Supporting Information

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SI Text

1. Existence of Equilibrium with Full Cooperation

A group is composed of N identical agents, where N is even. In each period, they are matched in pairs, with uniform probability of selection. In each pair, one agent is randomly assigned the role of producer (= red, in the experiment) and the other is a consumer (= blue). Producer and consumer are equally likely states in each period, for each agent. In the Control conditions, only the producer has a choice to make, corresponding to one of the two outcomes possible in a match: Y (= defection) and Z (= cooperation). If Z is the outcome, then $u=20$ is the payoff to the consumer and $-c=2$ is the payoff to the producer. If Y is the outcome, then $a=8$ is the payoff to the producer and to the consumer alike. Clearly, $u-c>2a$, hence social efficiency is achieved only if Z is chosen. Time is indexed $t=0,1\ldots$. Period payoffs are discounted geometrically at rate $\beta=0.93$ starting from period $n\geq 0$, whereas previous periods are not. Payoffs and continuation payoffs in the game are given by expected lifetime utilities.

Histories are private information, but at the end of each period, agents can observe how many producers in their group have selected Y. We call this situation anonymous public monitoring. We consider the following social norm, consisting of a rule of cooperation and a rule for punishment:

- Cooperation: if the agent is a producer, then he selects Z.
- Punishment: if an outcome Y is observed in the group, then the agent will always select Y whenever he is a producer.

The equilibrium payoff at the start of the game, on the initial date $t=0$, thus is

$$V(n):=(n+1)\times\frac{u-c}{2}+\sum_{j=1}^{\infty}\beta^j\frac{u-c}{2}=\frac{u-c}{2}\times\left(n+\frac{1}{1-\beta}\right).$$

An agent is a producer or a consumer with equal probability, in each period. Only payoffs from periods after $t=n$ are discounted geometrically, at rate β. Hence, $V(n)$ is simply the expected lifetime utility on the initial date. It should be clear that $V(n)$ is increasing in n and that the equilibrium payoff in the continuation game at the start of any date t (before any uncertainty is resolved) corresponds to

$$V_t=\begin{cases} V(n-t) & \text{if } t<n\\ V:=\dfrac{u-c}{2(1-\beta)} & \text{if } t\geq n.\end{cases}$$

It follows that the equilibrium payoff in the continuation game starting any date t for someone who is a producer (after the uncertainty about the role is resolved) corresponds to

$$V_{pt}=\begin{cases} -c+V(n-(t+1)) & \text{if } t<n\\ -c+\beta V & \text{if } t\geq n.\end{cases}$$

We now are ready to discuss individual optimality conditions in and out of equilibrium. Following the social norm means that we must check two items: (*i*) In equilibrium, no producer should have an incentive to defect, and (*ii*) out of equilibrium, no producer should have an incentive to cooperate.

In Equilibrium, No Producer Defects. Suppose an agent is a producer in a generic period. For cooperation to be a best response in every period $t=0,1,\ldots$, we need

$$V_{pt}\geq\hat{V}_t. \quad \textbf{[S1]}$$

The left-hand side of the first inequality denotes the payoff to a producer who cooperates in the period, choosing Z. The right-hand side denotes the continuation payoff on date t in an economy in which the agent is a producer who defects in equilibrium (reverting back to playing the social norm the following period), and everyone follows the decentralized enforcement rule prescribed by the social norm.

Out of Equilibrium, No Producer Cooperates. Consider out-of-equilibrium situations in which everyone follows the social norm. Because producers' actions are observable publicly, if a defection occurs, then—when everyone follows the social norm—every producer plays "always defect" from the period after the defection is observed. So, the continuation payoff out of equilibrium must satisfy

$$\hat{V}_t=\begin{cases} \hat{V}(n-t):=(n-t)a+\dfrac{a}{1-\beta} & \text{if } 1\leq t<n\\ \hat{V}:=\dfrac{a}{1-\beta} & \text{if } t\geq n.\end{cases}$$

This payoff is independent of the group size because every producer defects forever starting the period following a defection. It should be clear that a producer optimally selects Y out of equilibrium, because Y is the dominant action in the static game, that is, it always is individually optimal to punish out of equilibrium. To see this,

- Suppose a producer selects Z instead of Y out of equilibrium, and reverts to play Y afterward. He earns $-c$ this period, and his continuation payoff is $\beta\hat{V}$ because everyone will punish next period.
- Suppose instead, that the producer selects Y this period, as required by the social norm. He earns a, and his continuation payoff also is $\beta\hat{V}$.

Because $a>-c$, it is optimal to punish out of equilibrium. Now define

$$\Delta_t=V_{pt}-\hat{V}_t=-\frac{u+c}{2}+\left(\frac{u-c}{2}-a\right)\times\begin{cases}\left(n-t+\dfrac{1}{1-\beta}\right) & \text{if } t<n\\ \dfrac{1}{1-\beta} & \text{if } t\geq n.\end{cases}$$

Note that the minimum value of Δ_t is achieved for $t\geq n$. The implication is that **[S1]** holds for all t whenever

$$\beta\geq\beta^*:=\frac{2(a+c)}{u+c}.$$

Given the experimental parameters, we have $\beta^*=2/3$. It follows that the fully cooperative equilibrium exists in the Control conditions because in the experiment, $\beta=0.93$. Furthermore, this equilibrium exists in the Tokens conditions because tokens are intrinsically worthless, do not restrict the action set, and can always be ignored.

2. Specifics of the Design in the Tokens Conditions

We call Token an electronic object that is intrinsically worthless because holding it yields no extra points or dollars, and it cannot be redeemed for points or dollars at the end of any cycle. Tokens may be carried over to the next period but not to the next cycle. Tokens may be transferred from consumer to producer, one at a time, and subjects may hold two Tokens at most. This upper bound is not binding in monetary equilibrium. Because in each meeting only the outcome is observed, not the action, subjects cannot signal their desire to cooperate by requesting or offering a Token.

Choice Sets and Outcomes. In the experiment, the choice sets include conditional and unconditional actions. The producer may choose either Y (= no help, in Fig. 1), Z (= give help, in Fig. 1), or "implement Z conditional upon receiving a token" (= sell help, in Fig. 1); see also the screenshots in the experimental instructions. The consumer may choose to "keep the token(s)" (= do nothing, in Fig. 1), "transfer one token" (= transfer, in Fig. 1), or "transfer one token conditional upon Z being implemented" (= buy, in Fig. 1). If subjects attach value to tokens, then conditional actions facilitate coordination on the outcome where there is cooperation only in return for one token (= "trade"). The outcome "trade" also can be achieved through other actions, particularly in choosing "give help" and "transfer." In a meeting, consumer and producer make simultaneous selections from their choices sets, without prior communication. Choices are private information, i.e., only the outcome is observable but not the opponent's choice. Choices that are incompatible lead to the outcome "inaction." This design ensures that subjects can neither incur involuntary losses nor garnish their opponent's token holdings or earnings. If subjects choose "buy" and "sell help," then this would suggest that tokens have acquired value endogenously.

Possible and Impossible Trades. Because each subject might hold zero, one, or two tokens, token transfers could not take place in every circumstance. Trade is possible when the consumer has one or two tokens and the producer has zero or one token. Trade is impossible either when the consumer has zero tokens or when the producer has two tokens. Consequently, the consumer or producer may have a restricted choice set when trade is impossible (shaded cells in Fig. 1). In the experiment, a consumer with zero tokens had no action to take (= do nothing, in Fig. 1), whereas a producer with two tokens could choose only between "give help" or "no help." As shown in a previous experiment (1), removing the upper bound of token holdings would not alter the empirical frequency of possible trades, because subjects rarely would choose to hold more than two tokens. Fixing a two-unit upper bound for token holdings also has the advantage of simplifying subjects' task to formulate a prediction on the distribution of token holdings. Subjects were informed whether trade was possible in that encounter in a way that minimized the chance that such information indirectly would reveal identities. The producer observed whether the consumer had either zero or some tokens; the consumer observed whether the producer had either two or fewer than two tokens. Providing information about token holdings reduces the cognitive load for participants when making a decision and when interpreting the outcome.

Monitoring of Past Actions. In all conditions, subjects could observe on their screens the results of every past period of the cycle they were in. The information provided included the outcome of the encounter, Y or Z, and the total number of Z outcomes in the group period by period (= public monitoring). In the Tokens conditions, subjects also observed whether a token was transferred in the encounter. Each subject had a pen and a sheet of paper to fill in with the results, period by period. The type of information reported on paper was the same present at all times on the screen. Requiring manual writing is a standard procedure in experimental economics to keep participants alert to the ongoing session and to make sure subjects are aware of the outcome of interactions as the experiment unfolds. The same procedure was followed in the Control and Tokens conditions. If subjects wanted to rely on history-dependent strategies, such as social norms of cooperation and decentralized punishment, they could easily access information about past outcomes, either on the screen or on paper. This design feature might have biased the results against the use of tokens as money.

The Spontaneous Use of Tokens as Money. In pilot sessions, we expanded the choice sets of subjects. A producer might "implement Y conditional upon receiving a token," and a consumer might "transfer one token conditional upon Y being implemented." These additional choices are the opposite of a monetary exchange strategy, i.e., they do not involve the exchange of a token for help. Within this richer choice set, subjects might have more trouble in discovering the potential use of tokens as money. In fact, the use of tokens observed in these additional sessions was no different from that observed in the sessions with the reduced choice set. In other words, the limited choice set adopted here did not favor, per se, the emergence of tokens as money.

3. Evolutionary Model

Here, we show that cooperation cannot prevail as an evolutionary stable outcome if there are only cooperators and defectors. However, cooperation may prevail as an evolutionary stable outcome if the population includes a positive fraction of traders who cooperate only if they receive a token. The argument is developed along the lines of the analysis in ref. 2.

The Game. We present a game with slight modifications from the experiment to improve analytical tractability. Consider a discrete-time economy with a large finite population in which players interact repeatedly for an indefinite number of rounds; after each round, there is an additional round with probability $\beta \in (0,1)$. We call the current population in this economy a "generation." A share $\tau \in [0,1)$ of the generation is endowed with one indivisible token, and no one can store more than one token.

Assume three different types of players exist in a generation, differentiated according to the pure strategy they adopt. Unconditional defectors D never help, unconditional cooperators C always help, and traders T help only in exchange for a token. It is assumed that when a player has a token, she attempts to transfer it in exchange for help. It is also assumed that the distribution of types in the generation is stationary, and it is denoted by

$$\mathbf{p} := (p_C, p_D, p_T) \quad \text{with} \quad p_C + p_T + p_D = 1.$$

Let $v_i(\mathbf{p})$ denote the "normalized" payoff in such a repeated game for player's type $i = D, C, T$, i.e., the payoff multiplied by the termination probability $1-\beta$. Details about payoffs are presented at the end of this section. Clearly, the distribution of types p influences payoffs to the different types as well as the average payoff in the generation, denoted

$$v(\mathbf{p}) := p_T v_T(\mathbf{p}) + p_D v_D(\mathbf{p}) + p_C v_C(\mathbf{p}).$$

Now consider a sequence of generations and the evolution of the distribution of types across generations. We assume that p evolves according to the standard replicator dynamics. Letting $\dot{p}$ denote the change in p across two adjacent generations, we have

$$\dot{p}_i = [v_i(\mathbf{p}) - v(\mathbf{p})]\, p_i \quad \text{for } i = C, D, T.$$

The share p_i of types i increases from one generation to the next as long as the payoff of type i is greater than the average payoff in the generation.

The distribution of types $\mathbf{p}$ is unchanged across generations only if $\dot{p}_i = 0$ for all $i = C, D, T$, or equivalently, if $\dot{p} = 0$. For the parameter values of the experiment, there exist exactly four possible distributions $\mathbf{p}$ that are stationary across generations: (*i*) $\mathbf{p} = (1,0,0)$, (*ii*) $\mathbf{p} = (0,1,0)$, (*iii*) $\mathbf{p} = (0,0,1)$, and (*iv*) $\mathbf{p} = (0, 1-\tau, \tau)$. We find that all outcomes in which cooperators coexist with some other type are not stationary. Only two of the above distributions of types are asymptotically stable: when everyone is a defector (*ii*) and when everyone is a trader (*iii*). The distributions in which everyone is a cooperator (*i*) and in which there is a mix of defectors without tokens and traders who each hold tokens (*iv*) are asymptotically unstable. Any interior distribution such that $p_C, p_D, p_T > 0$ asymptotically converges toward either distribution *ii* or *iii*. The basins of attraction shown in Fig. 3 depend on the amount of tokens available, because this amount affects the payoff to traders and to cooperators. For smaller values of τ, the basin of attraction of distribution *ii* becomes smaller.

Payoffs Under a Stationary Distribution of Types. Here, we derive the payoffs for each type, $v_C(p), v_D(p), v_T(p)$, when the distribution of types p in a generation is fixed (p is omitted as argument when no confusion arises). For analytical tractability, we assume tokens initially are allocated to someone who is either a cooperator or a trader and that in the long run, defectors never hold tokens. Therefore, let p_T^j, p_C^j denote the population shares of types C and T in a generation that has $j = 0, 1$ tokens. The following conditions hold:

$$p_C = p_C^0 + p_C^1, p_T = p_T^0 + p_T^1, p_C + p_T + p_D = 1$$

and

$$\tau = p_T^1 + p_C^1 \quad \text{and} \quad 1 - \tau - p_D = p_C^0 + p_T^0.$$

Recall that a player in a round has an equal chance to be a seller or a buyer. Let $d = 8$ be the utility to buyer and seller when the seller defects, $c = 20$ the utility to the buyer when the seller cooperates, and $d - \ell$ with $\ell = 6$ the utility to a seller who cooperates. Given p, the long-run payoff to a defector D may be expressed recursively as

$$V_D = \overbrace{\frac{1}{2}(d + \beta V_D)}^{\text{player is a seller}} + \frac{1}{2}[(1 - p_C)d + p_C c + \beta V_D].$$

Defining the normalized payoff $v_i := (1 - \beta)V_i$ for $i = C, D, T$, we have

$$v_D = d + \frac{c - d}{2} p_C.$$

For a cooperator C who has no token, we have

$$V_C^0 = \overbrace{\frac{1}{2}\left[d - \ell + \tau\beta V_C^1 + (1 - \tau)\beta V_C^0\right]}^{\text{player is a seller}} + \frac{1}{2}\left[(1 - p_C)d + p_C c + \beta V_C^0\right]. \quad \text{[S2]}$$

Adding $\frac{1}{2}\beta V_C^0 - \frac{1}{2}\beta V_C^0$ on the right-hand side of Eq. **S2**, we obtain

$$v_C^0 = \frac{1}{2}\left[2d - \ell + (c - d)p_C + \tau\beta\left(V_C^1 - V_C^0\right)\right].$$

If the cooperator C has a token, we have instead

$$V_C^1 = \overbrace{\frac{1}{2}\left(d - \ell + \beta V_C^1\right)}^{\text{agent is a seller}} + \frac{1}{2}\left[d\left(\tau + p_D - p_C^1\right) + (\tau + p_D)\beta V_C^1 + (1 - \tau - p_D)\beta V_C^0 + c\left(1 - \tau - p_D + p_C^1\right)\right]. \quad \text{[S3]}$$

To see why, note that the agent as a buyer receives help whenever he meets types who always help or who help for a token, i.e., with probability $1 - \tau - p_D + p_C^1$. In one of these cases, the agent cannot spend the token because the opponent helps even if he has a token (with probability p_C^1). Again, we obtain

$$v_C^1 = \frac{1}{2}\left[c + d - \ell - (c - d)\left(\tau + p_D - p_C^1\right) - (1 - \tau - p_D)\beta\left(V_C^1 - V_C^0\right)\right].$$

It follows that

$$V_C^1 - V_C^0 = \frac{(c - d)p_T^0}{2 - \beta(1 + p_D)}.$$

For a trader T, we have

$$V_T^0 = \overbrace{\frac{1}{2}\left[\tau\left(d - \ell + \beta V_T^1\right) + (1 - \tau)\left(d + \beta V_T^0\right)\right]}^{\text{player is a seller}} + \frac{1}{2}\left[(1 - p_C)d + p_C c + \beta V_T^0\right]$$

$$V_T^1 = \overbrace{\frac{1}{2}\left(d + \beta V_T^1\right)}^{\text{player is a seller}} + \frac{1}{2}\left[(\tau + p_D)\beta V_T^1 + d\left(\tau + p_D - p_C^1\right) + (1 - \tau - p_D)\beta V_T^0 + c\left(1 - \tau - p_D + p_C^1\right)\right],$$

which give us

$$v_T^0 = \frac{1}{2}\left[2d - \ell\tau + (c - d)p_C + \tau\beta\left(V_T^1 - V_T^0\right)\right]$$

$$v_T^1 = \frac{1}{2}\left[c + d - (c - d)\left(\tau + p_D - p_C^1\right) - (1 - \tau - p_D)\beta\left(V_T^1 - V_T^0\right)\right].$$

Consequently, we have

$$V_T^1 - V_T^0 = \frac{(c - d)p_T^0 - \tau\ell}{2 - \beta(1 + p_D)}.$$

For the case in which $p_i > 0$, we define the payoff to type $i = C, D, T$

$$v_i = \frac{p_i^0 v_i^0 + p_i^1 v_i^1}{p_i} \quad \text{for } i = C, T.$$

To close the model, we must find the stationary distribution of token holdings across types, in a generation. Hence, we need to find conditions such that, given p and τ, p_T^j and p_C^j are stationary for $j = 0, 1$. Because $p_T^0 + p_T^1 = p_T$ and $p_C^0 + p_C^1 = p_C$, we need to consider only two conditions, so we work with $j = 0$. Stationarity of p_C^0 and p_T^0 requires, respectively,

$$0 = \overbrace{p_C^1 \frac{1}{2}\left(p_C^0 + p_T^0\right)}^{\text{inflow:cooperators spend tokens}} - \overbrace{p_C^0 \frac{1}{2}\left(p_T^1 + p_C^1\right)}^{\text{outflow:cooperators receive tokens}}$$

$$0 = \overbrace{p_T^1 \frac{1}{2}\left(p_C^0 + p_T^0\right)}^{\text{inflow:traders spend tokens}} - \overbrace{p_T^0 \frac{1}{2}\left(p_T^1 + p_C^1\right)}^{\text{outflow:traders receive tokens}},$$

which, because $p_C^0 + p_T^0 = 1 - \tau - p_D$ and $p_T^1 + p_C^1 = \tau$, may be rearranged as

$$p_C^1(1-\tau-p_D) = p_C^0\tau$$
$$p_T^1(1-\tau-p_D) = p_T^0\tau.$$

Because $p_T^0 + p_T^1 = p_T$ and $p_C^0 + p_C^1 = p_C$, the two equations above give

$$p_C^1 = \frac{\tau p_C}{1-p_D} \quad \text{and} \quad p_T^1 = \frac{\tau p_T}{1-p_D}.$$

Given the values of c, d, and ℓ adopted in the experiment, we can write payoffs to each type C and T as

$$v_C = 8 + 6p_C - \frac{3\tau[\tau(1-p_D-2p_C) + (1-p_D)(p_D+2p_C)]}{(1-p_D)^2}$$

$$v_T = 8 + 6p_C + \frac{3\tau(1-p_D-\tau)(1-p_D-2p_C)}{(1-p_D)^2}.$$

One may check that $v_c < \min(v_D, v_T)$ for all interior p, i.e., for all $p \in (0,1)^3$. This is because cooperators always have a loss $-\ell$ as sellers, whereas defectors never do; traders have a loss only if they receive a token, which is when they help. On the other hand, cooperators receive help either if they have tokens or if they meet cooperators, i.e., they receive help as often as traders.

4. Additional Statistical Analyses

Tables S1–S10 report information about the sessions, average frequencies of cooperation (all periods, period 1 only), the distribution of Subjects' choices (by group size), the distribution of token holdings, and an additional regression.

1. Camera G, Casari M, The coordination value of monetary exchange: Experimental evidence. *Am Econ J Microecon*, in press.
2. Nowak MA, Sigmund K (1998) Evolution of indirect reciprocity by image scoring. *Nature* 393:573–577.

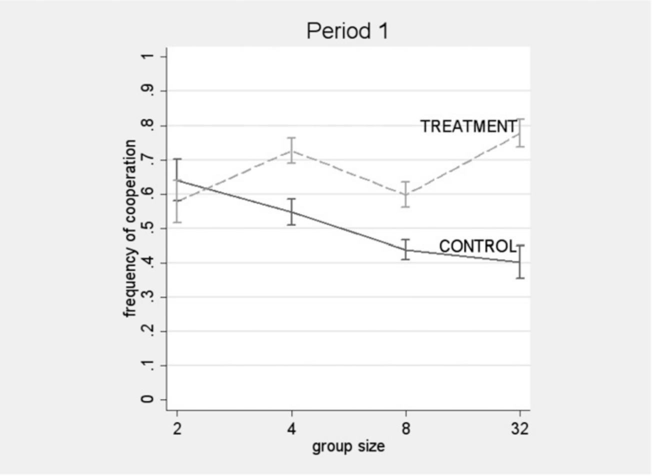

Fig. S1. The presence of tokens and cooperation in period 1. In large groups, the presence of tokens raises cooperation frequency in period 1 of each cycle relative to the Control conditions. By design, in period 1 trade is possible in all encounters. As groups get larger, cooperation declines in the Control conditions but not in the Tokens conditions. The lines represent the mean frequency of cooperation in period 1, i.e., the fraction of producer–consumer encounters in which the producer helps. The error bars represent the SEM. Unit of observation: frequency of cooperation in period 1 in a group of *N* players, in a cycle.

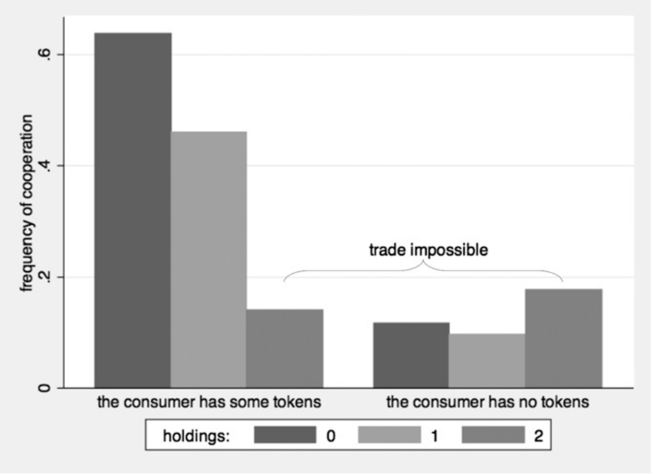

Fig. S2. Tokens do not serve as image scoring. The figure suggests that tokens did not work as an image score or reputational device. Producers cooperate infrequently when trade is impossible, irrespective of whether the consumer has tokens. In addition, the figure shows the existence of "wealth effects," i.e., producers with larger token holdings cooperate less frequently. This suggests that subjects valued tokens primarily as a store of value and not as a proxy of past cooperative behavior. Unit of observation: individual producer's choice in a period. Data are aggregated across all group sizes in the Tokens conditions.

Table S1. Sessions: Control condition

Session	Date	No. of subjects	Cycle	No. of groups	Group size	Duration (rounds)
CONTROL-A	April 6, 2010	32	1	16	2	22
			2	16	2	3
			3	16	2	19
			4	16	2	4
			5	1	32	27
CONTROL-B	February 28, 2010	32	1	8	4	11
			2	8	4	8
			3	8	4	36
			4	8	4	25
			5	1	32	9
	March 30, 2010	32	1	8	4	5
			2	8	4	5
			3	8	4	21
			4	8	4	4
			5	1	32	9
CONTROL-C	February 19, 2010	64	1	8	8	11
			2	8	8	11
			3	8	8	3
			4	8	8	15
			5	2	32	27
	April 7, 2011	64	1	8	8	7
			2	8	8	38
			3	8	8	7
			4	8	8	8
			5	2	32	18

Table S2. Sessions: Tokens condition

Session	Date	No. of subjects	Cycle	No. of groups	Group size	Duration (rounds)
TOKENS-A	April 1, 2010	32	1	16	2	4
			2	16	2	10
			3	16	2	16
			4	16	2	19
			5	1	32	27
TOKENS-B	March 5, 2010	32	1	8	4	11
			2	8	4	8
			3	8	4	22
			4	8	4	17
			5	1	32	10
	March 26, 2010	32	1	8	4	22
			2	8	4	17
			3	8	4	26
			4	8	4	31
			5	1	32	13
TOKENS-C	March 4, 2010	64	1	8	8	7
			2	8	8	22
			3	8	8	12
			4	8	8	10
			5	2	32	16
	March 31, 2011	64	1	8	8	31
			2	8	8	13
			3	8	8	6
			4	8	8	67
			5	2	32	3

Table S3. Average frequency of cooperation: All periods

	Group size			
Aspect	2	4	8	32
Control conditions				
Cycle				
1	0.565	0.459	0.367	
2	0.708	0.492	0.295	
3	0.743	0.441	0.406	
4	0.813	0.572	0.300	
5				0.285
Total	0.707	0.491	0.342	0.285
Average duration of the economy (rounds)	12.0	14.4	12.5	19.3
No. of groups	64	64	64	7
Tokens conditions				
Cycle				
1	0.391	0.376	0.347	
2	0.469	0.435	0.306	
3	0.457	0.363	0.359	
4	0.493	0.358	0.303	
5				0.340
Total	0.452	0.383	0.329	0.340
Average duration of the economy (rounds)	12.3	19.3	21.0	12.6
No. of groups	64	64	64	7
Tokens conditions: trade possible				
Cycle				
1	0.422	0.491	0.470	
2	0.548	0.625	0.483	
3	0.566	0.543	0.518	
4	0.623	0.526	0.444	
5				0.517
Total	0.540	0.546	0.479	0.517
Tokens conditions: trade impossible				
Cycle				
1	0.273	0.191	0.195	
2	0.225	0.126	0.111	
3	0.100	0.146	0.108	
4	0.125	0.132	0.078	
5				0.112
Total	0.172	0.149	0.123	0.112

Table S4. Average frequency of cooperation: Period 1 of each cycle

Aspect	Group size 2	4	8	32
Control conditions				
Cycle				
1	0.375	0.438	0.422	
2	0.625	0.563	0.406	
3	0.750	0.594	0.469	
4	0.813	0.594	0.453	
5				0.402
Total	0.641	0.547	0.438	0.402
Fraction of economies with 100% cooperation	0.641	0.234	0.031	0.000
Fraction of economies with 0% cooperation	0.359	0.141	0.078	0.000
Tokens conditions				
Cycle				
1	0.500	0.594	0.359	
2	0.500	0.688	0.672	
3	0.563	0.813	0.688	
4	0.750	0.813	0.672	
5				0.777
Total	0.578	0.727	0.598	0.777
Fraction of economies with 100% cooperation	0.578	0.500	0.203	0.000
Fraction of economies with 0% cooperation	0.422	0.047	0.047	0.000

Table S5. Distribution of subjects' choices in groups of size 2

Consumer's choice	Producer's choice: Sell help	Give help	No help	Total
Tokens condition				
Trade possible				
Buy	0.420	0.059	0.342	0.821
Do not buy	0.098	0.006	0.075	0.179
Trade impossible	—	0.172	0.828	1.000
Control condition	—	0.707	0.293	1.000

Table S6. Distribution of subjects' choices in groups of size 4

Consumer's choice	Producer's choice: Sell help	Give help	No help	Total
Tokens condition				
Trade possible				
Buy	0.464	0.051	0.332	0.847
Do not buy	0.085	0.011	0.056	0.153
Trade Impossible	—	0.149	0.851	1.000
Control condition	—	0.491	0.509	1.000

Table S7. Distribution of subjects' choices in groups of size 8

Consumer's choice	Producer's choice: Sell help	Give help	No help	Total
Tokens condition				
Trade Possible				
Buy	0.372	0.062	0.420	0.854
Do not buy	0.065	0.008	0.072	0.146
Trade impossible	—	0.123	0.877	1.000
Control condition	—	0.342	0.658	1.000

Table S8. Distribution of subjects' choices in groups of size 32

	Producer's choice			
Consumer's choice	Sell help	Give help	No help	Total
Tokens condition				
Trade possible				
Buy	0.454	0.021	0.431	0.906
Do not buy	0.060	0.001	0.033	0.094
Trade impossible	—	0.112	0.888	1.000
Control condition	—	0.285	0.715	1.000

Table S9. Distribution of token holdings in the average group

		Producers' tokens			
Economy size	Consumers' tokens	0	1	2	Total
2	0	0.000	0.000	0.249	0.249
	1	0.000	0.349	0.000	0.349
	2	0.402	0.000	0.000	0.402
	Total	0.402	0.349	0.249	1.000
	Trade possible (frequency)	0.751			
4	0	0.042	0.088	0.140	0.269
	1	0.094	0.224	0.084	0.402
	2	0.188	0.099	0.042	0.328
	Total	0.324	0.411	0.265	1.000
	Trade possible (frequency)	0.605			
8	0	0.061	0.105	0.103	0.269
	1	0.106	0.169	0.103	0.379
	2	0.179	0.117	0.057	0.352
	Total	0.346	0.391	0.263	1.000
	Trade possible (frequency)	0.572			
32	0	0.062	0.114	0.064	0.241
	1	0.093	0.199	0.107	0.399
	2	0.199	0.098	0.063	0.360
	Total	0.354	0.412	0.234	1.000
	Trade possible (frequency)	0.589			

Table S10. Impact of tokens on cooperation

	Group size			
Factor	2	4	8	32
Tokens condition				
Trade possible	−0.168* (0.000)	0.055† (0.022)	0.137 (0.093)	0.232‡ (0.078)
Trade impossible	−0.541* (0.005)	−0.342* (0.057)	−0.218* (0.036)	−0.173‡ (0.076)
Constant	0.638† (0.053)	0.476* (0.012)	0.371* (0.030)	0.285* (0.064)
Dummies for cycles	Yes	Yes	Yes	No
N	184	192	191	21
R-squared	0.309	0.360	0.462	0.642

The dependent variable is frequency of cooperation. The table reports results from linear regressions measuring the treatment effect (= Tokens condition) when trade is possible or impossible, for different group sizes. The unit of observation is the frequency of cooperation in a group of *N* players, in a cycle. SEs (in parenthesis) are robust for clustering at the session level. Dummies for cycles 2–4 are used to control for possible learning effects (*Methods*).

*Estimated coefficient is significant at the 1% level.

†Estimated coefficient is significant at the 10% level.

‡Estimated coefficient is significant at 5% level.