An Experimental Test of Fair Contribution Mechanisms¤

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Abstract

As the results of many experiments suggest players do not evade all their endowments facing ...scal games where there is a dominant strategy to evade. Factors such as the existence of confusion, reputational considerations, altruism or fairness considerations about the ...scal system are the most common explanations of these behaviour. This paper tries to ...nd out the predictive success of alternative theories explaining contribution. In a simple public good experiment characterized as a second shot game, where reputational and confusion e¤ects are discarded, theories dealing with fairness get better results predicting the choices of the players than any other, including the altruistic ones. Assuming that each type is private information and the distribution of types is common knowledge, strategic models of fairness and altruism or theories based on psychological games with heterogenous players ...t better with the data.

1. Introduction

A recent IMF working paper[1] establishes two key points of any Tax Administration reform strategy: its political sustainability and the ability of the administration to

¤Preliminary version. Comments welcome.
[1] Silvani and Baer (1997).

promote voluntary contribution or compliance. Both points depend critically on factors such as the public's perception of the equity of the tax system, the impartiality in tax laws application and the lack of fairness of the penalty system. The ultimate goals of a successful strategy of reform are never penalizing and pursuing tax evaders but the improvement in the promotion of voluntary compliance[2].

Nevertheless, it is not easy to measure the success of such reforms as the analysis of tax evasion using data from the real world is extremely difficult. The same nature of this illegal activity always makes uncertain the actual levels of evasion and makes it difficult to state policy recommendations, specially when trying to identify factors related to public's perception of equity or impartiality or fairness. In front of these problems, experimental economics seems to be exceptionally well-adapted to the analysis of tax evasion, as Alm (1991) suggests. Several experiments have been done in an attempt to study variables related to fairness perception.

What experimental evidence suggests is that in public good experiments, where the dominant payoff maximizing strategy is to contribute nothing to the public good and where the social and group optimum is to donate everything, participants in the experiments contribute to the public good to some extent. It is true that this experimental evidence shows that the level of contributions varies widely, from 90 percent to a minimum of 10 percent, depending on the experimental design. The maximum level of cooperation occurs in one-shot experiments or when the number of repetitions of the game gives no space for the emerging of learning mechanisms. The level of cooperation seems to be positively associated with experiments in which there is homogeneity of interest, rough information, no previous experience and some kind of communication between players (even when this information is cheap talk).

The threshold level of cooperation of 10 percent corresponds to the last rounds of repeated experiments in which the payoffs and the resources are heterogeneous, the information is complete and there is anonymity between players. Despite the existence of a negative correlation between cooperation and the number of rounds (where it seems more plausible the presence of learning mechanisms) hard-nosed game theory is unable to explain the data (that is to say that nor the presence of dominant strategies to evade neither reputational equilibria are enough as explanatory tools), as Ledyard (1995) concludes in his well-known chapter of the Handbook of Experimental Economics. To look for an alternative consistent explanation, however, seems to be a hard task.

[2] Silvani and Baer (1997), page 11.

As Ledyard also points out, the current state of the art of the public good experimental evidence requires new characterizations of the players behavioural models to face three stylized facts about cooperation:

1. Simple altruism (or group-regarding preferences) by itself cannot explain the data;
2. There seems to be several types of players;
3. Most subjects, no matter their type, make mistakes and some of them seem to act in an irrational way (in the sense that their behaviour is inexplicable from any logical point of view).

Altogether, the three facts seem to point in the direction of models with sophisticated players. These sophisticated players must optimize utility functions which incorporate a strategic concept of fairness, in the sense that the model (i) must be able to incorporate in its objective function something more that simply the income of other players, (ii) admit the existence of several types of players and (iii) incorporate the possibility of mistakes. These are the main goals of this paper. We design a sophisticated model of behaviour and we test it in a simple second-shot experiment where reputational effects and confusion (and so mistakes) are discarded.

The rest of the paper goes as follows. The next section shows the altruist tax-payer paradox as a simple example to understand why it is difficult to use simple models of altruism to understand the voluntary contribution mechanisms. We introduce then three fair tax-payer dilemmas in order to look for alternative models of behavior. Section 3 defines two sophisticated models, including a model of strategic fairness with heterogeneity of agents and briefly discusses its two main theoretical results. Section 4 shows a second shot experiment and its main results. Section 5 analyzes the predictions of seven alternative theories about the second shot of the players using the Predictive Success Index of Selten and Section 6 concludes.

2. The altruist tax-payer paradox

Some experimental evidence suggests that Altruist players play the Dictator Game but they do not play Ultimatum Games (except if they are the proposers)[3]. Imag-

[3] See Andreoni and Miller (1996) and Camerer and Thaler (1995).

ine a simple altruist tax payer utility function:

$$U^i_{AT} = x^i_{AT} + ®_{AT}x^j \tag{2.1}$$

where utility depends on hers and her opponent level of income (x^i and x^j). The more altruistic the tax-payer, the greater the value of the ® parameter. Being ® a positive parameter, simple models of altruism can face the evidence of dictator games because the existence of positive o¤ers …ts with this utility function form. But this simple model of altruism is unable to …t with the experimental data of simple ultimatum games except for the case of the proposers (those who o¤er positive quantities to the responders[4]), because the only way to explain the existence of rejections to positive o¤ers is to make ® negative, and then we are not talking anymore about altruism but instead about spite[5]. It seems then that the altruistic models can not capture equity mechanisms laying beside these experimental evidence.

We can see more clearly this lack of realism with the altruist taxpayer paradox. Take a Prisoner's Dilemma where an altruistic tax-payer faces the following payo¤ matrix:

		Player 2	
		Contribute	Evade
Altruist Taxpayer	Contribute	2,2	0,4
	Evade	4,0	1,1

(2.2)

If the taxpayer knows for sure that the other player is going to Evade, then she will evade if $®_{CA} > \frac{1}{3}$ [6]. If the taxpayer knows for sure that the player 2 is going to Contribute, then she will contribute if $®_{CA} > 1$ [7]. So if we take into account simple models of altruism as explanatory tools of tax behaviour, what we …nd is that altruistic players will voluntary contribute more frequently if their opponents evade[8].

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[4] Of course, you can also explain these positive o¤ers for strategic reasons.

[5] For some evidence of public good experiments dealing with spite, see Brandts, J.; Saijo, T. and Schram, A. (1997) and Cason, T.; Saijo, T. and Yamato, T. (1997).

[6] Because $U^{D;E}_{CA} > U^{E;E}_{CA}$) $0 + ®_{CA}4 > 1 + ®_{CA}1$.

[7] Because $U^{D;D}_{CA} > U^{E;D}_{CA}$) $2 + ®_{CA}2 > 4 + ®_{CA}0$.

[8] It is clear that this result depends on the concrete payo¤s. But the Altruist Tax Payer is just showing a case where the more the other player wins for every unit of monetary reward that you loose, the stronger the paradox. It doesn't seem unrealistic the case when the other player earns more if she evades and you shift from E to C (she gets the bene…ts of free riding) than if she cooperates and then you shift (she just gets the bene…ts of mutual cooperation).

2.1. Three fair taxpayer dilemmas

As the experimental evidence suggested that it was needed to take some equity e¤ect into account, the altruistic taxpayer paradox points out in the parallel direction of some distributive or intentionality matter. Some recent theoretical answers have been proposed to explain both the evidence and the paradox. We can brie‡y summarize those theories in three main groups:

- Intentionality theories: Incorporating attitudes and fairness into strategic decision models (as it is clearly proposed by Rabin, 1993).
- Sophisticated models of altruism: Incorporating fairness and spitefulness into altruistic models of behaviour (Levine, 1997).
- Equity theories: Incorporating equity, reciprocity and competition (Bolton, 1997).

All of them have been experimentally tested. Levine found his model compatible with a great amount of previous experiments, Bolton tested[9] his ERC model and he found support for it and at the same time little evidence for intentional models. The methodology of these experimental tests is quite di¤erent from our methodology[10], hence we will concentrate on intentional and sophisticated models.

Intentional models incorporate beliefs and attitudes of the players (say taxpayers) into models. We can see it clearly using the following Three Fair Taxpayer's Dilemma. In the …rst one, the fair taxpayer faces a PD like this one:

		Player 1	
Fair taxpayer	Contribute	0,4	(2.3)
	Evade	1,1	

where the unique solution is to evade. The Second Fair Taxpayer's Dilemma seems quite similar:

		Player 2	
Fair taxpayer	Contribute	3,3	(2.4)
	Evade	4,0	

[9] See Bolton, Brandts and Katok (1997) and Bolton, Brandts and Ockenfels (1997).

[10] Bolton, Brandts, Ockenfels and Katok method is esentially based on the assumption that the choices players make contingently on other player choices are strategically equivalent to the sequential ones, with complete information.

where the unique solution, again, is the evasion. Let's consider the Third Taxpayer's Dilemma.

		Player 2	
		Contribute	Evade
Fair taxpayer	Contribute	3,3	0,4
	Evade	4,0	1,1

(2.5)

The key point of this third dilemma is the following question: Is this 3rd dilemma the same dilemma as the 2nd one? If we look at the payoff matrix, what we find is a mutual dominant strategy to evade. But the logic of the third dilemma can be broken if we imagine, just for a moment, that player 1 (our fair taxpayer) knows for sure that player 2 is going to contribute. Is evasion the unique solution again?

To answer that question we can imagine two different situations. Will we get the same result if the payoff units are Million of USD or cents? Maybe our fair taxpayer, if the payoff unit is small enough (or if her taste for fairness is big enough) will reward the other player's cooperative action loosing 1 unit of payoff (the difference between 3 and 4) and allowing her to get 3 instead of 0. We can capture this idea of strategic fairness (player 1' taste for fairness depends on player 2 behaviour) with the following model.

3. The model

3.1. Psychological games

From a two-player, normal form of a material game with mixed strategy sets M_1 and M_2 for players 1 and 2, derived from finite pure-strategy sets P_1 and P_2, let $\pi_i : P_i x P_2 \to R$ be the payoff of player i, we construct a psychological game in the sense of Geanokoplos, Pearce and Stacchetti (1988) where $a_1 \in P_1$ and $a_2 \in P_2$ are the actions of the players; $b_1 \in P_1$ and $b_2 \in P_2$ are the beliefs of the players about the other player's actions; and $c_1 \in P_1$ and $c_2 \in P_2$ are the beliefs of the players about b_1 and b_2.

Following Rabin (1993), we define a fairness function for player i:

$$f_i(a_i; b_j) = \frac{\pi_j(b_j; a_i) - \pi_j^e(b_j)}{\pi_j^h(b_j) - \pi_j^{min}(b_j)} \tag{3.1}$$

where if $(\pi_j^h(b_j) - \pi_j^{min}(b_j)) = 0$, then $f_i(a_i; b_j) = 0$.

The Utility function of each player would be:

$$U_i(a_i; b_j; c_i) = \pi_i(a_i; b_j) + \tilde{f}_j(b_j; c_i)[1 + f_i(a_i; b_j)] \tag{3.2}$$

The logic of these sophisticated models is to maximize their utility function with something like a rule of reciprocity. The fairer the behaviour of the other player, the fairer must be your behaviour.

As some of the main problems of Rabin's model derived from the monetary unit of the payoffs and from the fact that the model was unable to incorporate heterogeneous players, we take into account the heterogeneity of players constructing a new game differing in the way players perceive their material payoffs, where each player has a type defined with a parameter α. We can briefly state some definitions[11]:

Definition 1. Given the mixed strategy sets M_1 and M_2 for players 1 and 2, derived from finite pure-strategy sets P_1 and P_2 and $\pi_i : P_i x P_2 \rightarrow R$ the material payoff of player i, let Γ be the set of games with strategies $M_1 \times M_2$ and $\alpha_i \pi_i(a_i; a_j)$ and $\alpha_j \pi_j(a_j; a_i)$ their perceived payoffs. $\gamma(\alpha_i; \alpha_j) \in \Gamma$ will be a game for a given value of $(\alpha_i; \alpha_j)$:

The fairness functions for player i will be the same as defined above:

$$f_i(a_i; b_j) = \frac{\alpha_j \left[\pi_j(a_i; b_j) - \pi_j^e(b_j)\right]}{\alpha_j \left[\pi_j^h(b_j) - \pi_j^{min}(b_j)\right]} = \frac{\pi_j(a_i; b_j) - \pi_j^e(b_j)}{\pi_j^h(b_j) - \pi_j^{min}(b_j)} \tag{3.3}$$

Definition 2. A pair of strategies $(a_i; a_2) \in (P_1; P_2)$ is a fairness equilibrium if, for $i = 1; 2$, $j \neq i$, if $a_i \in \arg\max_{a \in S_i} U_i(a_i; b_j; c_i)$ and $a_i = b_i = c_i$

Definition 3. A pair of strategies $(a_i; a_2) \in (P_1; P_2)$ is a mutual-max outcome if, for $i = 1; 2$, $j \neq i$, $a_i \in \arg\max_{a \in S_i} \pi_i(a_i; a_j)$ and a pair of strategies $(a_i; a_2) \in (P_1; P_2)$ is a mutual-min outcome if, for $i = 1; 2$, $j \neq i$, $a_i \in \arg\min_{a \in S_i} \pi_i(a_i; a_j)$.

Definition 4. An outcome is strictly positive (negative) if for $i = 1; 2$, $f_i > 0$ $(f_i < 0)$; weakly positive (negative) if, for $i = 1; 2$, $f_i \geq 0$ $(f_i \leq 0)$; neutral if, for $i = 1; 2$, $f_i = 0$ and mixed if, for $i = 1; 2$, $j = i$, $f_i f_j < 0$.

With this notation we can now state the following two propositions:

[11] See Fatás and Roig (1997) for the whole model.

Proposition 1. In a heterogeneous psychological game, for any outcome that is a mutual-max outcome and a strictly positive one, there exists a $\bar{\alpha}$ such that, for all $\alpha_{i,j} \in (0, \bar{\alpha})$, this outcome is a fairness equilibrium in γ.

Proposition 2. In any standard public good game the cooperative outcome is a fairness equilibrium in γ for some $\bar{\alpha}$.

Note that this last proposition is extremely interesting. It just says that we can get a fairness equilibrium for some $\bar{\alpha}$ in any standard public good game in which the dominant strategy is not to cooperate (or to evade all taxes). Maybe with this kind of strategic notion of fairness we are able to get better results explaining experimental evidence dealing with tax compliance.

4. A second shot experiment

4.1. The experiment scheme

To test the previous model we try to isolate the fairness effects from others explicative sources of cooperation. We discard reputation (it is a one shot game), confusion[12] (using a test) and corner solution biases (our methodology is biases-proof). The experiment is a tax evasion one where the agents just have to choose the level of resources they allocate to the public good and the level of resources they allocate to the private one.

Although the experiment is a tax evasion one, there is no audit nor sanctions. First because we avoid the problem of risk aversion, and second because the dynamic of the game is not significatively affected by this fact, as we will see. There is a flat tax rate of 0.50, and a collective externality of 0.75 (it is said to be the outcome of a fund made with the collected taxes). There is a minimum reward independently of the players actions.

The players were 150 people (students) randomly distributed into two kinds of players A and B. Their initial endowment was 8 USD and they were anonymously paired. They knew their opponent was in the same room as they were. They had to answer first a simple test in order to avoid at some extent confusion effects. After the test was made, all the players had to answer a question about the level of their initial endowments. They were just allowed to choose one out of the nine numbers between 0 and 8. As tax calculations was made by the experimenters,

[12] A la Andreoni (1995) or Palfrey and Prisbey (1996).

they just had to write the number in a white box in their control sheet. Then players B control sheets were collected and they went out of the room. Players A were then allowed to change their actions choice with complete information about their partner choice in a second white box of their sheet. That was the second shot.

It is easy to see the dominant strategy to evade all income considering the monetary reward:

$$\pi_i = E - \frac{a_1}{2} + [\frac{3}{2}(\frac{a_1}{2} + \frac{a_2}{2})]\frac{1}{2} = E - \frac{a_1}{8} + \frac{3}{8}a_2 \tag{4.1}$$

4.2. The data: Six facts on contribution

We can summarize the experimental results in a table and six facts:

	a_1^1	a_2^1	a_{1+2}^1	a_1^2
8	36,59	43,90	40,24	36.59
7	2,44	0,00	1,22	0,00
6	9,76	2,44	6,10	0,00
5	0,00	2,44	1,22	2,44
4	0,00	7,32	3,66	2,44
3	4,88	0,00	2,44	0,00
2	7,32	0,00	3,66	0,00
1	0,00	2,44	1,22	0,00
0	39,02	41,46	40,24	58,54

(4.2)

Fact 1: The two groups of players were homogeneous.

Using a Chi square test to test the homogeneity between the groups A and B of participants in the experiment, we get the result that there is not enough evidence to reject the homogeneity between both groups[13].

Fact 2: Players contribute less in the second shot.

We can merely observe a big increase in the proportion of non honest players: more than half of the players declare as their level of endowments 0 USD.

Fact 3: A significative proportion of the players changed their first choices.

Nearly 44% of the players changed their first shots.

Fact 4: Most of the players who changed their choice reversed their first choice totally.

[13] With a pvalue .52126.

Near 67% of the players who changed their first shots changed it as much as they could:

Fact 5: Almost 40% of the players who changed their first choice lost money in doing so.

As much as 38,9% of the players who modified their first choice lost money with their second shot and 88.89% of them changed it at their maximum relative level.

Fact 6: The group of players unable to pass the test cooperated more than the others

Nearly 20% of the players were unable to pass the test about the dynamics of the experiment. They cooperated significatively more than the rest of the players.

5. The predictions

5.1. The methodology

We assume that there are several types of players. Each player's type is private information but the distribution of types is common knowledge. We then use the first choice to get the type of the player and we make different predictions of the second shot using several models. We measure the success of the predictions using the Selten's index of predictive success.

5.2. Seven alternative theories

5.2.1. An income maximizer

An income maximizer would play $a_1^1 = a_1^2 = 0$

5.2.2. A kantian player

A Kantian Altruistic player would play $a_1^1 = a_1^2 = 8$

5.2.3. Social manners

A altruistic player following a social norm would play $a_1^1 \neq f(a_2) \Rightarrow a_1^1 = a_1^2$

5.2.4. Warm glow altruism

$$V_1 = \pi_1 + \alpha_1 \pi_2 = \left(8 - \frac{a_1}{8} + \frac{3a_2}{8}\right) + \alpha_1 \left(8 - \frac{a_2}{8} + \frac{3a_1}{8}\right)$$

The prediction is that if $a_1^1 = 8 \Rightarrow a_1^2 = 8$; if $8 > a_1^1 > 0 \Rightarrow a_1^2 = \text{Random}$[14]; and if $a_1^1 = 0 \Rightarrow a_1^2 = 0$.

5.2.5. A simple reciprocity model

$$a_1^1 = E[a_2], a_1^2 = a_2$$

5.2.6. The psychological game with fair types of players

$$V_1 = \alpha_1 \pi_1(a_1, b_2) + f_2(b_2, c_1)[1 + f_1(a_1, b_2)] \tag{5.1}$$

We can get an indirect utility function such the following:

$$V_1 = \Psi + a_1 \delta \Phi \tag{5.2}$$

where $\Psi = 8\alpha_1 + \frac{3}{8} b_2 \alpha_1 + \frac{b_2}{16} - \frac{1}{4}$ and the critical function is $\Phi = b_2 - 8\alpha_1 - 4$

The distribution of types

- If $\alpha_1 > 0 \rightarrow \Phi = b_2 - 8\alpha_1 - 4 < 0$ and $a_1^1 = 0$
- If $\alpha_1 < 0 \rightarrow \Phi = b_2 - 8\alpha_1 - 4 > 0$ and $a_1^1 = 8$
- If $\alpha_1 = 0 \rightarrow \Phi = b_2 - 8\alpha_1 - 4 = 0$ and $a_1^1 = \text{Random}$
- The meaning of the different values of α parameter would be that :
  - A non masochism condition implies that: $1 \geq \alpha_1^* > -0.075$.
  - Minimum rewards allow that players to loose some money.
  - The predictive methodology is always a comparative methodology.

[14] See Fudenberg and Levine (1995) for the argument about randomization and cautious play.

The prediction

1. If $a_2 < 4$ then $\tilde{a}_2 = 0$
2. If $a_2 = 4$ then if $a_1^1 = 0$ then $p(\tilde{a}_2 = 0) = \tilde{p}$ and $p(\tilde{a}_2 = R) = \bar{p}$; if $8 > a_1^1 = 0$, $\tilde{a}_2 = R$ and if $a_1^1 = 8$ then $p(\tilde{a}_2 = R) =$ and $p(\tilde{a}_2 = 8) = \tilde{p}$
3. If $a_2 > 4$ and $a_1^1 = 0$ then
    1. $p(\alpha_1 > 0) = \tilde{p}$
        - $\tau = 1$ then $p(a_1^2 = 8) = \frac{1}{8}$ and $p(a_1^2 = 0) = \frac{7}{8}$
        - $\tau = 2$ then $p(a_1^2 = 8) = \frac{2}{8}$ and $p(a_1^2 = 0) = \frac{6}{8}$
        - $\tau = 3$ then $p(a_1^2 = 8) = \frac{3}{8}$ and $p(a_1^2 = 0) = \frac{5}{8}$
        - $\tau = 4$ then $p(a_1^2 = 8) = \frac{1}{2}$ and $p(a_1^2 = 0) = \frac{1}{2}$
    2. $p(\alpha_1 = 0) = \bar{p}$, $a_2^1 = 8$
4. If $a_2 > 4$ and $8 \geq a_1^1 = 0$, then $\tilde{a}_2 = 8$

5.2.7. A model of altruism and spitefulness

As the last model we use the model of Levine (1996):

$$V_i = u_i(\pi_i) + \sum_{i \neq j} \frac{\alpha_i + \lambda\alpha_j}{1 + \lambda} u_j(\pi_j) \tag{5.3}$$

- If $\alpha > 0$ then there exist altruism, if $\alpha = 0$ selfishness, and if $\alpha < 0$ means spitefulness. If $\lambda = 0$ players are not concerned with fairness:

$$V_i = u_i(\pi_i) + \sum_{i \neq j} \alpha_i u_j(\pi_j)$$

- If $\lambda > 0$ players are concerned with fairness.
- With the second-shot experiment values of the parameters:

$$V_i = V^{\Sigma}(a_i) \text{ if } \Phi = (3\alpha_i + 3\lambda\alpha_j - (1 + \lambda)) \gtreqless 0 \Rightarrow \alpha^* = \frac{1}{3} \tag{5.4}$$

The prediction

1. If $a_2 = 8$ then $p\left(\tilde{a}^1_2 = 8\right) = \tilde{p}$[15] and with a probability $p\left(\alpha_2 = \frac{1}{3}\right) = \overline{p}$ if $a^1_1 = 0$ then $p\left(\tilde{a}^1_2 = 0\right) = \tilde{p}$, and $p\left(\tilde{a}^1_2 = R\right) = \overline{p}$, ; if $8 > a^1_1 > 0$, $\tilde{a}^1_2 = R$ and if $a^1_1 = 8$, then $p\left(\tilde{a}^1_2 = R\right) =$, and $p\left(\tilde{a}^1_2 = 8\right) = \tilde{p}$,

2. If $8 > a_2 > 0$ then if $a^1_1 = 0$ then $p\left(\tilde{a}^1_2 = 0\right) = \tilde{p}$, and $p\left(\tilde{a}^1_2 = R\right) = \overline{p}$, if $8 > a^1_1 > 0$, $\tilde{a}^1_2 = R$ and if $a^1_1 = 8$, then $p\left(\tilde{a}^1_2 = R\right) = \overline{p}$, and $p\left(\tilde{a}^1_2 = 8\right) = \tilde{p}$,

3. If $a_2 = 0$ then
   1. $p\left(\alpha_2 < \frac{1}{3}\right) = \tilde{p}$ and
      1. If $8 > a^1_1 \geq 0$, $\tilde{a}^1_2 = 0$
      2. If $a^1_1 = 8$, $p\left(\tilde{a}^1_2 = 0\right) = \overline{p}$, and $p\left(\tilde{a}^1_2 = 8\right) = \tilde{p}$,
   2. $p\left(\alpha_2 = \frac{1}{3}\right) = \overline{p}$ and
      1. If $a^1_1 = 0$ then, $p\left(\tilde{a}^1_2 = 0\right) = \tilde{p}$, and $p\left(\tilde{a}^1_2 = R\right) = \overline{p}$, $\tilde{a}^1_2 = R$
      2. If $8 > a^1_1 > 0$, $\tilde{a}^1_2 = R$
      3. If $a^1_1 = 8$, $p\left(\tilde{a}^1_2 = R\right) = \overline{p}$, and $p\left(\tilde{a}^1_2 = 8\right) = \tilde{p}$,

5.3. The results

The main results of the experiment are summarized in the following table:

[15] As there is a probability of randomizing, player 1 is not sure about the type of player 2 when she sees $a^1_2 = 8$. There is a big probability ($\tilde{p}$) of being a true type and a small probability of being a false type ($\overline{p}$) as the result of the randomization process.

	PSI[16]	HR[17]
Income Maximizer	0.255	0.366
Altruism as a social norm	0.450	0.561
Altruism as warm glow	0.444	0.555
Kantian altruism	0.255	0.366
Reciprocity	0.621	0.732
Altruism, fairness and spitefulness	0.615	0.726
Fair psychological players	0.695	0.806

(5.5)

It is easily observed that the last three models get better results predicting the data than the rest of theories. As an anecdote, the PSI of the Income Maximizer model is exactly the same as the Kantian Altruism one.

6. Conclusions

The results seem to follow the guidelines of the theoretical background. More speci…cally, the results of the second shot experiment, although as a one-shot game cannot con…rm the existence of dynamic equilibria, seem to validate the propositions of the model. This model has important advantages dealing with the presence of fairness perception mechanisms where fairness depends strategically on other player's actions and beliefs. These alternative equilibria are both socially optimal and able to explain the experimental and real data about high levels of compliance or cooperation.

Heterogeneous players appear to play a strategic[18] game where both the actions of gamesmen and fairmen are better explained using models developed from psychological games which get the best results both in terms of Hit Rate and Predictive Success Index.

7. References

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[16] IPS= Index of Predictive Success

[17] HR= Hit Rate

[18] Both in monetary and fairness senses and not only in monetary rewards terms.

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