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INCOME ASPIRATIONS AND COOPERATION: EXPERIMENTAL EVIDENCE

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Abstract

This article is the first attempt to study the empirical link between income aspirations and cooperation in a one shot public good game. By combining experimental with survey data, we find evidence that the more frustrated people are with their income, the lower is their propensity to cooperate with foreigners and compatriots. The quantitative effect is remarkable: participants who are most frustrated are 46 percent more likely to free-ride on foreigners than those who are satisfied with their income.

JEL classification numbers: D01, D6, H4, C9

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This article is the first attempt to explore the empirical link between two central concepts in the social sciences: real income aspirations and cooperation. Taking advantage of a rich database, the article enquires into what extent people's real life income aspirations explains voluntary contributions to public goods which are provided at different geographical levels (i.e. neighbourhood, country and world).

While the existing literature on social preferences focuses on whether people are intrinsically cooperative or not, we argue that people may be neither intrinsically selfish nor altruistic. Instead, their level of cooperation may depend on how satisfied they are with their income aspirations. The intuition is straightforward. When facing a decision involving a voluntary public good game, people may look at their own situation and assess their unsatisfied income aspirations. The closer (farther) they find themselves to the income they aspire, the more (less) likely they are to cooperate.

The following example illustrates our point. John is a New York cabdriver who works for a daily target return. Today, he has committed himself to clean a common area together with his neighbours. John cannot do both task during the day, so he has to choose only one. He individually prefers earning his daily target to cooperating with neighbours, while having the common area cleaned is unanimously preferred to leaving it as it is. John is better off when a neighbour cleans than when none does. Will John cooperate with his neighbours and leave his income aspirations unsatisfied or will he follows his own interest? John is facing a linear public good game and the answer to the question is trivial for any economist. If John is rational and selfish he will go for his daily target return.[1] If he cares to a sufficient extent about his neighbours he may leave his income aspirations unattained for that day and cooperate. Similar behaviour can be expected if he cares about reciprocity and thinks her neighbours have been kind enough to him. So far nothing new in this example. Now consider a different scenario. John is on a rainy and busy day in which earnings per hour are high. Suppose he is at a point in the day in which he is already satisfied with what he has earned although if he continues working, his earnings can only be improved further. Would he stop earning money and help her neighbours in this second scenario? According to the existing literature on human cooperation, the predictions of an economist in this scenario wouldn't be different from the previous one. The literature assumes that trade-off between John's and others' welfare is independent on John having reached or being close to reaching an aspiration level. This article challenges this assumption and investigates whether John would be more likely to cooperate with her neighbours if he were more satisfied with his income

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[1]We are assuming that there is no punishment is he does so.

aspirations. In addition, the article studies whether his behaviour would change if instead of having to clean a common local area (contribute to generate a local public good) he had to spend the day cleaning a river that would benefit citizens of another country (contribute to generate a global public good).

To anticipate results to come, this article finds that John (as a representative agent in our sample) would be more likely to cooperate with compatriots and foreigners the closer he is to achieve her income aspirations. However, his willingness to cooperate with his neighbours would seem to be independent on whether his income aspirations are satisfied or not.

We combine experimental data with a post-experiment survey. The experimental design consists in a Nested Public Good Game (NPGG).[2] In a NPGG, individuals have the option of keeping their endowment for themselves, contributing some of it to a local pot (L), and/or contributing some of it to a larger pot – in this case representing either a national (N) or global pot (G). In our experiment, participants play two interactions involving this NPGG, one in which the contribution entails a choice between the local and national pot (Decision N), and a second in which the contribution entails a choice between the local and global pots (Decision W). The local pot is comprised of the participant plus three other participants from the local area. The national or global pot consists of the participant's local group plus two other groups of four people from different areas of the same country (Decision N), or from different countries around the world (Decision W). A post-experiment survey collects different variables of interest for this article.

1 Related literature

The idea of people satisfying aspirations is not new in economics. On the theoretical side, Simon (1955) was one of the pioneers in introducing aspirations levels into decision making[3]. More recently Diecidue and van de Ven (2008) develops a model that introduces the probabilities of reaching and not reaching an aspiration level into an expected utility representation. There is also a theoretical literature on aspiration-based reinforcement learning that studies the economic implications of adaptive agents who compare payoffs achieved with an aspiration level (Bendor et al., 2001; Selten, 1998) and a recent literature that studies the relationship between failure of aspirations and

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[2] The design was constructed by Buchan et al. (2009) and it is similar to that employed by Blackwell and McKee (2003) in Economics and by Wit and Kerr (2002) in Psychology

[3] See Traub (1999) for a review of aspirations as frames that individuals use to make decisions.

poverty (Ray, 2006; Heifetz and Minelli, 2006; Dalton and Ghosal, 2007). Theories based on aspiration levels have been also used to explain phenomena such as the Easterlin Paradox (Easterlin, 1976, 2001), the merger paradox (Huck et al., 2007) and the labour supply of New York City cabdrivers (Camerer et al., 1997).

Closer to our work, there is an existing literature relating aspirations with cooperation. While our paper investigate the empirical link between real income aspirations and individual propensity to cooperate in a one shot game, this previous research develops theoretical frameworks that introduce adapting aspiration levels to explain cooperation in repeated interaction games (see Karandikar et al., 1998; Oechssler, 2002; Palomino and Vega-Redondo, 1999).

2 Conceptual Framework

This article argues that a person cares about others when her material needs/aspirations are sufficiently satisfied. We ground this idea on a combination of Simon's (1955) theory of satiation and Maslow's (1943) theory of human motivation. Maslow argued that humans are motivated by unsatisfied hierarchical needs:

> "the appearance of one need depends on the prior satisfaction of another, more pre-potent need. [...] No need or drive can be treated as if it were isolated or discrete; every drive is related to the state of satisfaction or dissatisfaction of other drive." (Maslow, 1943, pg. 370)

Maslow's theory can be interpreted with economics lenses as follows. Individual income aspirations correspond to the lower steps of Maslow's pyramid and others' welfare as being the upper levels of the pyramid. Preferences ranking depends on which level of the pyramid agents are. Someone who is seeking to satisfy lower level needs (e.g. food, water, shelter) may be expected to act "more selfishly" than someone who has overcome her basic needs and is seeking higher social goals in the pyramid, such as sense of belonging or good relationships. Below we describe a sketch of a simple framework consistent with our argument.[4]

Suppose an agent has two-dimensional aspirations levels:

x_1 income aspirations to satisfy own material needs and

x_2 social aspirations to satisfy concerns regarding others' needs such as equality, fairness, social welfare, etc.

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[4]Such a framework goes back to work of Encarnacion Jr (1964).

The agent decision problem is to maximize x_2 subject to $x_1 \geq x_1^*$, where x_1^* is the income aspiration level. If this problem has no solution, then the problem becomes simply to maximize x_1. In that way, the individual is supposed to pursue her aspirations within a system of priorities, where aspirations x_1 is superior to x_2. As soon as the satisfactory level of x_1 is reached, x_2 becomes dominant in the overall choice situation and x_1 becomes a constraint.

Let $u_1 = u_1(x)$ be a function which orders aspirations x according to the first aspirations: $x' \succ x''$ on the basis of aspirations 1 if and only if $u_1(x') > u_1(x'')$. Any other function $v_1(x) = f[u_1(x)]$ will do the job, provided only that $f' > 0$. Let make similar assumptions for $u_2 = u_2(x)$. It is also assumed that there exist arbitrary $u_i^* = u_i(x_i^*)$, where x_i^* is a particular constraint level of x_i. The agent utility function, which expresses overall preferences among aspirations levels, can then defined in term of a utility vector:

$$u(x) \equiv (\min[u_1(x_1), u_1^*], \min[u_2(x_2), u_2^*])$$

For simplicity, let's assume that $u_i(x) \leq u_i^*$ always, so $\min[u_i(x), u_i^*] = u_i(x)$. Consider any two alternatives x' and x'' with utility vectors

$$u(x') \equiv (u_1(x'), u_2(x'))$$

$$u(x'') \equiv (u_1(x''), u_2(x''))$$

The individual compares these two utility vectors lexicographically, and preferences among alternatives x can be described symbolically as in Encarnacion Jr (1964) $P(x) = L^*[u(x)]$, where them L^*-ordering emphasizes the essential roles played by the satiation levels u_i^*. Given these preferences, $x' \succ x''$ if and only if $u_1(x') > u_1(x'')$ or if $u_1(x') = u_1(x'')$, $u_2(x') > u_2(x'')$.

3   Method

3.1   Experiment and Survey

Data from a linear public-good experiment was gathered and a survey conducted in Argentina. The experiment was part of a set of similar experiments conducted

in six other countries around the world[5] under the umbrella of a meta-project on cooperation and globalization. (Buchan et al., 2009) We only make use of the data gathered in Argentina, where we included additional relevant questions for this article.

Approximately 200 subjects participated in three public goods experimental decisions[6] in fixed order. Pilot tests found no ordering effects. Subjects were drawn from the general population in Buenos Aires (city and province).[7] A quota sampling recruitment method was used based on gender, age and socioeconomic status.[8] The experimental sessions were conducted in groups of no less than eight and no more than eighteen participants. Interactions were anonymous, and the groups with which subjects interacted were randomly selected at the beginning of each decision. No feedback between decisions was provided. Hence, the three decisions can be treated as independent.

In each of the two decisions studied here, subjects were given 10 tokens each.[9] The task in each decision was to decide how to allocate these 10 tokens among their "personal" account (or private good) and two "collective" accounts (or public good), whose composition varied across the two decisions. Each token put into the "personal" account maintained intact its value (i.e. the individual marginal return to the *private* good, α, was 1). As it is standard in LPGGs, the individual marginal return to the *public good*, β, is lower than the marginal return to the private good, α, but contributing creates positive externalities for the other people in the group (i.e. $\alpha > \beta$, $N\beta > \alpha$, where N is the number of players).

In a first decision, Decision N, subjects were asked to allocate their endowments between their "personal" account, a "local" account (or local public good) composed of the subject and another three anonymous randomly chosen neighbours, and a "national" account (or national public good). The "national" group was made up of the subject, the same three "local" people benefiting from the "local" account - plus eight anonymous subjects from other parts of Argentina. Tokens allocated to the

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[5]The experiment was conducted also in Iran, England, Italy, United States, South Africa and Russia.

[6]Participants' play three Linear Public Good Games (LPGG) or Voluntary Contributions to a Public Good Game. For the purpose of this paper, we are going to focus only on two of the three decisions played, simply because this two decisions have exactly the same structure of incentives and only differ in the identity of the recipients of the public good.

[7]The locations chosen were Almagro, Boedo, Caseros, San Isidro and Las Flores. Approximately 50 subjects were recruited per location. Subjects recruitment was carried out by the CINEA, an argentine agency specialised in survey polls and market research.

[8]Gender (male, female), age (18-30, 31-50, 51-70) and socio-economic status (low, medium, high). The administration of the experiment was oral and paper-based.

[9]One token was worth the purchasing power equivalent of US $0.50

"personal" account were saved for the individual ($\alpha = 1$). Tokens placed in the "local" account were summed up, and the total was doubled and shared equally between the four individuals of the "local" group. Tokens placed in the "national" account were instead tripled by the experimenter and divided equally among the 12 people of the "national" group. Thus, the marginal return of one token allocated to the "local" account was $\beta^L = 0.5 = \frac{(1 \times 2)}{4}$, and to the "national" account was $\beta^N = 0.25 = \frac{(1 \times 3)}{12}$. Therefore, the payoff for individual i in decision N was:

$$\pi_i^N(x_i, G) = \alpha x_i + \beta G = \alpha(10 - g_i^{L+N}) + \beta^L(G_{-i}^L + g_i^L) + \beta^N(G_{-i}^N + g_i^N), \quad (1)$$

where $x_i \in [0, 10]$ is the number of tokens that player i keeps for herself (private good), $g_i^k \in [0, 10]$ for $k = \{N, L\}$ is the number of tokens player i contributes to the k collective account (or public good) and $G_{-i}^L = \sum_{j=1}^{N} g_j^k$ for $j \neq i$ is the sum of the contributions of the other members of the group. x_i and g_i^k are positive integers.

In a second independent decision, Decision W, subjects chose how much to allocate among their "personal" account, the "local" account and the "world" account. The structure of incentives in Decision W was exactly the same as that in Decision N (i.e. $\alpha = 1 > \beta^L = 0.5 > \beta^N = \beta^W = 0.25$) and **only** the composition of the group differed. The "world" group was made up of the subject, three "local" people - plus eight anonymous subjects from different countries around the "world." Subjects were not told which countries these other subjects were from, but were informed that these countries could be from any of the four continents where the research was conducted.[10] Therefore, the payoff for individual i in decision W was:

$$\pi_i^W(x_i, G) = \alpha x_i + \beta G = \alpha(10 - g_i^{L+W}) + \beta^L(G_{-i}^L + g_i^L) + \beta^W(G_{-i}^W + g_i^W), \quad (2)$$

Both decisions, N and W, characterize a multilevel public good dilemma. It is individually optimal to contribute nothing to the "collective" accounts ($\alpha > \beta^k, k = \{N, L, W\}$) although this goes against the social welfare of the group. In other words, the Nash equilibrium of this game is Pareto sub-optimal. These two decisions aim to mimic a situation in which the person has to decide wether to contribute to a *local public good* and/or *national public good* (decision N) and to a *local* and/or *global*

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[10]Due to the logistic of research, it was impossible to run the experiments simultaneously within a single country. We had to rely on a 'dynamic' matching procedure. For information about this and other particularities of the macro experiment, please refer to Buchan et al. (2009).

public good (decision W). The structure of incentives in both decisions is identical, the only change being the nationality of the co-members of the "collective" accounts. This feature allows us to identify, among other things, how the identity of the people eventually affects people's cooperation directly or/and mediates the effect of individual aspirations on the propensity to cooperate. In order to maximize the validity of our results, we controlled for the subjects understanding of the incentives and rules of the game.[11]

3.2 Data

The dependent variable, "propensity to cooperate," is measured by individual contributions to the "collective" accounts. The independent variables come from an individual survey that participants completed at the end of the experiment.

Table 1 provides descriptive statistics for the dependent variables.

TABLE 1: DESCRIPTIVE STATISTICS OF DEPENDENT VARIABLES[12]

	mean	sd.	max.	min.	N
Total Cont. (N)	7.32	2.67	10.00	0.00	201
Cont. "local" Account (N)	3.10	2.01	10.00	0.00	201
Cont. "national" Account	4.22	2.65	10.00	0.00	201
Total Cont. (W)	7.02	2.72	10.00	0.00	201
Cont. "local" Account (W)	3.22	2.37	10.00	0.00	201
Cont. "world" Account	3.81	2.84	10.00	0.00	201

On average, participants contributed at very high levels in both decisions. More than 70% (in decisions N and W) of people's endowments were allocated to their "collective" accounts. Even though the material incentives in Decision N and W are exactly the same, contributions to the "world" account were significantly lower[13] than contributions to the "national" account.[14] As shown in Table 2, only 6% of the participants contributed nothing at least once to the "collective" accounts. More

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[11]Built into the experiment instructions there was a basic understanding check, in which subjects were asked to answer some questions about the interaction. This gave us the chance to check for subjects' comprehension of the task. Subjects (6 out of 207 subjects) who showed evident failures to understand the task have been expunged from the dataset.

[12]*Note*: Total Cont. N and W stands for Total contributions to the collective accounts in Decisions N and W, respectively.

[13]$t = 1.5231, Pr(T > t) = 0.0643$

[14]However, as expected, no significant difference between the average contribution in Decision N and W was found ($t = -1.1097, Pr(|T| > |t|) = 0.2678$).

than 25% of the people contributed all their tokens to some "collective" account, in at least one decision, and just 3.5% of the participants played their dominant strategy (no contribution in any decision). Moreover, 65% (dec. N) and 69% (dec. W) of the participants played interior solutions, i.e. they split their endowments.

TABLE 2: FREQUENCY OF OVERALL CONTRIBUTIONS

Tokens contributed	Decision N	Decision W
0	5%	6%
1	0%	0%
2	0%	0%
3	2%	3%
4	5%	4%
5	5%	7%
6	11%	13%
7	14%	17%
8	20%	17%
9	6%	6%
10	30%	25%

Table 3 shows descriptive statistics for the independent variables used in this analysis.

Income is measured with the following question:

"Below you will find a scale of monthly income:[15]

$5-$350	$350-$500	$500-$700	$700-$850	$851-$1050	$1051-$1300	$1300-$1620	$1621-$2100	$2100-$3000	$3000-$108000
1	2	3	4	5	6	7	8	9	10

I would like to know which bracket your family belongs to, including wages, salaries, pensions, and other income. Check the income bracket that corresponds to your family, before taxes and other deductions."

Following Ray (2006), the variable *Income Aspirations Gap* - denoted by "g_i"- is defined as the relative difference between the standard of living that is aspired to - measured by the variable *Absolute Aspirations Level* and denoted by "a_i"- and the

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[15]This scale corresponds to the Argentine total household monthly income distribution by deciles at the moment the experiment was designed (July 2006).

TABLE 3 – Descriptive Statistics of Independent Variables

Range		mean	sd	max	min
[1-4]	Income Aspiration Gap	0.16	0.22	0.80	-1.00
[1-10]	Absolute Aspirations Level	8.56	1.72	10.00	1.00
[1-10]	Income	7.30	2.43	10.00	1.00
[0-1]	Social Identity (at World Level)	0.51	0.27	1.00	0.00
[0-1]	Social Identity (at National Level)	0.79	0.19	1.00	0.11
[0-1]	Social Identity (at Local Level)	0.76	0.24	1.00	0.00
[1-5]	Relative income (at World Level)	2.18	1.00	1.00	5.00
[1-5]	Relative income (at National Level)	3.08	1.03	1.00	5.00
[1-5]	Relative income (at Local Level)	2.92	0.88	1.00	5.00
[0-10]	Expectations about others' contribution (at World Level)	5.17	2.83	0.00	10.00
[0-10]	Expectations about others' contribution (at National Level)	5.26	2.56	0.00	10.00
[0-10]	Expectations about others' contribution (at Local Level)	4.77	2.45	0.00	10.00
[1-4]	Life Satisfaction	3.15	0.73	4.00	1.00
[1-6]	Education	2.61	1.06	5.00	1.00
	Gender	1.57	0.50	2.00	1.00
	Age	39.42	11.98	75.00	18.00

standard of living subjects already have - measured by the variable *Income* denoted by $"s_i"$.- Hence, the *income aspirations gap* is:

$$g_i(a_i, s_i) \equiv \frac{a_i - s_i}{a_i} \qquad (3)$$

Information about *Absolute Aspirations Level, a_i*, is gathered by asking subjects the following question:

> "Consider the following scale of monthly income, [which is the same as the one above] how much monthly income would your household need to be satisfied? Check the income bracket that corresponds to that level of income."

Thus, the maximum level of income aspirations gap that a person can have is $\bar{g}_i(a_i, s_i) \equiv \frac{10-1}{10} = 0.9$ and the minimum level is $\underline{g}_i(a_i, s_i) \equiv \frac{1-10}{1} = -9$. We allow for negative income aspirations gap because, although highly unlikely, it is possible that people may be satisfied with less income than that which they actually have. This was indeed the case with some participants distributed across the four locations[16]. A person characterized by $\bar{g}_i(a_i, s_i)$ is said to be "fully unsatisfied" income-wise: she belongs to the 1*st* decile of the population but aspires to be in the 10*th* decile. On the contrary, someone with a $g_i(a_i, s_i) \leq 0$ is said to be "fully satisfied" income-wise. We interpret $g_i(a_i, s_i) > 0$ as a measure of how frustrated the person is with the income of his household.

During the analysis, other sets of variables were used to capture different aspects that may either affect individual propensity to cooperate, or mediate/moderate the influence of income aspirations gap on it.

Income aspirations gaps may be highly correlated with life satisfaction. In order to eliminate this source of omitted variable bias, participants were asked the standard question used in the subjective well-being literature:

> "Overall, how satisfied are you with your life?[17]

Likewise, the motivations that people may have to cooperate with their compatriots or neighbours may be different from the motivations to cooperate with a foreigner. We collected information on individual degree of identification (social identity) with

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[16]The minimum g of our database was -1, and it is highly unlikely to have cases of aspirations gap less than this value.

[17](1=very unsatisfied; 2=somewhat satisfied; 3=somewhat unsatisfied; 4=very satisfied)

people from their neighbourhood, Argentina and the rest of the "world" (Yuki et al., 2005, see), with questions such us:

> "to what degree do you feel committed to your "neighbourhood, "Argentina" and the "rest of the world"?; to what degree do you see yourself as part of your "neighbourhood," "Argentina" and the "rest of the world"?, how close do you feel to the other members of ...?"[18]

In addition, a question aiming to get an approximate measure of people's perceptions of their own income relative to the income of the average recipient of the public good was asked. The question was as follows:

> "could you please indicate in which position you think the income of your household is with respect to the average income of a household of "your neighbourhood", "Argentina" and the "rest of the world".[19]

Finally, questions on *Gender,* (1=Masculine or 2=Feminine) and *Education* (1=Elementary School, 2=High School, 3=Tertiary, 4=University, 5=Masters, 6-Ph.D.) were included in the survey.

3.3 Estimation

Ordered Logit estimations were used to estimate whether - and eventually how - people's income aspirations gaps affect their propensity to cooperate, ceteris paribus. An ordinal regression model was chosen to allow the distances between categories (i.e. numbers of tokens allocated to different accounts) to differ.[20] One single regression for each decision was carried out. The underlying latent variable was the individual propensity to cooperate with each of the three groups: "local," "national" and "global" $(k = L, N, W)$.

The model estimated is as follows:

$$g_i^{k*} = \beta_1 gap_i + \beta_2 S_i + \beta_3 R_i + \beta_4 (gap_i * R_i) + x_i'\beta + \varepsilon_i \qquad (4)$$

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[18]Responses were indicated on 4-point scale from "not at all " to "very or a lot."

[19]The options were: 1- Very below average, 2- fairly below average, 3- aprox. same as average, 4- fairly above average, 5- very above average.

[20]We performed a likelihood ratio (LR) test on all the regressions in this paper to test the proportional odds assumption. It turns out that in most of the cases, we cannot reject the null hypothesis that that there is no difference in the coefficients. So, given that in almost all the cases the proportional odds assumption holds, for simplicity we preferred to present the results using a standard rather a generalized ordinal regression model.

where gap_i is income aspirations gaps, S_i is social identity, R_i is perceptions of relative income, x_i is a vector of control variables including demographic variables, absolute income, and absolute aspirations, social capital, among others. g_i^{k*} is a continuos unobserved number form 0 to 10 representing the propensity to contribute to k account. It is measured in 10 "m" discrete intervals by the number of tokens each people allocate to each k account. It is assumed that

$$g_i^k = m \ \ if \ \ \tau_{m-1} \leq g_i^{k*} < \tau_m, \quad \text{for } m = 0, ..., 10$$

The probability of contributing $g_i = m$ number of tokens to the $k = \{L, N, W\}$ account was estimated for a given vector of exogenous variables $\mathbf{x}$ and assuming that ε_i follows a logistic distribution.

4 Results

Table 4 summarizes the first results. Income aspirations gap is found to significantly reduce people's propensity to cooperate with foreigners and compatriots, ceteris paribus. However, it does not affect people's propensity to cooperate with neighbours. There are several possible reasons for this, which we discuss later in the article.

A natural question that arises is whether it is the gap that matters, or it is simply income or/and absolute aspirations levels which affect cooperation. This concern is addressed by including both variables, income and aspirations, as regressors. Table 4 confirms that income aspirations gap remains highly significant at the "world" and "national" levels after controlling for absolute income, aspirations and other demographic variables such us location dummies and gender, age and education. Moreover, absolute aspirations levels and absolute income levels are found to be statistically insignificant: it is the gap instead of the absolute income or aspirations per se that matters for cooperation with foreigners and compatriots. The quantitative effect of this result is considerably high. Figure 1 and Figure 2 depict the predicted probabilities of being a free-rider or a fully cooperator with foreigners conditional on income aspirations gap, ceteris paribus. The probability of contributing nothing to the "world" account is 9.11% if income aspirations gap is $g = 0$, and it is 55.5% if income aspirations gap is wide, i.e. $g = 0.8$ (see Figure 2). Figure 1 shows the probability of contributing all the endowments to the "world" account conditional on income aspirations gap. This probability is 12.8% if income aspirations gap is $g = 0$, and it is 1.2% if $g = 0.8$. The marginal probability of free-riding on foreigners as

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TABLE 4

Dependent Variable: Number of tokens contributed	Decision W Global PG	Decision N National PG	Decision N Local PG	Decision W Local PG
Income Aspirations' Gap (IAG)	-3.139***	-2.811*	-0.48	1.067
	(1.217)	(1.436)	(2.254)	(1.793)
Income	-0.32	-0.345	-0.072	0.148
	(0.197)	(0.225)	(0.368)	(0.264)
Absolute Aspirations Level	0.221	0.211	-0.026	-0.237
	(0.189)	(0.228)	(0.36)	(0.238)
Location dummies included	Yes	Yes	Yes	Yes
Demographic variables included (education, age, gender)	Yes	Yes	Yes	Yes
Number of Cases	194	194	194	194

Notes: Ordered logistic regression. Each column is a separate regression equation

Robust standard errors in parentheses, clustered by Location and income decile

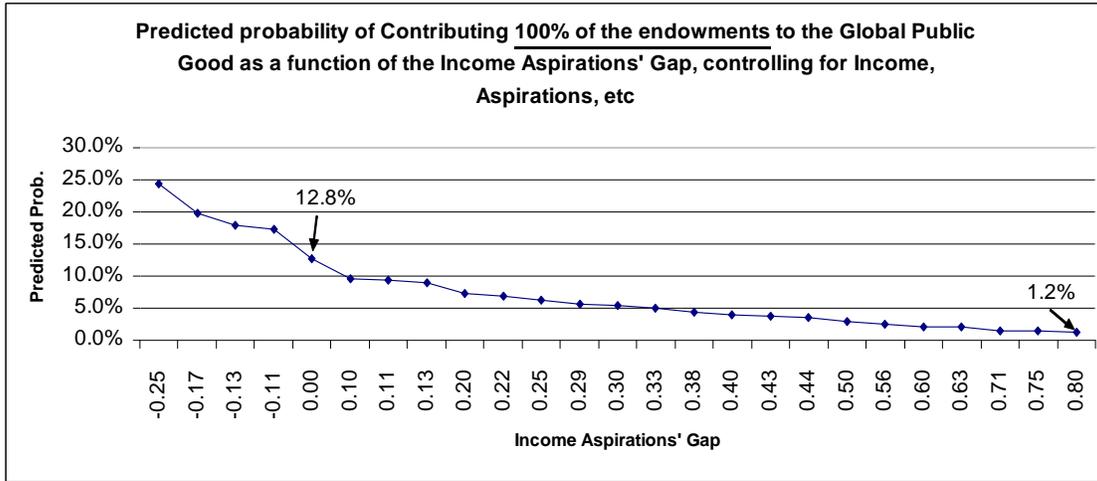** p<0.10, ** p<0.05, *** p<0.01; PG = Public Good*

Figure 1:

a function of income aspirations gap is 0.38. This marginal probability is the slope of the curve that associates income aspirations gap with the probability of being a 100% free-rider (Figure 2) evaluated at the mean of the income aspirations gap (0.16), holding all the other variables constant at their mean level. Intuitively, if the income aspirations gap of an average person increases by 1 percentual point, the probability that she/he will free-ride on foreigners increases by 0.38 percentual points.

We now take advantage of the richness of our survey data to make sure that our results are not spurious, and they are not driven by some confounding variable. The results of such analysis are depicted in Table 5. The first potential confounding variable included in the regression is "life satisfaction". We show that the inclusion of this variable does not affect our main results.

Another possible source of confound is the social identification of participants with neighbours, compatriots and foreigners. As pointed out in the literature (Brewer, 1981; Brewer and Kramer, 1986; Schopler and Insko, 1992; Akerlof and Kranton, 2000), social identification increases cooperation by reducing actors' tendency to draw distinctions between their own and others' welfare. This would imply that the closer people feel they are to their neighbour, compatriot or foreign fellow, the higher the number of tokens contributed to the local, national or global account, respectively. It is also known from the sociological literature (Appadurai, 2004; Sewell et al., 1957) that individuals draw their aspirations from those who they feel identified with Ray (2006). We include measures of social identity at different levels (local, national and

TABLE 5 - Complete Regressions

Dependent Variable: Number of tokens contributed	Decision W Global PG	Decision N National PG	Decision N Local PG	Decision W Local PG
Income Aspirations' Gap	**-3.949***	**-9.446***	-0.929	2.265
	(2.259)	(5.063)	(3.047)	(1.889)
Income	-0.013	-0.993	-0.598	-0.304
	(0.308)	(0.662)	(0.386)	(0.286)
Absolute Aspirations' Level	-0.046	0.718	0.591	0.294
	(0.244)	(0.588)	(0.364)	(0.251)
Social Identity (World Level)	**1.251****	0.603	**-1.305****	**-1.944*****
	(0.521)	(0.93)	(0.599)	(0.66)
Social Identity (National level)	-0.711	0.266	-0.634	-0.196
	(0.819)	(0.91)	(0.522)	(0.385)
Social Identity (Local level)	-0.164	-0.221	**2.019*****	**2.413*****
	(0.849)	(0.799)	(0.648)	(0.547)
Relative income (World level)	-0.037			
	(0.295)			
Relative income (National level)		0.171		
		(0.234)		
Relative income (Local level)			0.235	0.204
			(0.225)	(0.191)
Relative income (World level) x IAG	**1.492***			
	(0.855)			
Relative income (National level) x IAG		0.407		
		(0.913)		
Relative income (Local level) x IAG			**-1.285****	**-1.589*****
			(0.578)	(0.543)
Controls — Life Satisfaction	-0.205	-0.173	0.096	0.068
	(0.229)	(0.216)	(0.282)	(0.216)
Expectations on others' contribut (World Level)	**0.454*****			
	(0.066)			
Expectations on others' contribution (National Level)		**0.487*****		
		(0.087)		
Expectations on others' contribution (Local Level)			**0.238****	**0.397*****
			(0.093)	(0.09)
Location dummies included	Yes	Yes	Yes	Yes
Demographic variables included (education, age, gender)	Yes	Yes	Yes	Yes
Number of Cases	174	172	179	177

Notes: Ordered logistic regression. Each column is a separate regression equation
Robust standard errors in parentheses, clustered by Location and income decile
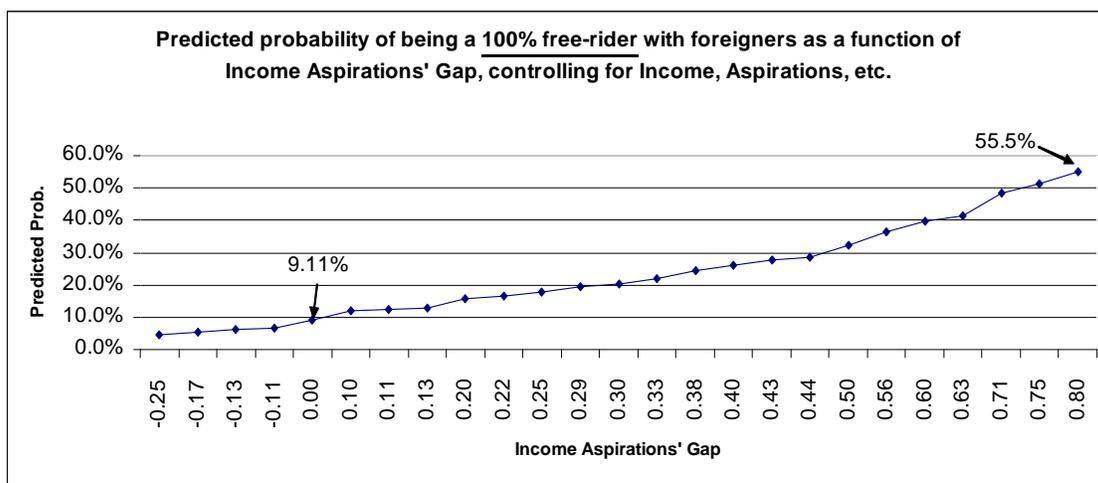** p<0.10, ** p<0.05, *** p<0.01*

Figure 2:

world) but our main results on aspirations gap and cooperation don't change. Moreover, our data confirm a positive effect of social identity on cooperation at "local" and "world" level, but not at "national" level. The probability that a person who doesn't feel identified with foreigners (i.e. social identity index at "world" level equals cero) fully cooperates with them is 14.4%, *ceteris paribus.* If the person feels identified with the foreigner the probability that she/he fully cooperates increases to 36.3%. The fact that social identification with compatriots does not affect people's propensity to cooperate with them is at least puzzling. One possibility is that identity increases cooperation with ingroup members by influencing actors' expectations about fellow ingroup members' behavior Yamagishi and Kiyonari (2000). That is, social identity alone is not sufficient to produce in-group favoritism. Group boundaries do not affect cooperation if actors have a more direct basis for forming expectations that others will reciprocate. In light of this argument, it may be the case that Argentineans, regardless of how closely identified they felt with their compatriots, expected less favourable treatment from their compatriots in return. The role of expectations is confirmed when expectations about others' contributions (at all levels) were added to the regression. As can be observed from Table 6, there is a clear strong relationship between the player's level of cooperation and the expectations of the level of the average partner's cooperativeness. However, social identity remain highly significant at "world" and "local" level, suggesting that Yamagishi and Kiyonari (2000) hypothesis is only confirmed at "national" level. At the other levels, the hypothesis that social identity alone is not sufficient to produce in-group favoritism cannot be rejected.

The last potential confounding variable we investigate is players' perceptions of their own income relative to the income of the average recipient of the public good. The effect of distributive justice principles on cooperation have been studied in the Social Psychology literature. Lamm and Schwinger (1980), for example, show empirical evidence that people contribute unequally in favor of the needier person. The richer people perceive themselves relative to their neighbour, compatriot or foreign fellow, the higher will be their contribution to the local, national or global account, respectively. In the economic literature, a similar version of this hypothesis has been put forward by Fehr and Schmidt (1999), who suggested that some people may be inequity averse and may be willing to sacrifice their own payoff in order to minimize disparities between own and others payoffs. However, what we do here is somehow different. In the experiment reported in this article, people come to the laboratory with (a) a particular real income situation and (b) a particular perception of their income relative to the income of the average neighbour, compatriot or foreigner. Thus, if perceived real relative disadvantage affect the behaviour in the lab, then we are saying that an "inequality averse" rich person will cooperate with a poor person, but may not cooperate with a "rich" person. According to Fehr and Schmidt (1999), however, this "inequality averse" person will cooperate in the same way in both experiments, because people's perceptions about their income relative to the others does not play a role in their model. Thus, in the light of their model, the same person will be thought to be pure altruistic in the first experiment, and pure inequality averse in the second. We don't find enough evidence in favour of inequality averse people and our main results on aspiration gap and cooperation remain robust after the inclusion of these variables.

Finally we test for the existence of an interaction effect. We want to investigate whether players' perception of their relative income w.t. the income of the average recipient of the public good moderates the effect of income aspirations gap on contributions. We expect that the (negative) effect of income aspirations gap on cooperation is lower (less negative) if the person perceives that her income is higher than the income of the average recipient of the public good. After including the interaction term in the four regressions, this interaction effect was found to be different, depending on the identity of the recipients of the public good. The coefficient measuring the interaction is negative and highly significant, only when the recipients of the public good are neighbours. It is positive and significant when the recipients of the public good are foreigners, and it is not significant when they are compatriots. These observations immediately highlight the complexity of human cooperation.

Players' perception of their relative income w.t. the income of the average recipient of the public good reduces the effect of Income Aspirations Gap on contributions with their neighbours, and increases the effect of Income aspirations Gap on contributions with foreigners, although it does not affect the effect of income aspiration gaps on cooperation with compatriots.

5   Robustness checks

The most important threats to internal validity are (a) errors-in-variables bias, (b) simultaneous causality bias and (c) omitted variable bias from a variable that is correlated with the regressors but is unobserved. This latter source of threat has been extensively considered in the preceding section. Thus, this section will focus on exploring the eventual influence of threats (a) and (b) on the results. In addition, model specification and concerns related to the (small) size of the sample used for estimations are also discussed.

Arguably, one of the main variables of this study, income aspirations gaps, may suffer from measurement error. Unfortunately, due to the lack of empirical work on *income aspirations gaps,* there is no other existing measure to contrast with. The closest one is an aspirations/attainment measure used by Easterlin (2003), who took information from a representative survey[21] of the American population that included the following two questions:

> "1. We often hear people talk about what they want out of life. Here are a number of different things. [The respondent is handed a card with a list of 24 items.] When you think of the good life – the life you'd like to have, which of the things on this list, if any, are part of that good life as far as you personally are concerned? 2. "Now would you go down that list and call off all the things you now have?"

The idea behind these two questions is similar to the idea used to measure income aspirations gap in this article. The first question gathers information about desires for certain goods, which can be summarized here as desires for a certain income level. The second question tries to capture the place in which the respondents stand in relation to these desires, i.e. to what extent they are fulfilled. This question is analogous to the question on current income made here. So, the only existing

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[21] These surveys are used in Schor (1998)

measure of "aspirations gaps" is not far from the one used here. Notwithstanding this, the measure used here is subject to another concern. The income aspirations people are asked to comment on are not absolute values, but *relative* to the income distribution in Argentina. People are asked to state in which position of the income distribution of their country they would be satisfied. Thus, the variable income aspiration is specifically measuring relative income aspirations. This approach has its positive and negative sides. On the positive side, it is perfectly in line with the "relative income hypothesis" first formulated by Duesenberry (1949). According to this, people essentially care about their relative position rather than their income in absolute terms (see Zizzo and Oswald, 2001). People set their standards relative to the standards of others. On the negative side, such a measure imposes an eventual artificial upper bound on people's aspirations. A person who is already in the highest decile of the income distribution is not allowed to aspire more than this. In order to reduce this measurement error, all the regressions conducted in this study where replicated dropping from the entire sample those subjects who belonged to the highest decile. Table 6 shows that the results remain qualitatively the same and, moreover, the coefficient of income aspirations gap even become more significant. Likewise, some variables that were not significant before (e.g. income, absolute aspirations and life satisfaction at the national level), now became significant.

One of the assumptions underlying ordinal logistic regressions is that the relationship between each pair of outcome groups is the same. In other words, ordinal logistic regression assumes that the coefficients that describe the relationship between, say, the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, etc. This is called the proportional odds assumption. Because the relationship between all pairs of groups is the same, there is only one set of coefficients (only one model). If this was not the case, we would need different models to describe the relationship between each pair of outcome groups. We test the proportional odds assumption, and we use a Log Likelihood ratio test [22]. In the first two models of Table 5 we found not enough evidence to reject the assumption of proportional odds (model column 1: $chi^2(136) = 147.65$ and $Prob > chi^2 = 0.2334$; model column 2: $chi^2(153) = 163.48$ and $Prob > chi^2 = 0.2664$). In the last two models (col. 3 and 4) the test rejects the null hypothesis at low significance levels, therefore only for these last two models, there is sufficient evidence that the proportional odds assumption does not hold. However, this is not a major concern since the main results of this

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[22]stata command: omodel (Wolfe, 1997)

TABLE 6: Complete Regressions (observations at the 10th Decile dropped)

Dependent Variable: Number of tokens contributed	Decision W Global PG	Decision N National PG	Decision N Local PG	Decision W Local PG
Income Aspirations' Gap	**-6.079****	**-13.505*****	-0.944	1.703
	(2.449)	(5.213)	(3.352)	(2.376)
Income	-0.042	**-1.316****	-0.647	-0.208
	(0.373)	(0.661)	(0.419)	(0.254)
Absolute Aspirations' Level	-0.016	**0.959***	0.638	0.241
	(0.254)	(0.559)	(0.391)	(0.237)
Social Identity (World Level)	**1.663*****	0.879	-1.058	**-2.176****
	(0.603)	(1.013)	(0.735)	(0.848)
Social Identity (National level)	-0.851	-0.217	-0.901	-0.436
	(0.959)	(0.983)	(0.655)	(0.476)
Social Identity (Local level)	-0.291	0.294	**2.081*****	**2.573*****
	(1.08)	(0.93)	(0.672)	(0.677)
Relative income (World level)	-0.411			
	(0.325)			
Relative income (National level)		-0.033		
		(0.283)		
Relative income (Local level)			0.312	0.023
			(0.242)	(0.204)
Relative income (World level) x IAG	**2.679*****			
	(0.869)			
Relative income (at National level) x IAG		1.379		
		(0.986)		
Relative income (at Local level) x IAG			**-1.544*****	**-1.334****
			(0.596)	(0.619)
Controls Life Satisfaction	-0.33	**-0.393***	0.16	0.189
	(0.224)	(0.205)	(0.326)	(0.242)
Expectations on others' contribution (World Level)	**0.466*****			
	(0.086)			
Expectations on others' contribution (National Level)		**0.481*****		
		(0.108)		
Expectations on others' contribution (Local Level)			**0.239****	**0.484*****
			(0.116)	(0.079)
Location dummies included	Yes	Yes	Yes	Yes
Demographic variables included (education, age, gender)	Yes	Yes	Yes	Yes
Number of Cases	136	135	140	138

Notes: Ordered logistic regression. Each column is a separate regression equation

Robust standard errors in parentheses, clustered by Location and income decile

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

article come from model 1 and 2 in which the assumption of proportional odds ratio is not rejected.

Before concluding, it is natural to comment on the size of the sample used in this article. As an estimation method, ordered Logit uses Maximum Likelihood (ML) Estimation. The ML estimators become minimum variance unbiased estimators as the sample size tends to infinite or it is large enough. Therefore, the ML estimation may be biased and inferential hypothesis tests are uncertain in small sample analyses. Hart and Clark (1999) explore the behavior of ML estimates in probit models across differing sample sizes and with varying numbers of independent variables in Monte Carlo simulations. Their experiments show that (a) the risk of making Type I errors does not change appreciably as sample size descends and (b) the risk of making Type II errors increases dramatically in smaller samples and as the number of regressors increases. These results strengthen the validity of the results shown in this article. In the analysis made here, the statistical significance of a coefficient is tested and the null hypothesis is that the coefficient are equal to zero. If the risk of "rejecting a null hypothesis when it is actually true" does not change considerably as sample size decreases, then we would expect that those coefficients that are significantly different from zero in this article will remain being different from zero if we increased the sample size. It is certainly true, however, that we do not know if some variables that are not statistically significant with the sample size used here, would become statistical significant if largest sample size is used.

6   Conclusion

Theories of aspirations have been applied to a broad array of issues across the social sciences, including Economics, Sociology, Psychology, Anthropology and Decision Theory. Since its inclusion in Economics in the early fifties by Simon (1955, 1959), no systematic work has been carried out to learn about the implications of income aspirations on cooperation, particularly in a one shot public good setting. This article is the first attempt to do so.

It has been shown that the narrower an individual's income aspirations gap, the greater is the propensity to cooperate providing both global and national public goods. However, this effect was not significant in the provision of a local public good. It is the gap that matters, instead of the absolute income or aspirations. The quantitative effect is considerably high. Participants with the widest aspirations gap were 46 percent more likely to free-ride on foreigners than those who were fully satisfied with

their income. We found a parallel result suggesting that the effect of social identity on cooperation depends on the geographical level of the public good provided. The more participants feel identified with foreigners or neighbours, the higher is their contribution levels to providing a global and local public good. In-group identification with compatriots does not affect participants' contributions to provide a national public good, ceteris paribus.

We have made three contributions to the economics literature. First, our results have important implications for the existing knowledge of private provision of public goods, initiated with Bergstrom et al. (1986) influential paper. Bergstrom et al. (1986) state that any change in the wealth distribution that leaves unchanged the aggregate wealth of current contributors will either increase or leave unchanged the equilibrium supply of public good. This statement may not hold if changes in the wealth distribution have a non-linear effect on people's cooperation through its change in income aspirations gap.

Second, we showed evidence that the motivations to contribute and the level of contributions depend on the geographical type of the public good in question. This has practical implications for regional public policies and raises some challenges for the design of policies aiming at increasing private contributions to public goods. For example, a policy that promotes in-group identification will increase cooperation at a local level but not at a national level. However, a policy aimed at reducing individuals' income aspirations gap will be more effective at increasing both national and global cooperation than local cooperation. In this latter case, one should be cautious, since reducing individual's income aspirations can, on the one hand, increase social welfare by increasing cooperation, but on the other hand, it can reduce social welfare through the effect on growth.

Third, the evidence presented here highlights a previously "unobserved" source of the individual heterogeneity identified in most public good experiments. Taking the example given in the introduction, if an econometrician does not control for John's unsatisfied income aspirations, then his behaviour in both scenarios will be inferred to be irrational or inconsistent, when in fact it is simple the case of an omitted variable bias.

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