



# Peer effects and social preferences in voluntary cooperation: A theoretical and experimental analysis



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## ABSTRACT

Social preferences and social influence effects (“peer effects”) are well documented, but little is known about how peers shape social preferences. Settings where social preferences matter are often situations where peer effects are likely too. In a gift-exchange experiment with independent payoffs between two agents we find causal evidence for peer effects. Efforts are positively correlated but with a kink: agents follow a low-performing but not a high-performing peer. This contradicts major theories of social preferences which predict that efforts are unrelated, or negatively related. Some theories allow for positively-related efforts but cannot explain most observations. Conformism, norm following and social esteem are candidate explanations.

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## 1. Introduction

Is pro-social voluntary cooperation subject to ‘peer effects’, that is, influenced by the behavior of comparison others (‘peers’)? Or is pro-sociality a preference that is largely immune to social influence? These questions are at the heart of this

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paper. Understanding how peer effects shape social preferences is important because people normally do not act in a social vacuum but are constantly exposed to peers. The purpose of this paper is to understand how social preferences and peer effects are linked both by providing novel experimental evidence and by clarifying what theories of social preferences have to say on peer effects.

We speak of a peer effect if an agent is influenced in his or her actions by what a comparison agent does, *even if there are no material spillovers between agents* and hence no *direct* social preference links exist between peers (indirect links are possible, as our theoretical analysis will show). Our definition is narrower than frequent usage of the term in the literature. Sometimes ‘peer effects’ is used as an umbrella term to describe behaviors where an agent reacts to other agents’ actions; such a behavioral reaction might be motivated by social preferences. As an example, think of voluntary contributions to a public good, where people contribute more the more other group members contribute. Such ‘conditional cooperation’ can be due to peer effects, but also social preferences.

Understanding the link between social preferences and peer effects is important for two reasons. First, in reality social preferences are often relevant in environments that are potentially rich in possibilities for social influence effects. Think of the workplace as a prime example. In a seminal field experiment, Falk and Ichino (2006) show that work effort is subject to peer effects which were suggested to be important in non-experimental empirical work (Ichino & Maggi, 2000). Yet, their study does not allow linking such peer effects to theories of social preferences, which is our main contribution.

Second, suppose we find evidence for peer effects. What would the implication be for theories of social preferences? For example, in popular theories of inequality aversion people’s social preferences are modeled as individually *fixed* distastes for inequitable outcomes. Evidence for peer effects would constitute a *prima facie* challenge to fixed preference assumptions. We deem it important to clarify theoretically whether peer effects indeed provide such a challenge or whether existing theories assuming fixed preferences can explain the data before resorting to changes in social preference parameters as an explanation.

Our tool to measure peer effects is a one-shot three-person gift-exchange game where a principal pays his two agents  $i$  and  $j$  a wage  $w$  (the same for both) and the agents choose efforts  $e_i$  and  $e_j$ . The material incentive structure gives both agents an incentive to choose minimal effort irrespective of  $w$  and irrespective of the other agent’s effort. However, from numerous two-person gift-exchange games we expect that many agents choose efforts that increase in wage. In this situation we will speak of a ‘peer effect’ if  $e_i = f(e_j)|_w$ , that is, holding the common wage  $w$  constant, agent  $i$ ’s effort depends on agent  $j$ ’s effort ( $f' \neq 0$ ), despite the absence of any earnings interdependency between agents.

A major problem of measuring peer effects empirically is the ‘reflection problem’ (e.g., Manski, 2000):  $e_i = f(e_j)|_w$  and  $e_j = f(e_i)|_w$ . If  $i$  is influenced by  $j$  and  $j$  is influenced by  $i$  it is impossible to disentangle the causal influences  $i$  and  $j$  have on each other. Here we propose a novel design that avoids the reflection problem. The main innovation is to make the effort of the other agent exogenous. To achieve this, both agents first choose their efforts simultaneously and then, after having learned the effort decision of their co-agent, are given the opportunity to *revise* their effort, *holding their co-agent’s effort constant*. Since the design removes any material and strategic incentives to revise effort, revision decisions (compared to a control condition with no effort information) tell us about the extent to which people change their effort *because* of the effort chosen by the co-agent.

Our results provide unambiguous evidence for peer effects. Effort revisions are more likely and bigger when agents are informed about their co-agent’s effort than when they are uninformed. When the co-agent has provided lower effort than them they revise their efforts downwards, but they barely increase their effort when the co-agent provided higher effort.

To see whether these peer effects are a novel phenomenon that is incompatible with existing theories of social preferences, we analyze the theoretical predictions of widely used theories of social preferences that model various distributional and/or intentional concerns under the assumption that preferences are fixed. We focus on the best-reply predictions with regard to effort changes, that is,  $de_i/de_j$ . To our knowledge, no such analysis has been done in the context of explaining peer effects in voluntary cooperation.

The most robust predictions of these standard theories of social preferences are that either there are no peer effects (efforts are unrelated in models of reciprocity), or if there are peer effects, efforts are negatively related (in all other models). Our finding of peer effects with positively correlated efforts seems therefore inconsistent with most models. However, this evidence is not fully conclusive because predictions are about the agents’ best-reply functions, which our simple revision decisions do not reveal.

To have a conclusive test we ran experiments where we also elicited the agents’ *beliefs* about the initial effort choice of their co-agent. Thus, we now observe two points on each agent’s best-response which allows us to draw conclusions about the slope of the best replies. The results reject the prediction of most theories that efforts are negatively related. In the peer effect we observe, efforts are strategic complements, not substitutes. Also the theories that predict positively correlated efforts are only consistent with a minority of choices.

While standard theories of social preferences which model equality concerns and/or intentions, typically predict the opposite of what we find, recent theories that incorporate social motives like conformism (Sliwka, 2007), norm-following (López-Pérez, 2008), or social esteem (Ellingsen & Johannesson, 2008) can explain the peer effects we observe.

Our paper is structured as follows. Section 2 places our paper in the related literature. Section 3 introduces our experimental game and procedures. Section 4 presents our results on peer effects. Section 5 discusses the implications of various models of social preferences in our game. In Section 6 we analyze data on agents’ beliefs to identify the slopes of the reaction function which allows us to contrast data and theories. Section 7 discusses the significance of the findings and alternative theoretical explanations. Section 8 summarizes the paper.

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