What Makes a Revolution?

by

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Abstract

Although property rights are the cornerstone of capitalist economies, throughout history existing claims have been frequently overturned and redefined by revolution. A fundamental question for economists is what makes revolutions more likely to occur. A large literature has found contradictory evidence for the effect of income and income inequality on revolt, possibly due to omitted variable bias. The primary innovation of the paper is to tackle this problem by introducing a new panel data set derived from surveys of revolutionary support across one-quarter of a million randomly sampled individuals. This allows one to control for unobserved fixed effects. The regressions are based on a choice-theoretic model of revolt. After controlling for personal characteristics, country and year fixed effects, more people are found to favor revolt when inequality is high and their net incomes are low. A policy that decreases inequality equivalent to a shift from the US to Luxembourg is predicted to decrease support for revolt by 7.7 percentage points. A decrease in net income of $US 3,510 (in 1985 constant dollars) increases revolutionary support by the same amount. The results indicate that 'going for growth', or implementing policies that reduce inequality, can buy nations out of revolt.

Keywords: Property Rights, Revolts, Income Inequality

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I. Introduction

A fundamental requirement of market economies is the security of ownership claims to property.[1] Without secure property rights, agents' ability to enter and fulfill contractual obligations is threatened. Yet throughout history existing claims to property have been regularly challenged by revolts. From the 1917 Russian October Revolution to Castro's 1959 Cuban revolt, from Portugal's 1974 Revolution of the Carnations to the 1989 protests in East Germany that preceded the fall of the Berlin Wall, history is filled with examples of revolutions that have had far reaching economic consequences. Attempts at revolt have often met with failure. Consequently an important question in economics is what makes a revolt occur. As a first approach, there are two views. One is that ideological motives connected with notions of fairness, social justice and feelings of exploitation have motivated legendary figures such as Che Guevara to fight against impossible odds. The other view is that rational economic incentives are important. This suggests that we may be able to observe empirical regularities between macroeconomic variables and revolutionary support. Historical case studies have described the economic conditions perceived to be important. For the French Revolution, Hobsbawm (1975) writes that in pre-1789 France "feudal dues, tithes and taxes took a large and rising proportion of the peasant's income, and inflation reduced the value of the remainder".[2] The welfare state is also credited with affecting revolutionary support. An example is the first mandatory, old-age pension system created in Germany in 1889. Otto von Bismark, "its sponsor and thus the founder of modern old-age social security, was neither a reformer nor particularly liberal. The 'iron-chancellor'

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[1] On the use of force in economic history, see Douglass North (1981).

[2] The kingdom's need for revenues was expanding, largely due to France's involvement in the American War of Independence. In 1788 war and navy made up one-quarter of expenditure, outrunning tax revenues by over 20 per cent, far greater than *"the extravagance of Versailles which has often been blamed for the crisis"*. In fact, King Louis XVI's court expenditure *"only amounted to 6 per of total spending"*.

advocated social security in the hope of pacifying the proletariat and luring them away from socialism" (pp40-41, Carter and Shipman (1997)).[3] The publication in 1887 of Karl Marx's (1887) *Das Kapital* began economists' interest in the question of whether capitalist societies could be sustained, or would meet their end in violent confrontation.[4]

Choice-theoretic models on conflict have made a number of appearances in the economics literature with a recent resurgence including Usher and Engineer (1987), Grossman (1991, 1994, 1999), Hirshleifer (1991, 1995), Kuran (1991), Roemer (1985, 1998), Skaperdas (1991, 1992), Grossman and Kim (1995) and Acemoglu and Robinson (1999, 2000). Several of these papers portray two-player contests between parties who are attempting to win control of a prize. Hirshleifer (1991) studies how the technologies of production and conflict affect the allocation of resources between production and conflict. Skaperdas (1991) studies the effect of risk-aversion on the allocation of resources between production and appropriation. Skaperdas (1992) and Hirshleifer (1995) derive conditions under which neither party invests in appropriative activities, despite there being a complete absence of property rights. Skaperdas' (1992) model has an element of productive complementarity, an assumption not made by Hirshleifer (1995). In Grossman and Kim (1995) the allocation of resources between production and appropriation is modeled in a setting in which each party possesses non-overlapping claims to the property subject to appropriation. Hence a distinction exists between resources devoted to production and defense which does not exist in other papers in this literature.

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[3] Sala-i-Martin (1997) shows how social safety nets could be used *"to bribe poor people out of disruptive activities such as crime, revolutions, and other forms of social disruption"*. Revolutionary threats may also arise as a response to a corrupt bureaucracy that derives its income from malfeasant behavior (see Di Tella and Ades (2000)).

[4] Other classic contributions on the use of force in economics include Schumpeter (1991), Haavelmo (1954) and Tullock (1974). Schelling (1960) deals with conflicts between nations and Olson (1965) with the economics of collective action and special interest groups. The economics of crime literature began with Becker (1968) and Stigler (1970).

Another strand of literature studies collective action models. Kuran (1991) and Lohmann (1994) show how protest activity can trigger a cascade of more protests that lead to the incumbent regime's collapse.

However empirical contributions by economists have been particularly rare. Durham, Hirshleifer and Smith (1998) use experimental evidence to study under what conditions an initially poor party is able to improve its financial position relative to a richer opponent in a game where resources can be allocated between productive and appropriative efforts. The effect of inequality on political stability has been of particular interest since uncertainty about the political environment may affect investment and consequently economic growth (for a survey, see Benabou (1996)). Alesina and Perotti (1996) focus on estimating the significance of this channel to help resolve the important question of exactly how inequality could harm growth (see also Alesina, Özler, Roubini and Swagel (1996), Perotti (1996)). To my knowledge, no panel studies of the causes of revolution based on a choice-theoretic economic model exist. This may have occurred because panel data sets on which strong statistical tests could be made to identify the factors systematically linked to revolutionary behavior have not been available to economists. Another reason may be that it has been difficult to find models assuming rational agents that could be applied to an econometric study.

The objective of this paper is to develop a choice-theoretic model of revolt that can be tested empirically to help identify the effect of income and income inequality on revolutionary support. It introduces a new panel data set based on large-scale surveys of revolutionary support across one-quarter of a million people. We seek to control for the possibility that both income and income inequality may be endogenous variables correlated with other omitted explanatory variables. General

equilibrium economic theory and historical evidence point to this possibility. For example, in Grossman's (1991) model of insurrection a ruling authority that maximizes *expected* returns for its clientele will be acting, in part, to reduce the chances of a revolt occurring. This includes not allowing the difference in income between the State's clientele and its subjects to grow too large. Hence one may expect the revolutionary activities of workers in response to their State's policies to seldom culminate in a successful revolt due to their scale, which is constantly being limited by the State. A long tradition of study in English history (referred to as the "Whig" view) has provided evidence of evolutionary policies that have been specifically designed to avoid revolutionary attempts.[5] Such policies imply that a negative bias may exist on the coefficient of income inequality in regressions attempting to explain the support for revolt (since the State moves to reduce income differences when threatened with more revolutionary pressures). This may help explain the ambiguous results of previous studies in the political science and sociology literature, which have found no clear evidence of a positive effect of inequality on revolt. The primary innovation of the present paper is to tackle this problem. It introduces a new panel data set derived from surveys of public opinion that allows us to control for unobserved fixed effects across nations and time. A choice-theoretic model of revolts is used as the basis for the empirical tests. The model helps us to choose which variables to include in the regression equation explaining revolt as well as an instrument set. This approach should help us to better identify the true effect of both income and income inequality on revolutionary support.

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[5] In early seventeenth century England, fiscal needs led to *"expropriation of wealth through redefinition of rights in the sovereign's favor"* and subsequently civil war. After the Glorious Revolution of 1688, the winners (the Whigs) sought to redesign government institutions in such a way as to control the problem of *"the exercise of arbitrary and confiscatory power by the Crown"* (North and Weingast (1989)). Grossman (1994) shows how land reform that reduces inequality in the distribution of land ownership can be an optimal response to the threat of extralegal appropriation of the landed class' income. Acemoglu and Robinson (2000) argue that political elites extended voting rights to prevent widespread social unrest and revolution.

A large literature in political science and sociology has attempted to provide evidence on the economic conditions responsible for revolts. The reason for including economic variables in regression equations explaining revolt has been "economic discontent" theories. These include relative deprivation theory and Marxist theories of revolt. The former is based on the perceived gap between people's expectations of what they should get from society and what they think they will actually get. The latter is based on the exploitation of workers by capitalists who expropriate "surplus value", leading to the "immiseration" of the working class. Although these theories predict a positive effect of income inequality on political conflict, the empirical studies have yielded contradictory results (see, *inter alia*, Davies (1962), Gurr (1970), Muller (1985) and Lichbach (1989) for a review). Another strand of literature seeks to explain revolts by the political processes that provide opportunities for mobilized dissidents to challenge the State (see Tarrow (1989), Francisco (1993)). Empirical attempts have often used protests and political violence as proxies for revolutionary support. Gurr and Moore (1997) study the effect of deprivation and resource mobilization on ethno-political violence in the 1980s. A virtue of this paper is its first use of a global data set, but it uses cross-sectional evidence so cannot control for unobserved fixed effects.

The present paper uses data from the Euro-Barometer Survey Series and the Combined World Values Survey in which over one-quarter of a million people are asked whether or not they support a revolt. This gives us direct evidence on the extent of revolutionary support across a panel of 12 nations from the 1970's to the 1990's. Section II develops the theory used as a basis for empirically identifying the macro-economic variables that affect revolutionary support. Section III introduces the data set used in the paper as well as studying the effect of the personal

characteristics of individuals on the desire to revolt. Section IV outlines the estimation strategy. Section V presents the panel regression results and Section VI concludes.

II. Theory

Grossman (1991) analyzes the behavior of many individual subjects of one ruling authority (or 'State') in response to its policies. This model forms the basis for the empirical tests in the present paper. By directly linking the desire to revolt across a population to macroeconomic variables, it opens a way for empirically testing the predictions of a rational economic theory of insurrection. By virtue of the State's sovereign powers her policy variables – the level of taxes and soldiering – are set to maximize expected revenue for her clientele. The State employs soldiers to lessen the probability of a successful revolt. A large number of identical families respond to these policy choices by allocating a fraction of time, l, to become a member of the productive labor force, s to be soldiers and i to be engaged in revolutionary activities.[6] These fractions must sum to unity. Let the average time spent across all families on labor force participation, soldiering and revolt be L, S and I, respectively.

Each family's total output is $Q=\lambda l$ and their net income from labor force participation is $(1-x)\lambda l$, where x is the fraction of net taxes that the State deducts from earnings. The parameter, λ, measures gross earnings per unit of time (which equals labor productivity). Families' income from soldiering is either ws with probability $1-\beta$, or zero with probability β, where w is the wage rate of the soldiers

[6] The theory assumes that the same families spend part of their day plotting revolt and then part of the day being paid as soldiers to stamp it out. This simplifying assumption does not capture those cases in which the security forces and revolutionaries are entirely different groups of people.

and β is the chance of a successful revolt. This setup assumes that soldiers are able to draw their pay only if there is not a successful insurrection. Income from participation in an insurrection is either ri/I with probability β or zero with probability $1-\beta$. This assumes that insurgents divide their booty among families proportionately to the time spent by each family on insurrection. The booty, r, equals $x\lambda L+r^s \geq 0$ which consists of the State's net tax revenues, plus her stored capital, r^s, which may have accumulated from sources other than current production. Without revolt the booty is enjoyed by the State's clientele which includes politically favored groups.[7]

II. A. The Family Problem

Families allocate their time to different activities to maximize their expected income:

$$\begin{aligned} &\text{maximize}_{l,s,i} \quad e=(1-x)Q+(1-\beta)ws+\beta ri/I \\ &\text{such that} \quad l+s+i=1 \end{aligned} \tag{1}$$

Assuming an interior solution ($I>0$, $S>0$, $L>0$) the first order conditions are:

$$(1-x)\lambda=(1-\beta)w \tag{2}$$
$$(1-x)\lambda=\beta r/I \tag{3}$$

These conditions imply that the return from time spent being a member of the labor force, $(1-x)\lambda$, must be equated to the expected returns from soldiering, $(1-\beta)w$, and from insurrection, $\beta r/I$. The probability of a successful revolt is given by:

[7] Grossman (1999) extends this theory to a dynamic setting in which a successful revolt leads to the replacement of the old ruling class with a new revolutionary leader who then acts in the same way as the old regime, maximizing the expected net income of his or her own clientele.

$$\beta = \frac{I^{1-\theta}}{S^{\sigma} + I^{1-\theta}} \qquad (4)$$

which is increasing in *I*, the fraction of time devoted to revolt, and decreasing in *S*, the fraction of time spent soldiering. The parameters, θ and σ, capture the technology of insurrection. For any level of soldiering, *S*, that the State wishes to set, equation (2) defines the wage that must be offered to attract the soldiers. Combining equations (3) and (4), together with the constraint that total time spent on production, soldiering and insurrection must sum to unity ($L+S+I=1$), yields:

$$f(S,I) - (1-S-I)\,\mathrm{E} - \frac{r^s}{\mathrm{Y}} = 0 \qquad (5)$$

where $E=x/(1-x)$, $Y=(1-x)\lambda$ and $f(S,I)=I+I^{\theta}S^{\sigma}$. The variable, *E*, is a measure of income inequality in this economy. It is the tax revenue income of the State's clientele relative to the net income from production (after taxes) of the workers.[8] *Y* is workers' net income from production.

Theorem 1: The proportion of time spent on revolt, *I*, ceteris paribus:

(1) decreases with Net Income: $\partial I/\partial Y<0$, for $r^s>0$. When $r^s=0$, $\partial I/\partial Y=0$.

(2) increases with Income Inequality: $\partial I/\partial E>0$.

(3) decreases with Soldiering: $\partial I/\partial S<0$.

(4) increases with Stored Capital: $\partial I/\partial r^s>0$.

Proof: Use the Implicit Function Rule on equation (5). #

The intuition for these results is as follows. Net Income, Y, can increase (ceteris paribus) due to a rise in productivity, λ. When this occurs revolutionary support decreases, provided the level of stored capital is positive, since otherwise the return from labor force participation and revolt increase by the same proportion. With positive stored capital, the rise in productivity increases the return from participating in the labor force proportionately more than it increases the return from revolt. An increase in inequality increases the return from participating in revolt relative to production. Greater soldiering, S, reduces the expected return to revolt by reducing the chances of its success as well as the size of the booty (due to larger State military spending) making time spent in the labor force more attractive. More stored capital, r^s, increase the booty available if the insurrection is successful and hence increase the returns to spending time on revolt.

II. B. The State's Problem

By virtue of her sovereign powers the State sets the policy variables - taxes and soldiering - to maximize a combination of the expected income of her clientele and of the production workers. Her problem is to:

$$\text{maximize}_{x,w,S} \quad M = \Psi^p (1-\beta)(x\lambda L - wS) + (1-\Psi^p)\, e \qquad (6)$$

subject to the constraints (2) and (3), $L+S+I=1$ and $0<\Psi^p<1$. The clientele's expected income, $(1-\beta)(x\lambda L-wS)$, equals the net revenues taken from workers minus the payments to soldiers, multiplied by the probability of there not being a successful revolt. Workers' welfare equals their expected income, e. The parameter, Ψ^p, captures the preference over the distribution of income in the economy by the

[8] Inequality could also be defined on an ex-ante basis, equal to the expected income of the State's clientele relative to the expected income of the workers. Our ex-post definition is conditional on the revolutionaries not succeeding.

State.[9] Constraints (2) and (3) define L and I in terms of x, w and S. The (interior) solution occurs when:

$$\frac{\partial M}{\partial x} = \frac{\partial M}{\partial w} = \frac{\partial M}{\partial S} \quad \text{and} \quad L + I + S = 1 \tag{7}$$

The reduced form solution for net taxes on workers is $x = f(r^s, \sigma, \theta, \lambda, \Psi^p)$. Hence

$$Y = (1-x)\lambda = (1 - f(r^s, \sigma, \theta, \lambda, \Psi^p))\lambda \quad \text{and} \quad E = \frac{x}{1-x} = \frac{f(r^s, \sigma, \theta, \lambda, \Psi^p)}{1 - f(r^s, \sigma, \theta, \lambda, \Psi^p)} \tag{8}$$

Similarly the optimal level of soldiering can also be expressed in terms of the 'deep' parameters: $S = g(r^s, \sigma, \theta, \lambda, \Psi^p)$. In the next section, the data used for testing the predictions obtained in Theorem 1 are described.

III. The Data and Effect of Personal Characteristics on the Desire for Revolt

III. A. The Data

Data on revolutions come from the Euro-Barometer Survey Series [1976-1990] and Combined World Values Survey [1980 and 1990] questions which ask: *"On this card are three basic kinds of attitudes vis-a-vis the society in which we live in. Please choose the one which best describes your own opinion (One Answer Only)"*. The three relevant response categories 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"* (The *"Don't know"* and *"Not asked in this*

[9] Grossman (1991) solves for the case in which the State seeks solely to maximise the expected income of its clientele ($\Psi^p = 1$).

survey" categories are not included in our data set). Appendix I provides a summary of these surveys.

There are advantages and disadvantages to the use of survey data. An advantage is that individual responses give a direct measure of the support for revolt that actually exists in nations. An indirect measure, such as political violence or protest activity, may not capture the true underlying level of revolutionary support. Furthermore, since there are many different indirect measures that could potentially be used (such as the number of acts of sabotage, rallies and terrorism) it is difficult to choose between them. Events such as political strikes are hard to classify.[10] One disadvantage of survey data is that the responses may be untruthful.[11] However micro-econometric revolution equations were found to have a similar structure across nations. In every one of the 12 OECD nations in the Euro-Barometer Survey, being in a lower income quartile monotonically increases the chance of supporting revolt. Men are also more likely to desire revolt in every nation. Appendix II reports the results for the United Kingdom, Italy, Germany and Belgium which are discussed in more detail in Section III. B. below. These results would not be expected if the survey responses were random. A second disadvantage may be that although people say they support revolutionary change, they do not actually spend time to achieve it. The proxy works to the extent that the proportion of individuals in a country who state they desire revolt is positively correlated with the time being devoted to the cause.

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[10] Francisco (1993) uses person-days of protest per 100,000 persons per week, noting that "most empirical studies of protest and revolution use other measures, especially political deaths".

[11] An issue raised in the psychology literature is that, in formulating their survey responses, subjects may be influenced by what they believe to be the socially desirable response. If the social norm is not to support revolt, subjects may bias responses towards maintaining the status quo. Since the first studies in the area, psychologists have found evidence that points to this concern being exaggerated (e.g. Rorer (1965), Bradburn (1969)). Furthermore, at least part

The survey response categories also force the individual respondents to make a discrete choice (you must either declare yourself in favour of revolt or not) whereas in our theory each family can devote a continuous fraction of their day on insurrection activities. This problem can be overcome by introducing an element of heterogeneity amongst families. The simplest way is to make the following assumption: each family, *f*, declares itself in favor of supporting revolt only if it spends at least time, i^f, on revolutionary activities, where the cumulative distribution function of positive responses is $G(i)$ ($G(0)=0$, $G(1)=1$ and $G'(i)>0$). With this assumption, as the population spends more time planning revolt, an increasing proportion will declare support for it.[12]

Tables A, B and C show the proportions of Russians, Americans and Europeans who desire revolutionary action, versus those who do not (i.e. the ones who desire either gradual reforms or the present society valiantly defended) by employment state, marital status, sex and income quartile. Russia has the highest overall proportion of people who desire revolt. In 1990 in this nation, 17.2 per cent of individuals wanted a revolution which included 30.8 per cent of the unemployed. Table B shows the proportion of American respondents who desire revolutionary action, depending on personal characteristics, pooled across 1980 and 1990. The proportion increased from 5.0 per cent in 1980 to 6.5 per cent in 1990. The support level rose from 4.1 per cent for the highest third of income earners to 7.2 per cent for the lowest third.

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of the influence of social norms can be controlled for in the regression evidence later on. The interviews for the Euro-Barometer Surveys were conducted under a condition of anonymity of the respondent.

[12] A more complicated way of introducing heterogeneity that would affect the incentives of families in the model is to assume a distribution of wages across the population. In equilibrium the returns to soldiering, revolt and production could then not be equalized across all families. Corner solutions in which some families devote all their time to production whilst others spent all their time plotting revolt must exist. The survey responses of those involved solely

There were 215,707 European survey respondents, covering people living in 12 nations between 1976 and 1990. Of the whole sample, 5.9 per cent desire revolution (see Table C). Of the sub-sample of unemployed people, 9.7 per cent desire revolt, which is lower than amongst the unemployed in the United States. A higher proportion of divorced respondents (6.8 per cent) were in favor of revolt compared to married ones (5.2 per cent). Of male respondents, 6.8 per cent desire revolt compared with 5.1 per cent of females. As we proceed from the lowest to the highest income quartiles, there is a monotonically decreasing proportion of responses in favour of revolution, the biggest jump occurring between the 2nd and 3rd income quartiles (from 6.5 per cent to 5.6 per cent, respectively). Appendix III shows how the proportion of respondents who desire revolt has varied over time for each country. Note the particularly high level of revolutionary support in Portugal, which fell from 14.3 per cent in 1985 to 6.0 per cent in 1986. After the "Revolution of the Carnations" on 25 April 1974, Portugal experienced extreme political swings and strikes until entry into the European Community in 1986 secured a measure of stability.[13] The lowest average level of revolutionary support was in Denmark where just 2.3 per cent were in favour.[14]

III. B. The Effect of Personal Characteristics on the Desire for Revolution

The micro-econometric results showing the effect of personal characteristics on whether or not the respondent supports revolt are reported in Table D for the

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in production would presumably not favor revolt, whereas those families whose sole activity was insurrection would presumably give responses supporting it.

[13] The subsequent regression results are unaffected by the omission of Portugal.

[14] Although this number seems low, Kuran (1991) shows how 'revolutionary bandwagons' can lead to small events creating very large increases in public opposition to the State. For example, if one individual has an unpleasant experience with the State that increases his alienation from it and drives him to revolt this may trigger another defection from a person who sees that there is now more opposition and fewer hostile State supporters to be faced. This process may continue, generating explosive growth in opposition from an initially small base, until even people who had previously strongly supported the State join the revolt as they fear hostility from the revolutionaries if they don't. Lohmann (1994) uses evidence from the East German revolution to evaluate several models of mass political action.

whole Euro-Barometer sample. Appendix II provides separate regressions for 4 of the 12 nations: The United Kingdom, Italy, Germany and Belgium.[15] There are strong similarities between nations of the effect of several personal characteristics on whether a respondent declares him/herself in favour of revolt. In every nation being in a higher income quartile monotonically decreases the chance of supporting revolt. A shift from the bottom to the top income quartile in the U.K. decreases the probability of supporting revolt by, on average, 4.3 percentage points (from 7.5% to 3.2%). Men are more likely to desire revolt in every nation, significant at least at the 2 per cent level in 9 countries and at the 10 per cent level in the remaining three.

In 10 of the 12 nations studied, being unemployed increases the chances of supporting revolt. The effect is significant at least at the 5 per cent level in seven of these countries. In every country married people are less likely to support revolt. The effect of other personal characteristics is more ambiguous. Older people are less likely in every nation, except Portugal, to declare themselves in favour of revolutionary action, although the effect is only significant in 3 nations. Whereas a British higher education decreases support for revolt, a French higher education increases it, both significant at the 1 per cent level. Overall, a higher education after leaving school decreases revolutionary support in six countries and increases it in the other six. In a majority of nations having children decreases support for revolt.[16]

IV. Empirical Strategy for Testing a Rational Choice Theory of Revolt

The empirical strategy has two stages. In the first stage we obtain estimates of the

[15] The results for the other countries are available upon request.

[16] The effect of personal characteristics on the desire for revolt across 51,793 individuals from the 37 nations in the World Values Survey show similar patterns. In particular, the size and sign of the coefficients on *Unemployed* and *Male* are similar to those obtained using the Euro-Barometer sample. Support for revolt also declines monotonically as one

proportion of respondents in each of nation and year who respond that "the entire way our society is organised must be radically changed by revolutionary action", controlling for personal characteristics.[17] In the second stage we estimate the impact of income, income inequality and the size of the military on this residual measure of revolutionary support.[18]

First, we estimate the effect of personal characteristics on individual survey responses of revolutionary choices in OLS micro-econometric regressions for each nation. These regressions are of the following form:

$$REVOLUTION\ DESIRED?_{n,t}^{j} = \alpha_0 + \alpha_1 X_{n,t}^{j} + \phi_{n,t} + \mu_{n,t} \qquad (9)$$

where $REVOLUTION\ DESIRED?_{n,t}^{j}$ is a discrete variable taking the value 1 if individual *j* in nation *n* (*n*=1 to 12) and year *t* (*t*=1976 to 1990) responds that *"The entire way our society is organised must be radically changed by revolutionary action"* and 0 otherwise.[19] $X_{n,t}^{j}$ is the vector of personal characteristics for each individual and the vector, α_1, contains the coefficients of the personal characteristics. The coefficients on the set of time dummies are denoted, $\phi_{n,t}$, whereas $\mu_{n,t}$ are independently, identically distributed (i.i.d) errors. Appendix II reports four such regressions for the U.K., Italy, Germany and Belgium.[20] Our main interest is the measure of aggregate support for revolt after controlling for personal characteristics, for each nation and year in the sample, given by the coefficients on the year dummies, $\phi_{n,t}$.

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goes up the income groups and there is some evidence that having more children decreases revolutionary support (results available upon request).

[17] On average, 1266 individuals are sampled each year for a given nation.

[18] Similar results are also obtained if we don't control for the effect of personal characteristics and just use the proportion of people who desire revolution in each country for each year from the raw data.

[19] Data on revolutionary preferences are only available for 1980-90 for Greece and 1985-90 for Spain and Portugal.

[20] Regression (9) was estimated using OLS since using residuals from logit regressions introduces issues that have not been resolved in the statistical literature. A similar procedure was used in Di Tella, MacCulloch and Oswald (2000).

The second stage regressions are based on equation (5) which defines aggregate revolutionary support, I, implicitly in terms of the explanatory variables Y, E, S, r^s, σ and θ. Whereas it is possible to obtain data for proxies of net income, Y, the degree of income inequality, E, and soldiering, S, the other variables are more problematic. It is not possible to obtain direct measures for the amount of stored capital, r^s, that belongs to the State's clientele who are probably difficult to even identify. No data also exist for the revolutionary technology variables, σ and θ. We shall focus on the effect of net income, income inequality and soldiering on revolutionary support in a set of primary regression specifications. Subsequently several other variables that could help explain revolutionary support are included in a set of secondary regression specifications.

IV. A. Primary Regression Specification

The primary 'second-stage' OLS regressions are of the form:

$$\phi_{n,t} = \beta_o + \beta_1 NET\ INCOME_{n,t} + \beta_2 INCOME\ INEQUALITY_{n,t} + \beta_3 MILITARY_{n,t} + \varphi_n + \delta_t + \varepsilon_{n,t} \qquad (10)$$

where φ_n and δ_t represent country and year fixed effects, respectively, and $\varepsilon_{n,t}$ is the error term (i.i.d.). All variables are measured across a panel data set comprising 12 nations over the 15 year period from 1976 to 1990.[21] The two-stage procedure ensures that we have the same (correct) level of aggregation between left-hand and right-hand variables, so it avoids the bias specified in Moulton (1986). This can also

[21] The total number of observations is reduced to 119 due to limited availability of inequality panel data. The full sample consists of 1976-90 for Denmark, Italy and the U.K., 1976-89 for The Netherlands, 1976-87 for Ireland, 1980-88 for Greece, 1976-84 for France and Germany, 1979-87 for Belgium, 1985-89 for Spain, 1985-90 for Portugal and 1985 for Luxembourg.

be achieved by estimation in one stage but correcting the standard errors.[22] *NET INCOME*, which proxies for income after net transfers in the model, Y, is measured as average household current receipts per capita per year after deducting direct taxes, at the price levels and exchange rates of 1985 (in U.S. dollars). *INCOME INEQUALITY* proxies for the ratio of the income of the State's clientele to its workers, E. It is measured by the Gini coefficient taken from the World Bank's Deininger and Squire (1996) 'high quality' data set (which has recently been used in Forbes (2000) to investigate the effect of inequality on the growth rate).[23] Soldiering, S, is proxied by *MILITARY*, which is total military expenditures as a fraction of GDP.[24]

IV. B. Biases Caused by Omitted Variables

The parameters that characterize the technology of revolt, σ and θ, are unobservable and hence form part of the error term in regression (10). They capture the productivity of revolutionary time in increasing the chances of a successful revolt and the productivity of counter-revolutionary soldiering time in reducing its chances. Observations of σ and θ are unavailable since they would have to measure not only weapon and information technology, but possibly also the charisma of a leader who may be able to inspire a small band of revolutionaries to achieve a great success. As these parameters vary the State reacts (according to equation (8)) by adjusting its policy variable, x, so as to change net income, Y, and income inequality, E. Soldiering may also be adjusted. In the setting of another model, Durham, Hirshleifer and Smith (1998) show how the evolution of the income distribution

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[22] The two-stage procedure is preferred since it is more transparent (for instance, one can graph the aggregate proportion who support revolution). Besides, in the two-stage procedure, the number of observations is directly related to the degrees of freedom that we actually have.

[23] For some countries, there are several missing years of data in the time series. Where this occurs, linear interpolation was used to complete the panel. Details are contained in Appendix IV.

[24] This variable does not measure spending on the police who may also be used to quell insurrection. However comparable policing statistics do not exist across many of the nations and years in the panel.

may depend on the decisiveness of conflictual effort. This technological parameter determines the relative allocation of output between productive and appropriative activities. Hence an omitted variable bias may arise in our regressions due to the potential correlation of the error term with the included explanatory variables.

This potential bias is dealt with in two ways. First, country and year fixed effects, φ_n and δ_t, have been included in the estimated regressions. As a result, it is possible to control for fixed differences in the parameters, σ and θ, across nations as well as shifts in σ and θ in a particular year for all nations. Country fixed effects not only take account of variations in the revolt technology possessed by security forces and rebels in different places, but also have the advantage of controlling for cultural and language differences that may affect how different nationalities respond to our survey question. Year fixed effects may be particularly useful to help control for sudden shifts in mass political support caused by 'revolutionary bandwagons' or informational cascades, studied in Kuran (1991) and Lohmann (1994). These two papers show how initially small events of no obvious significance (for example, the 1989 Leipzig Monday demonstrations which preceded the collapse of the German Democratic Republic) are capable of leading to large shifts in public opinion in a short period of time. The 1989-90 period saw a rapid rise of dissent and collapse of regimes across Eastern Europe, possibly linked to Gorbachev's reforms (discussed in Kuran (1991)). Including year dummies in our regressions should help capture those omitted variables that lead to such shifts in revolutionary desires that sweep nations at certain times.

Second, instruments are chosen for *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* that are correlated with these variables but are neither tax/benefit nor soldiering policy instruments of the State (and hence are uncorrelated with the

regression error term). The instruments used are *OIL*, *OPENNESS* and *RIGHT WING*, as well as changes in these variables. They are based on the equation (8) parameters, λ and Ψ^p, that measure labor productivity and the preference over income distribution by the government. The two parameters, λ and Ψ^p, affect *Y*, *E* and *S* but not the other variables in equation (5) which defines the support for revolt, *I*. The instrument, *OIL*, is an index of the country-specific real price of oil, calculated as the price of oil in the local currency divided by each nation's GDP deflator and standardized to equal 1 across all nations in 1975. The advantage of this instrument is that although it may be correlated with workers' real net incomes, as well as inequality, it is not dependent on the tax/benefit or soldiering policies of the nations in our sample that could be changed in response to revolutionary pressures. Second, *OPENNESS* is defined as the sum of imports and exports, divided by GDP. It may affect workers' earnings and income inequality through several different channels. One way is through the wages and unemployment rates of unskilled workers (see, for example, Freeman (1995) and Wood (1994)) and another is through government welfare programs whose size may depend on the level of risk in the economy (Di Tella and MacCulloch (2000) and Rodrik (1998)). Third, *RIGHT WING* is a measure of the extent to which the political preferences in a country lean towards the right. It is similar to those measures used by political scientists to indicate the left/right position of a government, and is constructed in two steps (see, for example, Hicks and Swank (1992)). In the first step, we collect the number of votes received by each party participating in cabinet and express them as a percentage of the total votes received by all parties with cabinet representation. In the second step, this percentage of support is multiplied by a left/right political scale (from Castles and Mair (1984)) and summed across all parties to give a continuous variable.[25]

[25] This instrument is unlikely to have been influenced by the voting patterns of the individuals in our sample who

To serve as valid instruments, these variables must be uncorrelated with revolutionary support, except through variables included in the equation explaining revolts (see Levitt (1997) for an example when estimating the effect of police on crime using electoral cycles). Other possible variables that may help explain revolts and could also be correlated with the instruments include the unemployment rate and the inflation rate. In a series of secondary regression specifications, controls for these variables are included to provide checks on the results.

IV. C. Secondary Regression Specification

The secondary regression specifications are of the form:

$$\begin{aligned}\phi_{n,t} = \omega_o + \omega_1\phi_{n,t-1} + \omega_2 NET\ INCOME_{n,t} + \omega_3 INCOME\ \ INEQUALITY_{n,t} + \omega_4 MILITARY_{n,t} \\ + \omega_5 INFLATION\ RATE_{n,t} + \omega_6 UNEMPLOYMENT_{n,t} + \theta_n + \sigma_t + \nu_{n,t}\end{aligned} \quad (11)$$

where θ_n and σ_t are country and year fixed effects, respectively, and $\nu_{n,t}$ is the error term (i.i.d.). *INFLATION RATE* is the rate of change in the GDP deflator and *UNEMPLOYMENT* is the unemployment rate. *HAPPINESS* is the average level of self-reported well-being (after controlling for personal characteristics) taken from the Euro-Barometer Survey Series.

Figures 1 to 4 show some evidence that in the pooled (across countries and time) raw macro data, nations with high net incomes, low inequality and low inflation rates tend to have experienced less support for revolts.

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wanted *"the entire way our society is organised"* to be *"radically changed by revolutionary action"*. Of the 5.9% of individuals in the full sample who desire revolt, 31% do not state an affiliation with any political party. This leaves 4.1% (=0.69*0.059) who support a recognized political party, consisting of 2.7% support for left-wing parties and 1.4%

V. The Effect of Net Income and Income Inequality on Revolutionary Support

V. A. Results using the Primary Regression Specification

In Table I we estimate the effect of *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* on the dependent variable, *REVOLUTIONARY SUPPORT*. Regression (1) is estimated using pooled OLS. The coefficients of the three explanatory variables have the signs predicted in Theorem 1 although the only significant coefficient is on *MILITARY* spending, at the 5 per cent level. These findings are similar to the cross-section results reported in the previous literature that has found, in particular, no clear evidence of a positive effect of inequality on revolt. However due to the potential omitted variable problems discussed in Section IV, we may expect the coefficients of these three explanatory variables to be biased against finding the signs predicted in Theorem 1. If better revolt technology or more charismatic revolutionary leaders yield greater support for revolt in a nation, the State can react by changing its tax/benefit policies to increase *NET INCOME* and reduce *INCOME INEQUALITY*. It can also spend more on the military. Hence once we control for unobserved fixed effects, we may expect to find coefficients on the explanatory variables that have larger absolute magnitudes and greater significance levels than those reported in regression (1).

In regression (2), which controls for country fixed effects, revolutionary support is reduced by higher *NET INCOME*, increased by higher *INEQUALITY* and reduced by more *MILITARY*. The coefficient of *NET INCOME* is now significant at the 1 per cent level. A one standard deviation increase in *NET INCOME* (equivalent to $US 2588 in 1985 dollars) reduces the support for revolt by 2.1 percentage points

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support for the others. Many of these parties have never been represented in cabinet (such as Sinn Fein in Ireland).

(or 1.2 times one standard deviation in this variable). The coefficient of *INEQUALITY* is also now significant at the 1 per cent level. A one standard deviation increase in inequality, equal to a rise in the Gini coefficient of 0.04 (on a scale from 0 to 1) is predicted to add 1.5 percentage points onto the level of revolutionary support (or 0.8 times one standard deviation in this variable). Higher *MILITARY* reduces support for revolt at the 1 per cent level of significance. A one standard deviation increase in *MILITARY*, equal to a rise in military spending divided by GDP of 2.2 percentage points, reduces support for revolt by 1.3 percentage points (or 0.7 times one standard deviation). As an example of the total potential size of all these effects, consider a shift from Luxembourg (which has the lowest inequality in the sample) to Portugal (which has the highest inequality). A rise in inequality from its level in Luxembourg to Portugal (from a Gini coefficient of 0.27 to 0.37) is predicted to add 3.8 percentage points onto revolutionary support. A drop in *NET INCOME* from Luxembourg to Portugal (from $US 13801 to $US 3846) should increase support for revolt by 8.0 percentage points. An increase in military spending from its level in Luxembourg to Portugal (from 1.6 percent of GDP to 6.4 per cent of GDP) is predicted to reduce revolutionary support by 2.7 percentage points. The net effect of all these differences in net income, inequality and military is that the support for revolt is predicted to be 9.1 percentage points higher in Portugal compared to Luxembourg (=3.8+8.0-2.7). The actual difference was 5.0 percentage points (2.3 percentage points in Luxembourg compared to 7.3 percentage points in Portugal).

As a further control for the potential bias that may still exist, regression (3) re-estimates the specification in regression (2) but using Two Stage Least Squares (2SLS). All three variables are regarded as endogenous and an instrument set consisting of *OIL*, *OPENNESS* and *RIGHT WING* (as well as changes in these

variables) is used. Since we again expect any remaining biases to have the opposite signs to the ones actually estimated on each of the coefficients in regression (2), instrumenting *NET INCOME, INCOME INEQUALITY* and *MILITARY* should help to identify even stronger effects (provided our instruments are correlated highly enough with the endogenous variables). In regression (3) the coefficient on *NET INCOME* becomes 1.8 times larger in absolute value than its corresponding value in regression (2) (-0.014 compared to -0.008) and is significant at the 1 per cent level. A one standard deviation increase in *NET INCOME* is now predicted to add 3.6 percentage points onto revolutionary support (or 2.0 times one standard deviation in this variable). The coefficient on *INCOME INEQUALITY* in regression (3) is significant at the 1 per cent level and also becomes 1.8 times larger than its corresponding value in regression (2) (0.659 compared to 0.375). A one standard deviation increase in *INEQUALITY* should add 2.6 percentage points onto revolutionary support (or 1.4 times one standard deviation in this variable). The coefficient on *MILITARY* retains its significance level of 1 per cent and increases the size of its effect on the support for revolt by 1.1 times (-0.619 compared to -0.572). A one standard deviation increase in this variable should now reduce revolutionary support by 1.4 percentage points (or 0.8 times one standard deviation).

Regression (4) is estimated using 2SLS but now adds controls for year, as well as country, fixed effects. The coefficient on *NET INCOME* further increases in absolute size (by 1.6 times) compared to its regression (3) value. It now equals -0.022, significant at the 1 per cent level. Using this specification, a one standard deviation increase in *NET INCOME* is predicted to increase revolutionary support by 5.7 percentage points (or 3.2 times one standard deviation). *INCOME INEQUALITY* has a positive effect on revolutionary support in regression (4) equal to 0.855, significant at the 1 per cent level and also increases in size (by 1.3 times)

compared to its regression (3) value. A one standard deviation increase in *INCOME INEQUALITY* is predicted to add 3.4 percentage points onto the support for revolt (or 1.9 times one standard deviation). *MILITARY* has a negative, but insignificant, coefficient. The marginal rates of substitution between *NET INCOME* and *INEQUALITY* (that keep revolutionary support constant) are of similar magnitude across the different specifications. It equals 47 for regression (2) (=0.375/0.008), 47 for regression (3) (=0.659/0.014) and 39 for regression (4) (=0.855/0.022). These numbers tell us how much extra net income one must give workers to keep their support for revolt unchanged when there exists higher inequality in their nation. As an example, consider the differences that exist between Luxembourg and the United States. Higher inequality in the U.S. compared to Luxembourg (a Gini of 0.36 compared to 0.27) increases the support for revolt by 7.7 percentage points, ceteris paribus (using the regression (4) specification). However an increase in *NET INCOME* equal to $US 3510 (=39*(0.36-0.27)*1000) should reduce revolutionary support by the same amount. In fact, average net income was $US 5526 higher in the U.S. compared to Luxembourg. Consequently the higher level of net income in the U.S. more than compensates for its greater inequality. In this sense, 'going for growth' could buy a nation out of a revolt.

Because the number of instruments is greater than the number of endogenous regressors used in estimating regressions (3) and (4) the equation is over-identified which allows us to test for the exogeneity of the extra instruments. The method for testing these kinds of restrictions is as follows: the residuals from the second-stage regression of 2SLS must be regressed on the exogenous variables in the specification, as well as the set of instruments.[26] The test statistic for the validity of the over-identifying restrictions is computed as $N*R^2$, where N is the number of

observations and R^2 is the unadjusted R^2 from the regression of the residuals on the exogenous variables and the instruments. This test statistic is distributed χ^2, with degrees of freedom equal to the number of over-identifying restrictions. The exogeneity of the over-identifying restrictions cannot be rejected for both regression (3) (p-value= 0.10) and regression (4) (p-value= 0.25).

V. B. Checks on the Results using Secondary Regression Specifications

Regressions (5) to (8) in Table II control for the effect of several other variables that may help explain revolts. They all use Two Stage Least Squares estimation. *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* are treated as endogenous variables and the other explanatory variables as exogenous. Exogeneity of the over-identifying restrictions could not be rejected in any of these regression equations (the p-values are all greater than 0.10). Regression (5) adds a lagged dependent variable, which is not significant, to the regression (4) specification. The size of the coefficients of *NET INCOME* and *INCOME INEQUALITY* remain similar to their previous values. *INCOME INEQUALITY* is significant at the 5 percent level and *NET INCOME* at the 10 percent level.

Since the validity of the instruments depends on them being uncorrelated with revolutionary support, except through variables included in the equation explaining revolutionary support, controls for inflation and unemployment are included in the next regressions as additional checks on the results reported in Table I. In regression (6) neither the *INFLATION RATE* nor *UNEMPLOYMENT* have significant effects on revolutionary support.[27] *NET INCOME* and *INCOME INEQUALITY*

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[26] Since all the explanatory variables in Table I have been treated as endogenous, the residuals from the second-stage regression are regressed solely on the instrument set.

[27] The effect of personally being unemployed on one's desire for revolt has already been controlled for in the first-stage microeconometric regressions along with other personal characteristics. Hence the coefficient of the

both retain coefficients of similar magnitudes to their values in regression (4) (which also controls for country and year dummies). They also both retain their significance levels, *NET INCOME* at the 5 per cent level and *INCOME INEQUALITY* at the 1 per cent level. The pooled relationship between inflation and revolutionary support, graphed in Figure 4, did reveal some evidence that a positive correlation may exist between these two variables. Regression (7) shows that this result is only robust to the inclusion of country dummies. Using the coefficient on *INFLATION RATE* in this specification, a one standard deviation increase in inflation (or 4.9 percentage points) is predicted to increase the support for revolt by 0.6 of a percentage point (or 0.35 times one standard deviation). The unemployment rate is not significant in regression (7), whereas *NET INCOME* and *INCOME INEQUALITY* both have significance levels of 1 per cent.[28]

VI. Conclusions

Although the security of ownership claims to property is one of the most basic requirements of a market economy, surprisingly large numbers of people declare themselves in favor of completing changing the way society is organized by revolutionary action. Large differences exist across nations and over time. In the United Kingdom in 1981, 10.1 per cent of individuals desired revolution, whereas there was only 1.2 per cent support in Denmark in 1987. In the United States the support for revolt increased from 5.0 per cent in 1980 to 6.5 per cent in 1990 whereas in Russia in 1990 it stood at 17.2 per cent. On average, 5.9 per cent of people desired revolt between 1976 and 1990 across the 12 OECD nations in the

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unemployment rate in the second-stage macro-regressions measures the extent to which the average member of society changes his or her revolutionary support as unemployment grows.

[28] We also tried including the change in income as an explanatory variable. Its coefficient was not significant. Results available on request.

panel used in this paper.

The causes of revolts have until recently received little interest from economists but much attention from historians and political scientists. The reasons may be that large scale data sets which could shed light on factors systematically linked to revolutionary behavior, as well as choice-theoretic models on which an empirical study could be based, have been absent in the past. This paper seeks to identify the effect of income and income inequality on revolutionary support. It introduces a new panel data set derived from large-scale surveys of public opinion which contain information on the revolutionary choices of approximately one-quarter of a million individuals. This allows one to control for unobserved fixed effects across nations and time which may have biased a large body of previous research that has struggled to find evidence of significant effects of income and income inequality on revolt. The paper also bases its regression equations on a choice-theoretic model of revolts that helps us to choose which variables to include in the equation explaining revolutionary support as well as in the instrument set.

After controlling for personal characteristics, as well as country and year fixed effects, we find that:

1. More people desire revolutionary action when their net incomes are low. The regressions estimate that a one standard deviation decrease in net income (or $US 2588 in 1985 dollars) leads to an increase in revolutionary support of up to 5.7 percentage points (or 3.2 times one standard deviation in the support for revolt).

2. Revolutionary support is lower when income inequality is low. A one standard deviation decrease in inequality (or a shift in the Gini coefficient of 0.04

measured on a 0 to 1 scale) leads to a decrease in revolutionary support of up to 3.4 percentage points (or 1.9 times one standard deviation). Results (1) and (2) combined indicate that 'going for growth', or implementing policies that reduce inequality, can buy nations out of revolt. For example, although inequality is higher in the United States compared to Luxembourg, an increase in net income of $US 3510 should keep revolutionary support in the U.S. unchanged. Actual net income in the U.S. compared to Luxembourg exceeded this difference.

3. Being unemployed significantly increases the likelihood of an individual responding in favor of revolutionary action in 7 of the 12 nations used in the panel regressions. However the unemployment rate is not a significant determinant of aggregate revolutionary support, after controlling for this personal effect.

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Table A: Desire for Revolution in Russia in 1990.

Revolution Desired?	All	Unemployed	Marital Status: Married	Divorced	Single
Yes	17.20	30.77	16.45	6.37	28.92
No	82.80	69.23	83.55	93.63	71.08

Revolution Desired?	Sex: Male	Female	Income Group: 1st (Lowest)	2nd	3rd (Highest)
Yes	22.56	13.00	16.10	18.27	17.03
No	77.44	87.00	83.90	81.73	82.97

Note: Based on 1,703 observations of individuals. All numbers are expressed as percentages.

Table B: Desire for Revolution in the United States: 1980 and 1990.

Revolution Desired?	All	Unemployed	Marital Status: Married	Divorced	Single
Yes	5.65	12.62	5.04	9.31	6.47
No	94.35	87.38	94.96	90.69	93.53

Revolution Desired?	Sex: Male	Female	Income Group: 1st (Lowest)	2nd	3rd (Highest)
Yes	5.45	5.82	7.18	5.91	4.08
No	94.55	94.18	92.82	94.09	95.92

Note: Based on 3,737 observations of individuals. All numbers are expressed as percentages.

Table C: Desire for Revolution in Europe: 1976-90.

Revolution Desired?	All	Unemployed	Marital Status: Married	Divorced	Single
Yes	5.93	9.67	5.20	6.75	8.12
No	94.07	90.33	94.80	93.25	91.88

Revolution Desired?	Sex: Male	Female	Income Quartiles: 1st (Lowest)	2nd	3rd	4th (Highest)
Yes	6.77	5.09	6.64	6.50	5.62	5.05
No	93.23	94.91	93.36	93.50	94.38	94.95

Note: Based on 215,707 observations of individuals. All numbers are expressed as percentages.

Table D

The Microeconometric Determinants of the Desire for Revolution (Logit Regression) Pooled Across 12 Nations from 1976 to 1990. Number of observations=215,707.

Dep Var: Revolution Desired?		**Coefficient**	**Standard Error**
Unemployed		0.248	0.037
Self employed		-0.074	0.033
Male		0.301	0.022
Age		-0.015	0.004
Age Squared		1.3e-6	4.4e-5
Education to age: 15-18 years		-0.012	0.026
	≥ 19 years	0.059	0.030
Marital Status: Married		-0.185	0.028
	Divorced	0.200	0.062
	Separated	0.362	0.078
	Widowed	-0.153	0.053
No. of children ≥ 8 & 15 yrs:	1	-4.9e-4	0.026
	2	-0.040	0.034
	≥3	-0.042	0.050
Income Quartiles: Second		-0.188	0.027
	Third	-0.392	0.028
	Fourth (highest)	-0.546	0.030
Retired		-0.205	0.044
School		-0.019	0.040
Home		-0.102	0.032
Countries:	Belgium	-0.129	0.036
	Netherlands	-0.573	0.040
	West Germany	-1.044	0.046
	Italy	-0.077	0.034
	Denmark	-1.239	0.050
	Ireland	-0.161	0.040
	Britain	-0.182	0.037
	Greece	0.329	0.037
	Spain	-0.117	0.057
	Luxembourg	-0.828	0.070
	Portugal	0.099	0.053

Notes: Log-likelihood=-45953. $Chi^2(45)=4251$. The regression includes year dummies from 1976 to 1990. The base country dummy is France.

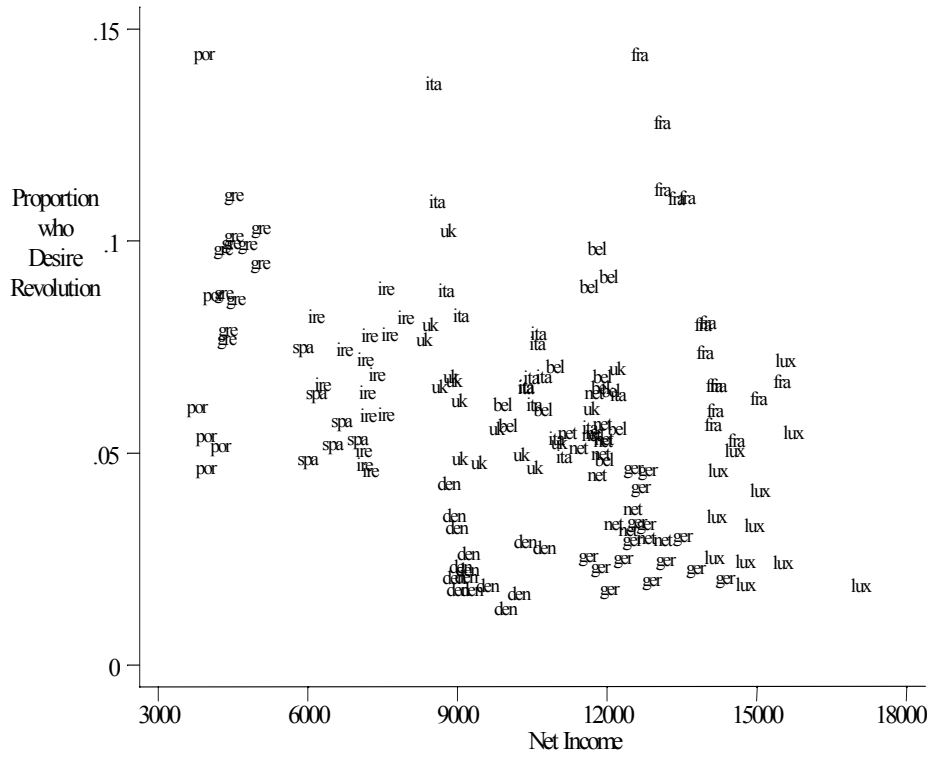


Figure 1: The Proportion of Individuals who Desire Revolt versus Net Income (at 1985 US$ and exchange rates): 12 Nations, 1976-90.

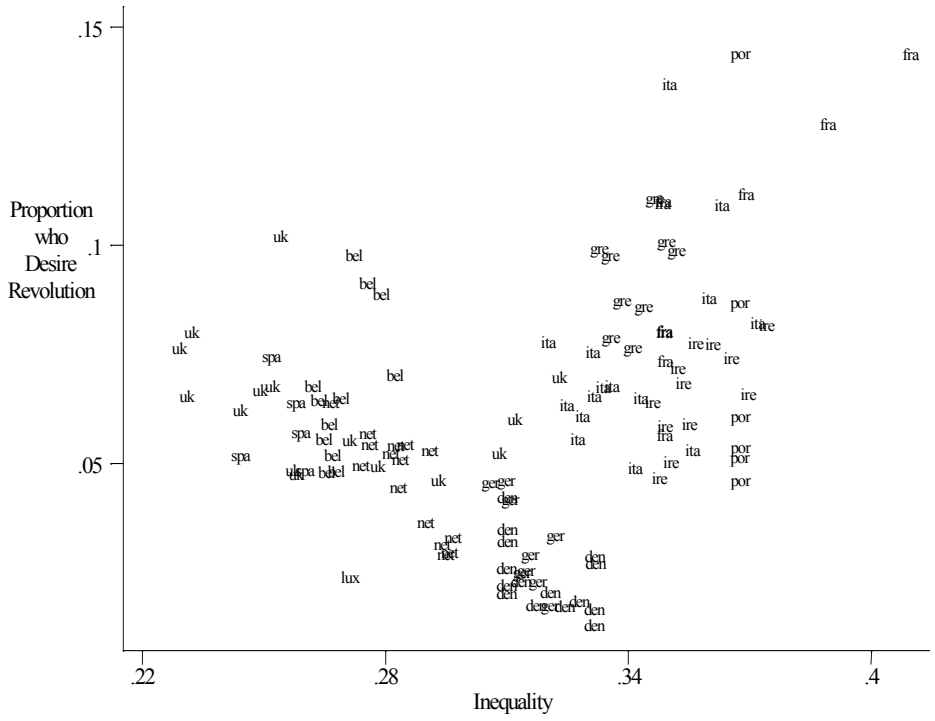


Figure 2: The Proportion of Individuals who Desire Revolt versus Inequality (measured by the Gini Coefficient): 12 Nations, 1976-90.

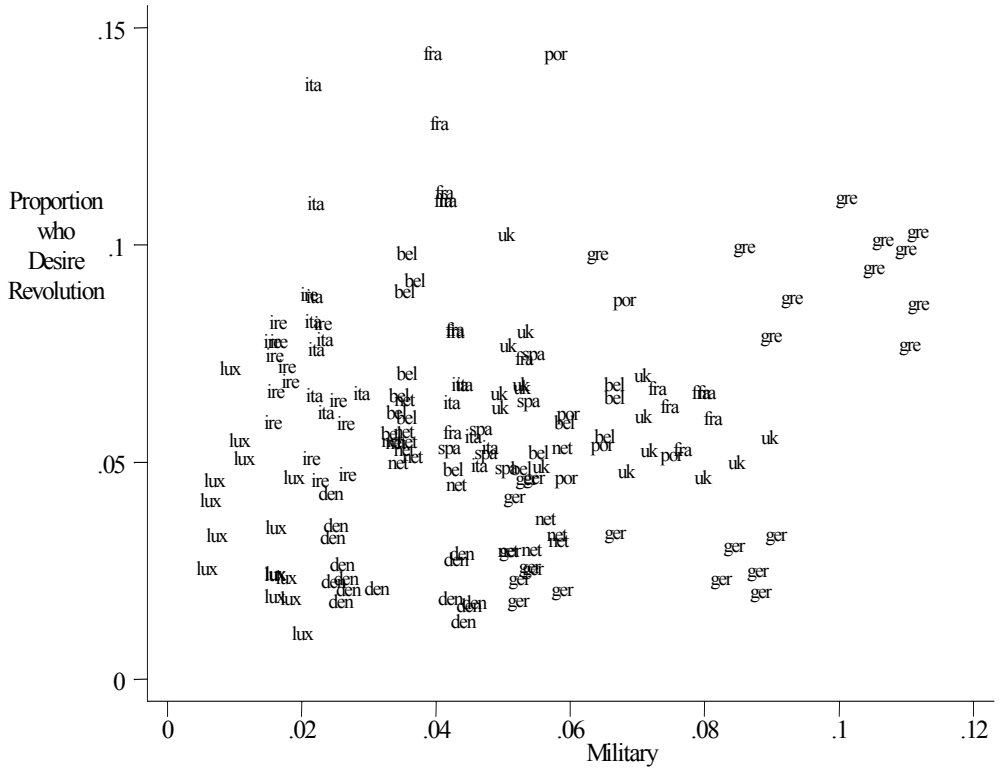


Figure 3: The Proportion of Individuals who Desire Revolt versus Military Spending as a Proportion of GDP: 12 Nations from 1976-90.

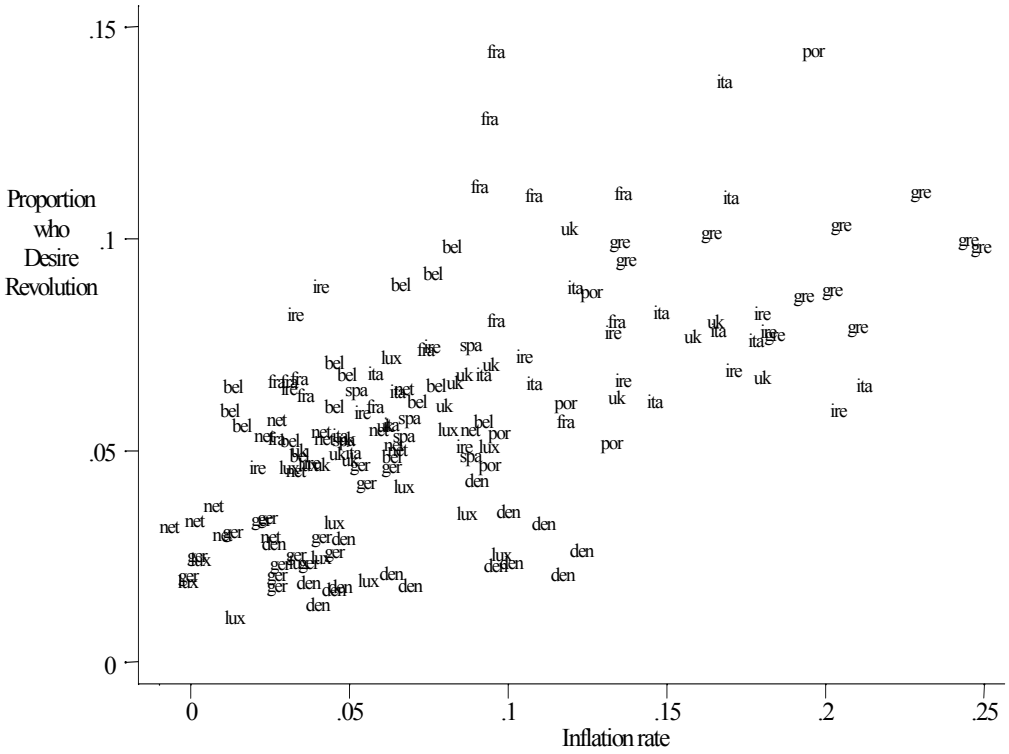


Figure 4: The Proportion of Individuals who Desire Revolt versus the Inflation Rate: 12 Nations from 1976-90.

Table E: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
REVOLUTIONARY SUPPORT	119	0.060	0.018	0.019	0.127
NET INCOME	119	9065	2588	3655	13801
INCOME INEQUALITY	119	0.315	0.040	0.229	0.410
MILITARY	119	0.047	0.022	0.016	0.112
OIL	100	1.285	0.671	0.311	3.256
RIGHT WING	100	5.504	1.633	2.275	7.800
OPENNESS	100	0.775	0.350	0.411	1.677
UNEMPLOYMENT	100	0.093	0.040	0.032	0.220
INFLATION RATE	100	0.082	0.049	-0.007	0.212
HAPPINESS	100	0.021	0.296	-0.070	1.189

Note: In the subsequent regressions, *NET INCOME* has been scaled down by a factor of 1000 for reporting purposes.

Table I
What Determines the Support for Revolt?
Panel of 12 Countries from 1976 to 1990 using
Residuals from the 1st Stage Regression.

Dependent Variable: REVOLUTIONARY SUPPORT	(1)	(2)	I.V. (3)	I.V. (4)
NET INCOME	-1.8e-4	-0.008***	-0.014***	-0.022**
	(8.7e-4)	(0.003)	(0.004)	(0.010)
INCOME INEQUALITY	0.036	0.375***	0.659***	0.855***
	(0.056)	(0.109)	(0.169)	(0.262)
MILITARY	-0.146**	-0.572***	-0.619***	-1.603
	(0.063)	(0.130)	(0.185)	(1.512)
Personal Controls	Yes	Yes	Yes	Yes
Country Dummies	No	Yes	Yes	Yes
Year Dummies	No	No	No	Yes
R^2	0.04	0.33	0.34	0.30
Observations	119	119	100	100

Notes: [1] * denotes significance at the 10% level. ** denotes significance at the 5% level. *** denotes significance at the 1% level. [2] White-corrected Standard Errors in brackets. [3] I.V. refers to estimation using Instrumental Variables (Two Stage Least Squares). All the explanatory variables are treated as endogenous. [4] Regressions (3) and (4) have fewer observations due to limited instrument data availability. [5] *NET INCOME* has been scaled down by a factor of 1000 for reporting purposes.

Table II

What Determines the Support for Revolt? Further Tests with Additional Explanatory Variables. Panel of 12 Countries from 1976 to 1990 using Residuals from the 1st Stage Regression.

Dependent Variable: REVOLUTIONARY SUPPORT	I.V. (5)	I.V. (6)	I.V. (7)
REVOLUTIONARY SUPPORT *t-1*	0.106		
	(0.141)		
NET INCOME	-0.015*	-0.026**	-0.014***
	(0.008)	(0.012)	(0.004)
INCOME INEQUALITY	0.731**	0.871***	0.697***
	(0.344)	(0.287)	(0.202)
MILITARY	-0.480	-2.349	-0.277
	(1.120)	(1.794)	(0.256)
INFLATION RATE		-0.010	0.128**
		(0.112)	(0.066)
UNEMPLOYMENT		-0.317	0.013
		(0.283)	(0.082)
Personal Controls	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	No
R^2	0.35	0.20	0.37
Observations	92	100	100

Notes: [1] * denotes significance at the 10% level. ** denotes significance at the 5% level. *** denotes significance at the 1% level. [2] White-corrected Standard Errors in brackets. [3] I.V. refers to estimation using Instrumental Variables (Two Stage Least Squares) where *INCOME*, *INCOME INEQUALITY* and *MILITARY* are all treated as endogenous variables. [4] *NET INCOME* has been scaled down by a factor of 1000 for reporting purposes.

Appendix I

The Euro-Barometer Survey Series [1975-1992]

The Euro-Barometer Surveys used in this paper were conducted by various research firms operated within the European Community (E.C.) countries under the direction of the European Commission. Either a nationwide multi-stage probability sample or a nationwide stratified quota sample of persons aged 15 and over was selected in each of the E.C. countries. The cumulative data file used contains 36 attitudinal, 21 demographic and 10 analysis variables selected from the European Communities Studies, 1970-1973, and Euro-Barometers, 3-38.

Data for Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom were available for the full sample period which was used (1976-1990) whereas data were only available from 1981 to 1990 for Greece and from 1985 to 1990 for both Spain and Portugal. The number of observations in the sample was 18992 for Belgium, 19954 for Britain, 21221 for Denmark, 22298 for France, 21237 for West Germany, 15639 for Greece, 14936 for Ireland, 25066 for Italy, 6668 for Luxembourg, 21870 for The Netherlands, 7218 for Portugal and 6582 for Spain.

The Combined World Values Survey [1980 and 1990]

The Combined World Values Survey used in the paper was produced by the Institute for Social Research, Ann Arbor, MI. Both national random and quota sampling were used. All of the surveys were carried out through face-to-face interviews, with a sampling universe consisting of all adult citizens, aged 18 and older, across 45 societies around the world. In total, 379 attitudinal, demographic and analysis variables were collected.

Data for The United States, Canada, Mexico, Japan, Argentina, France, Britain, West Germany, Italy, The Netherlands, Denmark, Belgium, Spain, Ireland, South Africa, Hungary, Norway, Sweden, Iceland and Finland were available for both 1980 and 1990. Data for China, Russia, Brazil, Slovenia, Portugal, Poland, Nigeria, Chile, India, Czech-Slovak, East Germany, Bulgaria, Austria, Lithuania, Latvia and Estonia were only available for 1990. Australia was only available for 1980. The number of observations for which data were available for the purposes of the present paper was 3737 for The United States, 2703 for Canada, 2911 for Mexico, 1336 for Japan, 1792 for Argentina, 2057 for France, 2508 for Britain, 3019 for West Germany, 3190 for Italy, 2021 for The Netherlands, 1965 for Denmark, 3297 for Belgium, 5691 for Spain, 2054 for Ireland, 3754 for South Africa, 1153 for Australia, 887 for Hungary, 2324 for Norway, 1790 for Sweden, 1595 for Iceland, 532 for Finland, 958 for China, 1703 for Russia, 1725 for Brazil, 769 for Slovenia, 989 for Portugal, 855 for Poland, 946 for Nigeria, 1378 for Chile, 2321 for India,

1391 for Czech-Slovak, 1280 for East Germany, 928 for Bulgaria, 1288 for Austria, 932 for Lithuania, 765 for Latvia and 890 for Estonia.

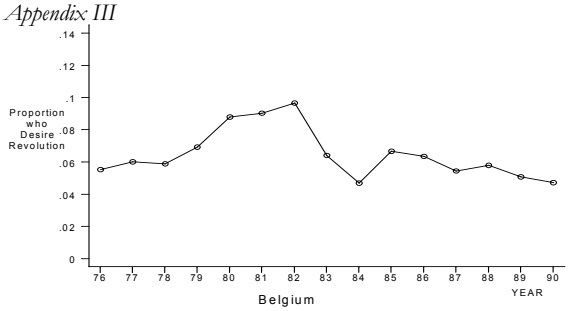
Appendix II

The Microeconometric Determinants of the Desire for Revolution (Logit Regressions): 1976-90.

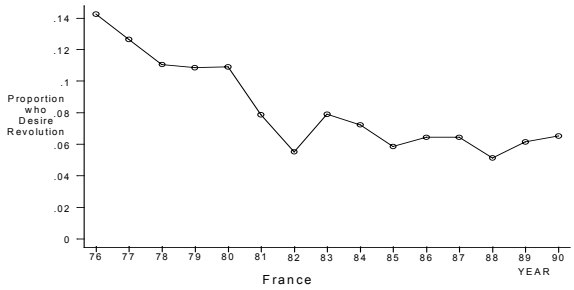
Dep Var: Revolution Desired?	U.K.	Italy	Germany	Belgium
Unemployed	0.373 (0.122)	0.287 (0.106)	-0.176 (0.211)	0.247 (0.108)
Self employed	0.150 (0.124)	0.164 (0.075)	0.063 (0.173)	0.110 (0.110)
Male	0.115 (0.071)	0.403 (0.059)	0.278 (0.096)	0.430 (0.071)
Age	-0.009 (0.012)	-0.015 (0.011)	-6.7e-4 (0.016)	-0.038 (0.012)
Age Squared	-7.7e-5 (1.3e-4)	-3.7e-5 (1.2e-4)	1.9e-5 (1.7e-4)	2.9e-4 (1.3e-4)
Education to age: 15-18 years	-0.279 (0.096)	0.043 (0.073)	-0.210 (0.105)	-0.058 (0.079)
≥ 19 years	-0.530 (0.133)	0.090 (0.073)	-0.143 (0.139)	-0.291 (0.096)
Marital Status: Married	-0.243 (0.094)	-0.204 (0.076)	-0.416 (0.122)	-0.041 (0.093)
Divorced	-0.016 (0.163)	0.794 (0.260)	-0.044 (0.192)	0.467 (0.177)
Separated	0.184 (0.216)	0.696 (0.193)	-0.066 (0.400)	0.373 (0.185)
Widowed	-0.287 (0.155)	-0.346 (0.152)	-0.480 (0.194)	0.038 (0.164)
No. of children ≥ 8 & 15 yrs: 1	0.127 (0.089)	-0.082 (0.067)	-0.039 (0.133)	0.078 (0.081)
2	0.238 (0.100)	-0.154 (0.100)	0.111 (0.168)	0.095 (0.112)
3	-0.135 (0.173)	0.224 (0.169)	0.324 (0.274)	0.241 (0.160)
Income Quartiles: Second	-0.231 (0.092)	-0.166 (0.071)	-0.292 (0.111)	-0.162 (0.087)
Third	-0.415 (0.098)	-0.282 (0.075)	-0.601 (0.122)	-0.311 (0.092)
Fourth (highest)	-0.764 (0.109)	-0.301 (0.079)	-0.866 (0.133)	-0.447 (0.101)
Retired	-0.040 (0.134)	-0.107 (0.118)	-0.634 (0.185)	-0.393 (0.138)
School	0.275 (0.174)	0.113 (0.104)	0.060 (0.168)	0.054 (0.135)
At home	0.022 (0.095)	-0.099 (0.095)	0.006 (0.135)	0.035 (0.105)
Obs.	19,954	25,066	21,237	18,992

Notes: All regressions include region and year dummies from 1976 to 1990. For the U.K., Italy, Germany and Spain, Log-likelihood=-4474, -6325, -2715 and -4574, respectively, and $Chi^2(46)$= 299, $Chi^2(38)$=534, $Chi^2(44)$=208 and $Chi^2(44)$=343, respectively. Standard errors in parentheses.

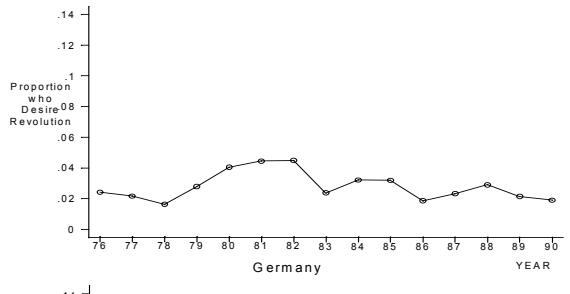
Appendix III



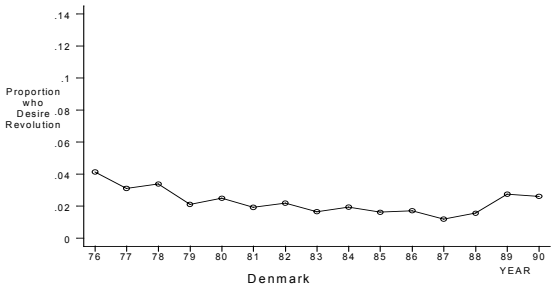
Belgium



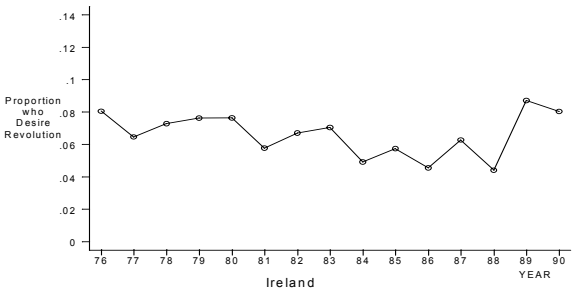
France



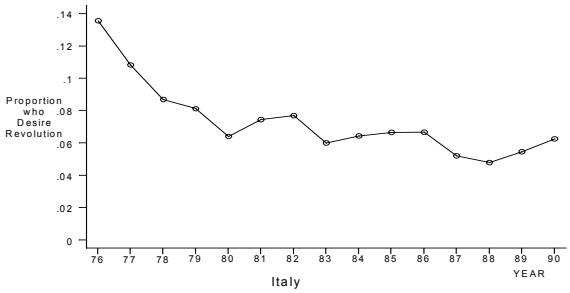
Germany



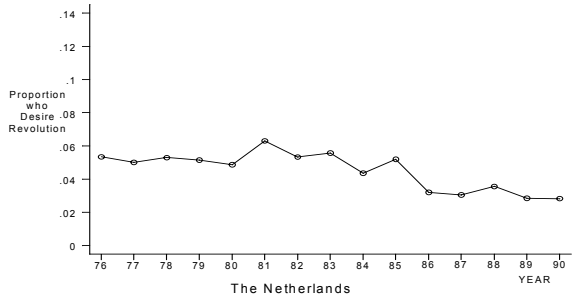
Denmark



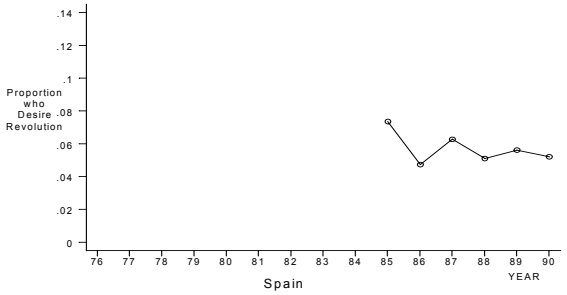
Ireland



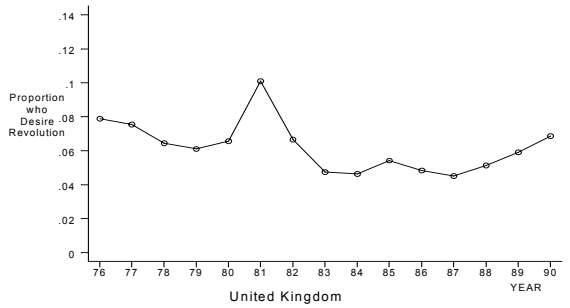
Italy



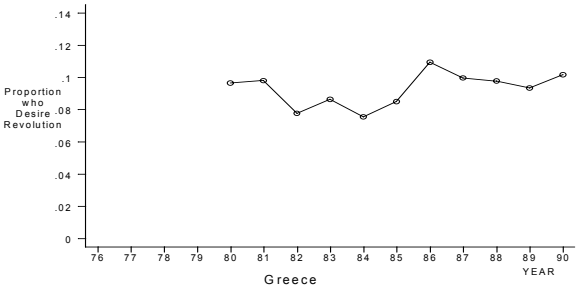
The Netherlands



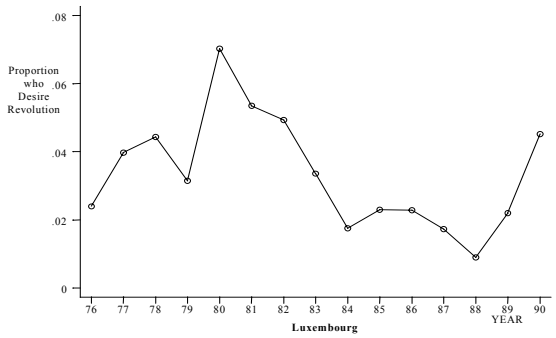
Spain

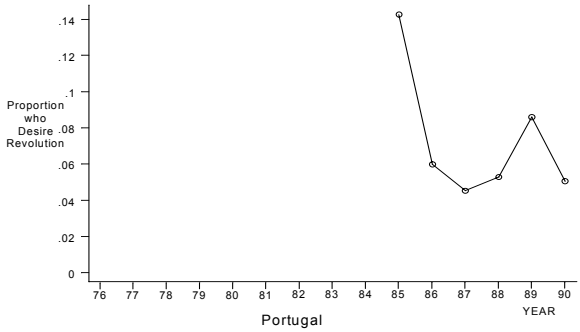


United Kingdom



Greece


Proportion who Desire Revolution
.08
.06
.04
.02
0
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
YEAR
Luxembourg


Proportion who Desire Revolution
.14
.12
.1
.08
.06
.04
.02
0
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
YEAR
Portugal

Appendix IV

Data Definitions

Countries: Belgium, Britain, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal and Spain. The base category for the cumulative regression in Table D is France.

REVOLUTIONARY SUPPORT: The coefficients on the year dummies from an Ordinary Least Squares regression of whether or not a respondent answers that "The entire way our society is organised must be radically changed by revolutionary action", controlling for personal characteristics, for each country.

NET INCOME: Average household current receipts per capita, after deducting direct taxes (=income taxes plus employee social security contributions), at 1985 price levels and exchange rates (in U.S. dollars), from the CEP-OECD data set [1950-1992].

INCOME INEQUALITY: The Gini coefficient from the Deininger and Squire (1996) 'high quality' data set. Missing years were linearly interpolated, which includes 1976-78 and 1980-83 for France; 1979-80 and 1982 for Germany; 1981-86 for Ireland; 1985, 1988 and 1990 for Italy; 1976, 1978, 1980 and 1984 for The Netherlands; 1980-84 and 1986-87 for Belgium; 1977-80, 1982-86 and 1988-90 for Denmark; 1985-87 for Greece; and 1985-89 for Portugal. No interpolated years were used for Britain, Luxembourg or Spain.

MILITARY: Total military expenditures divided by GDP, from the Statistical Abstract of the United States and World Military Expenditures and Arms Transfers.

OIL: An index of the country-specific price of oil, calculated as the price of oil in the local currency, divided by each nation's GDP deflator and standardized to equal 1 across all nations in 1975. The oil price is taken from The Statistical Abstract of the United States (various issues). Exchange rate and GDP deflator data are from the CEP-OECD data set [1950-1992].

RIGHT WING: Index of left/right political party strength, defined as the sum of the number of votes received by each party participating in cabinet expressed as a percentage of total votes received by all parties with cabinet representation, multiplied by a left/right political scale constructed by political scientists. Votes are from Mackie and Rose's (1982), *The International Almanac of Electoral History*, cabinet composition is from *The Europa Yearbook* (1969-1989 editions), and the left/right scale is from Castles and Mair (1984).

OPENNESS: Imports plus exports, all divided by GDP, from CEP-OECD [1950-1992].

UNEMPLOYMENT: The unemployment rate, from CEP-OECD data set [1950-1992].

INFLATION RATE: Rate of change in the GDP deflator, from CEP-OECD [1950-1992].