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Evidence from Survey and Laboratory Data**

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Determinants of Revolt: Evidence from Survey and Laboratory Data

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Abstract

This paper examines determinants of revolutionary behaviour. We study the role of freedom of communication, repression of opposition and the government's selfishness. Combining econometric analysis of survey data with a laboratory experiment, we analyse how these factors affect *preferences* for revolt and revolutionary *action*. We introduce an experimental game capturing essential features of a dictatorship. The results show that the feeling that the government operates selfishly increases both revolutionary preferences and actions. Political repression and lack of communication freedom increase revolutionary attitudes but decrease actual opposition, consistent with the collective action problem faced by opposition to a dictatorship.

Keywords

Conflict, revolutions, experimental economics, surveys

JEL Classification Codes

C23, C92, D74, H11

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1. Introduction

The role of economic conditions and political grievance as determinants of civil conflict is a long-standing question that has been approached both from political science and economics. One prominent view, put forward often by economists, is that there is no significant relationship between political repression and the likelihood of a civil conflict. Conflict is described as a result of opportunities for rent-seeking by interested groups. Opportunities are given by low economic growth, which may give incentives to invest in appropriative versus productive activities (Grossman (1991), Acemoglu and Robinson (2000, 2001), Garfinkel and Skaperdas (1996), and Hirshleifer (1995)) or by the discovery of natural resources (Collier and Hoeffler (2001, 2002)). At the other side of the debate Gurr (1970, 2000), Hegre, Ellingsen, Gates and Gleditsch (2001), and Fearon and Laitin (2003) stress political grievance as the primary motive for civil conflict.¹

Assessing empirically the role and the interaction of economic and political motives as determinants for conflict presents two sets of issues. One is the inherently sparse availability of data. Actual revolutions are unusual events, each involving idiosyncratic circumstances. A look at four recent revolutions, in Serbia and Montenegro (2000), in Bolivia and in the former Soviet republic of Georgia (both in 2003), and most recently in Ukraine (November 2004) illustrates the problem. Before the revolution, all countries were poverty-stricken and suffered from widespread corruption, and all three governments' legitimacy was questioned after allegations of rigged elections. Further, in all three revolutions the government had to bow to pressure from the streets, with relatively little violence involved. Yet in all three countries the situation was different from one another. In the former Yugoslavia the revolution that ousted former communist leader Slobodan Milošević took place in the aftermath of an ethnic war that Milošević had waged against neighbouring countries. In Bolivia protests went out of control after a dispute over ownership of the country's gas reserves. Georgia became ungovernable after years of secession fighting by regional separatist groups. In Ukraine a contested ballot and an empoisoned contender led people to the streets asking for new elections. Thus, while themes like economic depression or lack of political freedom are common, such special circumstances make it difficult to identify and isolate the importance of general economic and political determinants.

One approach to overcome this problem has been to shift the attention from conflict *occurrences* to *preferences* and *attitudes* in favour of conflict, for which extensive data are available. MacCulloch and Pezzini (2004) analyse attitudes to conflict and revolt from a large individual-level international survey. After providing evidence that revolutionary preferences map into active forms of dissent, they show that both political freedom and economic growth in a country affect individual revolutionary support. To tackle the possible endogeneity of

¹ Reynal-Querol (2002) and Montalvo and Reynal-Querol (2004) find that ethnic polarisation increases civil conflict.

political and economic factors to the support for revolt, they use legal and colonial origins as instrumental variables, on the ground that the different legal and colonial legacies shaped institutions towards their current state of political liberties and economic growth.

While this approach can overcome the problem of data availability, it does not solve an open question. Next to understanding how preferences for revolt are shaped, modelling the occurrence of civil conflict requires the understanding of two further elements affecting one's decision to revolt. There are also *constraints*, such as the liability for punishment if caught expressing dissent or revolting, economies of scale in effort that favour collective action over individual's, externalities. Finally, there are *expectations*, and more generally information asymmetries on the relative power of the opponent, observational learning, information cascades on the action of others (Hirshleifer (1995)).² Individual revolutionary tastes may not translate into actions due to the co-ordination problem that undermines collective action. Thus, while support for revolution is a necessary condition for uprisings actually breaking out, the effect that certain factors have on revolutionary preferences and actions may not be the same. Forces may even work in opposite directions. Fear of repression, for instance, may well enhance a taste for revolt but at the same time inhibit actual revolutionary behaviour.

This paper aims at disentangling the interaction between revolutionary preferences on the one hand and revolutionary action on the other. We study the impact of three potentially relevant determinants. On the economic side, we look at how the government's economic *appropriation* of the country's resources for the interest of the ruling classes affects the likelihood of an uprising. Further, we study the effect of *freedom of communication*, i.e. how far restrictions imposed by the government on the citizens' freedom to communicate affect revolutionary behaviour. Finally, we analyse to what extent political *repression*, i.e. the prosecution of political opposition has an impact on the incidence of revolt.

We examine the effect of these factors on preferences and actions in parallel, combining two distinct but complementary methodologies. Following the methodology developed by MacCulloch and Pezzini (2004), we analyse how the preferences for conflict of over 50,000 individuals are correlated to the above-mentioned factors (the citizens' feeling about government's appropriation, repression of press freedom and of political rights). We then address the relationship between preferences, actions and information observing the interaction between citizens and government in a laboratory experiment. In a laboratory we re-create an analogous, although stylised, set of conditions and incentives where we can analyse which factors of the economic and political environment lead to revolutionary action. The controlled environment also solves the conventional empirical problems.

We introduce a simple experimental model that captures essential features of a dictatorship. We model the political scenario as a game of one Governor and seven Citizens. The game consists of three stages. At the first stage, the Governor makes a choice in the three

² See also Esteban and Raj (2002) and Perez (2003) for theoretical models of civil conflict.

dimensions under study: he decides on the level of exploitation of the society by implementing either an egalitarian or a selfish allocation. Simultaneously, he decides on the punishment that Citizens will incur if they oppose. Finally, he has the option to restrict communication, an activity in which the citizens can engage at the second stage of the game. At the third stage the Citizens decide whether to revolt against the Governor. If a sufficient number of citizens oppose the Governor, the revolt is successful; if not, those who have opposed are punished. The game is played repeatedly to model the long-term interaction between citizens and the government.

In our combined study we find that appropriation by the government has an unambiguous effect. Both revolutionary preferences and actions increase with the unequal allocation of resources. Communication and repression show opposite effects on preferences and actions. While limitations of both freedoms increase people's willingness to revolt in the survey data, they decrease actual opposition in the experiment.

To our knowledge, the use of laboratory experiments in the study of civil conflict is a novelty.³ Some insights can be gained from previous experimental studies looking at the single influential factors we address. A dislike of exploitative distributions is a well-established finding in the large literature on the ultimatum game, as introduced by Güth, Schmittberger, and Schwarze (1982, see Camerer (2003) for a recent survey). Communication is found to increase contributions in social dilemma games (Isaac and Walker (1988)) and to facilitate play of Pareto-superior equilibria in co-ordination games (Cooper, DeJong, Forsythe and Ross (1992), Burton, Loomes and Sefton (1999), Charness (2000), Clark, Kay and Sefton (2001)). An exogenous punishment opportunity can improve public good provision (Fehr and Gächter (2000), Masclet, Noussair, Tucker, and Villeval (2003), Gächter, Herrmann, and Thöni (2004)), while the endogenous choice of a sanctioning mechanism can even be detrimental to reciprocal co-operation (Fehr and Rockenbach (2003)). Since all these studies examine environments that are very different from the one we are interested in, they cannot answer our research questions. Hence the need for a new experimental design.

Though we focus on the study of revolts against governments, our results are relevant to a broader range of issues. Industrial action can be seen as a form of rebellion against the firm's management. Conflict can arise over wages, working conditions, or participation in the management's decision making process. Many companies try to impede workers' ability to go on strike, e.g. by refusing to employ workers organised in a union. The potential for dissent is also inherent to the relationships within firms (examples are the forced resignation of Michael Eisner from being chairman of Walt Disney in 2004 or the shareholder rebellion at Eurotunnel in 2003), and in many other hierarchical organisations (e.g. dissent between players and the coach in team sports often leads to the forced resignation of the latter).

³ Previous experiments on political systems focus on the emergence of regimes in a model in which citizens can devote their efforts to production or appropriation (Durham, Hirshleifer, and Smith (1998), Carter and Anderton (2001), Duffy and Kim (2004)).

The paper is organised as follows. Section 2 presents the empirical evidence on revolutionary preferences derived from econometric analysis. Section 3 introduces the model and the experimental design. Section 4 presents the results of the experiment. Section 5 concludes.

2. Results on revolutionary preferences from survey data

In this section we investigate the role of economic and political motives on *preferences* for revolt. As later on in the experiment, we identify in the data the factors that can be more closely associated with economic and political grievances. Previous research by MacCulloch and Pezzini (2004) has developed an original methodology to identify preferences for revolt using survey data. The World Values Survey reports the attitudes of over 130,000 individuals in 61 countries towards a wide range of issues. One question they answered is: *“On this card are three basic kinds of attitudes vis-à-vis the society in which we live in. Please choose the one which best describes your own opinion”*. The three possible responses are: *“The entire way our society is organised must be radically changed by revolutionary action”*, *“Our society must be gradually improved by reforms”*, and *“Our present society must be valiantly defended against all subversive forces”*.⁴ MacCulloch and Pezzini (2004) assign an identifier to individuals who hold a belief that *“The entire way our society is organised must be radically changed by revolutionary action”* and assess the determinants of such an answer. Matching this information with country-level data and using three waves of the survey, they show that restrictions of political freedom and civil liberties (as well as economic growth) consistently increase the support for revolt in a country. Using the same specification, we investigate the role of the additional factors that we later examine in the experiment: freedom of communication, political repression and the perception that the government is appropriating the country’s resources. The effect of press freedom on preferences for revolt is not obvious. We can think of the freedom to communicate both as a magnifier of dissent and as a means of defusing it. The sign of this effect might be different in different sets of countries. For instance it may vary either with the level of political rights in the country or with the level of economic development. The expectation on the effect of thinking that the country is run for the few is less controversial. We would expect that it would increase one’s preference for revolt, but this effect may vary with the country’s aggregate income as well as individual income. Specific interaction terms are generated to test these hypotheses. Finally, we would like to investigate the role of having a political repression set up if a revolt erupts and fails, but we lack a direct measure of this. As a proxy we take the index of political rights. MacCulloch and Pezzini’s results suggest that its sign is negative, that is, less political freedom increases one’s taste for revolt. Here we use political rights to proxy for the level of repression on the ground that it measures the guarantees of freedom granted to the individuals under the current legal system.

⁴ “Don’t know” answers are coded as missing.

Matching the individual level data with information on press freedom in the country yields a sample of 52,616 individuals in 41 countries, covering both developed and developing countries from all continents⁵, between 1990 and 1997. The reduced form of the probit regression used to analyse the determinants of preferences for revolt is as follows.

$$Y_{ict} = \alpha X_{ict} + \beta Z_{ct} + \text{interactions} + \eta_c + \mu_t + \varepsilon_{ict}$$

where the dependent variable takes the value 1 when individual i in country c and year t answers that “*The entire way our society is organised must be radically changed by revolutionary action*”. The vector X_{ict} comprises individual-level variables and Z_{ct} identifies country-level variables. The first three independent variables capture the three factors that we focus on in our combined analysis. The variable *Country Run For The Few*_{ict} is a dummy that proxies the appropriation of the country’s resources by the government. In the World Values Survey, participants were asked the question: “*Generally speaking, would you say that this country is run by a few big interests looking out for themselves, or that it is run for the benefit of all the people?*”. Possible answers were “*Run by a few big interests*” and “*Run for all the people*”. In the regression the variable takes the value 1 if the individual answered that the country is run by a few big interests. The influence of repression is captured by the variable *Political Rights*_{ct}. To identify this factor, we use the *Freedom House* index of political rights, measured on a 1 to 7 scale. Finally, freedom of communication is reflected in the extent to which the country’s media are free from restrictions (*Press Freedom*_{ct}). This is represented by the *Freedom House* index of press freedom, which ranges from 1 to 3. Both indices are rescaled such that high scores mean high levels of freedom.

Two independent variables describe the economic circumstances that the individual lives in. *Personal Income*_{ict} is the person’s income position within the country on a 1 to 10 scale. *GDP per capita*_{ct} is measured as per capita income in 1992 US\$ in logs. The source is the World Bank’s *World Development Indicators*. To identify more precisely the role of these factors, we generate three interactions: *personal and aggregate income x the individual’s perception that the county is run for the few*, and *political rights x press freedom*. All regressions include country and year fixed effects and cluster the standard errors by country and year. The sources of all variables are given in the Appendix.

Table 1 shows the regression results. Column 1 gives a cross-sectional view of the correlations between the data where the only adjustment is clustering the standard errors. Across countries, higher aggregate income and more political rights are negatively correlated to a preference for revolt, while the individual perception that the country is run for the interest of the few increases the preference for revolt. Personal income and press freedom do not exhibit significant effects on the preference for revolt. Column 2 adds the interactions of the relevant factors: *personal and aggregate income x the individual’s perception that the*

⁵ Admittedly Middle Eastern and African countries are underrepresented in the sample.

county is run for the few, and *political rights x press freedom*. None of them is significantly different from zero. Only aggregate income maintains a negative effect on the preference for revolt.

Table 1. Regression results

Depvar: Preference for revolt (mean=0.114)	1	2	3	4	5	6	7	8
Country run for the few	0.034** (2.62)	0.062 (1.02)	0.028** (3.90)	0.006 (0.17)	0.029** (2.95)	0.043 (0.71)	0.030** (4.13)	0.006 (0.19)
Political Rights (1-7)	-0.016+ (1.65)	-0.014 (0.74)	-0.020** (10.13)	-0.015** (10.2)	-0.027** (45.47)	-0.045** (11.34)	-0.022** (12.54)	-0.018** (14.62)
Press Freedom (1-3)	0.027 (0.93)	0.036 (0.76)	-0.028** (6.33)	0.009 (0.92)	-0.038** (11.61)	-0.146** (9.61)	-0.021** (5.05)	0.014 (1.58)
Personal income (1-10)	-1.93E-04 (0.09)	0.003 (0.95)	-0.002 (1.52)	-0.002 (0.77)	-0.001 (0.59)	0 (0.14)	-0.003* (2.47)	-0.005* (2.28)
GDP per capita (logs)	-0.023** (3.46)	-0.021** (2.64)	0.083** (8.28)	0.077** (12.68)	0.098** (14.1)	0.099** (7.28)	0.073** (7.80)	0.068** (10.99)
Pers. income*Country run for the few		-0.004 (1.39)		-2.77E-04 (0.13)		-0.001 (0.3)		0.002 (1.10)
GDP per capita (logs)*Country run for the few		-0.002 (0.27)		0.003 (0.75)		-0.002 (0.18)		0.002 (0.50)
Political rights*Press Freedom		-0.002 (0.23)		-0.007** (4.01)		0.018** (7.98)		-0.006** (4.28)
Clustering by country-year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Countries	All	All	All	All	Developing		All	All
Personal characteristics	No	No	No	No	No	No	Yes	Yes
Pseudo R2	0.03	0.03	0.09	0.09	0.07	0.07	0.10	0.10
Observations	52,616	52,616	52,615	52,615	40,709	40,709	49,594	49,594

Note: This table builds on the set-up by MacCulloch and Pezzini (2004). Estimates from Probit regressions. Marginal probabilities are reported. Standard errors are in parentheses. + denotes significant at the 10 percent level; single-starred bold-face at the 5 per cent level; double-starred bold face at the 1 percent level. Standard errors are clustered by country and year. The baseline category for the relative income position of the individual is the bottom one. The personal characteristics are age, gender and unemployment status.

Column 3 adds country and year fixed effects to explore whether a *change* of economic and political factors within the same country affects the preference for revolt. Somewhat surprisingly, a growth in the aggregate income of the country increases support for revolt. This is likely to reflect higher capabilities to express dissent rather than a direct effect on preferences.⁶ A greater perception that the country is run by the few is associated with greater

⁶ Another possibility, often raised as a hypothesis but little studied, is that the growth in aggregate income increases support for revolt through an increase in inequality. MacCulloch and Pezzini (2004) have attempted to identify this effect but the findings are limited by the scarcity of reliable “high-quality” data on equality, such that their sample is strongly reduced (by 20%) and is not very representative. They found some positive effect

preference for revolt, as lower political rights and lower press freedom are. Column 4 interestingly adds the insight that holding political rights constant, a higher press freedom diminishes the sentiment of revolt.

Columns 5 and 6 run the basic specifications on the subset of developing countries. The estimated effects are largely similar but the effects are larger. The only difference is that in developing countries, holding political rights constant, greater press freedom is associated with a higher preference for revolt. Clearly both a negative and a positive sign on this interaction are informative. It appears that in developed countries having a free press is instrumental in defusing the dissent, while in developing countries it is one of the few channels to express it.

Finally, columns 7 and 8 add personal characteristics of the individuals such as age, gender and unemployment status as controls. The basic results are comparable to those on the full sample of countries, with the difference that personal income acquires significance in explaining the preference for revolt. Consistently with previous findings (MacCulloch (2003, 2004)), a lower personal income increases the sentiment of revolt. This also increases significantly when the person is young (less than 26 years old), male and unemployed.

Overall an investigation on preferences for revolt highlights the role that political rights, the freedom to communicate through the press and the perception that the country is run for the interest of the few, exert on attitudes to revolt within a country. Generally speaking, a higher level of political rights, which is taken to proxy the lack of repression if a revolt occurs, and higher press freedom weaken the taste for revolutionary action, while a feeling of appropriation by the ruling parties strengthens support for revolt. Like most empirical studies on civil conflict, these results are not totally immune from concerns of possible biases of endogeneity, here of press and political freedom to the preference for revolt itself.⁷ They rather give a view of the correlations involved when confronting feelings of unrest within a country with the macro-factors under analysis. We then turn to the controlled environment of a laboratory experiment to assess the separate role of these factors on actions of revolt.

3. The experimental model and design

For the experimental part of this work we devise a model that captures the essential features of the political situation under study, yet is simple enough to be tractable in the laboratory. We construct a stylised game consisting of three stages. The players in the game are one Governor and a number of Citizens. The general outline is as follows.

from inequality to conflict. Other possibilities are that the positive effect of GDP on revolt could also pass through unemployment status, for instance, or low class mobility.

⁷ Miguel, Satyanath and Sergenti (2004) provide an original answer to the endogeneity problem inherent to the regression analysis of conflict. They assess the role of economic shocks in triggering conflicts using rainfall variation as an instrumental variable. Application of this methodology is limited to the context of Sub-Saharan

1. At stage 1, the Governor decides on three policy issues. First he chooses the distribution of a fixed number of payoffs between himself and the Citizens (analogous to the wealth of the country). Second, he decides on whether to trigger an instrument impeding communication among Citizens. Third, he sets the penalty against opposing Citizens.
2. At stage 2, the Citizens can send messages to their neighbours indicating their willingness to oppose the Governor's policy.
3. Stage 3 is the actual revolt stage. Citizens simultaneously decide on whether to rise up against the Governor. If sufficiently many Citizens do so, then the Governor is punished and moved out of office, and a new Governor is appointed.

We construct a dynamic game of eight players, one Governor and seven Citizens.⁸ We aimed at having a relatively large group of players, as the real-life interaction takes place between many citizens of a sizeable country. On the other hand, resources (in particular subject pool and laboratory space) are limited. The choice of seven citizens allowed us to run two experimental countries in parallel, a measure that increases anonymity.

Players play the game over several repetitions (so-called *rounds*). The game is dynamic in that the participant who plays the role of the Governor is determined by the outcome of the preceding round. Otherwise each round follows the same pattern. The detailed rules of the game are described below.

3.1. Stage 1

The first stage of the game is the one at which the Governor decides. As mentioned earlier, the Governor makes decisions in three dimensions. The first is to choose a payoff distribution between himself and the seven Citizens. Together with this he also decides on the payoff that Citizens opposing against the government get if the revolt is unsuccessful. In both dimensions the Governor has the choice between a “tougher” and a “softer” option. This leads to four possible combinations, which are labelled as policies A, B, C, and D. Policies A and C are those with a more egalitarian distribution of payoffs, B and D are policies strongly favouring the Governor. Within these pairs, A and B are the policies in which the Governor is more lenient towards opposition, while in C and D rebels face a severe punishment. The precise distribution of payoffs in *talers*, the fictitious experimental currency, is described in table 2.

The second column indicates the payoff that the Governor allocates to himself with the policy chosen. The entries in third and fourth column are the payoffs provided to each of the seven Citizens. These payoffs will depend on a particular citizen's action at the third stage. Note

Africa, where rainfed agriculture is dominant in the economic production. MacCulloch and Pezzini (2004) instrument the level of political and civil liberties and economic growth with colonial and legal origins.

⁸ The choice of a single governor is a simplification. In reality, the government supports (and is supported by) a certain social group or class. We represent the ruling social groups by a single individual.

that the repressive policies C and D allocate one taler less to the Governor than their “softer” counterparts. This reflects the costs of running a repressive apparatus.

In addition to choosing one of the policies A to D (and therefore deciding on payoff distribution and political repression) the Governor makes a decision in a third dimension. He chooses whether or not to activate a so-called *deduction lottery*. If the lottery is activated, then Citizens’ messages at the second stage are intercepted with some probability and expressions of opposition are penalised (see next subsection). Activating the lottery costs the Governor one taler, which again assumes that there are some costs attached to running a secret police or other surveillance measures.

Table 2. Round payoffs for the different policies

Policy	Round payoff for Governor if fewer than 5 Citizens oppose the policy	Round payoff for a Citizen if fewer than 5 Citizens oppose the policy		Round payoff for a Citizen if 5 or more Citizens oppose the policy	
		...if the Citizen accepts the policy	...if the Citizen opposes the policy	...if the Citizen accepts the policy	...if the Citizen opposes the policy
A	7	6	5	5	7
B	28	3	2	5	7
C	6	6	0	5	7
D	27	3	0	5	7

3.2. Stage 2

The second stage is a communication stage. The seven Citizens are located on an ideal “circle”, where each citizen has a left neighbour and a right neighbour. Each Citizen has the opportunity to send a message to her right neighbour, and she receives a message from her left neighbour.⁹ This “circle” is merely figurative and not physical: it did not correspond to the seating in the laboratory.

As the simplest way to model it, a Citizen can send one of two messages: either “I intend to accept the policy” or “I intend to oppose the policy”. If the deduction lottery has not been activated, sending a message is merely cheap talk in the game theoretic sense, i.e. it may be useful as a co-ordination device, but it has no immediate consequences. If the Governor has activated the lottery, then each citizen’s message is intercepted with a probability of 0.2. If the message was “I intend to oppose the policy”, then the citizen sending the message is punished with a deduction of 3 talers from her payoff. In no case a message establishes a commitment for actions at the third stage.

⁹ We restricted the communication to one message to one neighbour for two reasons. First, we wanted to examine the effect of a network in which interaction is local (which would be the case in absence of free mass media). Second, this restriction limits the number of possible scenarios the game can reach, which is of great importance as we conduct part of the experiment eliciting complete strategies from the players (see section 3.5).

3.3. Stage 3

At this stage Citizens make a decision on whether or not they will actually revolt against the Governor. All Citizens make this decision simultaneously without knowing what other Citizens decide. The simultaneous-move structure is an idealised model of a situation in which many Citizens need to take action at about the same time to gather a critical mass of opposition. The decision the Citizens need to take is, again for simplicity, binary. They choose to either “accept” or “oppose” the Governor’s policy. The consequences an action has for a Citizen depends on how many fellow Citizens decide to oppose the policy. If fewer than five Citizens in total oppose the policy, then the revolt fails and the payoffs are implemented as determined by the Governor’s chosen policy, with payoffs for Citizens accepting the policy being higher than for opposing Citizens. In this case the Governor stays in power in the following repetition of the game.

If at least five Citizens oppose the policy, then this has several consequences. First, Citizens who have opposed receive a payoff of 7 talers while Citizens who have accepted the policy receive 5. This difference reflects the negative consequences that “collaborators” with the former regime face after a successful revolution. Second, the Governor receives a payoff of zero. Third, the Governor is removed from his role and becomes a Citizen in the following repetition of the game.¹⁰ There are a number of ways of how the replacement of the Governor can take place, as rebel leaders may emerge or there might be elections after the revolt. For the basic model used in this paper, we opted for simplicity. The Governor is replaced with a new Governor, who is randomly drawn from the group of Citizens who have opposed the policy. This reflects a situation in which the new leaders emerge only after the revolution, and ex-ante it is not known who will form the new government.¹¹

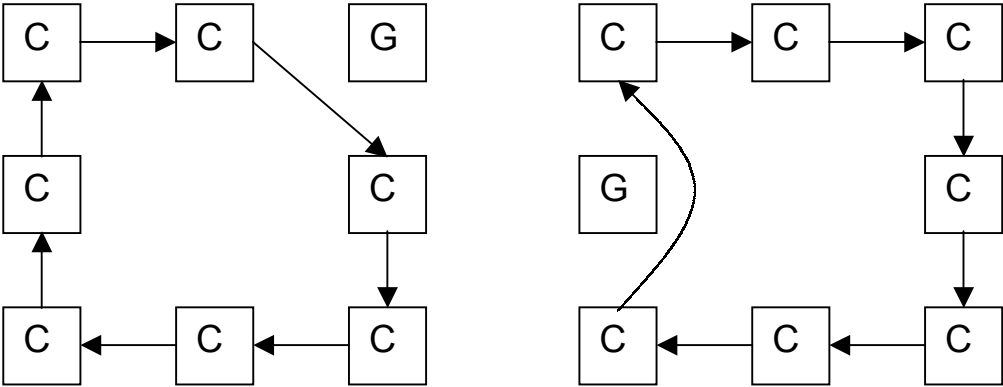


Figure 1: Order of the game

¹⁰ We have implemented this rule for practicality rather than realism. We thought of excluding a toppled governor from further play (which arguably would be more realistic). However, this would have necessitated either impractical replacement procedures or would have led to a changeable number of players. The latter would have affected all parameters of the game and would have made it impossible to present to participants.

When the Governor is replaced, all nodes on the communication “circle” remain unchanged as far as it is possible. An exception needs to be made to subtract the old and the new Governor from the communication circle. The way this is implemented is that the players actually form a circle of all eight players (including the Governor), which does not change throughout the play of the game. In each repetition of the game the Governor is “skipped” when the connections between the players are set up. This is illustrated in figure 1. The left-hand side shows the constellation before, the right hand side after the top-right player is replaced with the centre-left player as a Governor.

3.4. Game theoretic analysis

For the game theoretic analysis of the model we follow a standard backward induction approach to characterise subgame perfect equilibria (Selten (1965, 1975)).¹² Consider the last round of the experiment. The third stage of the game has two equilibria in pure strategies. If fewer than four other Citizens oppose, then a citizen’s best response is to accept the policy, as the revolution will be unsuccessful and a higher payoff is made by accepting. If four or more other Citizens oppose, then the best response is to oppose as well, since accepting Citizens after a successful revolution are worse off. Therefore, there are two “stage 3” equilibria in pure strategies: one in which no-one opposes, and one in which everybody opposes. This holds regardless of the policy the government has chosen. Stage 2, the communication stage, may be used as a co-ordination device to select among different equilibria, but since a message does not bear any commitment, it does not alter the set of subgame perfect equilibria.¹³

From the indeterminacy of the third stage it follows that every policy choice of the Governor is part of a subgame perfect equilibrium. The Governor will choose the policy that gives the highest payoff given the selected third stage equilibria. This policy can be any of the four policies and either of his options on whether to activate the lottery. The indeterminacy unravels through all earlier rounds of the game to the first round.¹⁴

¹¹ The East German revolution of 1989 is an example of such a constellation. There was no single dominant leader; the new government formed after the old government was forced out of office. Like in our game, however, individuals associated with the former regime were excluded from leading positions.

¹² We will restrict ourselves to subgame perfect equilibria in pure strategies. There are likely to be numerous equilibria in mixed strategies as well.

¹³ In a game theoretical model similar to ours, Perez (2003) uses equilibrium selection criteria to identify plausible equilibria. His focus is on the effect of network structures.

¹⁴ In earlier rounds there is an additional complication due to the dynamic character of the game. A Citizen may find it preferable to accept a policy even though five or six other Citizens oppose, in an attempt to *avoid* becoming the Governor. However, opposing yields an additional payoff of 2, which is higher than the highest possible expected loss. If *exactly* four fellow Citizens oppose, then a Citizen’s decision becomes pivotal. The best response depends on the Citizen’s expectations on the other Citizens’ behaviour, and on the Governor’s policy choice. Whatever the best response, the resulting strategy combination cannot be an equilibrium. If the Citizen accepts, then the remaining four rebels do not play a best reply, if she opposes, then – for the above argument – the two accepting Citizens are off equilibrium. Hence, consideration of the dynamic game does not change the set of third stage equilibria.

3.5. The conduct of the experiment

The experiment was conducted at the *Centre for Decision Research and Experimental Economics* (CeDEx) of the University of Nottingham. The software for the experiment was developed using the *RatImage* programming package (Abbink and Sadrieh (1995)). Subjects were recruited by e-mail from a database of students, who had previously registered at CeDEx as potential participants in experiments. Each subject participated in only one session, and no subject had participated in experiments similar to the present one. The subjects were undergraduate students from a wide range of disciplines. The majority of participants were British. Among the substantial fraction of foreign students the largest group were the Chinese. Virtually all subjects were aged between 19 and 25, with a balanced distribution between genders.

In each session two experimental countries were run in parallel. There was no migration between these countries and subjects interacted in fixed groups of 8 subjects. Subjects were not told who of the other participants were in the same group, but they knew that the composition of the groups did not change. Each session began with an introductory talk. A research assistant read aloud the written instructions (reproduced in the appendix). The language used in the instructions was natural, i.e. we did not disguise the situation by using abstract terms only. Players were labelled “Governor” and “Citizen”, and they decided on whether to “accept” or “oppose” the Governor’s policy. We had devised a set of instructions using abstract language, like “player A” and “player B” and “choose X or Y”, but with the rather complex three-stage structure of the game the result became incomprehensible. Embedded in the natural context, however, the game turned out to be relatively intuitive and easy to understand.¹⁵

We conducted 12 rounds of the stage game. These were divided into two phases. In phase 1, which comprised of the first nine rounds, participants played the game spontaneously, i.e. move by move. In phase 2, which lasted for the remaining three rounds, we elicited complete strategies from the players. Instead of responding to a policy choice made by the Governor, they had to specify a decision for every possible scenario the game could enter, before the Governor’s decision was revealed to them.¹⁶ Thus, citizens had to specify which message they would send to their neighbour for each of the eight combinations of policy and lottery activation, and, at the same time (thus before they received the message from their neighbours), determine a decision whether or not to revolt at stage 3. These decisions needed

¹⁵ Evidence for the effects of instruction framing has been very mixed so far. In a tax evasion experiment Baldry (1986) finds far more evasion if the task is presented neutrally as a gambling opportunity. Alm, McClelland, and Schulze (1992), however, do not find any differences. A study by Burnham, McCabe, and Smith (2000) reports significant less trustful choices in a reciprocity game when the other player is called “opponent” rather than “partner”. On the other hand, Abbink and Hennig-Schmidt (2002) do not find significantly different behaviour between a neutrally and a naturally worded version of a bribery experiment.

¹⁶ The idea of gathering complete strategies from subjects goes back to Selten (1967). The *strategy method* he proposes, however, is a much more complex set-up involving subjects returning to submit strategies and play tournaments over a long time. For our simple set-up we speak of *strategy elicitation*.

to be made contingent on (1) the Governor's policy choice, (2) the activation of the lottery, and (3) the message received from the neighbour. If the lottery was activated and the citizen sent an "I intend to oppose" message, then the citizen had to distinguish the cases in which the message was intercepted or not. This results in between 16 and 24 decisions to be taken for the third stage. After all Citizens and the governors (for whom both phases look the same) had submitted their strategies, the game was played following the instructions made in the strategies, and the participants were informed about the outcome of the round.

Strategy elicitation has the great advantage that it leads to a much richer data set. Unlike with spontaneous play, the experimenter can gather decisions for all possible scenarios of the game, including those that are reached less frequently.¹⁷ If a policy is rarely chosen, very few data points are available for Citizens' behaviour on that node, such that statistical analysis cannot be applied. Strategy elicitation avoids this problem. Before we conducted the experiment, we therefore decided to focus on the data from the strategy elicitation phase in our data analysis.

Subjects were granted a capital balance of 15 talers at the outset of each session to accommodate for some losses, which were possible if messages were intercepted. The total earnings of a subject from participating in this experiment were equal to this capital balance plus the sum of all the payoffs he or she made during the experiment minus the sum of his or her losses. A session lasted for about 90 minutes (this includes the time spent to read the instructions). At the end of the experiment, subjects were paid their total earnings anonymously in cash, at a conversion rate of one pound sterling for 5 talers. Subjects earned between £6.13 and £21.20 with an average of £11.26, which is considerably more than students' regular wage in Nottingham. At the time of the experiment, the exchange rate to other major currencies was approximately US-\$1.80 and €1.50 for £1.

We conducted six sessions with 16 subjects each. Subjects interacted with each other within groups but not across groups so that each group can be considered a statistically independent observation. Thus, we gathered 12 independent observations. Our analysis primarily consists of nonparametric tests performed on these data points.

4. The results of the experiment

At the heart of our data analysis is the Citizens' behaviour at the third stage, when they decide whether or not to take revolutionary action. Reversing the actual course of play we therefore

¹⁷ It is sometimes argued that the elicitation of complete strategies triggers "cold" decisions, which may or may not be different from the "hot" decisions made when reacting on an act actually carried out by a previous mover. If this is the case we would expect less emotional reactions, which would make the effects possibly thinner. This may be a downside of the strategy approach. The upside is that the data become so much richer that even very subtle effects can be detected. Evidence for substantially different behaviour triggered by the two methods is sparse in any case. Brandts and Charness (2000) examine behaviour in different interactive games comparing spontaneous play and complete strategy elicitation, but find results to be unaffected. They suggest that both procedures be equivalent for low-complexity tasks.

begin with the analysis of stage 3. We focus on the second phase of play in which we used strategy elicitation. From this phase we have a much richer data set than from phase 1. However we also present the results from the first phase. The situation in the last round is different from the others, because there is no new governor to be appointed. In order to ensure that possible end-game effects do not affect our results, we exclude the last round from the analysis.¹⁸ Our focus is on the effect of appropriation, freedom of communication, and repression on Citizens' propensity to oppose the governor's policy.

4.1. The Citizens' decisions

Figure 2 shows the citizens' decisions at stage 2. The figure shows the frequency of "I oppose" decisions, relative to all decisions made in that particular scenario. In the special case that the lottery was activated and a subject had sent an "I oppose" message we chose the case that the message was not intercepted, as this was more likely to occur (with $p=0.8$).

Each bar represents a different scenario, where type of allocation, level of freedom of communication and repression are combined differently. The graphic setup helps understanding the effect of the relevant variables by comparing two scenarios (=bars) which differ in only one variable. We remind that:

- A, C represent egalitarian allocations chosen by the Governor.
- B, D represent exploitative allocations chosen by the Governor.
- A, B are regimes where weak repression is set up if a revolution fails.
- C, D are regimes where strong repression is set up if a revolution fails.
- L is a regime where Citizens can communicate freely.
- N is a regime where Citizens cannot communicate freely.

On the effect of the Governor implementing a non-egalitarian allocation (comparing the B with the corresponding A scenario, or D with the C scenario), it appears that for each comparison the frequency of "we oppose" decisions is substantially higher in the scenario with an unequal distribution of payoffs. Activating the random repression of communication among Citizens (i.e. comparing the bars with "L" with the corresponding ones with "N") has a consistently negative effect on opposition rates. The same holds for the punishment in the case of unsuccessful revolts. When a C policy is chosen rather than the corresponding A policy, this results in less opposition, the same goes for a D policy rather than a B policy. Finally, comparing the two adjacent bars in each pair, we can see that having received an "I oppose" message increases a citizen's likelihood to oppose in all scenario comparisons. This points to network or informational effects in moving from individual preferences to collective action.

¹⁸ None of our conclusions changes if we include the data from the last round.

Frequency of "oppose" decisions (phase 2)

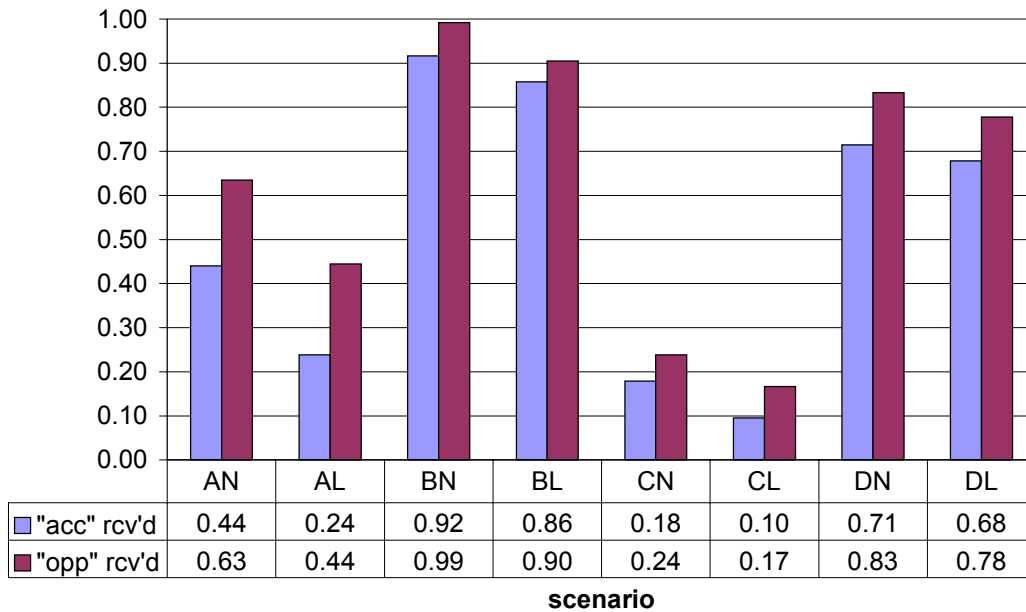


Figure 2

Note: “acc” rcv’d stands for when a Citizen has received a message from his neighbour saying “I intend to accept the Governor’s policy.” “opp” rcv’d stands for when a Citizen has received a message from his neighbour saying “I intend to oppose the Governor’s policy”.

There are 32 possible comparisons varying one dimension (selfishness of the governor, lottery activation, repression, and message received) while holding all others constant. We now check all these 32 effects for statistical significance, disaggregating the data and looking at the independent observations. Recall that each group (“country”) constitutes an independent observation in our experiment. The results are listed in table 3. The first and third columns show the 32 effects for which we test the significance. The direction of the comparison follows from the relationship shown in figure 2. The second and fourth columns show in how many independent observations the comparison is as in figure 2, which we call the expected direction. This is the number before the slash. We now compare this number with the number of observations in which we observe the opposite direction. This number is shown after the slash. For instance, “BN>BL(a) 8 / 1*” means that opposition rates were higher in BN than in BL in eight groups, for the scenario that a Citizen has received an “accept” message. In one group there were higher opposition rates in BL, in contrast to the relationship we observe in figure 2.

We then apply the binomial test to these counts in order to obtain the significance level. Under the null hypothesis there is no systematic effect of the variable in question, and the difference we see in figure 2 is due to random variation. So we should observe about as many

groups exhibiting the expected as the opposite effect. In the above example, getting eight groups out of nine showing the expected effect happens with a probability of less than 5%, so we can reject the null hypothesis for this effect.

Table 3. Significance of effects on the propensity to oppose the Governor’s policy

Freedom to communicate		Message received	
Comparison	exp / opp	Comparison	exp / opp
AN>AL(a)	10 / 0***	AN(a<o)	11 / 0***
BN>BL(a)	8 / 1*	AL(a<o)	10 / 0***
CN>CL(a)	5 / 0*	BN(a<o)	5 / 0*
DN>DL(a)	5 / 4	BL(a<o)	6 / 2
AN>AL(o)	9 / 1*	CN(a<o)	7 / 1*
BN>BL(o)	7 / 0**	CL(a<o)	7 / 0**
CN>CL(o)	5 / 0*	DN(a<o)	10 / 0***
DN>DL(o)	7 / 1*	DL(a<o)	9 / 0**

Repression		Appropriation	
Comparison	exp / opp	Comparison	exp / opp
AN>CN(a)	12 / 0***	AN<BN(a)	10 / 0***
AL>CL(a)	11 / 0***	AL<BL(a)	12 / 0***
BN>DN(a)	10 / 0***	CN<DN(a)	12 / 0***
BL>DL(a)	10 / 1**	CL<DL(a)	12 / 0***
AN>CN(o)	12 / 0***	AN<BN(o)	11 / 0***
AL>CL(o)	11 / 1**	AL<BL(o)	12 / 0***
BN>DN(o)	6 / 0*	CN<DN(o)	12 / 0***
BL>DL(o)	8 / 1*	CL<DL(o)	12 / 0***

* significant at $p < 0.05$ (one-sided), ** significant at $p < 0.01$ (one-sided), *** significant at $p < 0.001$ (one-sided)

In all comparisons we observe more counts in the predicted than in the opposite direction. The binomial test rejects the null hypothesis of no effect for all but two comparisons at a one-sided significance level of 5% or lower.

Most of the effects that we see in figure 2 are also evident in the data for phase 1. Figure 3 shows the corresponding picture, structured in the same way as figure 2. Opposition rates are much higher after policies with an unequal payoff distribution (B and D) than after the egalitarian allocations (A and C). Further, at least in the scenarios with the policies A and C, having received an “I oppose” message increases the propensity to make an oppose decision. We cannot identify such a clear pattern for the effect of repression if a revolt fails. However, it should be noted that some of these bars represent very few data points, such that random sampling variation might explain the absence of effects. For example, it happened only three times that the Governor chose the DN policy and a subject received an “I accept” message. Thus, though the picture is less clear for phase 1, we do not find statistically significant effects that contradict or negate the previous findings.

Frequency of "I oppose" decisions (phase 1)

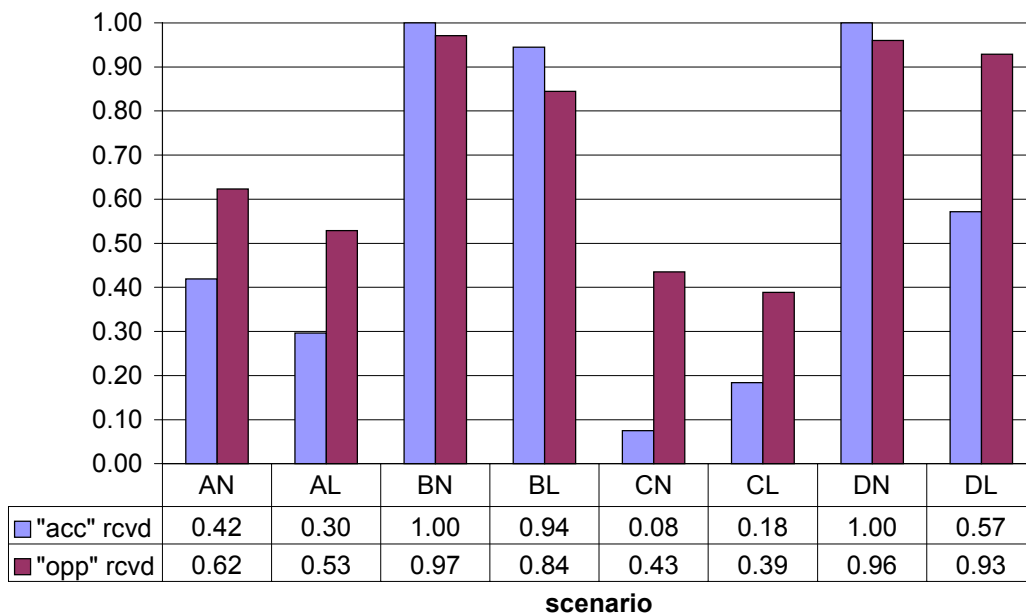


Figure 3

Note: “acc” rcv’d stands for when a Citizen has received a message from his neighbour saying “I intend to accept the Governor’s policy.” “opp” rcv’d stands for when a Citizen has received a message from his neighbour saying “I intend to oppose the Governor’s policy”.

Figure 4 shows how the frequencies of oppose decisions translate into successful revolutions, pooled for all rounds from both phases except the last round. As one would expect from the previous analysis, governors rarely survive another term when they decide for very unequal allocations. All instances in which BN or DN were chosen ended in a successful revolution, as did the clear majority of BL or DL. Revolutions against AL, CN, and BN – egalitarian policies that include some form of repression – are rare. Interestingly, governors choosing the AN policy, which can be seen as the most benevolent of all policies, are overthrown in almost half of all cases.

We can now complete the picture by relating these findings to the results from the survey data analysis presented in section 2. We find that appropriation of the country’s resources (proxied by the feeling by individuals that the government operates in the interest of the few in the empirical analysis) has an unambiguous effect on revolutionary preferences as well as actions. Individuals do not only become more willing to oppose, but they also engage in active opposition, as the experimental data show. Freedom of communication and political repression have opposite effects in the two data sets. Restrictions in both dimensions of freedom trigger stronger revolutionary preferences, but stronger attitudes do not translate into more revolutionary action. While individuals in a more repressive environment have a

stronger taste for revolt, the fear of negative consequences makes them less willing to actually engage in opposition. Table 4 summarises the effects.

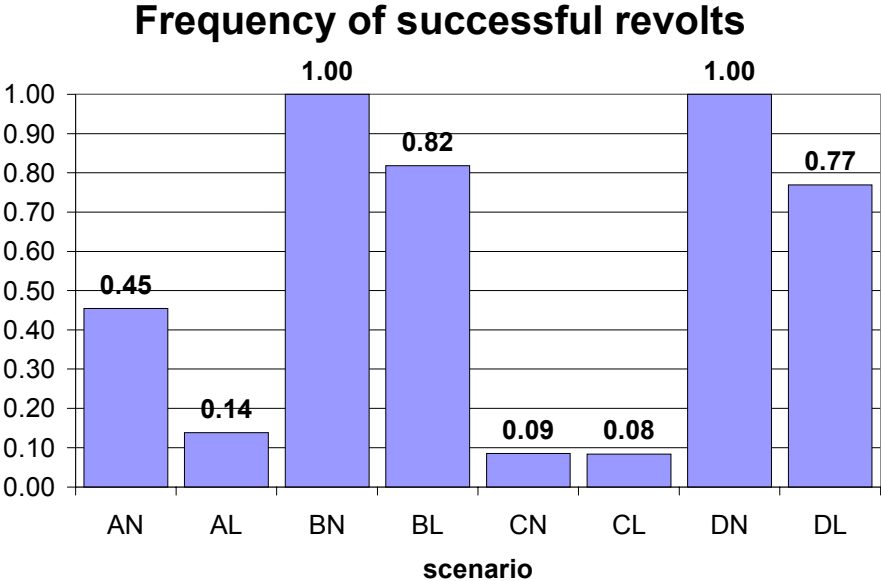


Figure 4

Table 4. Effects on revolutionary preferences and actions

	Preferences	Actions
Appropriation	+	+
Freedom of communication	-	+
Repression	+	-

4.2. The Citizens’ communication behaviour

The citizens’ decision to communicate their intention to revolt follows a pattern similar to that of actions of revolt, highlighting again the problem of the failure of collective action. Figure 5 shows the frequency with which the Citizens have sent the message “I intend to oppose the Governor’s policy” to their neighbours. This figure comprises the data from the rounds with strategy elicitation (phase 2) except the last round. We can see that restrictions of the freedom to communicate (i.e. activating the lottery) discourage Citizens from sending opposing messages, as indicated by the fact that in each scenario the bar with no lottery is higher than the one with the lottery. Comparing the frequencies under A versus B, as well as under C versus D, it appears that the Governor’s non-egalitarian allocation of resources increases the frequency of such messages. The lower opposition that we observe for the scenarios with high punishment for revolutionaries (C and D) as compared with the more lenient ones (A and B) are in line with the result we observed on actions.

Frequency of "I oppose" messages (phase 2)

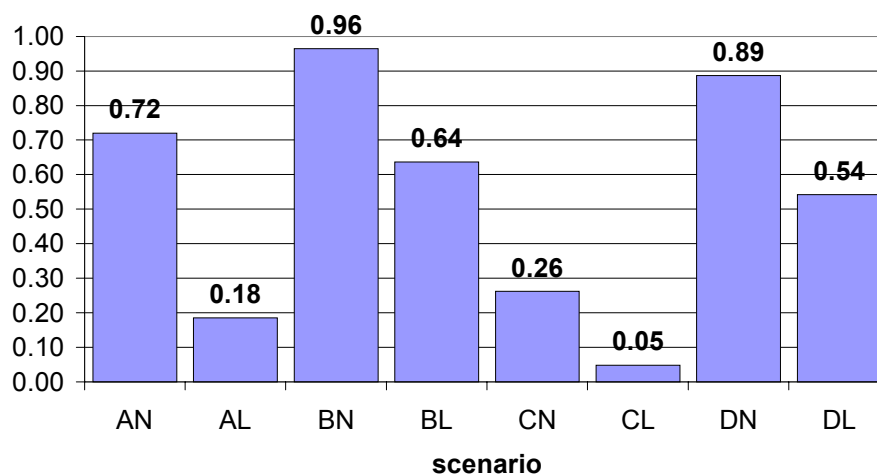


Figure 5

Table 5 shows that all the differences except two are significant at least at the 5 percent level. The method is analogous to the one used in table 3: we compute the frequencies for the independent observations separately and we apply the binomial test to check for statistical significance.

Table 5. Significance of effects on the propensity to send an "I oppose" message

Freedom to communicate		Repression		Appropriation	
Comparison	pred / rev	Comparison	pred / rev	Comparison	pred / rev
AN>AL	12 / 0***	AN>CN	12 / 0***	AN<BN	10 / 0***
BN>BL	12 / 0***	AL>CL	7 / 1*	AL<BL	11 / 0***
CN>CL	8 / 0**	BN>DN	7 / 2 ⁺	CN<DN	12 / 0***
DN>DL	12 / 0***	BL>DL	9 / 3 ⁺	CL<DL	12 / 0***

+ weakly significant at $p < 0.10$ (one-sided), * significant at $p < 0.05$ (one-sided), ** significant at $p < 0.01$ (one-sided), *** significant at $p < 0.001$ (one-sided)

4.3. The Governors' policy choices

To conclude the analysis of the experimental results, we report the governors' choices in the first stage of the game. Figure 6 shows the frequencies with which the proposed policies have been chosen. Since the two phases are not different for the governors, we pool the data for all rounds of the experiment except the last. Two interesting facts emerge. First, the more egalitarian policies (A and C) far outweigh the selfish ones by about three to one. The previous analysis of the Citizens' behaviour indicates that the non-egalitarian choices in our

experiment are largely unsuccessful, as only in few cases governors survive for another term. Second, even governors choosing an egalitarian policy tend to protect themselves with some form of repression, either by activating the lottery (AL), by setting a punishment for opposition (CN), or both (CL). It seems that they fear to be overthrown even though they choose a rather benevolent policy. The previous analysis has shown that this fear is not without reason: recall that Citizens rebelled against the AN policy (egalitarian allocation of resources with no repression and no limits to freedom of communication) in about half of the cases, making this choice very risky for governors who wish to stay in power.

Governors' policy choices

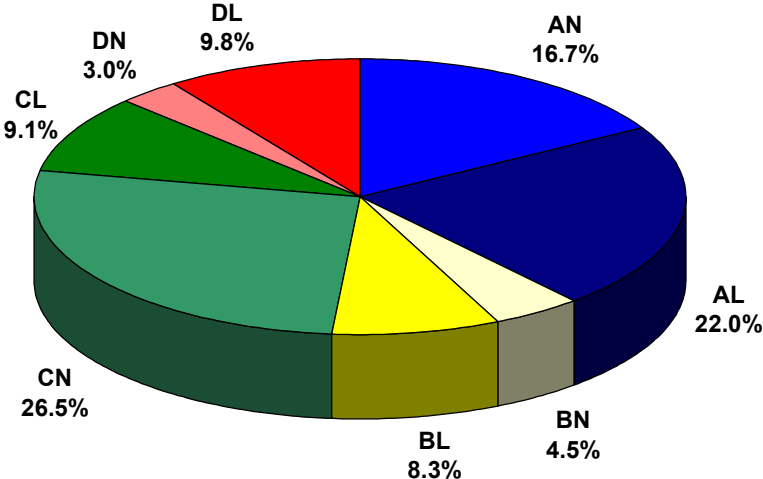


Figure 6

5. Conclusion

This study aims at identifying potential factors that contribute to the likelihood of revolutionary outbreaks in non-democratic countries. We are particularly interested in disentangling the relationship between revolutionary preferences (what makes people want to revolt) and revolutionary actions (what actually makes them revolt). This paper aims at contributing to solve this puzzle empirically. We use a combination of econometric analysis of survey data and the design of a laboratory experiment. So far the econometric analysis deals with the determinants of revolutionary tastes, but cannot extricate how these preferences turn into action.

In the laboratory, however, we can observe revolutionary actions directly. We set up a controlled environment that allows us to look at the influence of a particular variable while

keeping everything else constant. The combined analysis shows that both revolutionary preferences and actions are exacerbated by the government's "selfishness". Restrictions to freedom of communication as well as political repression, however, work in different ways. Preferences for revolt are reinforced but the likelihood of actual revolts decreases. This is the step that highlights the collective action problem inherent to rebellion. Though people would be willing to rise up, they need to co-ordinate their behaviour, which is impeded by the fear of the negative consequences. The experimental data lead us to additional insights. Even benevolent autocratic governors face a severe threat to be forced out of power and tend to protect themselves with some form of repression. This indicates that up to some extent revolts can be driven by the citizens' attempt to seek power themselves.

Our findings have their limits. For the first experimental study on revolutionary action we aimed at keeping the model as simple as possible and had to sacrifice some of real life's richness. Further, our experiment aimed at identifying qualitative effects of the relevant variables. The magnitude of these effects is bound to depend on the strength of the relative incentives. In our experiment those parameters were invented. The effects may also be affected by the fact that the experimental game is naturally played on a rather small scale, with stakes being relatively low. Previous evidence suggests that the qualitative effects observed in experiments are generally robust to transformations into environments with even very high stakes (Slonim and Roth (1998), Fehr, Fischbacher, and Tougareva (2002)). So we are confident that despite the small scale, our data are informative for many political situations in question. Often citizens find it possible to force their government out of office by means of civil disobedience, as it happened, for example, in the Eastern European revolutions of the late eighties, or the three recent cases discussed in the introduction. Nevertheless, the parallelism between the experiment and the real-world scenario may find its limits when the revolt turns into an open military conflict and the choice of behaviour becomes a question of life or death.

Despite these limitations, we believe that laboratory experiments can provide useful insights in the study of civil conflicts, in gathering empirical data as well as testing theoretical models. Further, we are convinced that the combination of field and experimental data is a fruitful approach. The methods are complementary and one method's weaknesses are the other one's strengths. Field data have the advantage of being gathered in real life, but they suffer from noise, identification problems, and lack of control. The laboratory, on the other hand, allows the set up of a controlled environment in which individual factors can be tested while keeping all others constant. Endogeneity problems do not arise. However, the data are gathered in an artificial environment, which inevitably raises the issue of external validity. We believe that in the study of civil conflict both sources of data can be informative and lead to deeper insight into the factors driving conflict and co-operation.

References

- ABBINK, K. and H. HENNIG-SCHMIDT (2002): "Neutral versus Loaded Framing in a Bribery Experiment". Bonn Econ. Discussion Paper 23/2002, University of Bonn.
- ABBINK, K., and A. SADRIEH (1995): "RatImage – Research Assistance Toolbox for Computer-Aided Human Behaviour Experiments". SFB Discussion Paper B-325, University of Bonn.
- ALM, J., G. MCCLELLAND and W. SCHULZE (1992): "Why do people pay taxes?" *Journal of Public Economics*, 48, 21-38.
- BALDRY, J. (1986): "Tax Evasion Is Not a Gamble – A Report on Two Experiments". *Economic Letters*, 22, 333-335.
- BRANDTS, J. and G. CHARNES (2000): "Hot vs. Cold: Sequential Responses and Preference Stability in Experimental Games". *Experimental Economics*, 2, 227-238.
- BURNHAM, T., K. MCCABE and V. SMITH (2000): "Friend- or Foe: Intentionality Priming in an Extensive Form Trust Game". *Journal of Economic Behavior and Organization*, 43, 57-74.
- BURTON, A., G. LOOMES, and M. SEFTON (1999): "Communication and Efficiency in Coordination Game Experiments". University of Newcastle Discussion Paper 99-07.
- CAMERER, C. (2003): *Behavioral Game Theory: Experiments on Strategic Interaction*, Princeton: Princeton University Press.
- CARTER, J.R. and C.H. ANDERTON (2001): "An experimental test of a predator-prey model of appropriation". *Journal of Economic Behavior and Organization*, 45, 83-97.
- CHARNES, G. (2000): "Self-serving cheap talk and credibility: A test of Aumann's conjecture". *Games and Economic Behavior*, 33, 176-194.
- CLARK, K., S. KAY, and M. SEFTON (2001): "When are Nash equilibria self-enforcing? An experimental analysis". *International Journal of Game Theory*, 29, 495-515.
- COLEMAN, J. (1990): *Foundations of Social Theory*. Cambridge, MA: Harvard University Press.
- COLLIER, P. and A. HOEFFLER (2001): "Greed and Grievance in Civil War". World Bank Policy Research Paper #2355.
- COLLIER, P. and A. HOEFFLER (2002): "On the Incidence of Civil War in Africa". *Journal of Conflict Resolution*, 46, 13-28.
- COOPER, R., D.V. DEJONG, R. FORSYTHE and T.W. ROSS (1992): "Communication in Coordination Games". *Quarterly Journal of Economics* 53, 739-771.
- DAWES, R., J. MCTAVISH, and H. SHAKLEE (1977): "Formal models of dilemmas in social decision-making", in M. Kaplan and S. Schwartz (eds.): *Human judgment and decision processes*. New York: Academic Press, 87-107.
- DUFFY, J., and M. KIM (2004): "Anarchy in the Laboratory (and the Role of the State)". *Journal of Economic Behavior and Organization*, forthcoming.
- DURHAM, Y., J. HIRSHLEIFER, and V. SMITH (1998): "Do the rich get richer and the poor poorer? Experimental tests of a model of power". *American Economic Review*, 88, 970-983.
- ESTEBAN, J., and D. RAJ (2002): "A model of religious conflict". Working paper, IAE CSIC Barcelona.
- FEARON, J., and D. LAITIN (2003): "Ethnicity, Insurgency and Civil War". *American Political Science Review*, 97, 75-90.
- FEHR, E., and S. Gächter (2000): "Cooperation and Punishment in Public Goods Experiments". *American Economic Review*, 90, 980-994.
- FEHR, E., U. FISCHBACHER, and E. TOUGAREVA (2002): "Do High Stakes and Competition Undermine Fairness? Evidence from Russia". Working paper, University of Zürich.
- FEHR, E., S. GÄCHTER, and G. KIRCHSTEIGER (1997): "Reciprocity as a Contract Enforcement Device: Experimental Evidence". *Econometrica*, 65, 833-860.
- FEHR, E., and B. ROCKENBACH (2002): "Detrimental effects of sanctions on human altruism". *Nature*, 422, 137-140.
- GÄCHTER, S., B. HERRMANN, and C. THÖNI (2004): "Understanding Determinants of Social Capital: Cooperation and Informal Sanctions in a Cross-Societal Perspective". Working paper, University of Zürich.
- GURR T. R. (1970): *Why Men Rebel?* Princeton, NJ: Princeton University Press.
- GURR T. R. (2000): *Peoples Versus States: Minorities at Risk in the New Century*. Washington, DC: US Institute of Peace.
- GÜTH, W., R. SCHMITTBERGER, and B. SCHWARZE (1982): "An Experimental Analysis of Ultimatum Bargaining". *Journal of Economic Behavior and Organization*, 3, 367-388.
- HEGRE, H., T. ELLINGSEN, S. GATES and N.P. GLEDITSCH (2001): "Toward a Democratic Civil Peace? Democracy, Political Change, and Civil War, 1816-1992". *American Political Science Review*, 95, 33-48.
- HIRSHLEIFER, J. (1995): "Theorizing about Conflict", in *Handbook of Defense Economics*, edited by K. Hartley and T. Sandler, vol. 1. Amsterdam: Elsevier, 165-192.

- ISAAC, R.M., K. MCCUE, and C. PLOTT (1985): "Public goods provision in an experimental environment". *Journal of Public Economics*, 26, 51-74.
- ISAAC, R.M., and J. WALKER (1988): "Communication and free riding behavior: The voluntary contribution mechanism". *Economic Enquiry*, 26, 585-608.
- MACCULLOCH, R. (2003), "The Taste for Revolt". *Economics Letters*, 79, 7-13.
- MACCULLOCH, R. (2004), "The Impact of Income on the Taste for Revolt". *American Journal of Political Science*, 48, 830-848.
- MACCULLOCH, R., and S. PEZZINI (2004): "The Role of Freedom, Growth, and Religion in the Taste for Revolution". Working Paper, London School of Economics.
- MASCLET, D., C. NOUSSAIR, S. TUCKER, and M.C. VILLEVAL (2003): "Monetary and Non-Monetary Punishment in the Voluntary Contributions Mechanism". *American Economic Review*, 93, 366-380.
- MIGUEL, E., S. SATYANATH and E. SERGENTI (2004): "Economic Shocks and Civil Conflict: An Instrumental Variables Approach". *Journal of Political Economy*, 112, 725-753.
- MONTALVO, J.G., and M. REYNAL-QUEROL (2004): "Ethnic Polarization, Potential Conflict, and Civil Wars". *American Economic Review*, forthcoming.
- PEREZ, W. (2003): "Divide and Conquer: Noisy Communication in Networks, Power and Wealth Distribution". Working Paper, Cornell University.
- REYNAL-QUEROL, M. (2002): "Ethnicity, Political Systems, and Civil Wars". *Journal of Conflict Resolution*, 46, 29-54.
- SAMBANIS, N. (2002): "A Review of Recent Advances and Future Directions in the Literature on Civil War". *Defence and Peace Economics*, 13, 215-243.
- SELTEN, R. (1965): "Spieltheoretische Behandlung eines Oligopolmodells mit Nachfrageträgheit". *Zeitschrift für die gesamte Staatswissenschaft*, 121, 301-324 and 667-689.
- SELTEN, R. (1967): "Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes", in Heinz Sauer mann (ed.), Beiträge zur experimentellen Wirtschaftsforschung, Vol. I, Tübingen: J.C.B. Mohr (Siebeck), 136-168.
- SELTEN, R. (1975): "Reexamination of the Perfectness Concept for Equilibrium Points in Extensive Games". *International Journal of Game Theory*, 4, 25-55.
- SLONIM, R., and A. ROTH (1998): "Learning in High Stakes Ultimatum Games: An Experiment in the Slovak Republic". *Econometrica*, 66, 569-596.

Appendix A. Data Definitions and Sources

World Values and European Values Surveys (version obtained by the UK Data Archive)

It is produced by the Institute for Social Research, Ann Arbor (USA), under the direction of Prof. Ronald Inglehart. It is designed to enable cross-national comparisons on a wide variety of values and norms and to monitor changes in values and attitudes across the globe. The surveys were carried out through face-to-face interviews, with a sampling universe consisting of all adult citizens aged 18 and older designed to be representative at the country level. Three waves are available (1981-83, 1990-93, 1995-97) but only the second and the third can be used in this analysis because of shorter time series on the macro data. In total, 64 independent countries have been surveyed in at least one wave of this investigation. The set of countries covered by this analysis is: Argentina, Armenia, Australia, Azerbaijan, Bangladesh, Belarus, Brazil, Canada, Switzerland, Chile, China, Colombia, Czech Republic, Dominican Republic, Spain, Estonia, Finland, Georgia, Ghana, Croatia, India, Japan, South Korea, Lithuania, Latvia, Moldova, Mexico, Nigeria, Norway, Peru, Poland, Russia, Sweden, Turkey, Taiwan, Ukraine, Uruguay, United States of America, Venezuela, Serbia and South Africa.

Years: 1990-93, 1995-97.

Data Definitions

Preference for Revolt?: A dummy variable that equals 1 when the survey respondent answers that “*The entire way our society is organised must be radically changed by revolutionary action*”, and equals 0 when the respondent answers that either “*Our society must be gradually improved by reforms*” or “*Our present society must be valiantly defended against all subversive forces*”. The source is the World Values Survey. The share of people who state a preference for revolution in the sample is 11.4 percent.

Country Run for the Few: A dummy variable equal to 1 when respondent agrees with the 1st answer to the question: “Generally speaking, would you say that this country is run by a few big interests looking out for themselves, or that it is run for the benefit of all the people? 1. Run by a few big interests 2. Run for all the people”. The source is the World Values Survey.

Political Rights: an index from *Freedom House* measured on a one-to-seven scale with 1 being assigned to the least free countries and 7 to the most free countries.

Press Freedom: an index from *Freedom House* measured on a one-to-three scale with 1 being assigned to the least free countries and 3 to the most free countries.

GDP per capita: the level of GDP per capita in constant 1992 US\$, measured in logs, from the World Development Indicators of the World Bank.

Personal Income Position: A set of 10 dummy variables that represent the income position of the individual within the country’s scale. The base category is the lowest one. The source is the World Values Survey.

Unemployed: A dummy variable equal to one when the the respondent is unemployed. The source is the World Values Survey.

Age dummies: *Adult* (26-50 years old) and *Old* (51 years old and over). The source is the World Values Survey.

Male: A dummy variable taking the value 1 if the respondent is a man and 0 if a woman. The source is the World Values Survey.

Table 6. Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
<i>Preference for Revolt?</i>	52,616	0.114	0.318	0	1
<i>Country Run for the Few</i>	52,616	0.715	0.451	0	1
<i>Political Rights</i>	52,616	5.224	1.790	1	7
<i>Press Freedom</i>	52,616	2.298	0.781	1	3
<i>GDP per capita</i>	52,616	7.908	1.486	5.47	10.56
<i>Personal Income Position</i>	52,616	4.719	2.648	0	10
<i>Unemployed</i>	52,027	0.072	0.258	0	1
<i>Adult</i>	50,225	0.545	0.498	0	1
<i>Old</i>	50,225	0.252	0.434	0	1
<i>Male</i>	52,560	0.503	0.500	0	1

Appendix B. Instructions for the Experiment

General information

We thank you for coming to the experiment. The purpose of this session is to study how people make decisions in a particular situation. During the session it is not permitted to talk or communicate with the other participants. If you have a question, please raise your hand and one of us will come to your desk to answer it. During the session you will earn money. At the end of the session the amount you have earned will be paid to you in cash. Payments are confidential, we will not inform any of the other participants of the amount you have earned. In the following, all amounts of money are denominated in talers, the experimental currency unit.

There are sixteen participants in this session. They are divided into two groups of eight participants. These two groups play completely independently. The composition of the two groups remains the same throughout the experiment. You do not know which of the other participants are in your group.

The experiment consists of two phases. In both phases you will interact with other participants according to the rules described below. These rules are exactly the same in both phases. The phases differ in that in the second phase you will be asked to make decisions for every possible situation you can be in, before the decisions are carried out.

The first phase consists of nine *rounds*, the second phase consists of three rounds of the same decision situation. Each round is structured as follows.

The decision situation

There are two types of players in this game: One Governor and seven Citizens. In the first round of the session, the Governor is drawn randomly.

Each round consists of three stages. At the first stage the Governor chooses a policy. At the second and third stage, the Citizens each make a choice between two alternatives. In particular, the decision the Citizens make at the third stage involves choosing either to oppose or to accept the Governor's policy. The outcome of the round is affected by the number of Citizens who have opposed. If fewer than five Citizens have opposed, the outcome is different from the case that five or more Citizens have opposed. This is explained below in more detail.

Stage 1:

At the first stage, the Governor makes two decisions. First, he chooses one out of four *policies*. Each policy provides a payoff for the Governor himself and each of the Citizens, distinguishing between different possible outcomes of the third stage. The policies the Governor can choose are as follows.

Policy	Round payoff for Governor if fewer than 5 Citizens oppose the policy	Round payoff for a Citizen if fewer than 5 Citizens oppose the policy		Round payoff for a Citizen if 5 or more Citizens oppose the policy	
		...if the Citizen accepts the policy	...if the Citizen opposes the policy	...if the Citizen accepts the policy	...if the Citizen opposes the policy
A	7	6	5	5	7
B	28	3	2	5	7
C	6	6	0	5	7
D	27	3	0	5	7

If five or more Citizens oppose the policy, the Governor's payoff is zero. This is so for all policies the Governor may have chosen.

Second, the Governor decides whether or not to activate the deduction lottery (see below). Activating the deduction lottery decreases the Governor's payoff by 1 taler.

Stage 2:

At the second stage, each of the Citizens can send a message to another Citizen. The message consists of one of the following statements:

“I intend to accept the Governor's policy” or

“I intend to oppose the Governor's policy”

Each Citizen sends a message to one other Citizen, and receives a message from a Citizen that is different from the one he/she sends a message to. More details are explained later.

Deduction Lotteries:

If the Governor has activated the deduction lottery, then for each Citizen who has sent the message “I intend to oppose the Governor’s policy at stage 3” a lottery is played out. With a probability of 20%, 3 talers are deducted from this Citizen’s round payoff. For those players who have sent the message “I intend to accept the Governor’s policy at stage 3”, no lottery is played out and no deductions are made. Further, if the Governor has not activated the deduction lottery, no lottery is played out and no deductions are made.

Stage 3:

At the third stage each Citizen chooses between two options: to **accept** or to **oppose** the Governor’s policy.

If fewer than five Citizens oppose the policy, then this has the following consequences:

- The payoff distribution as implied by the Governor’s policy is implemented.
- In the next round, the Governor retains the role as Governor.

If five or more Citizens oppose the policy, then this has the following consequences:

- The Governor receives a payoff of zero. Each Citizen who has accepted the policy receives 5 talers, each Citizen who has opposed the policy receives 7 talers.
- In the next round, the Governor becomes a Citizen, and a new Governor is selected randomly among those Citizens who have opposed the policy.

The phases

Phase 1:

In the first phase, nine rounds of the game described above are played, each according to the same rules. At the first stage, the Governor chooses an allocation. The Citizens are told which allocation the Governor has chosen, and send their messages at the second stage. They are then told which message they have received from the other Citizen, and proceed to stage 3. At the end of the round, they are informed about the outcome of the round.

Phase 2:

In the second phase, three rounds of exactly the same rules are played. In this phase, however, the Citizens must make all decisions for stage 2 and 3 at the very beginning of the round.

Imagine you have to play this game some other time, but you cannot be present in person. Thus, you send an agent who carries out all decisions according to your precise instructions. This agent must know which message you will send for each of the four possible policies that the Governor may choose, each combined with the case for whether or not the Governor has activated the deduction lottery. Thus, you need to make 8 choices for stage 2.

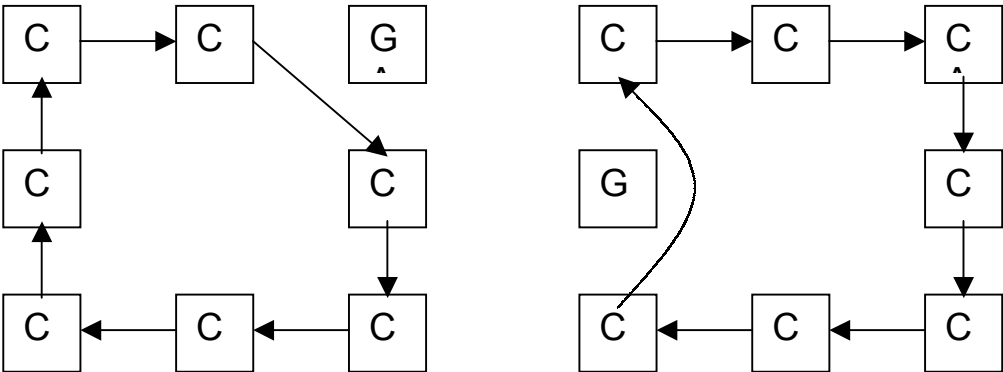
For stage 3, the agent must know whether you accept or oppose the policy, for each of the possible scenarios you may find yourself in at stage 3. There are between 16 and 24 such scenarios: Again, the Governor may have chosen four different policies, have or have not activated the deduction lottery, and in each of these eight cases you may have received an “I intend to accept the Governor’s policy at stage 3” or an “I intend to oppose the Governor’s policy at stage 3” message from the other Citizen. For some of the cases additional cases have to be considered. This happens when the Governor has activated the deduction lottery, and you have sent the message “I intend to oppose the Governor’s policy”. Then a lottery is played out determining whether or not 3 talers are deducted from your round payoff. For each of the two outcomes you need to specify separately whether you choose to accept or to oppose the Governor’s policy. The computer will automatically select those scenarios that are relevant to you given your choices, and request your decision one after the other.

Further information

For stage 2 of the game (when the messages are sent) the eight players of a group are connected like on a circle.

Each Citizen sends a message to one neighbouring Citizen and receives a message from the other neighbouring Citizen.

The positions on this “circle” remain the same throughout the experiment. Thus, each Citizen sends messages to the same Citizen and receives messages from the same Citizen, with one exception: If the Governor is exchanged because five or more Citizens have opposed the policy in a given round, then the connections are reinstalled as illustrated below.



The left hand side shows the flow of messages in a given round. The player on the top right corner is Governor in this round. The arrows depict who is sending a message to whom.

Now suppose in some round five or more Citizens have opposed the policy. Therefore, the previous Governor becomes a Citizen, and a new Governor is drawn randomly, in this example the middle left player. The direction in which messages are sent is reinstalled in a way that all players retain their positions on the circle, but the respective Governor is skipped.

Notice that the “circle” is merely figurative and does not in any way correspond to the seating in the laboratory!

Payoffs

You start with an initial capital of 15 talers to which your round payoffs are added. At the end of the session the talers are converted into Sterling at an exchange rate of 20p per taler.