Online Appendix

A mechanism requesting prices and quantities may increase the provision of heterogeneous public goods

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A Appendix: Additional Figures and Tables

Figure A.1: Tax per unit of public project by treatment. *Left panel:* hosts. *Right panel:* non-hosts.

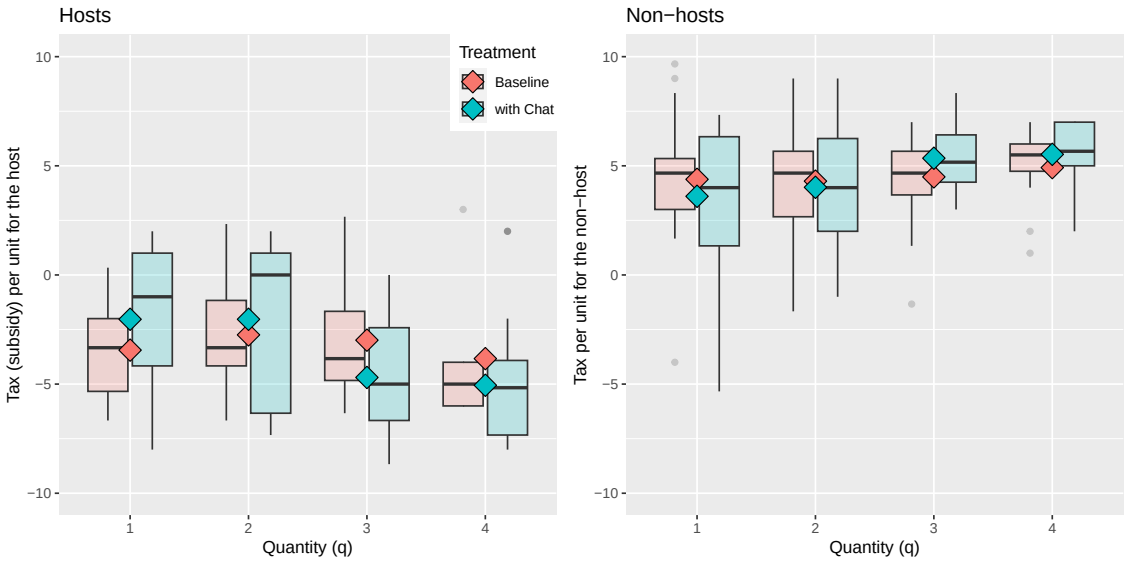

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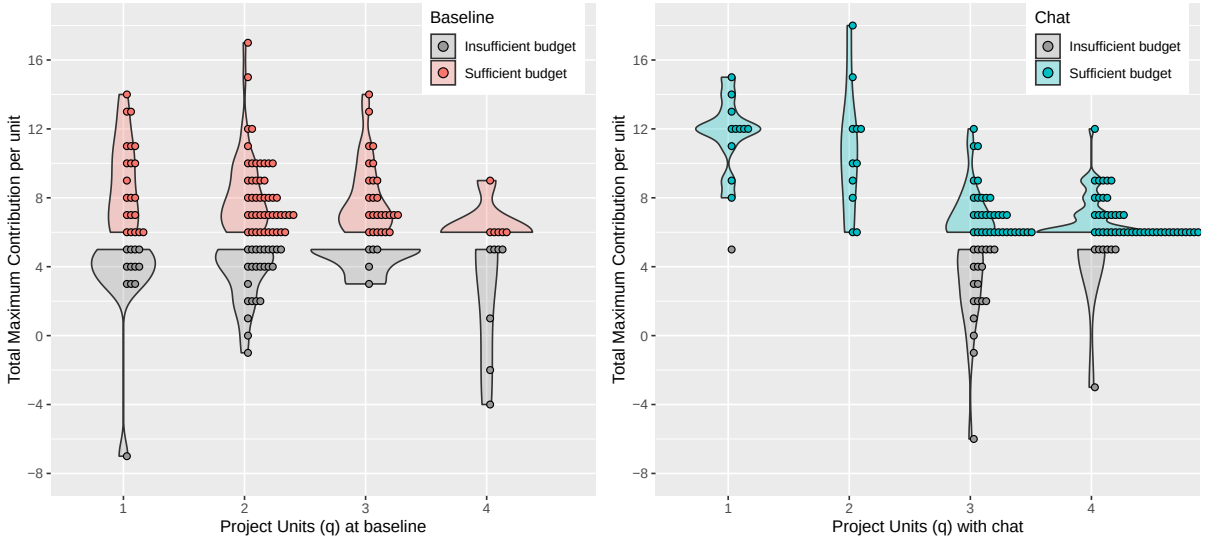
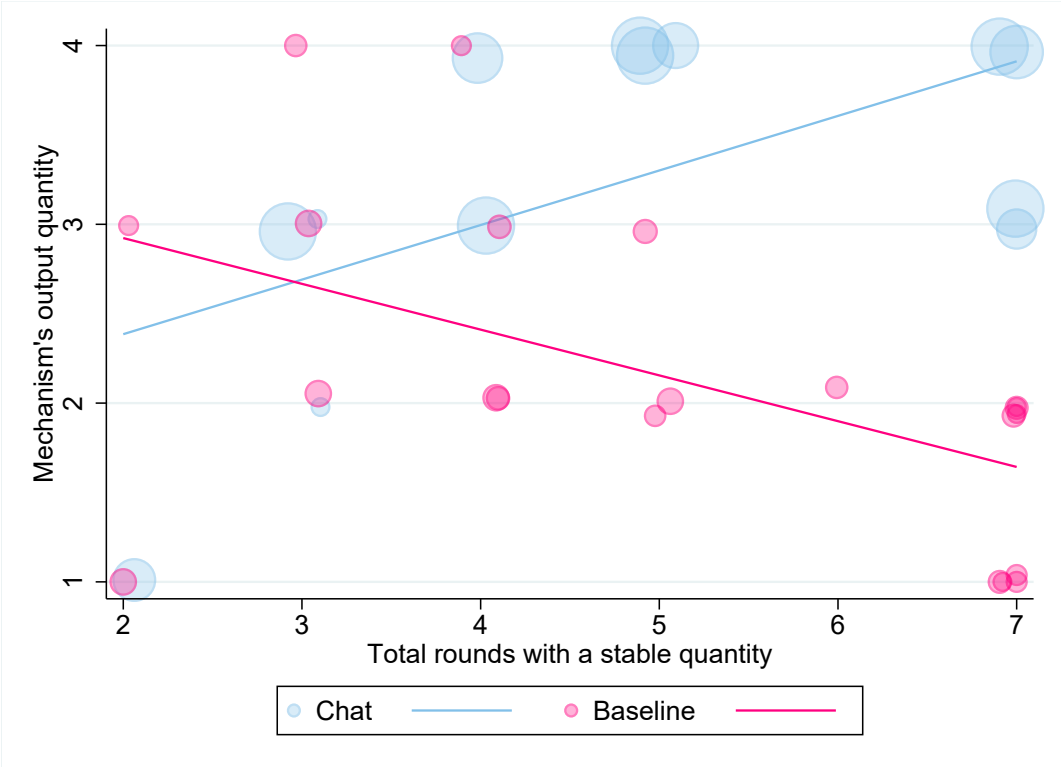
Figure A.2: Contributions per unit from the three group members. *Left panel:* baseline. *Right panel:* with communication. Colored dots (red and blue in the baseline and chat treatments, respectively) represent sufficient contributions (*i.e.*, $\sum c_i \geq 6$), and gray dots represent insufficient contributions.



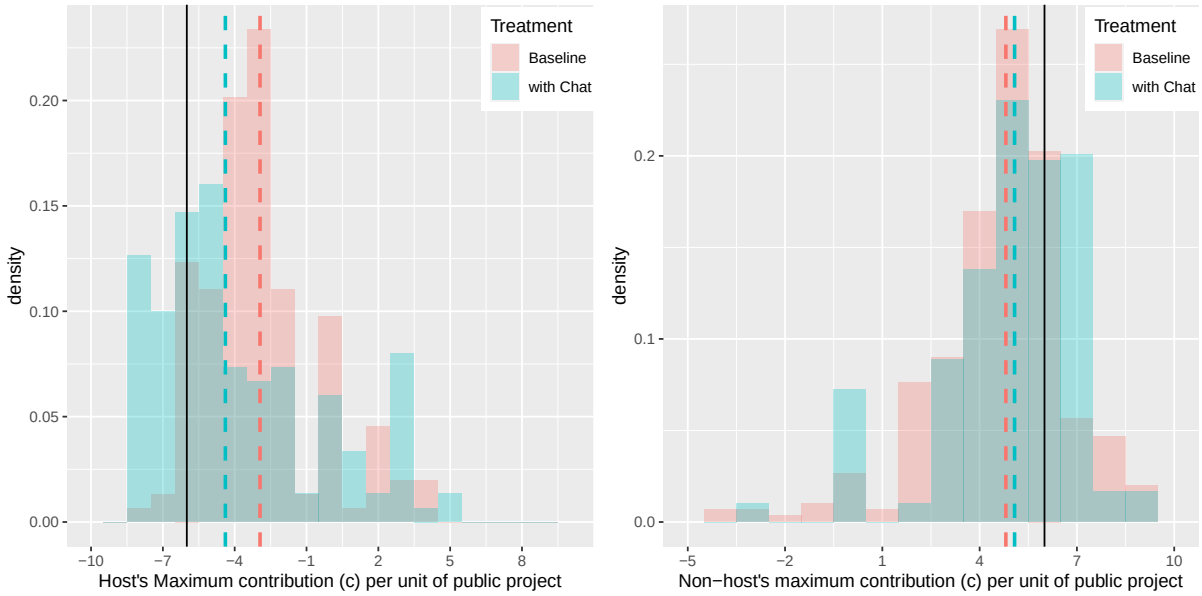
Note: Total contributions displayed for $q \in \{1, 2, 3, 4\}$, which represent 98% of provisions.

Figure A.3: Scatter diagram of the mechanism's output stable quantity (vertical axis) and the number of rounds with stability (horizontal axis). The unit of observation is the group of three players ($N = 44$, half of groups in each treatment condition). The marker size is given by the average provision rate after the stable quantity was reached.



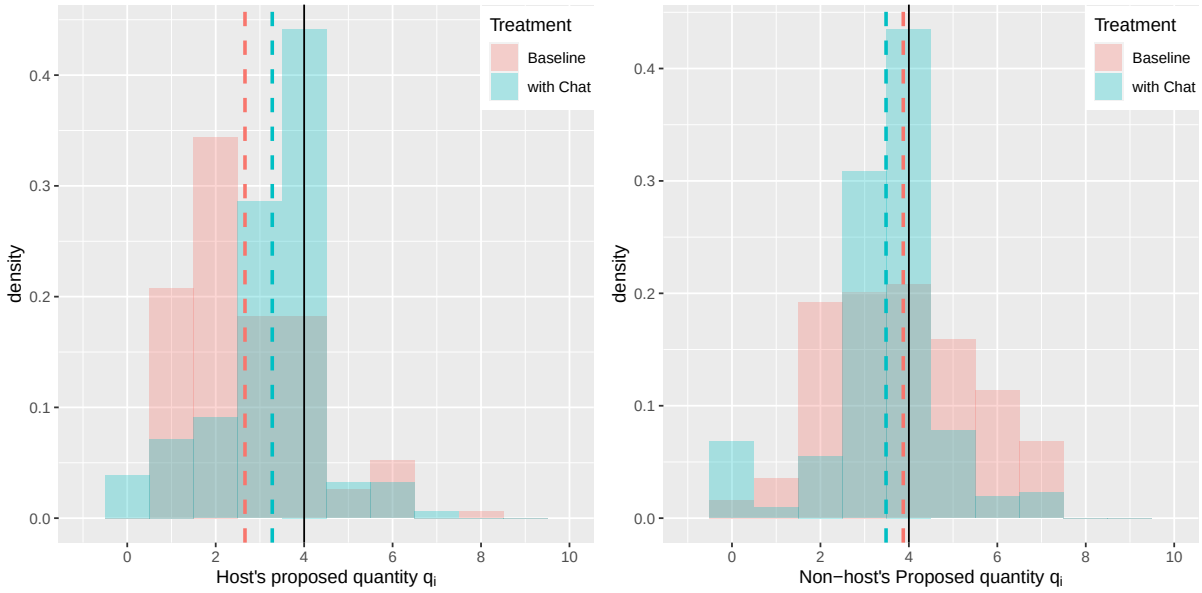
Notes. Definition of stable quantity: counting from round 10 and backwards, the number of rounds in which the selected quantity remained the same. We accepted at most one interruption of the stable quantity. They occurred in 10/35 (28.6%) of all the groups coded as unstable.

Figure A.4: Proposed contributions (c_i) per unit of public project by treatment. *Left panel:* hosts. *Right panel:* non-hosts.



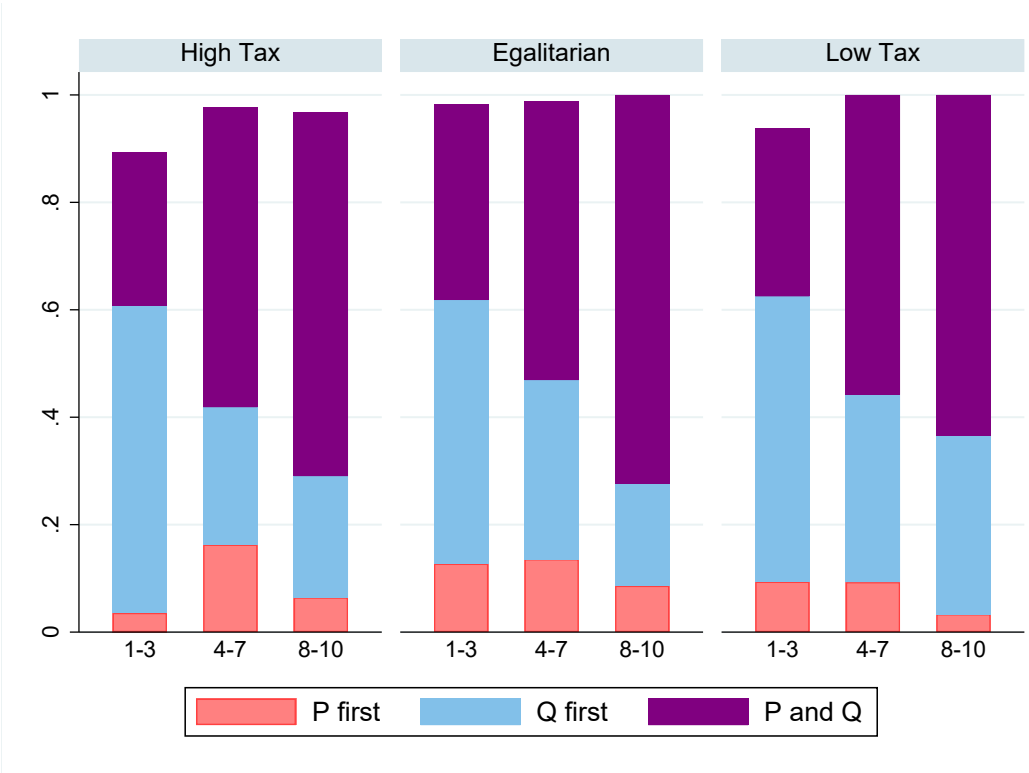
Negative contributions correspond to compensation requests. We omitted from the plots the 27 contributions (2%) lower than -10 or greater than 10. Colored dashed vertical lines correspond to the treatment average values. The black vertical lines correspond to the Lindahl allocation predictions.

Figure A.5: Proposed quantities (q_i) by treatment. *Left panel:* hosts. *Right panel:* non-hosts.



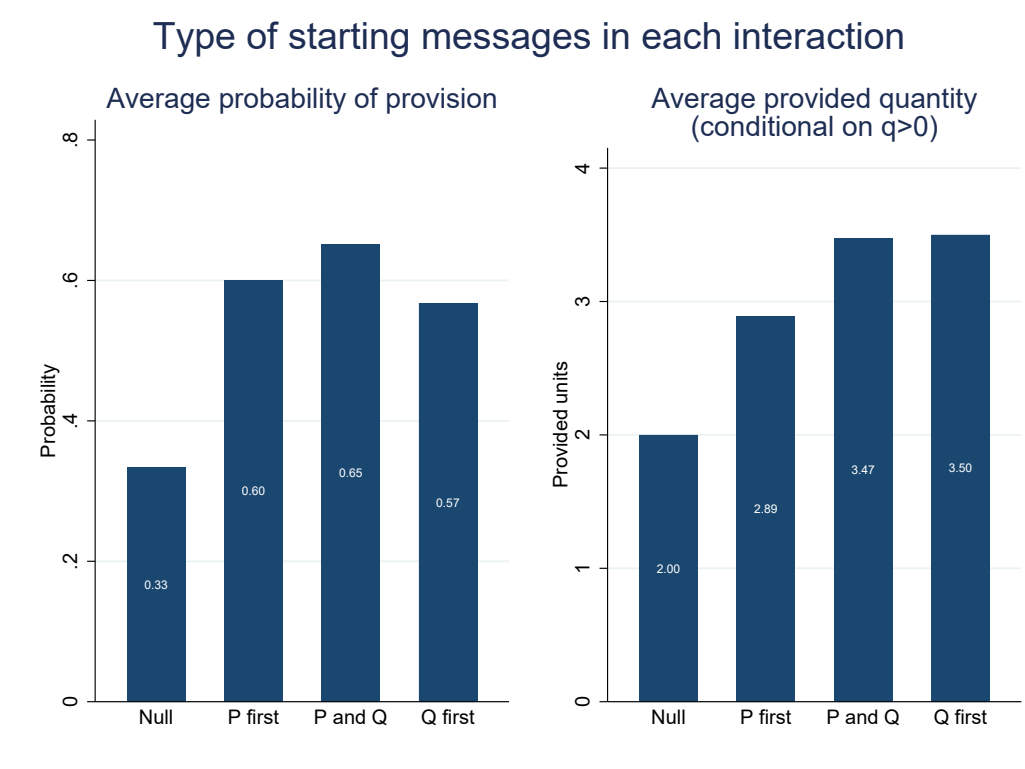
Colored dashed vertical lines correspond to the treatment average values. The black vertical lines correspond to the Lindahl allocation predictions

Figure A.6: What do participant start discussing? Prices, quantities, or both



We also include the practice rounds (1-3) as there is some significant learning to start discussing P and Q simultaneously.

Figure A.7: Differences in probability of provision and quantity provided by type of initial discussion



We also include the practice rounds (1-3) as there is some significant learning to start discussing P and Q simultaneously.

Table A.1: Robustness check. Regression for proposed contributions and quantities with clustering at the individual level.

	Proposed contributions		Proposed quantities	
	(1)	(2)	(3)	(4)
Chat	-1.448**	-2.288	0.617*	0.719
	(0.718)	(2.389)	(0.322)	(0.906)
Type NH	7.750***	7.750***	1.211***	1.211***
	(0.514)	(0.513)	(0.319)	(0.307)
Chat x Type NH	1.718**	1.718**	-1.006**	-1.006***
	(0.811)	(0.751)	(0.409)	(0.346)
Constant	-3.152***	-3.186	2.848***	2.998***
	(0.484)	(2.202)	(0.276)	(0.878)
Group Fixed Effects	✗	✓	✗	✓
Observations	924	924	924	924
Number of ID	132	132	132	132

All regressions include round fixed effects. Standard errors clustered at the individual level are shown in parentheses. *** p <0.01, ** p <0.05, * p <0.1.

Table A.2: Comparison of the mechanism's outcomes across treatments with different Lindahl allocations

	High Tax		Egalitarian		Low Tax	
	Base	Chat	Base	Chat	Base	Chat
Probability of provision	50.8%	52.0%	65.6%	68.2%	57.1%	64.9%
χ^2 test [$p-$value]	[0.892]		[0.628]		[0.362]	
Provided units	2.65	2.5	2.15	3.22	2.59	4.14
$t-$test [$p-$value]	[0.522]		[<0.0001]		[<0.0001]	
Provision wrt Lindahl (q/q^*)	66.3%	62.5%	53.8%	80.5%	64.8%	103.5%
Non-host						
Tax	13.88	13.23	9.77	16.72	13.03	20.18
$t-$test [$p-$value]	[0.603]		[<0.0001]		[<0.0001]	
Tax/Unit	5.14	5.36	4.54	5.06	5.00	5.08
$t-$test [$p-$value]	[0.536]		[0.018]		[0.762]	
Earnings	41.39	40.58	45.27	46.80	43.34	45.57
$t-$test [$p-$value]	[0.417]		[0.004]		[0.025]	
Tax wrt Lindahl (T_{NH}/T^*_{NH})	64.3%	67.0%	75.7%	84.3%	100.0%	101.6%
Surplus $(\pi_{NH}-e)/(\pi^*_{NH}-e)$	142.4%	132.3%	95.4%	105.0%	83.4%	97.3%
Host						
Subsidy	-11.81	-11.45	-6.59	-14.07	-10.50	-15.52
$t-$test [$p-$value]	[0.871]		[<0.0001]		[0.028]	
Subsidy/Unit (subsidy)	-4.29	-4.73	-3.10	-4.14	-4.00	-4.17
$t-$test [$p-$value]	[0.584]		[0.008]		[0.798]	
Earnings	33.91	34.05	35.56	38.86	36.82	36.49
$t-$test [$p-$value]	[0.942]		[0.008]		[0.895]	
Subsidy wrt Lindahl (T_H/T^*_H)	53.6%	59.1%	51.7%	69.0%	100.0%	104.3%
Surplus $(\pi_H-e)/(\pi^*_H-e)$	24.4%	25.3%	34.8%	55.4%	85.3%	81.1%

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.3: Random effects model for the comparison of the mechanism's group outcomes across treatments with different Lindahl allocations

	Project provision	Quantity
	(1)	(2)
Chat	0.0260	1.045***
	(0.0606)	(0.269)
High Tax	-0.148**	0.529*
	(0.0596)	(0.286)
Chat × High Tax	-0.0144	-1.183***
	(0.0891)	(0.458)
Low Tax	-0.0844	0.356
	(0.0731)	(0.312)
Chat × Low Tax	0.0519	0.539
	(0.0953)	(0.460)
Constant	0.656***	2.114***
	(0.0379)	(0.159)
Observations	581	360
Number of Clusters (groups)	83	83

All regressions include round fixed effects. Clustered standard errors at the group level are shown in parentheses. Model (1) corresponds to a linear probability model. *** p <0.01, ** p <0.05, * p <0.1.

Table A.4: Random effects model for the comparison of the mechanism's individual outcomes across treatments (by communication conditions) with different Lindahl allocations

	Chat			Baseline		
	Total tax	Tax per unit	Earnings	Total tax	Tax per unit	Earnings
	(1)	(2)	(3)	(4)	(5)	(6)
Non-host	31.11***	9.551***	6.758**	16.18***	7.776***	9.175***
	(3.647)	(0.950)	(3.024)	(2.224)	(0.742)	(1.914)
High Tax	1.794	-0.522	-5.316*	-7.478**	-0.852	-6.352**
	(3.812)	(1.088)	(3.047)	(3.686)	(1.322)	(3.199)
Non-host × High Tax	-5.553	0.783	-1.088	8.356	1.277	-0.692
	(5.732)	(1.632)	(4.529)	(5.520)	(1.983)	(4.808)
Low Tax	-3.394	-0.00157	-3.379	-5.225*	-0.918	-0.598
	(3.854)	(1.111)	(4.270)	(3.055)	(1.014)	(2.311)
Non-host × Low Tax	5.137	0.00235	0.981	6.890	1.377	-3.616
	(5.733)	(1.666)	(6.357)	(4.601)	(1.521)	(3.472)
Constant	-12.82***	-4.368***	41.61***	-5.874***	-3.184***	37.25***
	(2.397)	(0.633)	(1.963)	(1.524)	(0.494)	(1.399)
Observations	585	585	585	495	495	495
Number of clusters (groups)	132	132	132	117	117	117

All regressions include round and group fixed effects. Clustered standard errors at the group level are shown in parentheses.
*** p <0.01, ** p <0.05, * p <0.1.

Table A.5: Random effects model for the comparison of the mechanism's inputs across treatments (by communication conditions) with different Lindahl allocations

	Chat		Baseline	
	Proposed contributions	Proposed quantities	Proposed contributions	Proposed quantities
	(1)	(2)	(3)	(4)
Non-host	9.468***	0.205	7.750***	1.211***
	(0.756)	(0.192)	(0.632)	(0.384)
High Tax	-0.143	-0.617***	-2.495***	-0.0815
	(1.049)	(0.216)	(0.870)	(0.436)
Non-host × High Tax	0.357	0.211	2.099	-0.378
	(1.574)	(0.323)	(1.304)	(0.654)
Low Tax	0.710	0.643***	-2.143**	-0.466
	(1.006)	(0.150)	(0.920)	(0.396)
Non-host × Low Tax	-0.494	-0.464**	1.643	-0.300
	(1.509)	(0.225)	(1.380)	(0.594)
Constant	-5.406***	3.791***	-2.228***	3.121***
	(0.565)	(0.137)	(0.506)	(0.336)
Observations	924	924	819	819
Number of ID	132	132	117	117

All regressions include round and group fixed effects. Clustered standard errors at the group level are shown in parentheses. *** p <0.01, ** p <0.05, * p <0.1.

Table A.6: Random effects regression for how communication affects the PQ mechanism's outcomes across treatments

	Prob. of provision		Provided quantity	
	(1)		(2)	
Treatment: High Tax	0.0255	(0.128)	-0.948**	(0.437)
Treatment: Low tax	-0.0484	(0.136)	0.523	(0.441)
Initial discussion: Price and quantity	0.0699	(0.0942)	-0.429*	(0.237)
Initial discussion: Price first	0.235**	(0.0953)	-0.400	(0.255)
Initial discussion: Null	0.668***	(0.143)	-1.322***	(0.375)
High Tax × Price and quantity	-0.187	(0.138)	0.144	(0.482)
High Tax × Price First	-0.562**	(0.225)	0.146	(0.382)
High Tax × Null	-1.362***	(0.237)		
Low Tax × Price and quantity	0.0893	(0.173)	0.228	(0.321)
Low Tax × Price First	-0.228	(0.190)	-0.408	(0.291)
Host wrote first	-0.0897	(0.0679)	-0.0794	(0.113)
Agreement	0.218***	(0.0707)	0.325***	(0.113)
Total chat lines	-0.00582	(0.00532)	-0.00716	(0.0120)
Host's share of lines	0.269*	(0.142)	0.0825	(0.583)
Constant	0.517***	(0.139)	3.530***	(0.325)
Observations	286		177	

Both regressions include round fixed effects. Clustered standard errors at the group level (43 groups) are shown in parentheses. Model (1) is a linear probability model. *** p <0.01, ** p <0.05, * p <0.1.

B Appendix: Experimental Materials

B.1 Experimental Protocol: Translated Version

Instructions

The purpose of this activity is to understand how people make economic decisions that can benefit some and harm others. We will study this problem with a hypothetical case. Pay attention because you will have to make decisions that will affect your earnings.

Construction of a waste incinerator

The National Government has suggested to Cities A, B and C to build a waste incinerator that will benefit the three cities. The only place where the incinerator can be built is in City C. Cities A and B have millions of inhabitants, so they benefit more if the incinerator to be built is larger. The incinerator has more burning towers the larger it is. City C is much smaller, so an incinerator with few burning towers is enough. The incinerator generates environmental costs that only affect City C, where the incinerator must be built. The more burning towers the incinerator has, the higher the environmental costs.

Benefits from the waste incinerator

You will make decisions for City {A,B,C}. The budget of each of the cities is 30 tokens. The maximum number of burning towers that can be built is 10. Each burning tower costs 6 tokens. An incinerator with more burning towers favors Cities A and B, but not City C. Given the population of each city and the environmental costs, the benefits are different for Cities A and B over the City C. The following table summarizes the benefits for each city:

Benefits	Burning Towers in the Incinerator (Q)										
	0	1	2	3	4	5	6	7	8	9	10
City A	0	13	24	33	40	45	48	49	48	45	40
City B	0	13	24	33	40	45	48	49	48	45	40
City C	0	1	0	-3	-8	-15	-24	-35	-48	-63	-80

When the values in the table are **positive**, the number of burning towers generates benefits to that City. When the values in the table are **negative**, the number of burning towers generates costs to that City.

Decision-making

You will make two decisions for City {A,B,C}:

1. The maximum burning towers that you would accept to be built.
2. How many tokens are you willing to contribute for each burning tower that is built.

Your contribution can be **positive**, or it can be **negative**. A **positive contribution** is helping to **pay** the burning tower. A **negative contribution** is equivalent to asking **a compensation** for allowing the construction of the burning tower. Each burning tower costs 6 tokens, plus the sum of negative contributions (or compensations). For burning towers to be built, the sum of the contributions for each tower must be at least 6 tokens.

How is determined the number of burning towers?

Each city announces the maximum number of towers that it would accept to be built. The lowest number of towers announced by any of the cities (the minimum) will be built. Once the number of towers is defined, it should be verified if the contributions are sufficient:

- If the sum of contributions per tower is **less than** 6 tokens, the incinerator is not built.
- If the sum of the contributions per tower is **exactly** 6 tokens, each city pays the number of tokens it proposed as a contribution.
- If the sum of the contributions per tower is **greater than** 6 tokens, each city pays a smaller number of tokens than it proposed as a contribution.
  - Each surplus token is divided equally between all cities, and this amount is refunded to each city.
  - The refund is subtracted from the maximum contribution the player in charge of the city was willing to make.

Later we will see some examples and some questions to verify that you understood the rules of the game. The most important aspect of this rule is that you will never pay more than what you proposed to contribute for each tower, and that the maximum number of towers that will be built will not exceed the number of towers that you are willing to accept.

The rule of how many towers are built, and how much each city contributes, can be summarized as follows:

"I will agree to any number of burning towers that is not greater than Q units (see table), as long as my contribution does not exceed P for each unit."

Communication between cities [Only in Chat treament]

During the time available to make your decisions you can communicate with the participants who represent the other cities. You can talk about proposals in terms of quantities (**Q**), and contributions (**P** positive) or compensation (**P** negative). When making a proposal, keep in mind that the amount **Q** multiplied by your proposed contribution **P cannot exceed** your initial number of tokens (30 tokens).

Earnings in each round

Your earnings will be equal to:

+ Endowed tokens
- (Contribution per burning tower) x (Burning towers)
+ Benefits from burning towers (see table)

Payments

You will play for a total of 10 rounds. In each round you will have a maximum of 2 minutes to make your decision. The city assigned to you, as well as the participants representing the other two cities, will be the same during the 10 rounds. Once all rounds are completed, a table will summarize the results of all rounds.

The first 3 rounds will be practice rounds. One of the remaining 7 rounds will be randomly selected to pay the three participants in the group: the representatives of City A, City B, and City C. The payment will correspond to the number of tokens won, in thousands of pesos (rounded to the nearest multiple).

Negative payoffs

Pay close attention to the instructions of the game. There is a possibility of leaving with a null payment in case you do not understand the costs and benefits associated to the number of burning towers. If your earnings are negative in the round selected for payment, you will leave with a null payment. This has very little chance of happening, but it is important that you bear this in mind.

Please click to continue.

B.2 Experimental Protocol: Original (Spanish) Version

Instrucciones Generales

El propósito de esta actividad es entender cómo las personas toman decisiones económicas que pueden beneficiar a unos y perjudicar a otros. Vamos a estudiar este problema con un caso hipotético. Preste atención porque usted tendrá que tomar decisiones que afectarán sus ganancias por participar.

Construcción de un incinerador de basuras

El Gobierno Nacional ha sugerido a las Ciudades A, B y C construir un incinerador de basuras que beneficiará a las tres ciudades. El único lugar en que se puede construir el incinerador es en la Ciudad C. Las Ciudades A y B tienen millones de habitantes, por lo que se benefician más si el incinerador que se va a construir es más grande. El incinerador tiene más torres de quemado entre más grande sea. La Ciudad C es mucho más pequeña, por lo que un incinerador con pocas torres de quemado le basta. El incinerador genera costos ambientales que sólo afectan a la Ciudad C, donde el incinerador debe ser construido. Entre más torres de quemado tenga el incinerador, mayores son los costos ambientales.

Beneficios del incinerador de basuras

Usted tomará decisiones por la Ciudad {A,B,C}. El presupuesto de cada una de las ciudades es de 30 fichas. Se pueden construir hasta 10 torres de quemado. Cada torre de quemado cuesta 6 fichas. Un incinerador con más torres de quemado, favorece a las Ciudades A y B, pero no a la Ciudad C. Teniendo en cuenta la población de cada ciudad y los costos ambientales, los beneficios son diferentes para las Ciudades A y B respecto a la Ciudad C. La siguiente tabla resume los beneficios para cada ciudad:

Benefits	Burning Towers in the Incinerator (Q)										
	0	1	2	3	4	5	6	7	8	9	10
City A	0	13	24	33	40	45	48	49	48	45	40
City B	0	13	24	33	40	45	48	49	48	45	40
City C	0	1	0	-3	-8	-15	-24	-35	-48	-63	-80

Cuando los valores de la tabla son **positivos**, el número de torres de quemado generan beneficios a esa Ciudad. Cuando los valores de la tabla son **negativos**, el número de torres de quemado generan costos a esa Ciudad.

Toma de decisiones

Usted tomará dos decisiones por la Ciudad {A,B,C}:

1. El máximo de torres de quemado que aceptaría que se construyan.
2. Cuántas fichas está dispuesto a contribuir por cada torre de quemado que se construya.

Su contribución puede ser **positiva** o puede ser **negativa**. Una **contribución positiva** está ayudando a pagar la torre de quemado. Una **contribución negativa** equivale a pedir una **compensación** por permitir la construcción de la torre de quemado. Cada torre de quemado cuesta 6 fichas, más la suma de las contribuciones negativas (o compensaciones por pagar). Para que se construyan torres de quemado, la suma de las contribuciones por cada torre debe ser de al menos 6 fichas.

Cómo se determina el número de torres de quemado?

Cada ciudad anuncia el máximo número de torres que aceptaría que se construyan. Se construirá el número de torres **más bajo** anunciado por cualquiera de las ciudades (el mínimo). Una vez se define el número de torres, se debe verificar si las contribuciones son suficientes:

- Si la suma de las contribuciones por torre es **menor a** 6 fichas, no se construye el incinerador.
- Si la suma de las contribuciones por torre es **exactamente** 6 fichas, cada ciudad paga el número de fichas que propuso como contribución.
- Si la suma de las contribuciones por torre es **mayor a** 6 fichas, cada ciudad paga un número de fichas menor a lo que propuso como contribución.
  - Cada ficha adicional se divide por partes iguales entre todas las ciudades y se le devuelve a cada ciudad.
  - La devolución se resta de la contribución máxima que estaba dispuesto a hacer el jugador encargado de la ciudad.

Más adelante veremos unos ejemplos y unas preguntas para verificar que usted entendió las reglas de juego. Lo más importante es que sepa que nunca va a pagar más de lo que propuso contribuir por cada torre, y que máximo se va a construir el número de torres que usted está dispuesto a aceptar.

La regla de cuántas torres se construyen, y cuánto contribuye cada ciudad, puede resumirse así:

"Acepto cualquier número de torres de quemado que no sea mayor a Q (ver tabla), siempre y cuando mi contribución no sea mayor a P por cada unidad."

Comunicación entre las ciudades [Only in Chat treatment]

Durante el tiempo disponible para tomar sus decisiones podrá comunicarse con los participantes que representan a las otras ciudades. Usted puede hablar de propuestas en términos de cantidades (**Q**), y contribuciones (**P** positivo) o compensaciones (**P** negativo). Cuando haga una propuesta, tenga en cuenta que la cantidad **Q** multiplicada por su contribución propuesta **P**, **no** puede exceder su número de fichas inicial (30 fichas).

Ganancias de cada ronda

Sus ganancias serán iguales a:

+ Fichas iniciales
- (Contribución por torre de quemado) x (Torres de quemado)
+ Beneficios por torres de quemado (ver tabla)

Pagos por participar

Usted jugará por un total de 10 rondas. En cada ronda tendrá un máximo de 2 minutos para tomar su decisión. La ciudad que le fue asignada, así como los participantes que representan a las otras dos ciudades, serán los mismos durante las 10 rondas. Cuando complete todas las rondas aparecerá una tabla con los resultados de todas las rondas.

De las 10 rondas, las primeras 3 serán de práctica. De las 7 rondas restantes, una será seleccionada al azar para pagarle a los tres participantes en su grupo: los representantes de la Ciudad A, de la Ciudad B, y de la Ciudad C. **El pago será el número de fichas ganadas, en miles de pesos (redondeados al múltiplo más cercano).**

Pagos negativos

Preste mucha atención a las instrucciones del juego, pues de no entender los costos y beneficios de la torre de quemado, existe la posibilidad de irse sin ganancias. Si en la ronda seleccionada para determinar su pago sus ganancias son negativas, usted se irá con un pago de cero. Esto tiene muy poca posibilidad de ocurrir, pero es importante que lo tenga en cuenta.

Por favor haga click para continuar.

B.3 Validation Questions

In order to continue you must answer the following questions correctly. If your response is wrong, you will get an error message within a box, including an explanation of how to compute the correct answer. You will be shown only the hint for the first question in which you have an incorrect answer. That is, if questions 5 and 8 are wrong, the hint for question 5 will appear. Once you correct the response to question 5, a hint will appear for question 8. You will find at the bottom of the page a table with the summary of the game instructions.

First scenario

City A supports the construction of up to 3 burning towers and is willing to contribute a maximum of 6 tokens per burning tower. City B supports the construction of up to 2 burning towers and is willing to contribute a maximum of 3 tokens per burning tower. City C supports the construction of 0 burning towers, and is willing to contribute a maximum of 0 tokens per burning tower.

Q1. How many burning towers will be built?

Response to Q1: Zero (0) towers.
Burning towers are not built. Although City A supports the construction of up to 3 towers, and City B supports the construction of up to 2 towers, City C does not support the construction of burning towers. The minimum number of towers proposed is then zero.

Q2. How much will City B have to pay for each burning tower built?

Response to Q2: Zero (0) tokens.
City B proposed to build 2 burning towers, and it was willing to contribute up to 3 tokens for each tower. As no burning towers were built, none of the players should contribute any of their proposed contributions.

Second scenario

City A supports the construction of up to 3 burning towers and is willing to contribute a maximum of 6 tokens per burning tower. City B supports the construction of up to 2 burning towers and is willing to contribute a maximum of 3 tokens per burning tower. City C supports the construction of up to 2 burning towers, and is willing to contribute a maximum of -3 tokens (i.e., receive at least 3 tokens) per burning tower.

Q3. How many burning towers will be built?

Response to Q3: Two (2) towers.
Two conditions must be validated. First, determine what is the minimum number of towers among all proposals. City A supports the construction of up to 3 towers, and Cities B and C support the construction of up to 2 towers. The minimum between the three cities is 2 towers. Second, determine if the contributions add up to at least 6 tokens per tower. The sum of contributions from Cities A, B and C is 6 + 3-3 = 6 tokens. This amount per burning tower covers the costs of construction and compensation, and the 2 towers can be built.

Q4. How much will City A have to pay for each burning tower built?

Response to Q4: Six (6) tokens.
City A was willing to contribute a maximum of 6 tokens per tower. Since the sum of the contributions was exactly 6 tokens (see answer to Q3), a city with a positive proposed contribution pays, for each tower built, the maximum amount it was willing to contribute.

Q5. How much will City C receive as a transfer for each burning tower built?

Response to Q5: Three (3) tokens.
City C submitted a contribution of -3 tokens per tower built. That is, it requires compensation of at least 3 tokens for allowing up to 2 burning towers to be built. Since the sum of the contributions was exactly 6 tokens (see answer to Q3), a city with negative contributions receives exactly the minimum amount requested as compensation for each tower built.

Third scenario

City A supports the construction of up to 4 burning towers and is willing to contribute a maximum of 5 tokens per burning tower. City B supports the construction of up to 5 burning towers and is willing to contribute a maximum of 4 tokens per burning tower. City C supports the construction of up to 3 burning towers, and is willing to contribute a maximum of -5 tokens (i.e., receive at least 5 tokens) per burning tower.

Q6. How many burning towers will be built?

Response to Q6: Zero (0) towers.

Two conditions must be validated. First, determine what is the minimum number of towers among all proposals. City A supports the construction of up to 4 towers, City B supports the construction of up to 5 towers, and City C supports the construction of up to 3 towers. The minimum between the three cities is 3 towers. Second, determine if the contributions add up to at least 6 tokens per tower. The sum of contributions from Cities A, B and C is 5 + 4 -5 = 4 tokens. This amount per burning tower does not cover the costs of construction and compensation, the second condition is not met, and the burning towers are not built.

Fourth scenario

City A supports the construction of up to 3 burning towers and is willing to contribute a maximum of 9 tokens per burning tower. City B supports the construction of up to 4 burning towers and is willing to contribute a maximum of 6 tokens per burning tower. City C supports the construction of up to 3 burning towers, and is willing to contribute a maximum of -6 tokens (i.e., receive at least 6 tokens) per burning tower.

Q7. How many burning towers will be built?

Response to Q7: Three (3) towers.
Two conditions must be validated. First, determine what is the minimum number of towers among all proposals. Cities A and C support the construction of up to 3 towers, and City B supports the construction of up to 4 towers. The minimum between the three cities is 3 towers. Second, determine if the contributions add up to at least 6 tokens per tower. The sum of contributions from Cities A, B and C is 9 + 6-6 = 9 tokens. This amount per burning tower covers the costs of construction and compensation, and the 3 towers can be built.

Q8. How much will City B have to pay for each burning tower built?

Response to Q8: Five (5) tokens.
Since the sum of contributions between the three cities was 9+6-6=9 tokens per tower, and only 6 tokens are needed, there is a surplus of 3 tokens. This surplus is divided by three and refunded to the cities. In this case, each city receives a rebate of 1 token. To compute the contribution of each player we subtract 1 token from the proposed maximum contribution.

City B was willing to contribute at most 6 tokens per tower built. With the rebate, the actual contribution of City B will be 6-1=5 tokens per tower built.

Q9. How much will City C receive as a transfer for each burning tower built?

Response to Q9: Seven (7) tokens.
Since the sum of contributions between the three cities was 9+6-6=9 tokens per tower, and only 6 tokens are needed, there is a surplus of 3 tokens. This surplus is divided by three and refunded to the cities. In this case, each city receives a rebate of 1 token. To compute the contribution of each player we subtract 1 token from the proposed maximum contribution or compensation. City C requested a minimum compensation of 6 tokens per tower built. With the rebate, the actual compensation of City B will be -6-1=-7 tokens per tower built.

Q10. How much will be the final earnings for City A?

Response to Q10: Thirty-nine (39) tokens.
Remember that earnings are given by the initial endowed tokens (30 tokens), minus the total contribution, plus the benefits from the built burning towers. What is the total contribution? City A was willing to contribute at most 9 tokens per tower built. Since the sum of contributions between the three cities was 9+6-6=9 tokens per tower, and only 6 tokens are needed, there is a surplus of 3 tokens. This surplus is divided by three and refunded to the cities. In this case, each city receives a rebate of 1 token. To compute the contribution of each player we subtract 1 token from the proposed maximum contribution. City A was willing to contribute at most 9 tokens per tower built. With the rebate, the actual contribution of City B will be 9-1=8 tokens per tower built. Since 3 towers will be built, City A will pay a tax of 3x8=24 tokens. When 3 towers are built, City A receives as a benefit 33 additional tokens. Therefore, earnings from City A are 30-24+33 = 39 tokens.

C Appendix: Coding of chat logs

All the chat logs were manually coded by three independent raters: one co-author of the paper and two research assistants. The coding procedure took place between November and December 2022.[3] Then, the three coders met and solved the discrepancies. The coding outcomes employed in the paper correspond to an agreed category after solving these discrepancies. Table 8 reports the Cohen's kappa intercoders' agreement level, which was above 0.8 for all the variables.

Coding of group outcomes based on chat information

Each coder classified all interactions for the variables shown below. We define an interaction as all the group of chat entries (or messages) sent by members of a group in a given round.

- **Dimension initially discussed:** Any of the group members sent a first message proposing a price (P), a quantity (Q), or both. There were four coding categories:
  - *P first:* A group member proposed her contribution or requested a compensation. A group member suggested the contribution or compensation from others. A group member proposed a vector or prices (i.e., everyone's contributions or compensations).
  - *Q first:* A group member proposed a quantity.
  - *P and Q:* A group member proposed a quantity and her contribution or requested a compensation. A group member proposed a quantity and suggested the contribution or compensation from others. A group member proposed a quantity and a vector or prices.
  - *Null:* Group members interacted but did not send messages proposing prices or quantities. Group members did not interact.
- **Host wrote first:** Equal to 1 when the host sent the first chat message containing any relevant information about the prices or quantities to submit in the current round. Equal to 0 if one of the non-hosts sent the first chat message with the relevant information defined above. Messages referring to the previous round's outcome were not marked as the "first relevant message."
- **Non-binding agreement:** The interaction between the three players reveals that they have reached a non-binding agreement on how to play in the current round. The agreement does

[3] An initial coding exercise was performed in December 2019 for the egalitarian treatment and in July 2022 for the other two treatments. Nevertheless, this initial exercise was removed from the analysis because the unit of observation was the chat entry (i.e., each message) rather than the chat log content for a given group in a given round.

not need to include the intended price and quantity from the three group members, as sometimes they agreed even if not all information was revealed (e.g., in some cases, the hosts were not making an explicit compensation request, but they still agreed with their groupmates). Although in this paper we pooled all the types of agreements in a single category, we had four different categories:

  - *Explicit:* All three players sent an approval message (e.g., okay). Two players sent an approval message, agreeing with a proposal of the other group member.
  - *Implicit:* To define an implicit agreement, we coded each price or quantity proposal as follows:
    - (s) self: The participant proposed a contribution/compensation to herself. If the participant proposed a quantity, it was coded as an (s) for herself.
    - (o) other: A participant received a message where she received a contribution/compensation proposal. We coded every quantity proposal made by someone else as an (o) to the other players.
    - (*) agreed: The participant validates a proposal previously marked as (o).
    - (x) rejection: The participant rejects a proposal previously marked as (o).

    With these four categories in mind, we coded an agreement as implicit if, at the end of the round's chat log interaction, all the discussed prices and quantities were marked with an (s) or a (*).
  - *Past:* At least one player suggests repeating the strategy from a past round, and the others agree.
  - *No:* Using the four categories listed in the *implicit* agreement, we marked as "No" any interaction where a price or a quantity remained with an (x) or if there were no explicit approval messages and the prices and quantities were not fully defined.

- **Veto:** At least one group member explicitly threatened to choose $q = 0$ if the others' total contribution, for a given (or proposed) quantity, did not reach a proposed compensation.