogeneity, the null results could also be a product of the level of analysis. Evolutionary selection of cultural traits can occur at the individual level, the communal level, the cultural level, or the national level. Thus, individual, communal, cultural, and national market exposure may all produce different cultural or behavioral effects. In fact, Henrich and his coauthors find that within cultures, between-community and between-individual variance in prosociality is not explained by variance in market exposure (2004, p. 35-37). Several other studies also find no evidence of intra-cultural, inter-communal effects of market exposure (Gurven et al., 2008, 2015; Lamba & Mace, 2011). One study of intra-cultural, inter-communal effects in Greenland found that market integration is associated with less prosociality toward in-group members and more prosociality toward out-group members (Agneman & Chevrot-Bianco, 2023). Another inter-communal study of commons management in Ethiopia outcomes found a positive effect of market exposure (Rustagi et al., 2010). Evidence of intra-communal, inter-individual effects is also mixed, with some studies finding a positive relationship (Bauchet et al., 2020; Rustagi, 2024) and others finding no relationship (Gurven et al., 2015). Rustagi shows that the positive relationship he finds between individual market exposure and prosociality hinges on contract incompleteness in the market setting—if contracts are complete, prosociality is unnecessary for the functioning of the market, and the association disappears (2024).

Overall, the inconsistent experimental findings preclude any general claims of universal effects of market exposure on prosociality and suggest that the cultural effects of markets may depend on the form and role of markets in society.

5.3 FUTURE RESEARCH

The meta-analysis and theoretical synthesis presented here illuminate several important gaps in the experimental literature. Future experimental research in these areas could significantly advance our understanding the cultural and contextual effects of markets on prosociality.

Repeated DG and UG experiments with alternating roles and varied could vary the number of rounds or probability of continuation to explore the dynamics of reciprocity and the evolution of fairness norms in these settings. More experiments that vary the competitive or mutualistic environment in which subjects play games with distinctively prosocial, antagonistic, or self-interested behavior could help flesh out the effects of competition and mutualism on social preferences. Subjects could compete individually or collectively for the opportunity to continue playing (like Schotter et al. (1996)), or they could compete for an additional prize for the top individual or the top group. Or the entire session's probability of continuation could be determined by their collective payoff. In these varied environments, perhaps subjects could play a modified PGG where endowments could be held, contributed to the classic public good, or spent lowering the payoffs of everyone else. Public good contribution would indicate prosociality, non-contribution would indicate self-interest, and expenditure to reduce others' payoffs would indicate antagonism.

Experiments that explored interaction effects between context and culture could be particularly enlightening. This would simply require implementing varied context treatments in subject pools from diverse cultural backgrounds. Such studies could answer a number of important questions. Do individuals from larger, more anonymous societies act more prosocial in anonymous and ephemeral interactions than individuals from smaller-scale societies (as the theory of the evolution of anonymous prosociality would suggest)? What about in personal and durable interactions? Do people who are more exposed to markets react differently to explicit market frames than those who are less exposed to markets? Does the explicit market frame have the same effect on prosociality in societies where market interactions tend to be anonymous and ephemeral compared to societies where market interactions tend to be personal and durable? How much does context matter compared to culture? Are there certain contexts in which cross-cultural behavior converges and others where it diverges? Experiments aimed at these kinds of questions could be deeply insightful not just with respect to the effects of markets on prosociality but for human behavioral ecology in general.

5.4 IMPLICATIONS

Some might question the importance of the relationship between markets and prosociality since, as Smith points out (1776/1976, pp. 477–478), ideal markets do not need prosociality to promote collective material well-being. Here are four reasons why the effects of markets on prosociality matter: First, in the case of incomplete contracts, efficiency may depend on prosociality among contracting parties. Second, markets with externalities generate deadweight loss if actors are purely self-interested. Third, if markets do affect prosocial behavior, the effects may spill over into domains beyond the market where prosociality is important. Fourth, even if all such problems were solved by aligning incentives, such a society—the perfect invisible hand society of atomized individual utility maximizers—may generate less well-being than a society teeming with prosociality (holding surplus and distribution constant) due to the well-being gains associated with social relationships (Diener & Seligman, 2002; Lyubomirsky et al., 2005) and the warm glow

of giving (Andreoni, 1990). In other words, sociality and prosociality (which, due to the nature of empathy and reciprocity, often go hand in hand) may¹⁴ be desirable even apart from any material gains.

Understanding the relationship between markets and prosociality allows us to more intentionally shape the institutions, structures, and environments of our societies to promote individual and collective well-being. Insights into the behavioral ecology of prosociality illuminate more potential solutions to collective action problems. The conclusion of this essay is not that anonymous, ephemeral, and competitive interactions are inherently undesirable but rather that the potential behavioral consequences of these contextual characteristics should be taken into account when designing economic institutions.

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¹⁴ There is a dark side of prosociality that should not be neglected. Systems of oppression and stratification rely on prosociality among the privileged to generate, stabilize, and exacerbate asymmetries of power and privilege. This manifestation of parochial altruism is clearly undesirable.

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APPENDIX

Table A1: Unweighted meta-regression results

	Prosociality				
	PD	PGG	DG	UG	All
Anonymity	-26.30*** (3.72)	-22.89*** (2.65)	-8.68*** (1.56)	-5.31*** (1.15)	-18.59*** (1.55)
Ephemerality	-30.83*** (7.14)	-12.76*** (2.88)	NA	NA	-18.77*** (3.63)
Market frame	-13.99*** (5.44)	-1.80 (3.23)	-4.83 (3.38)	-12.48 (5.63)	-7.12*** (2.42)
log GDP per capita	-4.62 (3.5)	0.16 (0.74)	-0.84 (0.69)	0.35 (0.83)	-0.27 (0.47)
Wage labor	-0.09 (0.43)	0.14** (0.07)	-0.12* (0.06)	0.03 (0.08)	0.04 (0.04)

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficient estimates represent the within-study effects of market-related contexts and market exposure on prosocial behavior in the experiment, estimated via ordinary least squares with study fixed effects.

Table A2: Cross-country market-exposure results for additional specifications

Prosociality						
log GDP per capita	-0.14 (0.44)	-0.42 (0.62)	1.07 (1.66)	0.55 (0.47)	2.87*** (0.77)	0.42 (2.08)
Urbanization		0.03 (0.04)	0.20 (0.19)		-0.22*** (0.06)	-0.51** (0.24)
UrbanXlog(GDPpc)			-0.02 (0.02)			0.04 (0.03)
Wage labor	0.04 (0.04)	0.09 (0.06)	0.30** (0.14)	0.07 (0.04)	0.31*** (0.07)	0.21 (0.19)
Urbanization		-0.06 (0.04)	0.04 (0.07)		-0.24*** (0.06)	-0.28*** (0.09)
UrbanXwage			-0.00 (0.00)			0.00 (0.00)
Studies	79	79	79	556	556	556
Treatments	356	356	356	851	851	851
Observations	42771	42771	42771	120228	120228	120228
Study FE	yes	yes	yes	no	no	no
Year FE	no	no	no	yes	yes	yes
Game FE	yes	yes	yes	yes	yes	yes

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficient estimates in the first three columns represent the within-study effects. Coefficient estimates in the last three columns represent pooled within- and between-study effects. All regressions are estimated via weighted least squares. The additional studies included in columns 4, 5, and 6 are all PD and PGG experiments from the Cooperation Databank (Spadaro, Tiddi, et al., 2022). GDP per capita (2015 USD), wage labor (wage and salaried workers, % of population 15+), and urbanization (% of population) values are obtained from the World Bank for each country in each study for the year closest to the study's publication.

Table A3: Studies included in the meta-analysis

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Abatayo, Lynham, & Sherstyuk	2018	X					X		
Adres, Vashdi, & Zalmanovitch	2016				X		X		
Anderson, DiTraglia, & Gerlach	2011				X		X		
Anderson, Rodgers, & Rodriguez	2000				X			X	
Andreoni	1988		X				X		
Andreoni & Miller	1993		X			X			

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Andreoni & Petrie	2004	X					X		
Arceo Gomez, Campos Vazquez, Medina Cortina, & Velez Grajales	2018	X							X
Arechar, Dreber, Funderberg, & Rand	2017	X				X			
Arechar, Kouchaki, & Rand	2018		X			X			
Ashraf, Bohnet, & Piankov	2006				X			X	
Barreda-Tarrazona, Jaramillo-Gutiérrez, Pavan, & Sabater-Grande	2017		X			X			
Batson & Moran	1999			X		X			
Battiston & Gamba	2020	X					X		
Bayer	2016		X				X		
Bazart, Lefebvre, & Rosaz	2022	X					X		
Bernold, Gsottbauer, Ackermann, & Murphy	2014			X			X		
Bezu & Stein	2013	X						X	
Binzel & Fehr	2013	X						X	
Blackwell & McKee	2011				X		X		
Blanco, Haller, Lopez, & Walker	2016				X		X		
Bland, Bochet, Nikiforakis, & Zhang	2023		X			X			
Blonski, Ockenfels, & Spagnolo	2011		X			X			
Boarini, Laslier, & Robin	2009				X				X
Bochet & Putterman	2009	X					X		
Bochet, Page, & Putterman	2006	X					X		
Bohnet & Frey	1999	X						X	
Bohnet & Frey	1995	X						X	
Boone & Macy	1999		X			X			
Bosch-Domènech, Nagel, & Sánchez-Andrés	2010	X						X	
Bose & Sgroi	2019	X					X		
Botelho, Hirsch, & Rutstrom	2000				X				X
Bouas & Komorita	1996	X				X			
Bouwmeester, Verkoeijen, Aczel, Barbosa, et al.	2012				X		X		
Brañas-Garza, Cobo-Reyes, Espinosa, Jiménez, et al.	2010	X						X	
Brandts & Schwieren	2009			X			X		
Brandts, Rott, & Sola	2015	X					X		
Brandts, Saijo, & Schram	2004		X		X		X		

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Braver & Wilson	1986	X				X			
Brick, Visser, & Van der Hoven	2015	X					X		
Brosig, Ockenfels & Weimann	2003	X					X		
Buchan, Grimalda, Wilson, Brewer, et al.	2009				X		X		
Buchanan, McMahon, Simpson, & Wilson	2017	X						X	
Buhrmester, Goldfarb, & Cantrell	1992	X						X	
Burlando & Hey	1997		X		X		X		
Burnham	2003	X						X	
Camera, Casari, & Bigoni	2010	X				X			
Candelo, Eckel, & Johnson	2018	X						X	
Cappelen, Moene, Sørensen, & Tungodden	2013				X			X	
Cardenas	2011	X					X		
Cárdenas, Chong, Ñopo, Horowitz, & Lederman	2009				X	X			
Cardenas, Dreber, von Essen, & Ranehill	2014				X		X		
Cardenas, Rodriguez, & Johnson	2011	X			X		X		
Carpenter, Daniere, & Takahashi	2004				X		X		
Cartwright & Drouvelis	2024			X			X		
Cason & Khan	1999	X					X		
Casoria & Ciccone	2021		X			X			
Castro	2008				X		X		
Catola, Guarnieri, Pizziol, & Rapallini	2024				X		X		
Chandrasekhar, Kinnan, & Larreguy	2018	X						X	
Chao & Shin	2026				X	X			
Charness & Gneezy	2008	X						X	
Chaudhuri	2018		X				X		
Chaudhuri, Graziano, & Maitra	2006				X		X		
Chen	1996	X					X		
Chen & Komorita	1994	X					X		
Chen & Tang	2009				X				X
Cherry, Kallbekken, Kroll, & McEvoy	2013			X			X		
Chuah, Hoffmann, Jones, & Williams	2009				X				X
Clark & Sefton	2001				X	X			
Cochard, Couprie, & Hopfensitz	2016	X				X			
Collins, Hammah, & Lightle	2018			X				X	

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Columbus, München, & Gerpott	2020			X		X			
Cook, Yamagishi, Cheshire, Cooper, et al.	2005		X		X	X			
Cooper, DeJong, Forsythe, & Ross	1996		X			X			
Cortés Aguilar, Palacio García, & Parra Carreño	2014		X				X		
Cox & Stoddard	2015		X				X		
Croson	1996		X				X		
Dal Bó	2005		X			X			
Dal Bó & Fréchette	2019		X			X			
Dal Bó & Fréchette	2011		X			X			
Dawes, McTavish, & Shaklee	1977	X				X			
Dawes, van de Kragt, & Orbell	1988	X				X			
de Haan & van Veldhuizen	2015			X		X			
D'Exelle & Riedl	2010	X						X	
Dorrough & Glöckner	2019				X		X		
Dreber, Ellingsen, Johannesson, & Rand	2012			X		X			
Duffy & Feltovich	2002	X				X			
Dufwenberg & Muren	2006	X						X	
Dufwenberg, Johansson-Stenman, Kirchler, Lindner, & Schwaiger	2022			X				X	
Dung	2015				X		X		
Dvorak & Fehrler	2024	X				X			
Eichenberger & Oberholzer-Gee	1998	X						X	
Ellingsen, Johannesson, Mollerstrom, & Munkhammar	2012			X		X			
English	2012				X		X		
Englmaier & Gebhardt	2016	X					X		
Etang, Fielding, & Knowles	2011	X						X	
Fehr & Gächter	2000		X				X		
Fiedler, Hellmann, Dorrough, & Glöckner	2023				X			X	
Fosgaard, Fosgaard, & Foss	2017			X			X		
Fox & Guyer	1978	X				X			
Frey & Bohnet	1997	X				X			
Frey & Bohnet	1995	X						X	
Frohlich & Oppenheimer	1998	X					X		
Gächter & Fehr	1999	X					X		

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Gächter & Herrmann	2009				X		X		
Gächter, Fehr, & Kment	1996	X					X		
Gasiorowska, & Helka	2012			X				X	
Gasiorowska, Chaplin, Zaleskiewicz, Wygrab, & Vohs	2016			X				X	
Ghidoni & Suetens	2022		X			X			
Gnagey, Grijalva, & Rong	2018	X						X	
Goeree, McConnell, Mitchell, Tromp, & Yariv	2010	X						X	
Goerg & Walkowitz	2010				X		X		
Goette, Huffman, & Meier	2012	X				X			
Greiner & Levati	2005		X				X		
Greiner, Caravella, & Roth	2014	X							X
Greiner, Güth, & Zultan	2012	X						X	
Grimalda	2006				X		X		
Grimalda, Pondorfer, & Tracer	2016	X				X			
Grund, Harbring, & Thommes	2018		X				X		
Grund, Harbring, & Thommes	2015		X				X		
Gunessee, Xie, & Lane	2020	X						X	
Gurven, Zanolini, & Schniter	2008	X						X	
Haan, Kooreman, & Riemersma	2006	X					X		
Hammah, Weber, & Woon	2011	X					X		
Haruvy, Li, McCabe, & Twieg	2017	X					X		
Hayashi, Ostrom, Walker, & Yamagishi	1999				X	X			
He, Offerman, & van de Ven	2017	X				X			
Hemesath	1994				X	X			
Hemesath & Pomponio	1998				X	X			
Henrich, Boyd, Bowles, Camerer, Fehr, & Gintis	2004				X		X		
Henrich, Ensminger, McElreath, Barr, et al.	2010				X			X	
Herrmann, Thöni, & Gächter	2008				X		X		
Hillis & Lubell	2015	X					X		
Hoenow & Pourvisesh	2024	X					X		
Hoffman, McCabe, Shachat, & Smith	1994			X					X
Holm & Danielson	2005				X			X	
Horak & Arya	2020				X				X
Insko, Hoyle, Pinkley, Hong, et al.	1987	X				X			

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Irwin, Mulder, & Simpson	2014				X		X		
Isaac & Walker	1988	X					X		
Isaak, Schwieren, & Iida	2022				X		X		
Jacquet, Hauert, Traulsen, & Milinski	2011	X				X			
Jakiela	2015				X			X	
Jensen, Farnham, Drucker, & Kollock	2000	X					X		
Johnson	2016	X							X
Kachelmeier & Shehata	1997	X			X		X		
Kamei	2019		X				X		
Kartal & Müller	2025	X				X			
Kay, Wheeler, Bargh, & Ross	2003			X					X
Kerr, Garst, Lewandowski, & Harris	1997	X					X		
Keser & van Winden	2000		X				X		
Kiesler, Sproull, & Waters	1996	X				X			
Kim, Choi, Lee, Lee, & Choi	2017				X			X	
Kinukawa, Saijo, & Une	2000	X					X		
Klinowski	2018				X			X	
Kocher & Matzat	2016		X				X		
Kocher, Cherry, Kroll, Netzer, & Sutter	2008				X		X		
Kölle, Quercia, & Tripodi	2025		X			X			
Koukouvelis, Levati, & Weisser	2012		X				X		
Kovacs, Dunaïski, Galizzi, Grimalda, et al.	2024				X			X	
Krysowski & Tremewan	2021	X						X	
Kumakawa	2013	X					X		
Kuroda, Li, Shachat, Wei, & Zhu	2021				X	X			
Lamba & Mace	2010	X							X
Lazear, Malmendier, & Weber	2012	X			X			X	
Leibbrandt, Ramalingam, Sääksvuori, & Walker	2015				X		X		
Leider, Mobius, Rosenblat, Do	2008	X						X	
Lian & Zhou	2015		X				X		
Lieberman, Samuels, & Ross	2004			X	X	X			
Ligon & Schechter	2012	X						X	
Lindskold & Finch	1981	X				X			
Lönnqvist, Verkasalo, Wichardt, & Walkowitz	2013				X		X		

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Lotito, Migheli, & Ortona	2013	X					X		
Lu, Zhang, & Xu	2016	X				X			
Martinsson & Villegas-Palacio	2010	X					X		
Martinsson, Pham-Khanh, & Villegas-Palacio	2013	X			X		X		
Masclet, Noussair, Tucker, & Villeval	2001				X		X		
Mengel & Peeters	2011		X				X		
Mischkowski & Glöckner	2016			X	X		X		
Mohlin & Johannesson	2008	X						X	
Molleman & Gächter	2018				X	X			
Morehous	1966		X			X			
Mori	1994	X				X			
Munier & Zaharia	2002				X				X
Munroe	2018				X			X	
Nihonsugi	2016		X				X		
Nikiforakis	2008		X				X		
Noussair & Tucker	2005	X					X		
O'Garra & Alfredo	2019	X					X		
Orbell, van de Kragt, & Dawes	1988	X				X			
Oskamp & Perlman	1966	X				X			
Ostrom & Walker	1989	X					X		
Peeters & Vorsatz	2012		X				X		
Peters, Ünür, Clark, & Schulze	2004	X					X		
Pillutla & Chen	1999			X			X		
Proto, Rustichini, & Sofianos	2019		X			X			
Proto, Sgroi, & Nazneen	2019	X				X			
Putterman, Tyran, & Kamei	2011				X		X		
Raihani, Mace, & Lamba	2013				X			X	
Rankin	2006	X						X	
Rege & Telle	2004	X					X		
Rochat, Dias, Liping, Broesch, et al.	2009				X			X	
Rodebaugh, Klein, Yarkoni & Langer	2011	X					X		
Rojas & Cinner	2020			X			X		
Romano, Sutter, Liu, Yamagishi, & Balliet	2021				X		X		
Romero & Rosokha	2023		X			X			
Rosenbaum, Billinger, Stieglitz, Dju-manov, & Atykhanov	2012				X				X

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Rosenbaum, Billinger, Twerefou, & Isola	2016				X		X		
Roth	1995	X							X
Roth, Prasnikar, Okuno-Fujiwara, & Zamir	1991				X				X
Samek & Sheremeta	2014	X					X		
Sanchez-Pages & Turiegano	2010				X	X			
Sarker, Poon, Haque, & Herath	2023	X					X		
Schmidt, Carsten, & Zultan	2005	X							X
Sell, Chen, Holmes, & Johansson	2002				X		X		
Small & Loewenstein	2003	X						X	
Smith, Lagarde, Blaauw, Goodman, et al.	2012				X			X	
Suneja & Das	2023	X				X			
Tan & Bolle	2007		X				X		
Tanner, Lusk, & Tyner	2005				X		X		
Thompson, Kray, & Lind	1998	X					X		
van de Kragt, Dawes, Orbell, Braver, & Wilson	1986	X				X			
van der Heijden & Moxnes	1999				X		X		
Van Lange, Klapwijk, & Van Munster	2011		X				X		
Van Vugt & Iredale	2013	X					X		
Vu	2016	X					X		
Weber, Schulz, Beranek, Lambarraa-Lehnhardt, & Gächter	2023				X		X		
Weimann	1994		X				X		
Werthmann, Weingart, & Kirk	2010	X			X		X		
Whitt & Wilson	2007				X			X	
Wichman	1970	X				X			
Wilson & Sell	1997	X					X		
Wong & Hong	2005	X				X			
Yamagishi	1988				X		X		
Yamagishi & Sato	1986	X					X		
Yamagishi, Makimura, Foddy, Matsuda, et al.	2005				X		X		
Yamagishi, Mifune, Liu, & Pauling	2008				X		X		
Yang, Wu, Zhou, Mead, et al.	2013			X				X	
Zhu, Keller, Gummerum, & Takezawa	2010				X			X	

Authors	Year	Anon	Eph	Frame	Expos	PD	PGG	DG	UG
Zizzo & Tan	2007				X	X			
Zultan	2012	X							X

Notes: Anon (anonymity), Eph (ephemerality), Frame (market frame), and Expos (market exposure) indicate which market-related variables of interest the study is used to analyze, and PD, PGG, DG, and UG indicate which games are played in the study. For the titles of each paper, see the full table in the supplementary online materials.