Investments in Impure Public Goods

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Based on a laboratory experiment we examine the behavioral implications of different distributions of risks. Specifically, we create a series of modified investment games where an investment is linked to giving to a charity and we manipulate the risk in the private payoff and in the public payoff to the charity jointly. With this, we elicit individuals' reactions to interrelated private and public risks and furthermore we investigate investment decisions in impure public goods. An impure public good denotes a bundled good that yields a private payoff and a public payoff, as for example organic food or green technologies, and consumers derive utility from both its private and its public component. Our research project extends the existing theoretical models (Cornes and Sandler 1994, Chan and Kotchen 2014) and experimental studies on demand for impure public goods (e.g. Engelmann et al. 2012, Kotchen and Moore 2007) to risky environments. As an example, consider an investment in a green technology that will yield the investor a monetary return and in addition she contributes to the reduction of CO_2 emissions and to the mitigation of climate change. Investigating individual investments in impure public goods fosters the understanding of the phenomena of microlending and crowdinvesting. Crowdinvesting in projects is one possible form of crowdfunding which has recently been gaining importance as a financing alternative for social ventures and projects in the energy and the environmental sectors (Lehner, 2013), i.e. sectors where impure public goods are being produced. The results will allow to disentangle crowdinvestors' motivations to engage in projects and in addition they will indicate under which conditions it is profitable for a firm to finance impure public goods via crowdinvesting compared to financing alternatives that do not take the public benefits into account.

The concept of bundled goods allows us to jointly examine individuals' reactions to risk in the private and the public good, thereby adding to the literature on prosocial behavior under risk. So far, studies have investigated the reaction to risk either in pure private goods or in purely altruistic decisions as in dictator games (like Brock et al. 2013). By our design, we can distinguish the impact of coexistent private and public risk dependent on whether those risks are independent or positively or negatively correlated. For that purpose, a risky private investment is connected to the provision of a public benefit, which can be risky itself or not. The effect of the public component on the final investment decision is tested separately for the different risk scenarios:

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The experimental design consists of two parts that investigate different facets of individuals' investment behavior.

The task in part 1 consists of a combination of an investment game (as proposed by Gneezy and Potters 1997) and a dictator game with a charity as the recipient. Participants get an endowment that they can invest in an impure public good. This impure public good generates two kinds of returns: a private return plus a return for a charity, which are modified between treatments, see table 1. Employing a within-subject design, the treatments each consist of one-shot individual investment decisions that are played in random order. In the end, one treatment is randomly chosen for payment and lotteries are not played before the end of the experiment. In the treatments involving risk, a high or a low return can be randomly drawn with a probability of 1/2, and the magnitudes of the possible returns correspond to those commonly used in private investment games (see Charness and Viceisza 2012). In order to ensure comparability, the expected returns are the same across treatments. Predicting the amounts invested under the different

Treatment	Private Return	Public Return
T1a	-	no risk
T1b	-	risk
T2	risk	-
T3	no risk	no risk
T4	no risk	risk
T5	risk	no risk
T6a-c	risk	risk

Table 1: Treatments

treatment conditions, we assume that prosocial investors derive utility from a warm glow of giving (Andreoni, 1989). To capture different behavioral reactions to risk in the private and the public return, we allow for different preferences over the two risks. By integrating a public or a private component or both in the investment good and by varying the risk in the returns, we create several decision situations: The pure dictator games -that serve as control treatments- allow to compare giving under certainty and risk (T1a-T1b). A conventional investment game, which provides a measurement for individuals' risk preferences, is extended by a public component to represent an impure public good (T2-T5). In the investment games with impure public goods (T3 to T6) one or both of the returns can be subject to risk. In order to capture the full effect of the presence of joint risks, treatment T6 needs to consist of three variants, where the private and public risks are either (perfectly) positively or negatively correlated, or independent. The fact that, depending on the correlation structure, the additional public component decreases or increases the riskiness of the bundled good, is assumed to impact the overall influence of the public component on individuals' willingness to invest in an impure public good: For a risk-averse investor we predict positive correlation to have a negative impact while in the case of negative correlation we expect to

observe a higher willingness to invest. A low private return going along with a high public return (and vice versa) creates the effect of an insurance. Moreover, the correlation structure determines the distribution of final outcomes between the decision-maker and the charity: The distribution of the risk influences the distribution of final outcomes.

The results of the previous treatments will lead to the question whether firms can benefit from choosing crowdinvesting as a financing mean for impure public goods compared to investors who do not take the altruistic benefit into account. Therefore, in part 2 we design a simple binary choice list to quantify the effect of adding a public component to a private good on the investment decision. Specifically, we measure how much lower one can set the private return of the impure public good than the return of a pure private good such that the first is still preferred. Participants are asked to divide an endowment between an impure public good and a pure private good in a list of ten binary choices along which the size of the private return of the impure public good decreases while its public return and the return of the pure private good stay constant. Employing two choice lists, one with a sure and one with a risky public return, this design allows to extract two switching points of an individual at which she is indifferent between the two goods.

The experiment is going to be conducted at the experimental laboratory of the School of Economics and Social Sciences of the University of Hamburg in the first week of April 2015. In addition, a shorter version will be tested in an online experiment in collaboration with the experimental laboratory in order to obtain data from a larger and more heterogeneous subject pool to increase external validity.

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