Signaling Trustworthiness with Impact Investments: An Experimental Study

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Entrepreneurs may differentiate their ventures and attract investments by advertising that their firm produces positive externalities for society. Such signaling of entrepreneurs' trustworthiness may be a prevalent practice in these "impact investment'' opportunities. This paper investigates theoretically this possible signaling and it studies its interplay with altruistic and fiscal motives in a laboratory experiment. Entrepreneurs choose between a conventional investment opportunity or an impact investment opportunity involving a spillover – a donation to society – whose size they need to decide on. Investors may transfer funds to the entrepreneur, who may then invest some, all or none of this money onto the opportunity, and then decide whether or not to transfer some of the funds back. The results are that both theoretically and empirically the choice alone of an impact project does not increase investors' transfers to impact investments but a higher spillover does as long as the spillover is not too high. Entrepreneurs who announce higher rates of spillovers return more funds to investors, making a high spillover a valid signal of trustworthiness, and they also pay "out-of-pocket" the spillover by sending the same amount back as the entrepreneurs who chose purely financial project. In the presence of tax, entrepreneurs internalize that a too high spillover could scare away investors. The mechanisms behind investors believing that socially-oriented entrepreneurs will be more trustworthy is that the mere project type is insufficient and information about the effective societal impact is necessary; making that quantitative information visible allows investors to differentiate between investment opportunities.

Key words Trust, Signaling, Visibility, Impact Investment, Entrepreneurial financing.

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1. Introduction

As part of a general surge of demand for a more ethical, sustainable and socially inclusive financial services (Dacin, Dacin, and Tracey, 2011), a variety of new investment opportunities which take into account their consequences for society has emerged. One category among these are impact investments. Such investments aim to create a positive impact for society and have gained substantial popularity in recent years. This impact, often called spillover, is a different forms, e.g. investing in sustainable skiing or investing in a social entrepreneur's project. Between 2013 and 2015, this investment category grew by 385%, resulting in a market volume of 98.3 Billion EUR in Europe alone (Eurosif, 2016). The GIIN's 2018 Annual Impact Investor Survey (Global Impact Investing Network) reports over USD 228 billion in impact investing assets. Following this outstanding rise in popularity, the concept has been defined in many different ways (Harji and Jackson, 2012, Höchstädter and Scheck, 2015). In this paper, Impact investments are meant as investments made into companies, organizations and funds with the intention to generate social and environmental impact alongside a financial return.

An entrepreneur's decision to undertake a social project as well as an investor's interest in it can be driven by various factors. In addition to possible social preferences, by advertising that their firm produces positive externalities for society entrepreneurs may differentiate their ventures and attract investments. Our hypothesis is that by choosing an impact project, entrepreneurs may not only draw the interest of morally motivated investors, but also build trust to mitigate the impact of endemic obstacles to startup investment such as asymmetric information and agency problems (Amit et al., 1990; Gompers, 1995; Cable and Shane, 1997; Shepherd and Zacharakis, 2001).

It has been argued that individuals who care for the respect and the opinion of others, may both trust and reciprocate in order to enhance their social esteem by adopting costly behaviors to signal their types (Ellingsen and Johannesson, 2008; Gintis et al., 2001). In this respect, there is experimental and field evidence that signaling motives affect trust (Albert et al., 2007; Ariely et al., 2009; Riedl and Smeets, 2017). In particular, players who behave altruistically are believed to be more trustworthy, receive higher transfers and return higher amounts (Fehrler and Przepiorka, 2012). However, in these studies altruistic behavior is only costly to the party that signals its type. In the context of finance, prosocial practices of entrepreneurs are costly to the investor. We investigate the effects of this cost on the behavior of the investor as well as the behavior of the entrepreneur.

This paper studies the role of signaling motives, in a setting which accounts for the altruistic and fiscal motives as they mediate the primary effect. We investigate the interplay between these factors in a laboratory experiment where participants play an extended version of the trust game (Berg et al., 1995).

Entrepreneurs move first, by announcing to potential investors the kind or project they will invest on and the proportion of the returns that will be transferred to society and all signaling is binding. The investor decides how much of his endowment to transfer to the entrepreneur. This amount is, as in Berg et al. (1995), triplicated. The entrepreneur may then invest some, all or none of this money onto a conventional investment opportunity or an impact investment opportunity. Both types of projects can entail either a gain or a loss and yield a positive expected return. Upon learning the outcome of the project, the entrepreneur decides how much to transfer back to the investor, and in the case of the impact project, the donation is implemented.

We implement two visibility treatments – one in which the entrepreneur's announcement of spillover is visible to the investor and one in which it is not – to disentangle the effects of signaling motives and altruistic ones (Cox, 2004). We further implement three taxation treatments – one with no taxation, one with both project types facing the same taxation and one with the impact investment being exempt from taxation – to investigate the effect of fiscal advantages lent to impact projects, as described in the Financial Times' moto "Do good and save tax", which, in addition to changing the incentives to choose impact projects, may dilute the signaling effect behind the choice of an impact project.

Our contributions can be summarized as follows. First, we investigate how the choice between impact and conventional projects can help investors coordinate onto different investment types. More specifically, we study the mechanisms behind the belief that investors might be more inclined to invest in social projects because they assume socially-oriented entrepreneurs will be more trustworthy. Second, we disentangle the role of signaling and intrinsic prosocial motivations by incorporating a treatment in which the donation to the social cause is visible to the investor before she makes her decision. Third, we incorporate entrepreneurial decision making to account for the effect of potential gains and losses on trust and trustworthiness. Fourth, we investigate the extent to which taxes interact with signaling motives behind prosocial behavior.

2. Predictions and hypotheses
2.1. Beliefs and social preferences

An investor trusts if she voluntarily places resources at the disposal of another individual, for instance, an entrepreneur, without a legally binding commitment (Coleman, 1990). Such an action entails a potential loss -if the trustee is not trustworthy-, and a potential gain -if the trustee reciprocates-. Trusting behavior is theorized to depend on beliefs and preferences (Rotter, 1980; Williamson 1993; Hardin, 2002; Fehr, 2009).

The empirical evidence confirms the canonical hypothesis in the trust game, according to which the higher the amount the investor expects the entrepreneur to return, the higher the amount she sends (Johnson and Mislin, 2011; Ashraf et al., 2006). In addition to expectations, several experimental studies show that the trust placed by the investor is also motivated by her social preferences. There is evidence of altruism (Cox, 2004), unconditional kindness (Cox, 2004; Asharf et al., 2006) and fairness (Ashraf et al., 2006; Cox, 2004; Fehr, 2009). Investors also exhibit betrayal aversion, in the sense of being less willing to take a risk when the source is another person rather than nature (Bohnet et al., 2008; Fehr, 2009). Finally, although there is evidence against it (Houser et al., 2011; Ashraf et al., 2006), the amount sent by the investor has been shown to be affected by attitudes towards financial risk. In particular, more risk averse individuals send on average less money (Bohnet et al., 2008; Fehr, 2009).

The second essential element of a trust relationship is trustworthiness, namely the willingness of a person to act favorably towards another, when the latter has placed an implicit or explicit demand or expectation for action on the first (Ben-Ner and Halldorsson, 2010). Trustworthiness is usually interpreted as a form of reciprocity (Ostrom and Walker, 2003). As such, it is belief contingent and crucially depends on the information about the intentions and choices of the other players (Rabin, 1993; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006). In the trust game, the motivation of the entrepreneur to reciprocate depends on his beliefs about the intention of the investor which in turn depend on her beliefs about the entrepreneur's trustworthiness. According to Dufwenberg and Kirchsteiger (2004) there is a sequential reciprocity equilibrium in this game in which the first player trusts and the second player believes that the first player believes that he is trustworthy.

A rich body of experimental evidence indicates that second players are more likely to reciprocate if they interpret the behavior of the first player as placing trust (McCabe et al. 2003; Cox, 2004; Ashraf et al., 2006; Bicchieri, 2006; Sugden, 2000). This interpretation depends on the set of alternative choices available to the investor (Dufwenberg and Kirchsteiger, 2004; Ellingsen and Johannesson, 2008). For instance, sending money to the entrepreneur does not signal trust if the investor lacks the opportunity to send nothing (McCabe et al., 2003; Cox, 2004).

2.2. Reputational motivations and social signaling

Prosocial behavior and the lack thereof have been theorized to depend on intrinsic, extrinsic and reputational motivations (Glazer and Konrad, 1996; Bénabou and Tirole, 2006; Andreoni and Bernheim 2007; Ellingsen and Johannesson 2007, 2008; Ariely et al., 2009). Intrinsic motivations stem from private preferences for others' well-being such as pure altruism, and reciprocity (Fehr and Schmidt, 2003) and were accounted for in the previous section. Extrinsic motivations relate to material rewards such as tax breaks

and subsidies and will be addressed the next section. In this section we deal with image motivation, also called signaling motivation, which depends on the value individuals' place in being liked and respected by others, and thought to be a good person (Andreoni, 1989, Glazer and Konrad 1996; Ariel et al., 2009).

There are several theoretical models explaining how reputational motivations affect entrepreneurs' willingness to reciprocate the investor's intention. They all involve heterogeneity and signaling. Ellingsen and Johannesson (2008) assume that there are two types of players, altruistic and non-altruistic. If an altruistic entrepreneur values esteem from an altruistic investor more than from a non-trusting investor, she will return more if she interprets the investor as expecting her to reciprocate (Ellingsen and Johannesson, 2008). If altruistic trustors are more inclined to trust than selfish trustors, there is a separating equilibrium in which trust is a reliable signal of altruism and the trustee's esteem is higher after this signal compared to the situation in which trust does not signal the trustor's type (Ellingsen and Johannesson, 2008). Gintis et al. (2001) show that this signaling equilibrium can be evolutionary stable in a multi-player public goods game with cooperative and non-cooperative types. Cooperation can emerge as an evolutionary stable separating equilibrium in which prosocial agents signal their unobservable quality by incurring the cost of acting altruistically (Gintis et al., 2001).

There is evidence that reputation motives affect behavior in the trust game (Albert et al., 2007; Ariely et al., 2009; Riedl and Smeets, 2017). Furthermore, there is experimental evidence that players who behave altruistically are believed to be more trustworthy. Albert et al. (2007) show that being a high donor is a reliable signal of trustworthiness and that it pays off in the sense of leading to higher than average expected payoffs. Fehrler and Przepiorka (2012), who allow the second player in the trust game to make a donation to charity, find that investors expect –other things equal- higher back transfers from donors than from non-donors and send higher transfers to them because they expect them to be more trustworthy. However, investors expect significantly smaller transfers from less endowed second players (Fehrler and Przepiorka, 2012). This means that investors will expect less back transfers from entrepreneurs who announce high spillovers. According to Fehrler and Przepiorka (2012) donors, reciprocate higher transfers with higher proportions of back transfers than non-donors. In our design, the entrepreneur makes the first move by committing to undertake either a purely financial project or an impact project should the investor trust him, as well as announcing the amount he will eventually donate. According to the reviewed literature we postulate the following hypotheses.

H1a. *The choice of the impact project is used as a signal of trustworthiness. Entrepreneurs are more likely to choose the impact (financial) project if they expect it to receive higher transfers than the financial (impact) project.*

H1b. *The choice of the impact project and of the rate of spillover is perceived as a signal of trustworthiness. Investors paired with entrepreneurs who choose the impact project make higher transfers on average compared to investors paired with entrepreneurs who chose the purely financial project. Among investors paired with entrepreneurs who choose the impact project, investors transfer more to impact projects with a higher announced spillover.*

To gain social approval, prosocial behavior needs to be observed (Ariely et al., 2009). In this respect, studies show that socially motivated behavior increases with visibility (Andreoni and Petrie 2004; Dana et al., 2006; Ariely et al., 2009; Riedl and Smeets, 2017). In our design, the choice of project made by the entrepreneur is always known to the investor but the spillover that the entrepreneur will devote to the impact project is only observed in the visibility condition. An entrepreneur who chooses an impact project together with a low rate of spillover sends a mixed signal as to her commitment to the social cause. Therefore, for the signal to be effective in case of visibility, the spillover needs to be correspondingly high. If entrepreneurs choose the impact project to signal trustworthiness, we should expect a higher propensity to choose this project in the invisibility treatment as it is less costly for them. For the same reason we should also expect a smaller rate of donation to the impact project in the invisibility treatment. Therefore, we postulate the following hypotheses.

H2a. *In the invisibility treatment, entrepreneurs are more likely to choose the impact project, but allocate on average lower rates of spillovers unless they exhibit high prosociality.*

As for the proportion invested by the entrepreneur, several studies show that, even when it is not the main motivation or it is not highly correlated, people with prosocial concerns (as measured in surveys) are more likely to invest in mutual funds with socially responsible profiles (Nilsson, 2008). According to experimental evidence (Riedl and Smeets, 2017), altruistic behavior in the dictator game explains the decision to invest in socially responsible projects (SRI) but not the proportion of the portfolio invested in it, which in turn depends on financial motives. The authors interpret their results in the sense that SRI requires strong social preferences, but once this threshold is overcome, these preferences do not affect the ratio. This leads us to the following hypothesis.

H2b. *Entrepreneurs do not engage on average a higher proportion in the impact project compared to the purely financial project.*

2.3. Extrinsic motivations and taxation

Income taxation affects investment decisions because it decreases the upside of investments, without reducing the downside. Several experiments show that investors significantly reduce their risk-taking in the

presence of an income tax on their investment with no provision for loss deduction (Ackermann et al., 2013; Fochmann et al., 2012; Fochmann et al., 2016). However, in our design subjects pay tax on their endowment if this is not invested and on their gains. Since investment involves quadrupling the amount invested with a probability of 1/2 and a non-taxed loss with a probability of 1/2, investing the money in a dominant strategy in the presence of a tax. However taxation also reduces wealth; for this reason entrepreneurs will have less resources to send back to the investor. As previously stated, in experimental settings in which second players have different monetary resources at their disposal investors expect smaller transfers from less endowed second players (Fehrler and Przepiorka, 2012). Therefore, we expect transfers to entrepreneurs to be lower in the tax conditions of our design because entrepreneurs have less money to send back.

H3a. *Taxation reduces the amount transferred by the investor. In other words, the average transfer in the tax treatments is lower than in the no-tax treatments.*

The literature shows that taxes induce several kinds of perception biases due to environmental complexity, information level and salience (Ackermann et al., 2013; Fochmann et al., 2016). For this reason Fochmann et al., (2016) advice experimental researches to provide subjects with a what-if-calculator and a pocket calculator to minimize perception biases. There is also evidence that subjects overestimate the value of loss offset provisions of income taxation in the case of both partial and capped loss-deduction compared to the situation of no loss deduction. Our design only allows for full loss-deduction; therefore, we do not expect this type of bias. Furthermore, subjects are fully informed and receive sufficient aid to calculate possible payoffs in order to reduce any further source of biases.

We incorporate taxes in our design not only because they affect investment decisions, but also because they are used in reality to incentivize impact investment in the form of differentiated taxation schemes. Compared to the same tax treatment, the differentiated tax treatment provides a subsidy for engaging funds in impact projects. However, the impact projects implies a spillover that is costly for both the investor and the entrepreneur. The experiment allows to document whether entrepreneurs choose more often the impact project when such subsidy exists and to document whether they lower their announced spillover to attract investors in a setting in which they choose the impact project. It is well known that extrinsic motivations can interact with reputational motivations: for instance, monetary rewards may crowd out prosocial behavior if they spoil the reputational value of good deeds by creating doubts as to the underlying motivation. If these rewards for prosocial behavior increase the noise-to-signal ratio they can lead to a signal-extraction problem (Bénabou and Tirole, 2006; Sliwka, 2007). Public extrinsic incentives to encourage impact investment such as differentiated taxes schemes may dilute the signaling effect of the choice of an impact project mitigating the effectiveness of the incentive. Such effects are only observed

when incentives are public information (Ariely et al. 2009). Correspondingly, we postulate the following hypothesis.

H3b. *Entrepreneurs are more likely to choose an impact project when taxes are differentiated compared to the situation in which they are no taxes and they combine this choice of an impact project with a level of spillover that is maintained at the same level to attract investors.*

2.4. Social preferences as a signal of trustworthiness

According to Ellingsen and Johannesson (2008), if prosocial investors are more inclined than their non-prosocial counterparts, and if altruistic entrepreneurs value esteem from altruistic investors more than from non-trusting investors, then there is a separating equilibrium in which trust is a reliable signal of altruism. In this equilibrium, prosocial entrepreneurs return more if they interpret the investor as expecting them to reciprocate. However, in their model trust does not reduce the resources available to both parties as the spillover in our experimental design does. To understand how this condition affects signaling equilibria and derive further hypotheses concerning the effect of impact investments on startup funding, in this section we analyze a simplified version of the trust game that incorporates core features of our experimental design.

Assume that the investor (player 1, hereafter "he") receives an endowment (M) and decides which proportion (a) to transfer to an entrepreneur (player 2, hereafter "she"). As in our design, the entrepreneur receives the amount sent by the investor (aM) multiplied by 3 (3aM). Before the investor makes his decision, the entrepreneur chooses between a social and a purely financial project to which the received money will be devoted. If the entrepreneur chooses the social project, then she has to decide which proportion (d) of her resources to donate to it. This donation (d3aM) is binding and known to the investor beforehand. If the entrepreneur chooses the purely financial project the donation is made equal to zero. After the entrepreneur receives (1-d)3aM she decides which share (r) to send back to the investor. The investor receives from the entrepreneur r(1-d)3aM earning [(1-a)+r(1-d)3a]M in total. The entrepreneur earns (1-r)(1-d)3aM. Setting M=1, the monetary payoff of the investor is given by P_I (a, r, d) =(1-a) + r(1-d)3a, and the monetary payoff of the entrepreneur is given by P_E (a, r, d) = (1-r)(1-d)3a.[4]

In addition to the monetary payoffs we incorporate social preferences. Assume first that there are two types of players: prosocial (S) and non-prosocial (~S) in exogenous proportions which are unknown to the players. Prosocial entrepreneurs earn a non-monetary payoff from donating to an impact project (D>0) and from reciprocating the transfer of an investor (R>0). Prosocial investors earn an extra non-monetary payoff from trusting an entrepreneur regardless of her intentions (T>0) and from transferring money to an

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[4] Although in the experiment we let subjects choose proportions in the interval [0,1] in the model we use discrete measures for simplicity.

entreprenneur who has committed to donate (D>0) and. In contrast, non-prosocial types have T=0, D=0 and R=0. The table below displays the total (monetary and non-monetary) payoffs or utility of prosocial types for all possible strategies. The payoffs of the non-prosocial types can be obtained by setting T=D=R=0.

Table 1. *Utilities of prosocial types*

	d>0 & r>0	d=0 & r>0	d>0 & r=0	d=0 & r=0
a>0	1-a+3ra(1-d)+T(a)+D(a,d)	1-a+3ra+T(a)	1-a+D(a,d)	1-a
	3(1-d)(1-r)a+D(a,d)+R(a,r)	3(1-r)a+R(a,r)	3(1-d)a+D(a,d)	3a
a=0	1	1	1	1
	0	0	0	0

Since prosocial types earn extra utility form behaving in a prosocial way, they are more likely to trust, to be trustworthy and to reciprocate. If prosocial behavior, such as committing resources to an impact investment, were a strong signal, observing that the entrepreneur chose d>0 would make the investor revise his prior probability that the entrepreneur is prosocial thereby increasing the posterior probability that he will earn a positive return on the original investment r>0. In a separating equilibrium, prosocial entrepreneurs would choose d>0 and non-prosocial types, d=0, and investors would be able to assess their types conditional on that behavior. However, after observing d=0 investors would choose a=0 since they would expect zero return from a non-prosocial entrepreneur. Anticipating this reaction, non-prosocial entrepreneurs would have incentives to deviate by choosing d>0, defeating the separating equilibrium under analysis. The first lesson of this simple model is that to attain a separating equilibrium, non-prosocial entrepreneurs who choose d=0 would have to expect a positive transfer from the investor. This could only happen if prosocial investors were altruist players (or inequality averse individuals) who enjoy trusting even when they expect r=0.[5]

Different kinds of social preferences have been found to affect play in the trust game (Ashraf et al., 2006; Cox, 2004; Fehr, 2009). To understand how they affect separating equilibria, we introduce altruistic or, for that matter, inequality averse investors, who enjoy not only giving donations but also placing trust in entrepreneurs from which they expect zero return. We call them prosocial investors. In addition we include social investors, who enjoy placing trust only when they expect the entrepreneur to be trustworthy. We assume that these social investors do not derive non-pecuniary payoffs from donating. Finally, we assume non-social investors, who lack any kind of social preferences. As for entrepreneurs, we incorporate prosocial, social and non-social entrepreneurs. Prosocial entrepreneurs enjoy donating and reciprocating

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[5] It is worth noting that in this game the parametric conditions for a positive transfer are less demanding for d=0 than for d>0 regardless of whether the investor is prosocial or not. The reason is that positive donations lead *ceteris paribus* to lower expected payoffs for the investors as there is less money available to split.

investors who placed trust on them. Social entrepreneurs on the other hand, do not earn extra payoffs from donating but enjoy reciprocating an investor who transferred them money. Non-social entrepreneurs enjoy neither donating nor reciprocating. These assumptions lead to the following utility functions of prosocial (P), social (S) and non-social (N) investors: $U_I^P (a, r, d) = (1-a) + 3ra(1-d) + T^P(a,r) + D(a,d)$, $U_I^S (a, r, d) = (1-a) + 3ra(1-d) + T^S(a,r)$, and $U_I^N(a, r, d) = (1-a) + 3ra(1-d)$. The possible values of the actions are: $a \in \{0, a_L, a_H\}$; $d \in \{0, d_L, d_H\}$; $r \in \{0, r_L, r_H\}$.

For prosocial investors, the utility derived from trusting depends only on the amount transferred to the entrepreneur: $T^P(0,r)=0$; $T^P(a_L,r)=T_L$; $T^P(a_H,r)=T_H$ for all values of r. This means that the utility of placing trust is not does not depend on the amount investors expect the entrepreneur to return. This is not the case for social investors. These investors get utility from trusting but the disutility associated with r=0 cancels this effect, so they get zero utility from trusting if r=0. They only get T>0 if they are reciprocated: $T^S(a_H,r_H)= T^S(a_L,r_H)=T_H$; $T^S(a_H,r_L)= T^S(a_L,r_L)=T_L$; $T^S(a_H,0)= T^S(a_L,0)=0$.

For investors (as well as for entrepreneurs), the utility of the donation depends on the size of the donation announced by the entrepreneur and on "a" because if the investor does not send money then the entrepreneur cannot donate: $D(0,d)=0$; $D(a, d_L)=D_L$; $D(a, d_H)=D_H$.

The utility functions of prosocial, social and non-social entrepreneurs are as follows: $U_E^P (a, r, d) = 3(1-d)(1-r)a + D(a,d) + R^P(a,r)$, $U_E^S (a, r, d) = 3(1-d)(1-r)a + R^S(a,r)$, and $U_E^N (a, r, d) = 3(1-d)(1-r)a$. For prosocial and social entrepreneurs, the utility from reciprocating is zero when the investor sends a zero transfer $R^P(0, r)= R^S(0, r)=0$. Given any positive transfer, the utility of reciprocity depends on the amount returned to the investor: $R^P(a, r_H)=R^P_H$, $R^P(a, r_L)=R^P_L$, $R^S(a, r_H)=R^S_H$, $R^S(a, r_L)=R^S_L$.

We distinguish between the necessary conditions for separating equilibria and those that enhance them. The separating equilibria of interest are those in which the level of donation reveals the social type of the entrepreneur. In a companion paper that is available upon request, we investigate the conditions for a separating equilibrium in which prosocial, social and non-social entrepreneurs choose d_H, d_L and d=0 respectively at the first node and r_H, r_L and r=0 at the last one. Prosocial, social and non-social investors transfer a_H, a_L and a=0 after d_H. After d_L, all types send a_L and after d=0 only prosocial investors send a_L.

Investors and entrepreneurs will have incentives to conform to this signaling equilibrium if the following requirements are met. First, prosocial investors must be willing to trust even when they expect zero monetary return (namely, $T_L > a_L$) to keep non-social entrepreneurs from deviating to d_L. Second, it must be the case that the net transfer of prosocial investors should be higher for d_H than for d_L, namely, $(1-d_L)a_L > (1-d_H)a_H$ (this keeps social entrepreneurs investors from deviating to d_H). Third, for prosocial entrepreneurs to respond with a_H after d_H and a_L otherwise, is that the neto return after d_H should be higher than the neto

return after d_L ($r_H(1-d_H) > r_L(1-d_L)$). Fourth, the play of r_H by investors can only happen if entrepreneurs derive higher utility from reciprocation after r_H than after r_L.

The model presented in this section accounts for the fact that prosocial behavior may help entrepreneurs signal trustworthiness to investors. Furthermore, it captures an aspect that has been neglected in the literature, namely that this signaling activity is costly for both parties. The equilibrium analysis of the game shows that the higher the size of donation, the smaller the incentives of the investors to confirm to the separating equilibrium. This is particularly critical for social investors, who only care for trustworthiness and not for donations. Because of this effect, social entrepreneurs have incentives to announce d_L instead of d_H. In line with these findings we formulate the following hypotheses.

H1b'. *The choice of the impact project and of the rate of spillover is perceived as a signal of trustworthiness. Investors paired with entrepreneurs who choose a higher spillover make higher transfers on average, as long as the rate is not too high since it lowers their own payoffs.*

H1c. *The choice of the impact project combined with a high enough spillover is a valid signal of trustworthiness. The higher the spillover announced by the entrepreneur the higher the share from his post-project result he returns back.*

H2a'. *In the invisibility treatment, prosocial entrepreneurs allocate on average higher rates of spillovers than less social entrepreneurs. Overall, prosocial and social entrepreneurs choose lower spillovers in the visibility treatment as the spillover is also costly for the investor. Impact washing is crowded-out by prosociality.*

2.5. Graphical representations

Figure 1 and Figure 2 present in a graphical fashion the hypotheses concerning the investor and the entrepreneur, respectively.
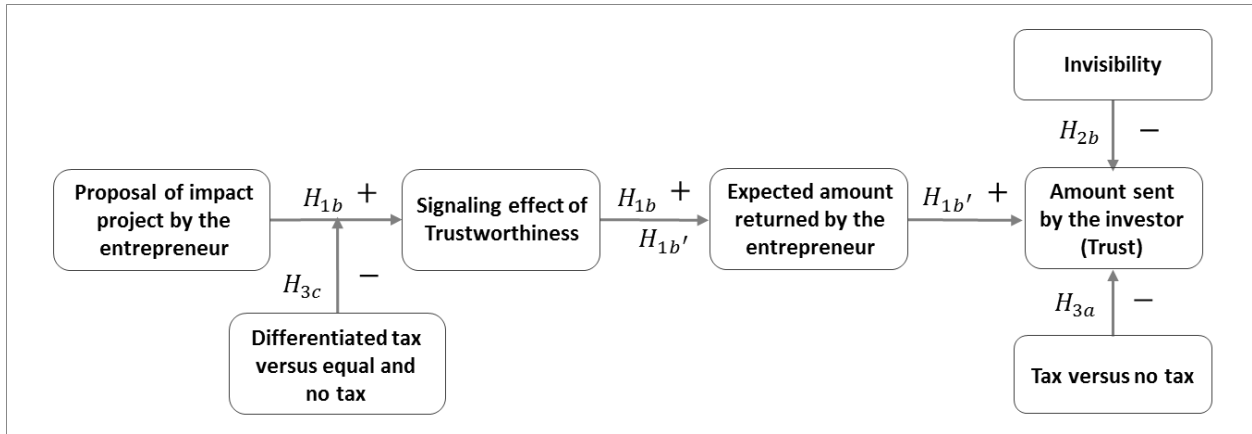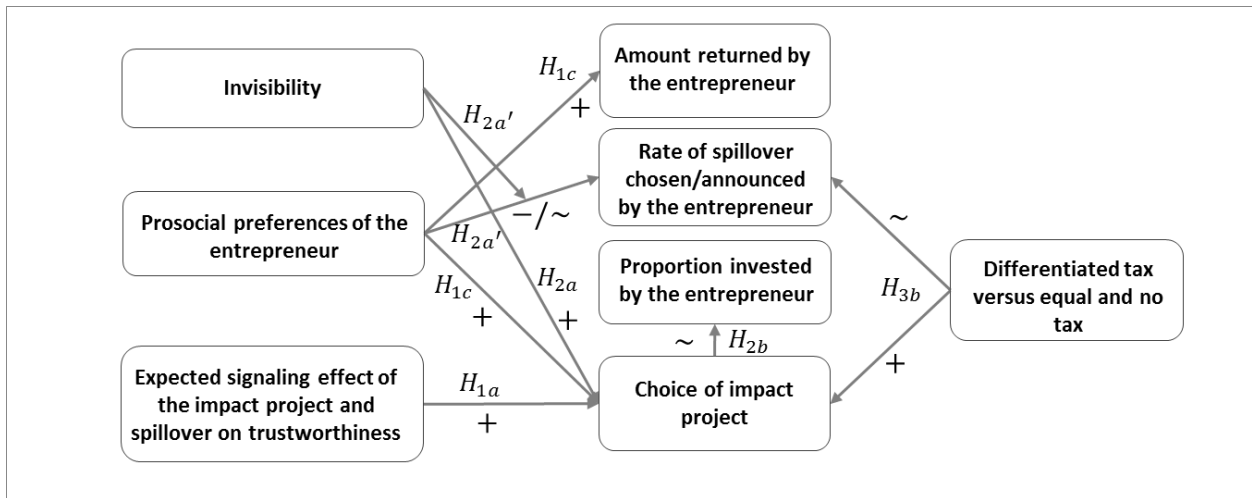
Figure 1. *Hypotheses concerning the investor*

Figure 2. *Hypotheses concerning the entrepreneur*

3. Methodology

3.1. The basic setup

The experimental framework used in this experiment is the trust-to-investment game (Boulu-Reshef et al., 2018). This dyadic sequential game extends the trust game (Berg et al., 1995) to investigate the aspect of trust in relationships between investors and entrepreneurs.

Specifically, in the trust-to-investment game, a first player (in the following: investor) receives an initial endowment of 10 ECU. The investor decides whether to transfer none, a part of, or all of this endowment to a second player (in the following: entrepreneur). The amount transferred is multiplied by three. With the

amount received, the entrepreneur has the possibility to engage in a project. He can engage none, some of or all of the money received in the project. The structure of this entrepreneurial project is based on a modified version of the risk preference elicitation measure by Gneezy and Potters (1997). With a probability of 50%, the amount of ECU engaged in the project is lost and with a probability of 50%, the money amount of ECU engaged is multiplied by four. After learning the outcome of the entrepreneurial project, the entrepreneur decides whether to return none, a share of or all of the money disposable to him after the project, to the investor.

The dynamics of the game as well as all players' payoff structures are common knowledge. The investor receives full information about the amount the entrepreneur engaged in the project, the outcome of the project and the money returned by the entrepreneur after the entrepreneur's decisions are made.

3.2. Types of projects

In the experiment, there are two types of projects. Purely financial projects are exactly those of the trust-to-investment game described in the paragraph above. Impact projects entail an additional component, which is a spillover to a social cause. This results in a real donation. The spillover is a percentage - between 1% and 100% - of the gains that will be donated in case the project is a success (and the money engaged is multiplied by four). For an impact project, entrepreneurs choose this percentage in the beginning of an interaction. After they engage money in the project and the outcome of the project is randomly drawn, this percentage is automatically deducted from the amount they receive from the project. Investors are informed about the type of project the entrepreneur proposes before making their transfer decision.

To ensure that participants reveal their true social preference about impact projects, the spillover is deducted from gains during the game and given to the association pour le droit à l'initiative économique (ADIE; https://www.adie.org/). This organization helps people who do not have regular access to credit from banks to create their own business and job.

3.3. The frameworks

All participants made interactions in five different Frameworks: In the Framework Purely Financial, entrepreneurs can only choose a purely financial project. In the Framework Impact, entrepreneurs can only choose an impact project. They are hence required to allocate at least 1% of the potential gains from the project to the social cause. In the Framework Choice, entrepreneurs are free to propose either a purely financial project or an impact project to the investor. For the Frameworks Purely Financial and Impact, the first step of choosing the type of project do not exist. In the Framework Tax, entrepreneurs can choose the type of project and there exists a tax scheme which is equal for both types. The amount the entrepreneur

received but did not invest as well as the outcome of the project was decreased by a tax rate of 20%. In the Framework Different Tax, entrepreneurs can choose the type of project and there is a tax which differs for the types of projects. For purely financial projects, both the amount not invested by the entrepreneur and the outcome of the project are decreased by a tax rate of 20% while for impact projects, only the amount not invested by the entrepreneur is decreased by this tax.

3.4. Difference between visibility and invisibility

The visibility of the spillover was varied between sessions. In the Visibility treatment, in case of an impact project, investors were informed about the exact percentage of spillover announced by the entrepreneurs before making their transfer decision. In the Invisibility treatment, investors only learned the type of project proposed by the entrepreneur before making their transfer decision. In case of an impact project, investors learn about the actual percentage of the size of the real donation in the end of an interaction, together with the information regarding the amount engaged, the outcome of the project and the amount that was returned to them.

3.5. Design and participants

The experiment is a 2x5 mixed factorial design with the between-subjects factor Visibility (Visibility / Invisibility) and the within-subjects factor Framework (Purely Financial / Impact / Choice / Tax / Different Tax). Eight sessions were conducted, of which half were Visibility sessions and half were Invisibility sessions. Within the different Frameworks, Purely Financial and Impact serve as a Baseline for the Choice Framework and Choice serves as a Baseline for the Frameworks Tax and Different Tax. Consequentially, within a session, Purely Financial and Impact were conducted first (in randomized order) and Tax and Different Tax were conducted last (in randomized order). This order also ensured the comprehension of treatments by participants and it allows for the Choice treatment to serve as a baseline for the Tax and Different Tax treatments. Table 2 summarizes the treatment order over all sessions.

Table 2. *Randomization of treatment order*

Session	Treatment	1	2	3	4	5
1	Visibility	Purely Financial	Impact	Choice	Tax	Different Tax
2	Invisibility	Purely Financial	Impact	Choice	Tax	Different Tax

3	Visibility	Purely Financial	Impact	Choice	Different Tax	Tax
4	Invisibility	Purely Financial	Impact	Choice	Different Tax	Tax
5	Visibility	Impact	Purely Financial	Choice	Tax	Different Tax
6	Invisibility	Impact	Purely Financial	Choice	Tax	Different Tax
7	Visibility	Impact	Purely Financial	Choice	Different Tax	Tax
8	Invisibility	Impact	Purely Financial	Choice	Different Tax	Tax

Each session was conducted with 16 participants which were recruited through the database of the Parisian Experimental Economics Laboratory (LEEP). There were in total 128 participants (58 women), aged 18 to 48 years ($M = 24.66$ years, $SD = 4.27$ years).

3.6. Procedure

Each session started with the participants privately reading the instructions. Then they completed additional tasks to measure their degree of risk aversion and their social value orientation. In the main part of the experiment, all subjects went through all five Frameworks in the order summarized in Table 1. Participants were assigned to the role of an investor or an entrepreneur and they kept this role throughout the entire experiment. Each Framework was played three times, so all subjects went through a total of 15 periods. Each period, participants were randomly matched with one of the players of the opposite role (stranger matching).

After completing the main experiment, the participants completed a post-experimental questionnaire (see Appendix). Subsequently, they were informed about their payoff from the risk preference task and the social value orientation task. In the end, they received an overview of the payments for these additional measures, their earnings from the main experiment and their total earnings. After indicating their gender and age, the session was ended by privately paying the participants.

Participants' final earnings depend on their payoffs in the risk aversion task, the social value orientation task and the accumulated payoffs from all periods played. During the experimental periods and in the social value orientation task, they played with experimental credit units (ECU), with 70 ECU being worth 1 EURO. Participants earned 15.66 EURO on average (Min = 11.5 EURO, Max = 24 EURO). Sessions lasted between 90 and 105 minutes.

3.7. Materials

The experiment was programmed and conducted with the experiment software Z-Tree (Fischbacher, 2007).

3.8. Additional measures

Participants' risk attitude and social value orientation are likely to influence the amount transferred by the investor as well as the amount engaged and returned by the entrepreneur. Thus, these two facets of participant heterogeneity are elicited because it allows a more precise estimation of the factors which drive behavior in the experiment.

3.8.1. Social value orientation

Before starting the main experiment, participants' social value orientation (SVO) was elicited. SVO refers to people's preference for specific allocation patterns between themselves and another person. SVO was measured using the six primary items proposed by Murphy, Ackermann and Handgraaf (2011). For each item, the participant must choose between nine possible distributions of ECU between oneself and another participant. Participants are randomly matched with a partner. For each partner, one of the six decisions is randomly drawn and payed out to the player and the partner. Participants chose their answers in the beginning and were informed of their payoff in the end of the experiment.

Each of the six item represents a trade-off between the preferred allocation corresponding to two of the four commonly used categories of SVO (altruistic, prosocial, individualistic and competitive). The mean allocation to the self and the mean allocation for the other in all item is transformed in an overall SVO score (score values: altruist > prosocial > individualist > competitor). This numerical value can be transformed into the four categories, but for the data analysis, the numerical score is used as it yields more information than the category.

3.8.2. Risk aversion

Following the completion of the SVO measure, participants' risk aversion was elicited using ten pairwise choices between lotteries as proposed by Holt and Laury (2002). Choice transitivity was forced, so for all pairs below the chosen switching point from the safe to the risky option, the program automatically chose the risky option. Risk aversion is measured by the number of safe options a participant chooses.

3.8.3. Belief elicitation

Both the investor and the entrepreneur had the possibility to earn additional ECUs by correctly predicting their partner's behavior. In the Frameworks Purely Financial and Impact, the entrepreneur was asked to predict the investor's transfer for the type of project they were forced to propose in this Framework. In the

other Frameworks, the entrepreneur was asked to predict the investor's hypothetical transfer to both types of projects. After their transfer decision, investors were asked about the amount of ECU they expected the entrepreneur to engage in the project, the amount of ECU they expected them to return in case the project makes a loss (and the amount is lost) and the amount of ECU they expected them to return in case the project makes a gain (and the amount is multiplied by four). In the Invisibility treatment, in the case of an impact project, investors were additionally asked to predict the actual percentage of the spillover that the entrepreneur would allocate to the social cause in case the project makes a gain.

Predictions were considered as correct if the absolute distance of the predicted value from the actual behavior was at most 1 ECU (for the expected spillover: 2% points). Only questions corresponding to the real state of the world (in terms of project chosen and outcome of the project) were used for payment. Participants could earn up to one ECU per period. The payment corresponded to the number of correct predictions, divided by the total number of predictions made in ECU.

4. Results
4.1. Reputational motivations and social signaling in the absence of taxation

The data of treatments without taxation is organized according to a 2x2x2 (treatment: visibility vs invisibility, project type: purely financial project vs impact project, choice of project type: yes vs no) structure. Participants' characteristics did not differ significantly between the visibility and invisibility treatments with respect to social value orientation, risk aversion, age and gender ($p > 0.1$, using a Mann-Whitney rank sum test). Results which are presented here without controlling for participants' social value orientation and risk aversion do not qualitatively change when adding these variables to the model. The Appendix presents a detailed description of the sample characteristics with respect to social value orientation and risk aversion as well as their answers to the post-experimental questions which are employed in the analysis.

Table 3 presents mean and standard deviation for decisions made by entrepreneurs and investors, separated by treatment, choice and project type. Overall, out of the 192 periods in which the entrepreneur could choose between an impact and a purely financial project, the impact project was chosen 63 times (33%), so there was no consensus regarding the preferred project type.

In total, there was 64 entrepreneurs. They each made three decisions in each framework. 39 (so 61%) made the same decision each time. 29 chose a purely financial project each three times and the 10 remaining chose an impact project each three times. 25 made one exception to their predominant choice. 8 chose an

impact project twice and a purely financial project once. 17 chose a purely financial project twice and an impact project once. Hence, also for some individual participants, the choice was not evident. Table 2 also shows that on average, entrepreneurs returned little more than the investor had transferred to them. They mostly returned less than a third of the money they had after the project.

Table 3. *Mean (SD) of main behavioral variables in frameworks without taxation, by possibility of choice, project type and treatment*

	Visibility			
	Choice (Framework Choice)		No Choice (Framework Impact/Purely Financial)	
	Impact project	Purely financial project	Impact project	Purely financial project
Number of projects	28	68	96	96
Spillover [%]	17.00 (21.12)	-	17.63 (21.22)	-
Transferred out of 10 [ECU]	5.91 (2.89)	5.69 (3.21)	5.78 (2.94)	5.75 (2.96)
Engaged [ECU]	11.65 (8.94)	12.46 (8.60)	11.46 (7.46)	11.21 (7.50)
Share Engaged [%]	66.67 (29.31)	70.00 (26.25)	67.54 (26.70)	65.35 (24.52)
Returned [ECU]	7.16 (10.29)	6.16 (7.83)	5.56 (7.43)	7.94 (10.83)
Share Returned [%]	21.17 (20.92)	20.28 (21.40)	28.36 (25.26)	25.01 (23.20)
	Invisibility			
	Choice (Framework Choice)		No Choice (Framework Impact/Purely Financial)	
	Impact project	Purely financial project	Impact project	Purely financial project
Number of projects	35	61	96	96
Spillover [%]	23.46 (27.12)	-	23.89 (26.92)	-
Transferred out of 10 [ECU]	5.19 (3.38)	5.65 (3.17)	5.65 (3.19)	5.56 (2.99)
Engaged [ECU]	12.33 (9.58)	10.30 (8.44)	10.10 (8.44)	10.49 (7.52)
Share Engaged [%]	69.80 (31.70)	68.50 (30.20)	59.08 (30.80)	64.61 (29.66)

Returned [ECU]	5.54 (8.82)	5.83 (7.63)	5.73 (7.22)	5.97 (8.12)
Share Returned [%]	25.98 (26.33)	21.47 (21.19)	35.03 (30.30)	26.09 (26.41)

Note. The share returned is the amount entrepreneurs returned divided by the amount they held after the gain or loss in the project and in case of an impact project, after the donation. It excludes entrepreneurs who lost all ECU in the project and thus could not return any money to the investor.

Table 4 reports the results of a logistic regression modeling how an entrepreneurs' project choice is influenced by social preferences and strategic concerns. Social preferences are measured by entrepreneurs' answers to the post-experimental question regarding their own interest in impact projects on a Likert scale from 1 to 7. Strategic concerns are measured by the per-period belief regarding the transfer they expect for each project type.

Table 4. *Logistic regression modeling the likelihood of choosing an impact project (marginal effects)*

	Choice of an impact project
Entrepreneur interest	0.091***
	(0.018)
Expected transfer to a purely financial project	-.044**
	(0.019)
Expected transfer to an impact project	0.041**
	(0.017)
Visibility treatment	-0.001
	(0.072)
Probability of an impact choice	0.286**
N	192
R^2	0.1873
$\chi^2(4)$	45. 52***

Note. *p < .05; **p < .01; ***p < .001; Standard errors are clustered at the individual level.

The results confirm Hypothesis 1a.

Result 1a. *Entrepreneurs are more likely to choose an impact project if their own interest in such projects is higher. The same is true if they expect higher transfers from the investor for impact projects. These confirm H1a. The converse relation of a decreased likelihood of choosing an impact project when a higher transfer to a purely financial project is expected is marginally significant.*

To investigate Hypotheses 1b and 1b', investors' transfers are regressed on the proposal, the presence of a choice and an interaction between these variables. The results presented in Table 5 reveal that investors do not transfer more or less to impact projects than to purely financial projects. Hence on average, the participants neither show increased interest in impact projects nor do they transfer less due to the reduction in gains. They also do not transfer more to those impact projects which were voluntarily chosen by the

entrepreneur, as captured by the non-significant coefficient on the interaction between the presence of a choice and the project type. This suggests that investors do not prefer impact projects over purely financial projects and they do not perceive the choice of an impact project as a signal of trustworthiness.

Table 5. *Tobit regression model of the amount transferred depending on chosen project type and rate of spillover.*

	Amount transferred [ECU]		Amount transferred [ECU]
Impact project	0.183 (0.666)	Rate of spillover	0.153* (0.072)
Choice Yes	-0.090 (0.386)	Quadratic rate of spillover	-0.002 (0.001)
Impact project * Choice Yes	0.076 (0.752)		
Constant	4.770*** (0.493)	Constant	4.186** (1.570)
N	576	N	124
R^2	.009	R^2	.039
$F_{(5, 571)}$	2.01	$F_{(4, 92)}$	4.17**

Note. *p < .05; **p < .01; ***p < .001; Standard errors are clustered at the individual level. The regression models control for participants' social value orientation and risk aversion.
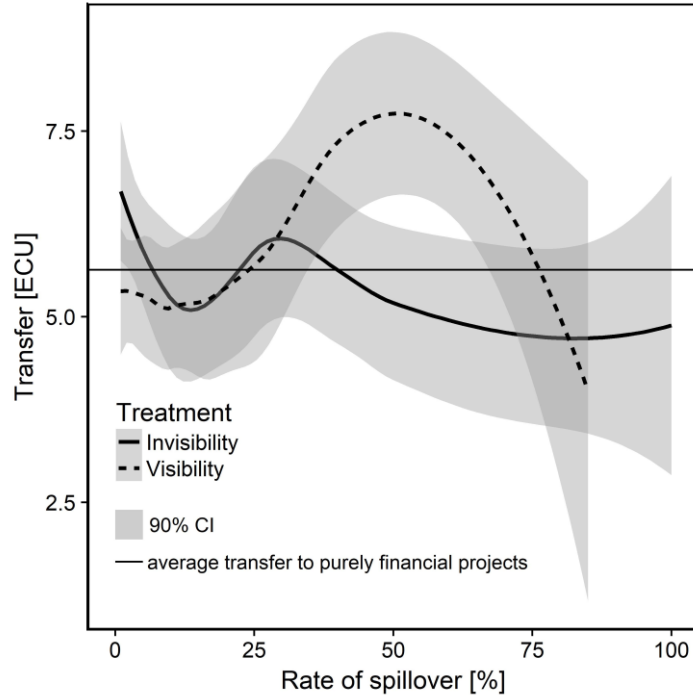
Figure 3. *Relation between announced rate of spillover and investors' transfers*

To investigate the effect of the announced spillover on investors' transfers, transfers to impact projects in the visibility treatment are regressed on the announced rate of spillover and the quadratic rate of spillover. The results presented in Table 5 suggest a non-linear relationship between the announced spillover and investors' transfers. Generally, impact projects with higher announced spillovers do receive higher transfers but the marginally significant coefficient on the squared spillover is negative, indicating that too high spillovers decrease the transfer received. This non-linear relation is depicted graphically in Figure 3. The results partially confirm Hypothesis 1b.

Result 1b. *The mere choice of an impact project does not increase transfers by signaling trustworthiness, not confirming H1b and confirming H1b'. But social signaling through the announced rate of spillover increases transfers from investors at low levels of spillover.*

On average, entrepreneurs returned $M = 2.13$ ($SD = 3.15$) to the investor in case the project made a loss and $M = 9.72$ ($SD = 9.87$) in case it made a gain. To investigate whether entrepreneurs' choices are a valid signal of trustworthiness, the amount returned in the Framework Choice is regressed on the amount held after the project and the chosen project type. Table 6, column (1) shows that entrepreneurs choosing an impact project did not return more of the money held after the project (which still includes the amount donated) to the investor. Table 5, column (2) shows that entrepreneurs who chose higher donations did not

return more to the investor in absolute terms. But the rate of spillover, which decreases the amount that can be possible returned, also does not decrease returns to the investor. This indicates that entrepreneurs pay the donation "out of their own pocket". This behavior is visible in Figure 4 – while donations made from the gains of impact projects decrease the money available to split between the investor and the entrepreneur, they do not decrease the amount returned. Hence, they increase the share returned of the money available to the investor after the donation.

Table 6. *Regression model of the amount returned depending on the chosen project type and rate of spillover.*

	Amount returned [ECU]		
Amount after project	0.184*** (0.020)	0.218*** (0.022)	
Impact project	0.429 (0.832)		
Amount after donation			0.233*** (0.023)
Rate of spillover		0.024 (0.028)	0.053* (0.025)
Visibility treatment		2.399 (1.444)	2.127 (1.397)
Rate of spillover * Visibility Treatment		-0.078 (0.059)	-0.056 (0.042)
Constant	0.177 (0.493)	-1.401 (0.948)	-1.840* (0.908)
N	192	63	63
R²	.607	.735	.750
χ^2	179.418*** (*df* = 2)	83.568*** (*df* = 4)	87.213*** (*df* = 4)

Note. *p < .05; **p < .01; ***p < .001; Standard errors are clustered at the individual level.
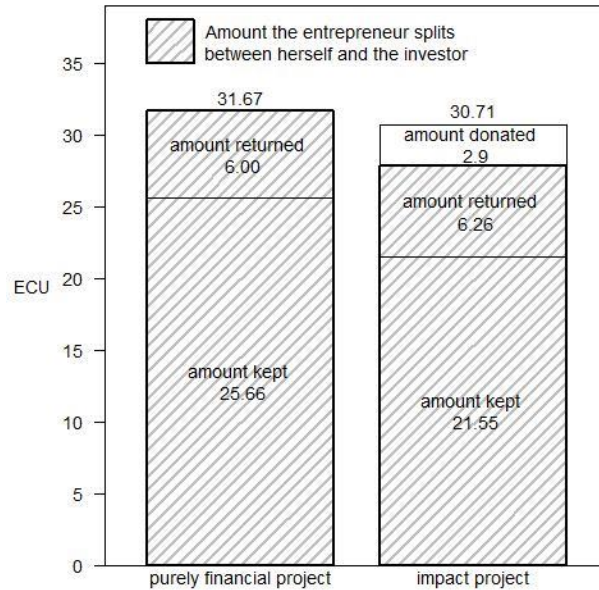
Figure 4. *Allocation of the ECU available to the entrepreneur after the project*

Table 6, column (3) shows that out of the amount available after the donation, entrepreneurs who had chosen a higher rate of spillover return more to the investor than those who had chosen a lower rate. Overall, entrepreneurs who had chosen a purely financial project return 18.96% of the money available to split after the project. Entrepreneurs who had chosen an impact project returned 22.50% of the money available to split after the project and a higher chosen rate of spillover of 10% points corresponds to a higher return of 0.53 ECU to the investor.

In sum, this partially confirms Hypothesis 1c.

Result 1c. *Entrepreneurs who chose an impact project do not return a higher amount to the investor in absolute terms. But entrepreneurs choosing to donate do so out of their own pocket, resulting in a less unequal distribution of the gains of the project. Additionally, a higher chosen rate of spillover increases the amount returned out of the money available after the donation and therefore is a valid signal of trustworthiness. Result 1c partly validates H1c and unpacks the mechanism underlying this hypothesis.*

Strategic concerns on the entrepreneur's side could also be visible by choosing more impact projects in the Invisibility Treatment, where "impact washing" is possible. In this treatment, entrepreneurs could propose an impact project with a 1% rate of spillover while the investor only knows that it is an impact project. Table 5 shows that entrepreneurs do not choose impact projects more often in the Invisibility Treatment than in the Visibility Treatment. Moreover, among voluntarily chosen impact projects, spillover rates are not lower under Invisibility than under Visibility ($M_{Invisibility} = 23.46\%$, $M_{Visibility} = 17.00\%$; $p = .52$ using a Mann-Whitney rank sum test). In sum, this does not confirm hypothesis 2a.

Result 2a. *Entrepreneurs do not attempt to "impact wash" their projects by obtaining the label of an impact project and choosing a lower level of spillover when the spillover is not visible to the investor before the transfer decision is made, not confirming H2a.*

Furthermore, there is no difference between treatments regarding the share engaged by the entrepreneur in the impact project ($M_{Invisibility} = 61.93\%$, $M_{Visibility} = 67.34\%$; $p = .21$ using a Mann-Whitney rank sum test). Therefore, hypothesis 2b is not supported.

Result 2b. *There is no difference between treatments regarding the share engaged by the entrepreneur in the impact project, supporting H2b.*

4.2. Extrinsic motivations in the presence of taxation

Table 7 reports descriptive statistics of behavior in the presence of taxes. The data of treatments with taxation is organized according to a 2x2x2 (treatment: visibility vs invisibility, project type: purely financial project vs impact project, Framework: tax vs different tax; choice of project type is always available) structure. Table 6 presents mean and standard deviation for decisions made by entrepreneurs and investors, separated by treatment and project type. In the visibility treatment with tax, out of 96 periods in which the entrepreneur could choose between an impact and a purely financial project, the impact project was only chosen 23 times, which shows that purely financial projects are preferred when projects are taxed. When taxes are different across project types, impact projects and purely financial projects are equally selected by entrepreneurs.

Table 7. *Mean (SD) of main behavioral variables in frameworks with taxation by project type and treatment*

| | Visibility | | | |
| | Tax | | Different tax | |
	Impact project	Purely financial project	Impact project	Purely financial project
Number of projects	23	73	49	47
Spillover [%]	9.35 (9.35)	-	15.36 (22.44)	-
Transferred out of 10 [ECU]	5.34 (3.40)	4.63 (3.55)	5.17 (3.39)	5.17 (3.45)
Engaged [ECU]	10.45 (7.96)	9.69 (8.39)	12.25 (8.99)	11.04 (9.82)
Share Engaged [%]	67.29 (27.37)	71.01 (30.45)	80.81 (24.03)	71.56 (33.32)

	5.74 (8.27)	3.68 (7.35)	5.90 (10.31)	4.03 (7.15)
Returned [ECU]	5.74 (8.27)	3.68 (7.35)	5.90 (10.31)	4.03 (7.15)
Share Returned [%]	19.87 (16.28)	18.22 (21.58)	20.76 (15.30)	16.95 (22.33)

	Invisibility			
	Tax		Different tax	
	Impact project	Purely financial project	Impact project	Purely financial project
Number of projects	35	61	54	42
Spillover [%]	20.1 (28. 37)	-	15.73 (24.50)	-
Transferred out of 10 [ECU]	5.9 (3.92)	5.20 (3.64)	5.05 (3.27)	5.13 (3.52)
Engaged [ECU]	12.38 (10.75)	11.77 (10.27)	10.85 (9.52)	9.46 (7.77)
Share Engaged [%]	71.15 (33.08)	72.89 (31.78)	71.04 (34.80)	62.99 (30.63)
Returned [ECU]	5.92 (9)	4.32 (6.88)	3.63 (5.85)	5.13 (5.95)
Share Returned [%]	21.21 (19.32)	26.23 (29.42)	24.48 (2720)	24.23 (25.84)

Note. The share returned is the amount entrepreneurs returned divided by the amount they held after the gain or loss in the project and in case of an impact project, after the donation. It excludes entrepreneurs who lost all ECU in the project and thus could not return any money to the investor.

The effect of taxation on behavior is investigated in a context in which both investors and entrepreneurs know that there are frameworks in which no tax is implemented, as in reality, in which investors and entrepreneurs account for fiscal differences when deciding on the type of investments and the types of ventures they wish to pursue, respectively. The amount transferred by investors in the treatments in which a tax is implemented is statistically significantly lower than in the treatments in which no tax is implemented (with a p-value of 0.0359 using a Mann-Whitney rank sum test). The amount transferred by investors in the treatments in which a tax is implemented is statistically significantly lower than in the treatments in which no tax is implemented (with a p-value of 0.0359 using a Mann-Whitney rank sum test). Furthermore, there is no additional effect of visibility on the amount transferred by investors when comparing the visibility tax treatments with the no visibility tax treatments (with a p-value of 0.5461 using a Mann-Whitney rank sum test).

Result 3a. *Taxation reduces the amount transferred by the investor, validating H3a. Furthermore, there is no additional effect of visibility on the transfers in the tax treatments.*

The hypothesis that entrepreneurs are more likely to choose the impact project and announce on average lower spillovers in the different tax and visibility treatment compared to both the tax treatment and the no tax treatment is tested in the following way. Table 8 reports the results of a logistic regression modeling on how an entrepreneurs' project choice is influenced by the presence or absence of a tax as well as strategic concerns. As in Table 3, strategic concerns are measured by the per-period belief regarding the transfer they expect for each project type.

Table 8. *Logistic regression modeling the likelihood of choosing an impact project (marginal effects)*

	Choice of an impact project		Choice of an impact project
Treatment: Different tax	0.207*** (0.049)	Treatment: Different tax	0.277*** (0.048)
Expected transfer to a purely financial project	-0.074*** (0.022)	Expected transfer to a purely financial project	-0.102*** (0.024)
Expected transfer to an impact project	0.074*** (0.023)	Expected transfer to an impact project	0.097*** (0.024)
Probability (Choice of an impact project in the Choice treatment)	0.387	Probability (Choice of an impact project in the Tax treatment)	0.349
N	384	*N*	384
R²	0.0647	*R²*	0.1120
$\chi^2(4)$	33.47***	$\chi^2(4)$	56.93***

Note. *p < .05; **p < .01; ***p < .001; Standard errors are clustered at the individual level.

The results confirm Hypothesis 3b. The different tax treatment increases the likelihood of choosing an impact project compared to the choice treatment as well as the tax treatment. The same is true if they expect higher transfers from the investor for an impact projects. The converse relation of a decreased likelihood of choosing an impact project when a higher transfer to a purely financial project is expected is significant. Thus, the choice of an impact project is driven at least partially by expectations of the investors' behavior by the entrepreneurs. The rate of spillover for the impact projects in the different tax and visibility treatment (M = 15.36, SD = 22.33) is not statically different from the rate of spillover for the impact projects in the choice treatment with visibility and no tax (M = 17.00, SD = 21.12) and from the one for the impact projects in the tax and visibility treatment (M = 9.35, SD = 9.24). This suggests that entrepreneurs, while choosing more frequently impact projects, do not increase their rate of spillover in the different tax treatment to signal trustworthiness. These lead to the following result.

Result 3b. *In the differentiated tax and visibility treatment, entrepreneurs choose more impact projects and announce spillovers that are maintained relative to the ones in the Choice No tax treatment, validating H3b.*

4.3. Social value orientation, risk aversion and gender

Social value orientation measures range from -16.26 to 61.39 with a mean of 20.56 and a standard deviation of 15.13. As explained in Murphy et al. (2011), "altruists would have an angle greater than 57.15°; prosocials would have angles between 22.45 and 57.15°; individualists would have angles between –12.04° and 22.45°; and competitive types would have an angle less than –12.04°". Thus our sample is composed mainly of prosocials and individualists. There are positive correlations between social value orientation score and transfer decisions with r=0.23 and a p-value of 0.00, between social value orientation score and spillover decisions with r=0.07 and a p-value of 0.02 and between social value orientation score and return decisions with r=0.08 and a p-value of 0.00. Such positive correlations suggest that individuals' social preferences impact their decisions in the experiment. To further deepen the documentation of these relationship, we report in Table 9 the means and standard deviations for the four social value orientation types. The results show that prosocial players choose higher transfers, higher spillovers and higher returns.

Table 9. *Decisions by Social Value Orientation Types*

Player	Decision	Competitors	Individualists	Prosocials	Altruists
Investors	N	1	33	30	0
	Transferred [ECU]	4.46 (1.18)	4.98 (3.24)	5.99 (3.22)	-
Entrepreneurs	N	2	29	32	1
	Size of the spillover	18.14 (14.63)	15.88 (24.33)	21.89 (24.16)	2.27 (.78)
	Share engaged (in %)	89.71%	67.32%	66.79%	82.14%
	Returned [ECU]	3.63 (6.65)	4.58 (6.31)	6.58 (9.36)	5.76 (12.35)

Table 10 reports the spillover decision of players whose social value orientation score is below or above the mean score and by treatment.

Table 10. *Spillover decisions by Social Value Orientation profile and treatment*

Player	Below mean SVO	Above mean SVO
No visibility	17.61 (29.95)	24.21 (23.24)
Visibility	13.73 (13.53)	17.31 (23.62)

The statistical significance of these results is reported in Table 11. In the no visibility treatment, spillover decisions of players with higher than the mean social value orientation score are above those of players with lower than the mean score. In the visibility treatment, this difference is not statistically different. Across visibility conditions, spillover decisions are higher in the no visibility treatments for both social value orientation profiles. These results suggest that social value orientation has the expected effect of being associated to more pro-social decisions and that under the veil of invisibility, players with higher social value orientation dare increasing spillover while they refrain from doing so when such costly pro-social decisions are visible to the investors.

Table 11. *Statistical significance of differences across SVO profile and across treatment of spillover decisions*

Comparison	Effect	P-value
No visibility – Below mean SVO vs above mean SVO	Below < Above	0.0000
Visibility – Below mean SVO vs above mean SVO	No difference	0.5347
Below mean SVO – Visibility vs No visibility	Visibility < No visibility	0.0624
Above mean SVO – Visibility vs No visibility	Visibility < No visibility	0.0003

Result 4. *Visibility mediates the impact of social value orientation on spillover decisions made by players in the experiment, validating H2a.*

Risk aversion is neither correlated with transfer decision (with $r=0.01$ with a p-value=0.63), nor with the size of the spillover (with $r=0.01$ and a p-value=0.86), nor the share engaged in the chosen project (with $r=-0.01$ and a p-value=0.77). Using Mann-Whitney test, the same holds, with p-value of 0.46, 0.41 and 0.15, respectively. The return decision is disregarded as it implies no risk.

Gender, using Mann-Whitney tests, has no impact on the size of the spillover (p-value=0.52) and on the return decision (p-value=0.87). However, it has a borderline significant effect on the transfer decision which is that women transfer more than men (p-value=0.07). This effect does not hold when players are transferring funds to impact projects (p-value=0.39) but it holds when transferring for purely financial projects (p-value=0.00). Gender also impacts the share engaged in the chosen project which is that women engage less in the projects than men as well as (p-value=0.00). This effect does not hold when players are engaging funds to impact projects (p-value=0.14) but it holds when engaging for purely financial projects (p-value=0.00).

5. Concluding comments

Trust is essential for dealing with uncertainty and asymmetric information problems common in entrepreneur-investor relationships (Cable and Shane 1997; Sapienza and Korsgaard, 1996). It economizes monitoring costs and the need of controls thereby reducing the possibility of conflict and increasing the likelihood of a mutually beneficial exchange (Shepherd and Zacharakis, 2001). In this paper we set out to investigate the conditions under which the choice of a costly signal in the form of a positive donation to an impact project can enhance trust between investors and entrepreneurs.

The literature on reciprocity and pro-social behavior underscore the importance of reputational concerns besides intrinsic and extrinsic motives and provides the conditions under which trust can emerge in a population of altruistic and non-altruistic types (Glazer and Konrad, 1996; Bénabou and Tirole, 2006; Andreoni and Bernheim 2007; Ellingsen and Johannesson 2007, 2008; Ariely et al., 2009). The main idea is that individuals that incur the cost of pro-social behavior signal a disposition to engage in altruistic behavior, cooperate and reciprocate thereby increasing their prospects of beneficial interactions. Under appropriate parametric conditions, for instance when altruistic trustors are more inclined to trust than selfish trustors, there is a separating equilibrium in which trust is a reliable signal of altruism (Ellingsen and Johannesson, 2008).

Experimental evidence provides support for models showing that individuals who behave in a pro-social manner are believed to be more trustworthy, receive higher transfers and send higher amounts back (Fehrler and Przepiorka, 2013). We contribute to this literature by investigating the extent to which the commitment by an entrepreneur to invest in an impact project when a conventional investment is also available affects the trust placed by the investor. We find that, once the trade-off between a purely financial project and an impact project is made available to entrepreneurs, entrepreneurs signal trustworthiness by choosing the impact project to attract investors, a decision that is corresponded with higher average transfers. We find corollary results, in particular, that a higher chosen rate of spillover increases the proportion returned out of the money available after the donation, confirming that the spillover is an effective signal of trustworthiness.

In our design entrepreneurs make two decisions with the potential to signal trustworthiness, namely the choice of project and the size of the spillover. Since the impact project only requires a positive spillover, it is a rather cheap signal. So it is mainly the rate of spillover that can affect the resources available to transfer back to the investor. Our study shows that when the spillover is visible pro-social entrepreneurs do not increase the announced rate of spillovers expecting investors to be concerned about these resources. Most interestingly, in the presence of tax, entrepreneurs internalize that a too high spillover could scare away

investors and therefore compensate the imposition of the tax by choosing more often impact projects and by concomitantly maintaining the amount of the spillover.

Finally our findings confirm the existence of a trade-off between financial and psychic returns and a predisposition to trust conditioned on beliefs regarding the behavior of other players as presupposed in evolutionary models of social norms (Beal et al., 2005; Gintis et al., 2001; Bicchieri, 2006). The main reason for conditional behavior is that subjects with an unconditional disposition to trust would be easily exploited by others. In sum, our study attests to the fact that costly signals may enhance the trust between investors and entrepreneurs and confirms the view that extrinsic incentives, such as taxes, may interact with the signaling effects of pro-social investment reducing trust.

References

Ackermann, H., Fochmann, M., and Mihm, B. (2013). Biased effects of taxes and subsidies on portfolio choices. *Economics Letters*, 120, 23–26.

Albert, M., Güth, W., Kirchler, E., and Maciejovsky, B. (2007). Are we nice(r) to nice(r) people? An experimental analysis. *Experimental Economics*, 10, 53–69.

Andreoni, J. 1989. Giving with impure altruism: Applications to charity and Ricardian Equivalence. *Journal of Political Economy*, 97(6), 1447-1458.

Andreoni, J. and Bernheim, B. D. 2007. "Social Image and the 50-50 Norm: A Theoretical and Experimental Analysis of Audience Effects." Unpublished.

Ariely, D., Bracha, A. and Meier, S. 2009, Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially, *American Economic Review* 99, 544-555.

Arrow, Kenneth J. 1971. "A Utilitarian Approach to the Concept of Equality in Public Expenditure," *The Quarterly Journal of Economics*, 85(3): 409–15.

Ashraf, N., Bohnet, I., and Piankov, N. (2006). Decomposing trust and trustworthiness. *Experimental Economics*, 9(3), 193–208.

Barclay, P. (2004). Trustworthiness and competitive altruism can also solve the "tragedy of the commons". *Evolution and Human Behavior*, 25, 209–220.

Bauer, Rob and Paul Smeets, 2015, Social identification and investment decisions, *Journal of Economic Behavior and Organization* 117, 121-134.

Bénabou, Roland, and Jean Tirole, 2006, Incentives and prosocial behavior, *American Economic Review* 96, 1652–1678.

Ben-Ner, A., and Halldorsson, F. (2010). Trusting and trustworthiness: What are they, how to measure them, and what affects them. *Journal of Economic Psychology*, 31, 64–79.

Berg, J., Dickhaut, J., and McCabe, K. (1995). Trust, reciprocity, and social-history. *Games and Economic Behavior*, 10(1), 122–142.

Bicchieri, C. 2006. *The Grammar of Society: the Nature and Dynamics of Social Norms*, New York: Cambridge University Press.

Bohnet, I., Greig, F., Herrmann, B., and Zeckhauser, R. (2008). Betrayal aversion: Evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States. American Economic Review, 98, 294–310.

Béatrice Boulu-Reshef, Adrian Calmettes, Klodiana Istrefi, Sofiia Mun, Romain Pfau and Luise Rohland (2018) The trust-to-investment game: An experimental framework for entrepreneurship research, *in progress*.

Cable, D. M. and Shane, S., 1997, A prisoner's dilemma approach to entrepreneur venture capitalist relationships. *Academy of Management Review*, 22, 142–176.

Coleman, J. (1990). *Foundations of Social Theory*, Cambridge, MA: Belknap.

Costa-Gomes, M.A., Huck, S. and Weizsäcker, G. 2014. Beliefs and actions in the trust game: Creating instrumental variables to estimate the causal effect. *Games and Economic Behavior*, (88), 298-309.

Cox; J.C. 2004. How to identify trust and reciprocity. *Games and Economic Behavior*, 46, 260-281.

Dacin, M. T., Dacin, P. A., & Tracey, P. (2011). Social Entrepreneurship: A Critique and Future Dire. *Organization Science*, 22(5), 1203–1213.

Dufwenberg, M. and Kirchsteiger, G. (2004).A theory of sequential reciprocity. *Games and Economic Behavior*, *47*, 268–298

Ellingsen, T. and Johannesson, M. 2008, Pride and prejudice: The human side of incentive theory, *American Economic Review* 98, 990-1008.

Eurosif. (2016). *European SRI study*. https://doi.org/10.1080/14634980802171106.

Falk, A. and Fischbacher. U. 2006. "A Theory of Reciprocity." *Games and Economic Behavior*, 54(2): 293–315.

Fehr, E. (2009). On the economics and biology of trust. *Journal of the European Economic Association*, 7(2–3), 235–266.

Fehr, E. and Schmidt, K. 2003. "Theories of Fairness and Reciprocity—Evidence and Economic Application." In Advances in Economics and Econometrics - 8th World Congress, Econometric Society Monographs, ed. M. Dewatripont, L. P. Hansen, and S. J. Turnovsky, 208–57. Cambridge: Cambridge University Press.

Fehrler, S. and Przepiorka, W. 2013, Charitable giving as a signal of trustworthiness: Disentangling the signaling benefits of altruistic acts, *Evolution and Human Behavior* 34, 139-145.

Finucane, M. L., Alhakami, A., Slovic, P., and Johnson, S. M. 2000. The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13, 1–17.

Fochmann, M., Kiesewetter, D., Sadrieh, A. 2012. Investment behavior and the biased perception of limited loss deduction in income taxation. *Journal of Economic Behavior and Organization*, 81, 230-242.

Fochmann, M., Hemmerich, K. 2014. Real tax effects and tax perception effects in decisions on asset allocation. Arqus Discussion paper no. 156.

Fochmann, M., Hemmerich, K. Kiesewetter, D. 2016. Intrinsic and extrinsic effects on behavioral tax biases in risky investment decisions. *Journal of Economic Psychology*, 56, 218-231.

Fochmann, M., Hewig, J., Kiesewetter, D., and Schüßler, K. (2014). Affective reactions influence investment decisions: Evidence from a laboratory experiment with taxation. Arqus Discussion paper no. 160.

Global Impact Investing Network's eighth Annual Impact Investor Survey
https://thegiin.org/assets/2018_GIIN_AnnualSurvey_ExecutiveSummary_webfile.pdf

Gintis, H., Smith, E. A., and Bowles, S. (2001). Costly signaling and cooperation. *Journal of Theoretical Biology*, 213, 103–119.

Glazer, Amihai, and Kai A. Konrad, 1996, A signaling explanation for charity, *American Economic Review* 86, 1019-1028.

Gneezy, U., & Potters, J. (1997). An Experiment on Risk Taking and Evaluation Periods. *Quarterly Journal of Economics*, 112(2), 631–645.

Hardin, R. (2002). *Trust and trustworthiness*. New York: Russell Sage.

Harji, K., and Jackson, E. T. (2012). *Accelerating Impact: Achievements, Challenges and What's next in building the Impact Investing Industry*. The Rockefeller Foundation.

Höchstädter, A. K., & Scheck, B. (2015). What's in a Name: An Analysis of Impact Investing Understandings by Academics and Practitioners. *Journal of Business Ethics*, 132(2), 449–475.

Holt, C. A., & Laury, S. K. (2002). Risk aversion and incentive effects. *American Economic Review*, 92(5), 1644–1655.

Houser, D., Schunk, D., and Winter, J. (2010). Distinguishing trust from risk: An anatomy of the investment game. *Journal of Economic Behavior and Organization*, 74(1–2), 72–81.

Johnson, N.D., Mislin, A.A. 2011. Trust games: A meta-analysis. *Journal of Economic Psychology*, 32, 865-889.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., and Welch, N. 2001. Risk as feelings. *Psychological Bulletin*, 127, 267–286.

McCabe, Kevin A., Mary L. Rigdon, and Vernon L. Smith. 2003. "Positive Reciprocity and Intentions in Trust Games." *Journal of Economic Behavior and Organization*, 52(2): 267–75.

Murphy, R.O., Ackermann, K.A., Handgraaf, M.J.J. 2011. Measuring Social Value Orientation. *Judgment and Decision Making*, 6(8), 771-781.

Nilsson, J. 2008. Investment with a conscience: Examining the impact of pro-social attitudes and perceived financial performance on socially responsible investment behavior. *Journal of Business Ethics*, 83,307-325.

Ostrom, E., and Walker, J. (2003). (eds.), *Trust and Reciprocity*. New York: Russell Sage.

Rabin, M., 1993. Incorporating fairness into game theory and economics. *American Economic Review*. 83, 1281–1302.

Riedl, A. Smeets, P. (2017). Why do investors hold socially responsible mutual funds? *Journal of Finance*, 72(6), 2505-2550.

Rotter, J. (1980). Interpersonal trust, trustworthiness and gullibility. *American Psychologist*, *35*, 1–7.

Sliwka, Dirk. 2007. Trust as a Signal of a Social Norm and the Hidden Costs of Incentive Schemes. *American Economic Review*, 97(3): 999–1012.

Sugden, R. (2000). The Motivating Power of Expectations. In J. Nida-Rumelin and W. Spohn (eds.), *Practical Rationality, Rules, and Structure* (Theory and Decision Library), Dordrecht: Kluwer.

Williamson, O. E. (1993). Calculativeness, trust and economic organization. *Journal of Law and Ethics*, *36*, 453–486.

Appendix – Post-Experimental Questionnaires *Questionnaire for Investors*

On a scale from 1 (strongly disagree) to 7 (strongly agree), please rate your opinions on the following statements:

I think type 2 players who choose an impact project do so because they are really interested in such projects.
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that type 2 players who choose an impact project are more reliable/trustworthy (i.e. they will return a larger proportion of the money) than those who choose a purely financial project.
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that Type 2 players who choose an impact project do so to be perceived as more reliable/trustworthy (i.e. they will return a larger proportion of the money) than those who choose a purely financial project.
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that type 1 players who transfer money to an impact project expect lower returns on investment than those who transfer money to a purely financial project.
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that type 2 players who choose an impact project in the Choice + Different Tax framework (with a reduced tax for impact projects) are more trustworthy (i.e. they are more reliable by sending back more money).
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

In cases where you have transferred money to an impact project, what percentage of the earnings would you have liked the Type 1 player to allocate to the social cause?
$$1\% - 100\%$$

Questionnaire for Entrepreneurs

If and when you chose a purely financial project, why did you do it?

_____

_____

_____

If and when you chose an impact project, why did you do it?

_____

_____

_____

On a scale of 1 (strongly disagree) to 7 (strongly agree), please rate your opinions on the following statements:

I chose an impact project because I am really interested in such projects.

$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I chose an impact project because I want to be perceived as more reliable/trustworthy (i.e. I will return a larger portion of the money).

$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

In the Choice + Different Tax (with a reduced tax for impact projects) box, I choose an impact project to save money.
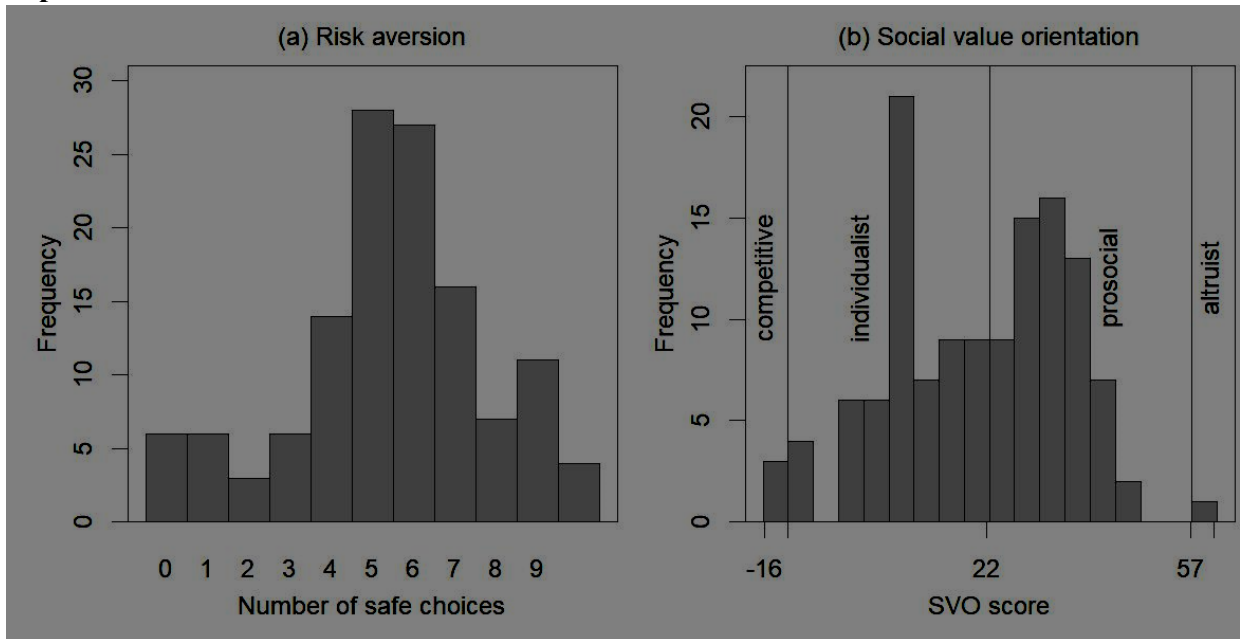
$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that type 1 players who transfer money to an impact project are willing to accept lower returns on investment than those who transfer money to a purely financial project.

$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

I think that type 1 players who transfer money to an impact project are really interested in the social cause.

$$1 - 2 - 3 - 4 - 5 - 6 - 7$$

Sample Characteristics

Participants' (a) risk aversion, measured by the number of safe choices in the Holt and Laury (2002) elicitation task and (b) social value orientation, measured by their score obtained in the SVO slider measure. For details regarding the score calculation, see Murphy et al. (2011).
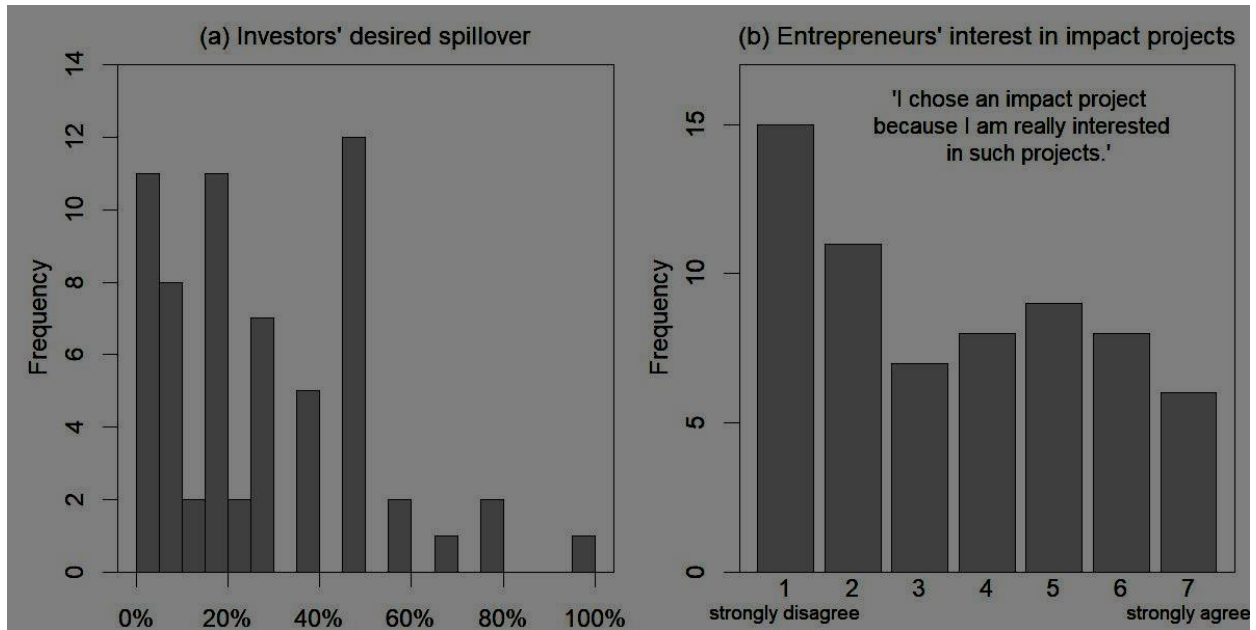
(a) Investors' answers to the post-experimental question: "When transferring money to an impact project, what percentage of the gains would you have wanted player 1 to allocate to the social cause?" and (b) Entrepreneurs' answers to the post-experimental question regarding their interest in impact projects.