Zentrum für Europäische Integrationsforschung
Center for European Integration Studies
Rheinische Friedrich-Wilhelms-Universität Bonn

Working Paper

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What Makes a Revolution?

B99-24
1999

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1 November, 1999
Draft

Abstract

A fundamental requirement of market economies is the security of ownership claims to property. Yet history is littered with cases of challenges to these claims. 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 in two ways. First, it introduces 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. Second, the estimated regressions are based on a choice-theoretic model of revolt that also helps us to choose an instrument set. 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. An increase in inequality equivalent to a shift from Belgium to the US is predicted to increase support for revolt by 6.3 percentage points. An increase in net income of $US 3330 (in 1985 constant dollars) decreases revolutionary support by the same amount. The results indicate that 'going for growth' can buy a nation out of revolt.

JEL Classification: D23, D31, D74.
Keywords: Property Rights, Revolt and Income Inequality

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I. Introduction

A fundamental requirement of market economies is the security of ownership claims to property. Without secure property rights, agents' ability to enter and fulfill contractual obligations is threatened. Yet throughout history large amounts of resources have been employed for the purpose of overthrowing an existing order by revolution and redefining the allocation of property rights. Choice-theoretic models of conflict and revolt have made a number of appearances in the economics literature, with a recent resurgence of interest (see Haavelmo (1954), Grossman ((1991), (1994), (1999)), Hirshleifer ((1991), (1995)), Skaperdas ((1991), (1992)), Grossman and Kim (1995)). However empirical contributions have been particularly rare (see Durham, Hirshleifer and Smith (1998), and Alesina and Perotti (1996)). To my knowledge, no panel studies of the determinants of revolts based on a choice-theoretic economic model exist.[1] This is important since the economic conditions responsible for revolutions are hotly debated in the political science and sociology literature. In particular the relationship between inequality and revolt has been the subject of much study in this literature with contradictory results (see Davies (1962), Gurr (1970), Tilly (1978), Zimmerman (1983), Muller (1985), Lichbach (1989)). Few people view revolts as entirely rational events. To the contrary, feelings of exploitation and social injustice connected with Marxist ideology have often been regarded as motivating such legendary revolutionary figures as Che Guevara to fight against impossible odds.

There are numerous historical case studies detailing the economic conditions perceived to be responsible for revolt. For the French Revolution, Eric Hobsbawm (1975) writes about pre-1789 France in which "feudal dues, tithes and taxes took a large and

[1] This may have occurred because it has been difficult to find models assuming rational agents that could be applied to an econometric study. Another reason may be that large-scale data sets have not been available on which strong statistical tests could be made to identify the factors systematically linked to revolutionary behavior.

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' advocated social security in the hope of pacifying the proletariat and luring them away from socialism" (pp40-41, Carter and Shipman (1997)). [3]

The extensive work by political scientists and sociologists on revolt begins largely with the publication in 1887 of Karl Marx's *Das Kapital*. Their empirical studies often use protests and political violence as proxies for revolutionary support. Francisco (1993), for example, uses person-days of protest per 100,000 persons per week. He notes that "most empirical studies of protest and revolution use other measures, especially political deaths". Measurement is difficult since events such as political strikes are hard to classify. One strand of literature seeks to explain revolts using politically oriented theories highlighting the importance of the political processes and structures that provide opportunities for mobilized dissidents to challenge the State for any reasons (Tilly (1978), Tarrow (1989), Gurr and Moore (1997)). A second strand of literature seeks to establish the economic conditions responsible for revolutions. The rationale for including economic variables, particularly income inequality, as explanatory variables in regression equations 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

[2] The kingdom's need for revenues was expanding, due in large part to France's involvement in the American War of Independence, in which victory over England came at enormous cost. In 1788 war, navy and diplomacy made up one-quarter of expenditure, which outran tax revenues by at least 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", by comparison.

expectations of what they should get from society and what they believe they will actually obtain. The latter is based on the exploitation of workers by capitalists who expropriate "surplus value" (which Marx defined as the total value of a product minus the production costs). Marx argued that greater exploitation would lead the working class to experience greater discontent, or "immiseration", leading to violent challenges to the State and revolt. The economic discontent theories predict a positive effect of inequality on political conflict. However a large body of literature has found no clear evidence of this prediction. Lichbach (1989) provides a review of these contradictory findings. A probable source of bias is the likely endogeneity of income inequality in regressions explaining revolts. The present paper endeavors to overcome this problem since both history and economic general equilibrium theory point to the possibility of that inequality is not an exogenous variable uncorrelated with other factors affecting revolutionary pressures. An historical example comes from early seventeenth century England where 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)). Evolutionary policies, designed to avoid revolutionary attempts, have a long tradition of study in English history, and are referred to as the "Whig" view.[4] Such policies imply that

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[3] Sala-I-Martin (1997) shows in his model how social safety nets can be used as a way "to bribe poor people out of disruptive activities such as crime, revolutions, and other forms of social disruption", and how this can affect the growth rate of the economy.

[4] General equilibrium theory supports this evidence. In Grossman's (1991) model of insurrection a ruling authority which maximizes *expected* returns for its clientele will always be acting, in part, to reduce the chances of a revolt occurring. This includes not only employing more counter-revolutionaries but also not allowing the difference in income between the State's clientele and its subjects to grow too large. Consequently one may expect the revolutionary activities of individuals in response to their State's policies to seldom boil over into violent large-scale protest activity or culminate in a successful revolt due to their scale, which is constantly being limited by the State. In Durham et al

a negative bias exists on the coefficient of income inequality in regressions attempting to explain the support for revolt (since the State may move to reduce income differences when threatened with more revolutionary pressures). This may help explain the ambiguous results of previous studies. The primary innovation of this paper is to tackle this problem in two ways. First, it introduces a new panel data set derived from large-scale surveys of public opinion that allows us to control for unobserved fixed effects across nations and time which may also be correlated with revolutionary support. Second, 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 revolutionary support as well as the instrument set. These two approaches should enable us to better identify the true effect of both income and income inequality on revolutionary support.

Several economists have designed choice-theoretic models in the emerging economics of conflict and revolt. Skaperdas (1991) studies the effect of risk-aversion on the allocation of resources between production and appropriation. When conflict is unavoidable, being risk-averse turns out to be an advantage. The more risk-averse party invests more in arms since it is more fearful of losing the conflict and thereby also obtains a higher chance of winning. Hirshleifer (1991) studies how the technologies of production and conflict affect the allocation of resources between production and conflict. One result is the flaw in assertions that growing international interdependence among nations makes war obsolete, since this also means each side has more to gain by fighting and more to lose by not. Both these papers assume that all property subject to appropriation is in a common pool which the warring parties attempt to grab. Grossman and Kim (1995) model the allocation of resources between production and appropriation but in a setting in which each party possesses non-overlapping claims to the property subject to appropriation.

(1998) the evolution of income distribution in an economy depends on the decisiveness of conflictual effort which determines the relative allocation of output by two opponents between productive and appropriative activities.

Hence a distinction exists between resources devoted to production and defense which does not exist in Hirshleifer (1991) and Skaperdas (1991). Durham et al (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 in which resources can be allocated between productive and appropriative efforts. The above papers all portray two-player contests between parties who are attempting to win control of the other's resources. Grossman (1991) analyzes the behavior of many individual subjects of one ruling authority in response to its policies. It forms the basis for the empirical tests in the present paper. Economists have also been interested in the effect of inequality on political stability since uncertainty about the political environment can affect investment and consequently economic growth (see Benabou (1996)). Alesina and Perotti (1996) focuses on estimating the significance of this channel using a cross-section of 71 countries to help resolve the important question of exactly how inequality could harm growth.

Grossman's (1991) positive theory treats revolt and its deterrence as economic activities that compete with production for scarce resources in an explicitly choice theoretic analysis. By virtue of its sovereign powers, the ruler sets his or her policy variables - the level of taxes and soldiering - to maximize expected revenue for its clientele. Workers respond to the ruler's policies by devoting time to production, soldiering or to insurrection. The more the ruler attempts to extract greater revenues by increasing taxes, keeping the level of soldiering constant, the more workers shift their time toward participating in revolt so as to increase the chance that the regime can be successfully overthrown and its revenues taken back by the workers. The ruler can attempt to diminish the chance of a successful revolt by employing more soldiers which act as counter-revolutionaries. By directly linking the extent of revolutionary support amongst the population to macroeconomic variables, this model opens a way for empirically testing the predictions of a rational economic theory of insurrection. 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.[5]

Section II 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 III develops the theory used as a basis for empirically identifying the macro-economic variables which systematically affect revolutionary support. Section IV outlines the estimation strategy. Section V presents the panel regression results. Section VI concludes.

II. The Effect of Personal Characteristics on the Desire for Revolution

II. 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 survey"* categories are not included in our data set). Appendix I provides a summary of the Euro-Barometer Survey Series and The World Values Survey.

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

[5] The use of survey data may be particularly useful in countries where protest is legal and an insurrection has not actually taken place, since answers may be more truthful. Respondents have less chance of retribution to fear.

response. If the social norm is not to support a revolt, subjects may bias their response towards maintaining the status quo.[6] Since the first studies in the area, psychologists have found evidence pointing out that this concern may be exaggerated (e.g. Rorer (1965), Bradburn (1969)). Furthermore at least part of the influence of social norms can be controlled for in the empirical specifications later on.

Tables IA, IB and IC show the proportions of European, Russian and American respondents who desired revolutionary action, versus those who did not (i.e. the ones who desired 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 desired revolt. In 1990 in this country, 17.2 per cent of individuals wanted a revolution and 30.8 per cent of the unemployed. No monotonic pattern existed across income groups.

There were 215,707 respondents in Europe between 1976 and 1990. Of the whole sample, 5.9 per cent desired revolution. Of the sub-sample of unemployed people, 9.7 per cent desired revolution. With respect to marital status, a higher proportion of separated respondents (9.3 per cent) desired revolt compared to divorced respondents (6.8 per cent), who in turn were proportionately more in favor of revolt than married respondents (5.2 per cent). Of male respondents, 6.8 per cent desired 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).

Table IC shows the proportion of American respondents who desired revolutionary action, versus those who do not, depending on their personal characteristics,

[6] This bias is captured by the Marlowe-Crowne measure of social desirability which uses evidence from an array of questions where the social norm differs from the honest answer.

pooled across 1980 and 1990. The proportion increased from 5.0 per cent in 1980 to 6.5 per cent in 1990, and was higher amongst the unemployed than in Europe. 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.

Appendix II shows how the proportion of respondents who desire revolution has varied over time in each country in the sample. Note the particularly high level of revolutionary support observed in Portugal, which drops 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.[7] The lowest average level of revolutionary support over the sample period was in Denmark where just 2.3 per cent were in favour.[8]

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

The microeconometric results showing the effect of personal characteristics on whether or not the respondent supports revolt are reported in Table IIA for the whole Eurobarometer sample. Appendix III provides the regressions for 4 of the 12 countries individually: The United Kingdom, Italy, Germany and Belgium.[9] There are strong

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For example, the honest answer to the question *"Were there occasions when you took advantage of someone?"* is likely to be yes, though the socially acceptable one is no.

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

[8] 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 which exacerbates his alienation from it and drives him to revolt this may trigger another defection from an individual who sees that, with a larger opposition, there are fewer hostile supporters of the State he has to face. This process may continue, generating an 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 rising 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.

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

similarities between countries of the effect of several of the personal characteristics on whether a respondent declares him/herself in favour of revolution. In every country, being in a higher income quartile monotonically decreases the chance of supporting revolt. A shift from the bottom quartile to the top quartile in the United Kingdom decreases the probability of supporting revolt by, on average, 4.3 percentage points (7.5 per cent of people in the bottom quartile supported revolt in the U.K.). Men are more likely to desire revolt in every country, 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 countries 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. Although older people are less likely in every country, except Portugal, to declare themselves in favour of revolutionary action, the effect is only significant in 3 countries. 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.

The effect of personal characteristics on the desire for revolt for 51,793 individuals from the 37 countries in the World Values Survey sample are reported in Table IIB. The size of the effects of being unemployed and male are similar to those obtained using the different Eurobarometer sample. Both increase the chance of revolutionary support. Support for revolt declines monotonically as one goes up the three income groups. There is some evidence that having more children also decreases revolutionary support. The country dummy variables indicate that an American and a Chinese are together almost equally less likely to support revolt than a French individual (the base category).

III. Theory

Grossman's (1991) model of insurrection is applied to form the basis of the empirical estimation strategy for identifying the effect of macroeconomic variables on revolutionary support. A large number of identical families choose between 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. These fractions must sum to unity. Each family's objective is to maximize expected income. Let the time spent by all families, on average, to participating in the productive labor force, soldiering and revolt be *L*, *S* and *I*, respectively. Families can obtain income from entering the labor force, soldiering or by plotting revolt. Total output per family is $Q=\lambda l$. A family's net income from participating in the workforce is $(1-x)\lambda l$, where *x* is the fraction of net taxes that the State deducts from earnings. λ measures gross earnings per unit of time (which equals labor productivity).

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

III. A. The Family Problem

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

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

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

$$(1-x)\,l=(1-b)w \tag{2}$$
$$(1-x)\,l=br/I \tag{3}$$

These conditions indicate 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, $(1-\$)w$, and from insurrection, $\$r/I$. The probability of a successful revolt is given by:

$$b=\frac{I^{1-q}}{S^{s}+I^{1-q}} \tag{4}$$

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, which the State wishes to set to reduce the probability of a successful revolt, equation (2) defines the wage that must be offered to attract the soldiers. Combining equations (3) and (4), together with the constraint that total worker time spent on production, soldiering and insurrection must sum to unity ($L+S+I=1$) yields:

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

where $E=x/(1-x)$, $Y=(1-x)\lambda$ and $f(S,I)=1+I^{2-1}S^{\sigma}$. The variable, E, is a measure of income inequality in the economy. It is the income of the State's clientele relative to the income of the workers. If E is large then workers' incomes are small compared to the income of

clientele.[10] *Y* is workers' net income, after taxes and transfers.

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

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

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

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

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

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

The intuition for these results is as follows. Net Income, *Y*, can increase (without changes in the other explanatory variables in equation (5)) 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 income inequality increases the return from participating in revolutionary activities relative to production. More soldiering, *S*, reduces the return to revolt by decreasing the likelihood of its success and also by reducing the size of the available booty due to larger State military expenditures, making time spent in the labor force more attractive. Higher levels of stored capital, r^s, increase the booty available in the case of a successful revolution and consequently increase the returns to spending time on insurrection.

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[10] The theory so far 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 of course doesn't capture those cases in which the security forces and revolutionaries are entirely different groups of people. The security forces may, in practice, even be part of the State's politically favoured clientele.

III. B. The State's Problem

The State wishes to maximise a combination of the expected income of its clientele and of the production workers. Its problem is to:

$$\text{maximize}_{x,w,S} \qquad M = \Psi^p[(1-b)(x\,lL - wS)] + (1-\Psi^p)\,e \tag{6}$$

subject to the constraints (2) and (3), $L+S+I=1$ and $0<Q^p<1$. The clientele's expected income, $(1-\$)(x\lambda L-wS)$, equals the net revenues taken from the workers minus the payments to soldiers, multiplied by the probability of there not being a successful revolution. Workers' welfare equals their expected income, e. The parameter, Q^p, captures the preference over the distribution of income in the economy of the country's governing party. For example, Q^p may have a different value depending on whether the index p is either 'Democrat' or 'Republican'. More generally p could be measured on a continuous scale.[11] 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 $x = f(r^s, \sigma, \theta, \lambda, Q^p)$. Hence

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

Similarly there also exists a reduced form solution for soldiering:

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[11] Grossman (1991) solves the general equilibrium problem for the case in which the State seeks solely to maximise the expected income of its clientele ($Q^p=1$).

$$S = g(r^s, s, q, l, \Psi^p) \tag{9}$$

The solution to the State's problem gives a second set of conditions (in addition to equation (5)) which must be satisfied in equilibrium.

IV. Empirical Strategy

The dependent variable used in the subsequent regressions is the proportion of respondents in each country and year who respond that "the entire way our society is organised must be radically changed by revolutionary action", controlling for personal characteristics.[12] The response categories in the Euro-Barometer Survey question on revolt correspond neatly to attitudes which we may expect in the kind of world being modelled here: the ruling authority and its clientele would presumably want to valiantly defend the status quo against possible uprisings, whereas workers choose whether or not to support insurrection.[13] However the survey response categories do force the individual respondents to make a discrete choice (whereby you 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

[12] On average, 1266 individuals are sampled each year for a given country.

[13] A limitation of the use of survey responses is that although people may say they support revolutionary change, they may not actually be spending 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 time being devoted to the cause.

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.[14]

In order to generate our measure of revolutionary support, we follow a two-stage procedure. First, we estimate the effect of personal characteristics on individual survey responses of revolutionary choices in OLS microeconometric regressions for each country. These regressions are of the following form:

$$REVOLUTION\ DESIRED\ ?_{n,t}^{j} = a_0 + \underline{a_1} X_{n,t}^{j} + f_{n,t} + m_{n,t} \qquad (10)$$

where $REVOLUTION\ DESIRED\ ?_{n,t}^{j}$ is a discrete variable taking the value 1 if individual *j* in country *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. $X_{n,t}^{j}$ is the vector of personal characteristics for each individual and the vector, $\underline{\alpha_1}$, 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 normal errors. Appendix III reports three such regressions for the U.K., Italy, Germany and Belgium. Our main interest is the measure of aggregate support for revolt, after controlling for personal characteristics, for each country and year in the sample given by the coefficients on the year dummies, $\phi_{n,t}$.[15] This variable is measured across a panel data set which

[14] A more complicated way of introducing heterogeneity which would affect the incentives of families in the model is, for example, 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 must exist. The survey responses of those involved solely in production would presumably not be in favor of revolt, whereas those families whose sole activity was insurrection would presumably give responses in support of it.

[15] 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.

comprises 12 nations over a 15 year period from 1976 to 1990 and is labelled *REVOLUTIONARY SUPPORT* in the regressions in the next section.[16]

The second stage regressions are based on equation (5) which defines the fractional support for revolt, *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:

$$f_{n,t} = b_o + b_1 NET\ INCOME_{n,t} + b_2 INCOME\ INEQUALITY_{n,t} + b_3 MILITARY_{n,t} + j_n + d_t + e_{n,t} \quad (11)$$

where n_n and δ_t represent country and year fixed effects, respectively, and $e_{n,t}$ are independently, identically distributed normal errors. 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). The same can be achieved by estimation in one stage but correcting the standard errors.[17] *NET INCOME*, which proxies

[16] Data are available from 1980-1990 for Greece and from 1985-1990 for Spain and Portugal.

[17] 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

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*, which proxies for the ratio of the income of the State's clientele to the production workers (*E*) is measured as the Gini coefficient using the Deininger and Squire (1996) 'high quality' data set.[18] Soldiering (*S*) is proxied by *MILITARY*, which is total military expenditures as a fraction of GDP.[19]

IV. B. Biases Caused by Omitted Variables

The parameters which characterize the technology of revolt in equation (4), σ and θ, are unobservable and consequently form part of the error term, $e_{n,t}$, in regression (11). 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 *Y* and *E*. Soldiering is also adjusted according to equation (9).

The potential omitted variable bias is dealt with in two ways. First, country and year fixed effects are included in the estimated regression equations. Consequently fixed variations in σ and θ across nations, as well as shifts in σ and θ across all nations in a

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procedure, the number of observations is directly related to the degrees of freedom that we actually have.

[18] 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.

[19] 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.

particular year, can be controlled for in the regressions. 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 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.

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 $e_{n,t}$). The instruments used, *GROSS HOURLY EARNINGS*, *RIGHT WING* and *OPENNESS* are based on the equation (8) variables, λ and Q^p, which equal gross earnings per unit of time (before net taxes) and the preference over the distribution of income by the ruling government. The two variables, λ and Q^p, affect Y, E and S but not the other variables in equation (5) which defines the support for revolt, I.

GROSS HOURLY EARNINGS is a real index of the gross hourly earnings in manufacturing. It should not be influenced by changes in the productivity of revolutionary and counter-revolutionary activities. *RIGHT WING* is an index of the left/right ideological position of the ruling political parties, weighted according to their electoral support. It is 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. *RIGHT WING* ranges continuously from 0 (left) to 10 (right). This instrument varies as the composition of the ruling parties in government changes. It is unlikely to have been influenced by the voting patterns of the individuals in our sample who wanted "the entire way our society is organised" to be "radically changed by revolutionary action". Of the 5.9% of individuals in the total sample who desire revolt, 31% do not state an affiliation with any political

party.[20] This leaves 4.1% (=0.31*0.059) who support a recognized political party, consisting of 2.7% support for left-wing parties and 1.4% support for center/right parties. Many of these parties have never been represented in a ruling government's cabinet (such as Sinn Fein in Ireland). *OPENNESS* is defined as the sum of imports and exports, divided by GDP. It may affect workers' earnings and income inequality (see Freeman (1995) and Wood (1994)) as well as tax/benefit policies due to its effect on risk in the economy (Rodrik (1999)).

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 as well as the self-reported happiness of the population are included to provide checks on the results.[21]

IV. C. Secondary Regression Specification

The secondary regression specifications are of the form:

$$f_{n,t} = w_o + w_1 f_{n,t-1} + w_2 NET\ INCOME_{n,t} + w_3 INCOME\ \ INEQUALITY_{n,t} + w_4 MILITARY_{n,t} + w_5 INFLATION\ RATE_{n,t} + w_6 UNEMPLOYMENT_{n,t} + w_7 HAPPINESS_{n,t} + q_n + s_t + n_{n,t} \quad (12)$$

[20] The Eurobarometer Survey Series contains several questions about respondents' political affiliations.

[21] Self-reported levels of well-being have been found to vary with macro-economic variables. Di Tella, MacCulloch and Oswald (1998) show that people systematically tick lower scores in surveys which ask individuals, *"Taken all things together, would you say you're Very Happy, Pretty Happy, or Not Too Happy?"*, when there is inflation or unemployment in their country. Self-reported well-being may also be correlated with non-economic factors (such as national pride) which affect revolutionary support.

where 2_n and F_t are country and year fixed effects, respectively, and $<_{n,t}$ are independently, identically distributed normal errors. *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 revolutions.

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

V. A. Results using the Primary Regression Specification

In Table IV the determinants of *REVOLUTIONARY SUPPORT* are reported. Regression (1) is estimated using pooled OLS (similar to the cross-section results reported in the previous empirical literature). The three explanatory variables, *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* have the signs predicted in Theorem 1. However the only significant coefficient is on *MILITARY* spending, at the 10 per cent level. 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 yields greater support for a revolt in one nation compared to another, its government may react by changing its tax/benefit policies to increase *NET INCOME* and reduce *INCOME INEQUALITY*. It may also spend more on the military. Unobserved fixed effects can be controlled for by including country as well as time fixed effects in the regression equations. We expect to find coefficients on the explanatory variables that have larger absolute magnitudes and greater significance levels.

In regression (2), which controls for country fixed effects, higher *NET INCOME* decreases support for revolt, higher *INEQUALITY* increases it, and more *MILITARY* reduces it. The coefficient of *NET INCOME* is significant at the 1 per cent level. A one standard deviation increase in *NET INCOME*, equivalent to a rise of $US 2588, reduces the fractional support for revolt by 2.1 percentage points. A shift in *NET INCOME* equivalent to a move from France to Portugal (from $US 13059 to $US 3645) is predicted to add 7.5 percentage points onto revolutionary support. The coefficient of *INEQUALITY* is also significant at the 1 per cent level. A one standard deviation increase, 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. If inequality rose from the sample's lowest level in Belgium to its highest level in Portugal (a rise in the Gini coefficient from 0.27 to 0.37) support for revolt would increase by 3.8 percentage points. Alternatively Portuguese workers would have to be compensated with $US 4688 of extra net income to keep revolutionary support unchanged due to the higher inequality in their country. A higher fraction of GDP devoted to the 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 spending on the military over GDP equal to 2.2 percentage points, reduces support for revolt by 1.3 percentage points.

Regression (3) includes year, as well as country, fixed effects. *NET INCOME* again reduces *REVOLUTIONARY SUPPORT*, although only at the 10 per cent level. The magnitude of the effect is similar to regression (2). *INCOME INEQUALITY* has a positive effect on revolt, significant at the 1 per cent level and of similar size to the coefficient in regression (2). Increased *MILITARY* again has a negative effect, significant at the 5 per cent level. As a further control for potential omitted variable bias, the next two regression equations are estimating using instrumental variables. Since the biases which may still be present have the opposite signs to the ones actually estimated on the coefficients of the three explanatory variables in regressions (2) and (3), instrumenting *NET INCOME*,

INCOME INEQUALITY and *MILITARY* should identify even larger absolute magnitudes for these coefficients. This should be the case provided our instruments are correlated strongly enough with the endogenous variables. These correlations are reported in Table V and described in the next sub-section.

Regressions (4) and (5) re-estimate the regression equations using Two Stage Least Squares estimation (2SLS). All three variables are regarded as endogenous and an instrument set consisting of *GROSS HOURLY EARNINGS* in manufacturing, *RIGHT WING* political ideology and *OPENNESS*, as well as lags of these variables, are used. In regression (4), with country fixed effects, the coefficient on *NET INCOME* almost doubles in absolute size relative to its coefficient in regression (2) (from –0.008 to –0.015) and is significant at the 1 per cent level. A shift from France's to Portugal's level of net income is now predicted to add 14.1 percentage points onto revolutionary support. *INCOME INEQUALITY* increases the size of its effect on revolutionary support from 0.375 in regression (2) (estimated without 2SLS) to 0.562 in regression (4) at a 1 per cent level of significance. If inequality rose from the level in Belgium to the level in Portugal, support for revolt would now be predicted to increase 5.6 percentage points. *MILITARY* retains its negative coefficient but is not significant.

In regression (5), which controls for both country and time fixed effects, the coefficient on *NET INCOME* equals –0.019 and is significant at the 1 per cent level. It has an absolute size almost three times greater than the regression (3) value of –0.007 (estimated without 2SLS) which was just significant at the 10 per cent level. A shift in *NET INCOME* equivalent to a move from France to Portugal (from $US 13059 to $US 3645) is now predicted to add 17.9 percentage points onto revolutionary support. *INCOME INEQUALITY* has a positive effect on revolutionary support in regression (5) equal to 0.703, significant at the 1 per cent level, and twice its regression (3) value of 0.350. A shift in inequality equivalent to a move from Belgium to Portugal is now predicted to add 7.0 percentage points onto the level of revolutionary support. Similarly a

shift in inequality from Belgium to the United States (from a Gini coefficient of 0.27 to 0.36, respectively) would add 6.3 percentage points. *MILITARY* has a negative, but insignificant, coefficient.

The marginal rates of substitution between *NET INCOME* and *INEQUALITY* (which keep revolutionary support constant) are similar across the different regression specifications. They are equal to 37 for both regressions (4) and (5) (=0.562/0.015 and 0.703/0.019, respectively). This number tells us how much extra net income is needed to compensate workers for a rise in inequality in their country. For example, if inequality rose from the level in Belgium to the United States then a rise in net income equal to $US 3330 (=37*(0.36-0.27)*1000) would keep revolutionary support unchanged. In this sense, 'going for growth' could buy a nation out of a revolt.[22]

Because the number of instruments is greater than the number of endogenous regressors used in estimating regressions (4) and (5) 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.[23] 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= 0.85) and regression (4) (p-value= 0.94).

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[22] Average *NET INCOME* equalled $US 10612 in Belgium and $US 19327 in the US. Average support for revolt equalled 6.5 per cent in Belgium and 5.7 per cent in the US. Despite higher inequality in the US, higher net income could account for lower revolutionary support in the US compared with Belgium.

[23] In Table IV, all the explanatory variables are endogenous. Hence the residuals from the second-stage regression are regressed solely on the instrument set.

V. B. Regressions of the Endogenous Variables on the Instruments

Table V reports results when the endogenous variables, *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* are regressed on the instrument set, *GROSS HOURLY EARNINGS*, *RIGHT WING* and *OPENNESS* (at time *t* and lagged one year, *t-1*). In both regressions (6) and (7) (which include country, and time and country, fixed effects respectively) higher *GROSS HOURLY EARNINGS* in manufacturing has a significant positive, contemporaneous effect on average household current receipts per capita per year after deducting direct taxes (*NET INCOME*). The other significant effects are not consistent across the two specifications. Whereas more *RIGHT WING* government at *t-1* increases *NET INCOME* in regression (6), the effect is not significant in regression (7). The negative impact of *OPENNESS* on net income is only significant in regression (7). Regressions (8) and (9) (which again include country, and time and country, fixed effects respectively) estimate the effects of the instrument set on *INCOME INEQUALITY*. There exists a strong positive relationship in both regressions between greater support for more *RIGHT WING* government and more inequality. There is also evidence that positive changes in *GROSS HOURLY EARNINGS* in manufacturing increase the level of inequality (since the signs on the current and lagged values are of opposite sign and similar magnitude). The instrument set does not provide a consistent explanation of *MILITARY* across regressions (10) and (11). In regression (10) which controls for country fixed effects, more *RIGHT WING* government increases military spending as a proportion of GDP. However this effect is not robust to the inclusion of year dummy variables in regression (11). *OPENNESS* has a positive contemporaneous effect on *MILITARY* in regression (10) and a negative lagged effect in regression (11).

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

Regressions (12) to (15) in Table VI control for the effect of several other variables that may help explain revolts. They all use Two Stage Least Squares estimation

with the instrument set that was used in regressions (4) and (5). *NET INCOME*, *INCOME INEQUALITY* and *MILITARY* are treated as endogenous variables and the other explanatory variables as exogenous. 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 regressions (12) and (13) as additional checks on the results reported in Table IV. Regression (14) includes a lagged dependent variable and regression (15) controls for the self-reported well-being of the population. Exogeneity of the over-identifying restrictions could not be rejected in any of these regression equations.

In regression (12), which controls for country fixed effects, the *INFLATION RATE* has a positive effect on revolutionary support, significant at the 10 per cent level. A 10 percentage point rise in the inflation rate is predicted to increase the support for revolt by 2.3 percentage points. *UNEMPLOYMENT* is not significant.[24] *NET INCOME* retains its negative effect on revolutionary support, at the 1 per cent level of significance, and *INCOME INEQUALITY* keeps its positive effect, also at the 1 per cent level. The significance of the *INFLATION RATE* disappears once time fixed effects are included in regression (13). Both net income and income inequality remain significant at the 1 per cent level. *INCOME INEQUALITY* has the largest impact on the support for revolt in this regression compared with all the previously estimated effects. Using the coefficient from this specification, a shift in inequality equivalent to a move from Belgium (Gini=0.27) to the United States (Gini=0.36) would be predicted to add 6.5 percentage points to revolutionary support.

[24] 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 employment rate in the second-stage macroeconometric regressions will measure the extent to which the average member of society changes his or her revolutionary support as unemployment grows.

Regression (15) includes the explanatory variable, *HAPPINESS*, which may capture multiple other factors that affect the desire to revolt, including economic as well as non-economic variables. It is the average level of self-reported well-being (after controlling for personal characteristics) across the randomly sampled individuals in each nation and year, taken from the Euro-Barometer Survey Series.[25] *HAPPINESS* has a negative effect on *REVOLUTIONARY SUPPORT*, significant at the 5 per cent level. The coefficients on *NET INCOME* and *INCOME INEQUALITY* are again significant at the 1 per cent level. The results are also quite robust to the inclusion of a lagged dependent variable, which is not significant, reported in regression (15). The coefficients on *NET INCOME* and *INCOME INEQUALITY* are both significant at the 9 per cent level. The magnitudes of these coefficients are similar to the previous estimates. However the significance level of *HAPPINESS* drops to 12 per cent.

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 have declared themselves in favor of completing changing the way society is organized by revolutionary action in nations over the past two decades. Large differences exist across countries and over time.

In the United Kingdom in 1981, 10.1 per cent of surveyed individuals desired revolution, whereas there was only 1.2 per cent support in Denmark in 1987. In the United States 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

[25] Other regression specifications which tried, including adding the change in income as an explanatory variable, which was not significant. Results available on request.

individuals desired revolt between 1976 and 1990 across the 12 European countries in the 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. One reason may be that large scale data sets which could shed light on factors systematically linked to revolutionary behavior have until now not been available. 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 the instrument set. After controlling for personal characteristics, as well as country and year fixed effects, it is found that:

1. More people desire revolutionary action when their net incomes are low. For example, a reduction in net income equivalent to a move from France to Portugal (from $US 13059 to $US 3645) is predicted to add 17.9 percentage points onto revolutionary support.
2. Support for revolt is greater when income inequality is high. For example, a shift in inequality equivalent to a move from the sample's lowest level in Belgium to its highest in Portugal is predicted to add 7.0 percentage points onto the level of revolutionary support. Results (1) and (2) combined indicate that 'going for growth' can buy a nation out of revolt.
3. Being unemployed significantly increases the likelihood of an individual responding in favor of revolutionary action in 7 of the 12 countries used in the panel regressions.

However the unemployment rate is not a significant determinant of aggregate revolutionary support, after controlling for this personal effect. The inflation rate is also insignificant.

Table IA: 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 IB: 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 IC: 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 IIA: The Microeconometric Determinants of the Desire for Revolution (Logit Regression) Pooled Across European Countries 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		1.26e-6	4.36e-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	-4.91-4	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.

Table IIB: The Microeconometric Determinants of the Desire for Revolution (Logit Regression) Pooled Across 37 Countries in 1980 and 1990. Number of observations=51,793.

Dep Var: Revolution Desired?	**Coefficient**	**Standard Error**
Unemployed	0.238	0.069
Self employed	0.105	0.066
Male	0.306	0.035
Age	3.84e-5	0.008
Age Squared	-1.55e-4	8.62e-5
Education to age: 15-18 years	0.009	0.051
≥ 19 years	0.078	0.054
Marital Status: Married	-0.141	0.062
Divorced	0.070	0.102
Separated	0.180	0.128
Widowed	-0.029	0.102
No. of children: 1	0.048	0.062
2	-0.046	0.062
≥3	-0.045	0.066
Income Groups : Second	-0.164	0.039
Third (highest)	-0.378	0.056
Retired	-0.020	0.076
School	0.153	0.076
Home	0.026	0.064
Other	-0.002	0.178

Countries:	**Coefficient**	**Standard Error**	(continued)		
United States	-0.318	0.129	South Africa	0.908	0.121
China	-0.441	0.192	Hungary	0.114	0.175
Russia	1.144	0.128	Norway	-1.346	0.186
Mexico	0.793	0.141	Sweden	-0.344	0.162
Japan	-1.060	0.203	Iceland	-1.711	0.309
Argentina	0.107	0.187	Finland	-0.654	0.284
Britain	-0.309	0.152	Australia	-0.735	0.206
Brazil	0.850	0.134	Poland	1.580	0.136
Canada	-0.519	0.144	Nigeria	1.492	0.135
West Germany	-1.329	0.170	Chile	-0.277	0.163
Italy	-0.042	0.130	India	0.793	0.132
Netherlands	-1.278	0.219	Czech-Slovak	2.494	0.119
Denmark	-0.969	0.178	East Germany	0.804	0.136
Belgium	-0.383	0.144	Bulgaria	1.465	0.136
Spain	-0.176	0.118	Austria	-1.014	0.225
Ireland	-0.453	0.171	Lithuania	2.031	0.129
Slovenia	0.900	0.152	Latvia	1.798	0.136
Portugal	-0.402	0.194	Estonia	1.363	0.136

Notes: Log-likelihood=-13964. $Chi^2(57)=4420$. The regression includes a year dummy for 1990. The base country dummy is France.

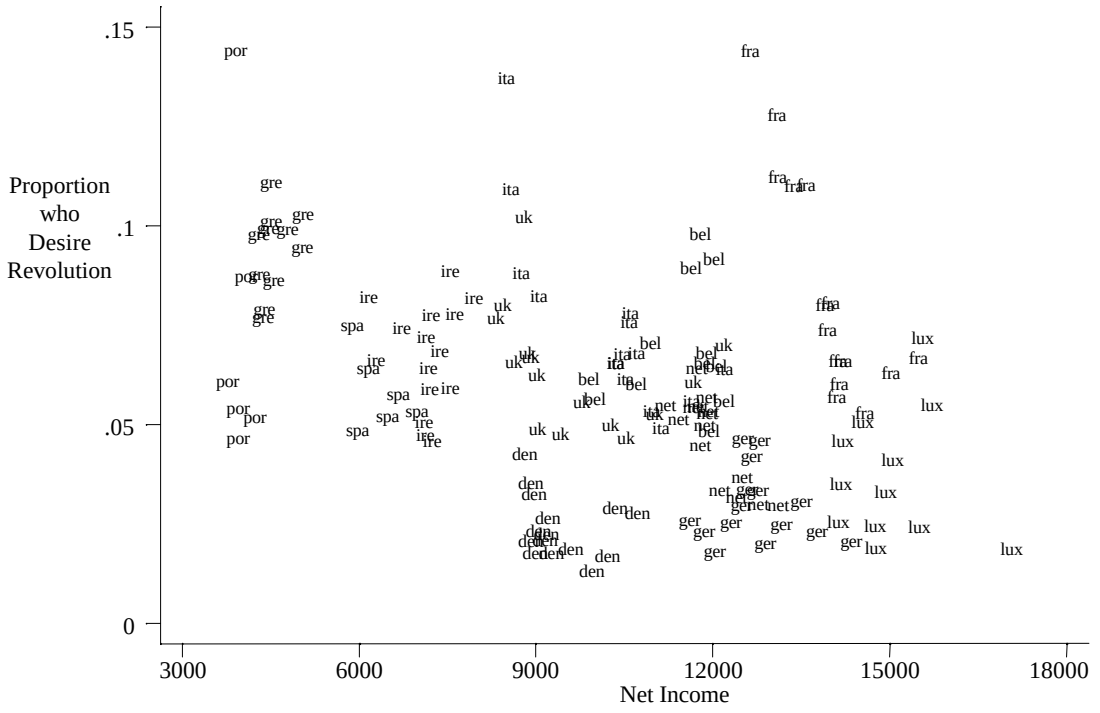


Figure 1: The Proportion of the Population who Desire Revolution versus Net Income (at 1985 US$ and exchange rates): 12 Countries from 1976 to 1990.

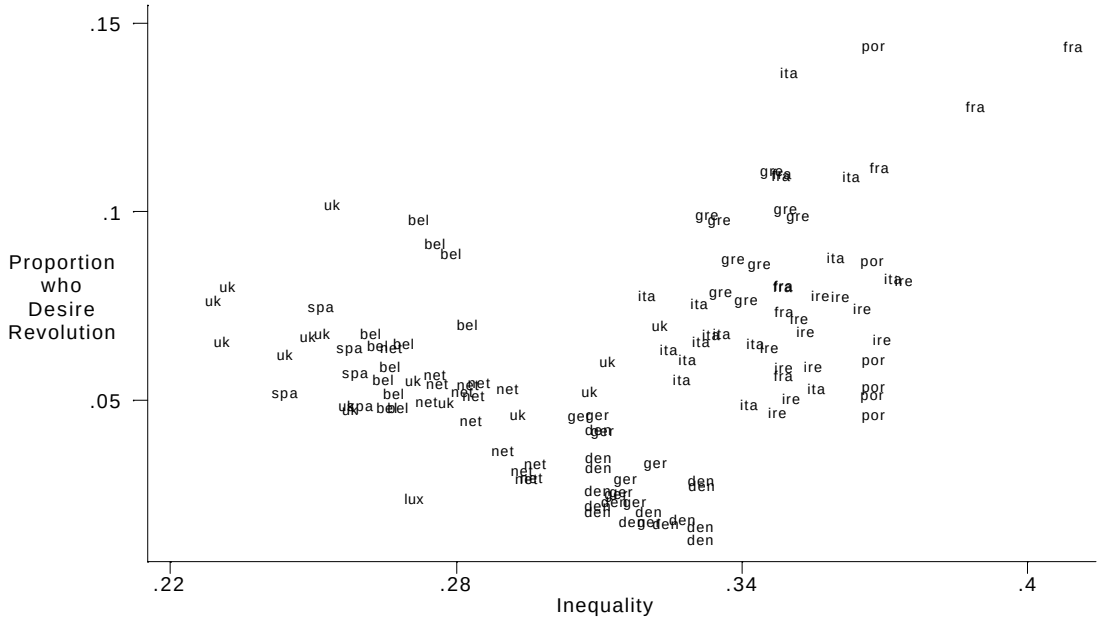


Figure 2: The Proportion of the Population who Desire Revolution versus Inequality (as measured by the Gini coefficient): 12 Countries from 1976 to 1990.

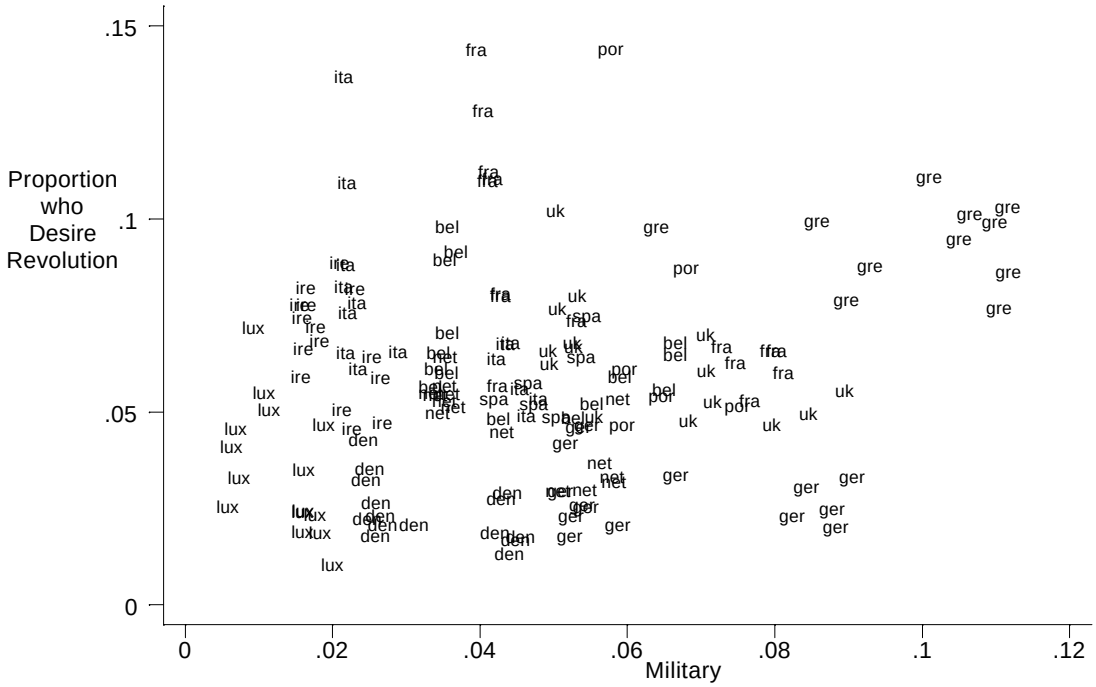


Figure 3: The Proportion of the Population who Desire Revolution versus Military Spending as a Proportion of GDP: 12 Countries from 1976 to 1990.

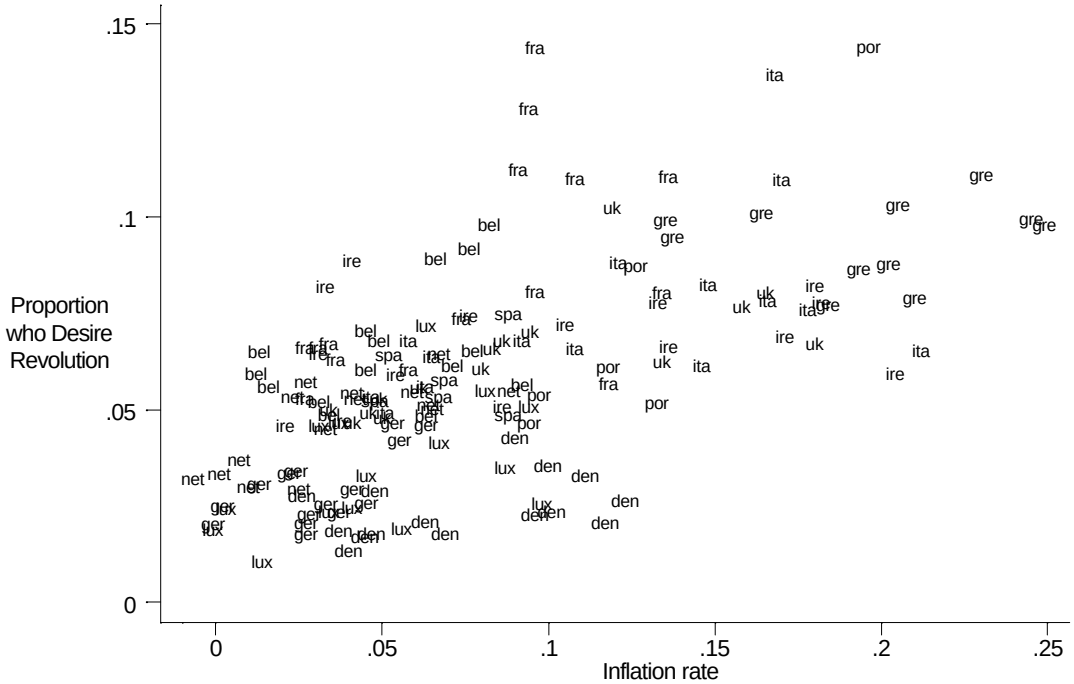


Figure 4: The Proportion of the Population who Desire Revolution versus the Inflation Rate: 12 Countries from 1976 to 1990.

Table III: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
REVOLUTIONARY SUPPORT	119	0.060	0.028	0.012	0.143
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
GROSS HOURLY EARNINGS	100	0.967	0.063	0.771	1.083
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	-0.0701	1.189
)NET INCOME	100	147.0	243.7	-321.4	1266

Note: In the subsequent regressions, *NET INCOME* is scaled down by a factor of 1000

Table IV:
What Determines the Support for Revolt?
2nd-Stage Regressions for a Panel of 12 Countries from 1976 to 1990 using Residuals from the 1st Stage Regression.

Dependent Variable: REVOLUTIONARY SUPPORT	(1)	(2)	(3)	I.V. (4)	I.V. (5)
NET INCOME	-1.7e-4	-0.008***	-0.007*	-0.015***	-0.019***
	(6.9e-4)	(0.003)	(0.004)	(0.006)	(0.007)
INCOME INEQUALITY	0.036	0.375***	0.350***	0.562***	0.703***
	(0.043)	(0.104)	(0.107)	(0.188)	(0.197)
MILITARY	-0.146*	-0.572***	-0.647**	-0.544	-1.218
	(0.079)	(0.170)	(0.323)	(0.414)	(1.140)
Personal Controls	Yes	Yes	Yes	Yes	Yes
Country Dummies	No	Yes	Yes	Yes	Yes
Year Dummies	No	No	Yes	No	Yes
Adi R^2	0.02	0.24	0.32	0.30	0.24
Observations	119	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] Standard errors in parentheses. [3] I.V. refers to estimation using Instrumental Variables (Two Stage Least Squares). All explanatory variables are treated as endogenous. [4] Regressions (3) and (4) have fewer observations due to limited availability of the instruments. [5] *NET INCOME* is scaled down by a factor of 1000.

Table V:
Regressions of Net Income, Income Inequality and Military on the Instruments:
12 Countries from 1976 to 1990.

Dependent Variable:	NET INCOME (6)	NET INCOME (7)	INCOME INEQUAL (8)	INCOME INEQUAL (9)	MILITAR (10)	MILITAR (11)
GROSS HOURLY EARNINGS *t*	6.849***	4.139**	0.176**	0.163**	0.046	-0.011
	(2.034)	(1.690)	(0.067)	(0.067)	(0.041)	(0.020)
GROSS HOURLY EARNINGS *t-1*	3.485*	2.056	-0.164**	-0.159***	0.031	-0.007
	(1.811)	(1.589)	(0.060)	(0.063)	(0.036)	(0.019)
RIGHT WING *t*	-0.009	-0.016	0.004***	0.004***	3.0e-4	-1.1e-4
	(0.042)	(0.036)	(0.001)	(0.001)	(8.4e-4)	(4.1e-4)
RIGHT WING *t-1*	0.101**	0.050	0.002*	0.002	0.002**	1.7e-4
	(0.042)	(0.037)	(0.001)	(0.001)	(0.001)	(4.3e-4)
OPENNESS *t*	-1.804	-4.575**	0.071	-0.068	0.091***	0.004
	(1.624)	(1.669)	(0.054)	(0.066)	(0.032)	(0.019)
OPENNESS *t-1*	-0.244	-0.090	-0.109*	-0.011	-0.059	-0.041**
	(1.873)	(1.793)	(0.062)	(0.071)	(0.037)	(0.021)
Personal Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	Yes	No	Yes	No	Yes
Adi R^2	0.96	0.98	0.91	0.92	0.80	0.96
Observations	100	100	100	100	100	100

Notes:[1]* denotes significance at the 10% level.** denotes significance at the 5% level.
*** denotes significance at the 1% level. [2] Standard errors in parentheses. [3] *NET INCOME* is scaled down by a factor of 1000

Table VI:
What Determinants the Support for Revolt?
Further Tests with Additional Explanatory Variables.
2nd-Stage Regressions for a Panel of 12 Countries from 1976 to 1990 using Residuals from the 1st Stage Regression.

Dependent Variable: REVOLUTIONARY SUPPORT	I.V. (12)	I.V. (13)	I.V. (14)	I.V. (15)
REVOLUTIONARY SUPPORT *t-1*				0.104 (0.188)
NET INCOME	-0.018*** (0.006)	-0.019*** (0.008)	-0.019*** (0.007)	-0.017* (0.010)
INCOME INEQUALITY	0.552*** (0.226)	0.722*** (0.212)	0.576*** (0.192)	0.553* (0.323)
MILITARY	0.654 (0.982)	-1.499 (1.070)	-0.454 (1.072)	0.498 (0.885)
INFLATION RATE	0.232* (0.126)	0.029 (0.094)	-0.082 (0.097)	-0.070 (0.097)
UNEMPLOYMENT	-0.048 (0.107)	-0.016 (0.130)	-0.109 (0.120)	-0.085 (0.115)
HAPPINESS			-0.020** (0.009)	-0.015 (0.009)
Personal Controls	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes
Year Dummies	No	Yes	Yes	Yes
Adi R^2	0.21	0.18	0.36	0.21
Observations	100	100	100	92

Notes: [1] * denotes significance at the 10% level. ** denotes significance at the 5% level. *** denotes significance at the 1% level. [2] Standard errors in parentheses. [3] I.V. refers to estimation using Instrumental Variables (Two Stage Least Squares). *INCOME*, *INCOME INEQUALITY* and *MILITARY* are treated as endogenous variables and the other variables as exogenous. [4] *NET INCOME* is scaled down by a factor of 1000.

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.

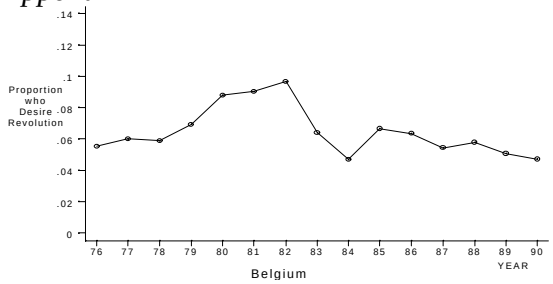
Data for Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom were available for the full sample period which was used (1976-1990) whereas data were only available from 1981 to 1990 for Greece and from 1985 to 1990 for both Spain and Portugal. The number of 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 was 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


Proportion who Desire Revolution
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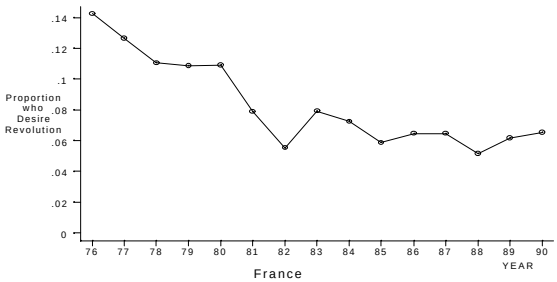
YEAR
Belgium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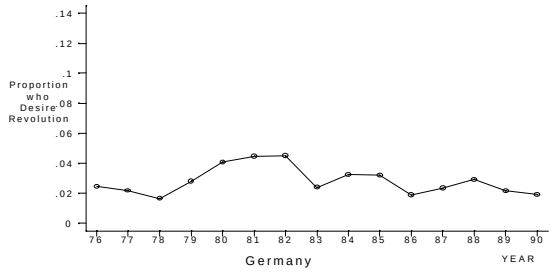
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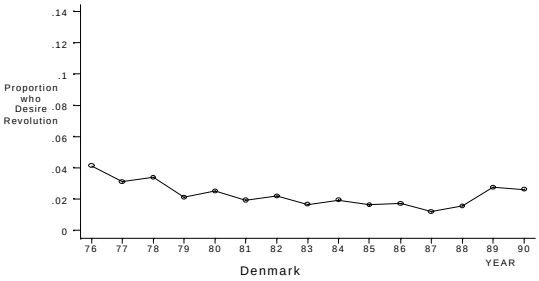
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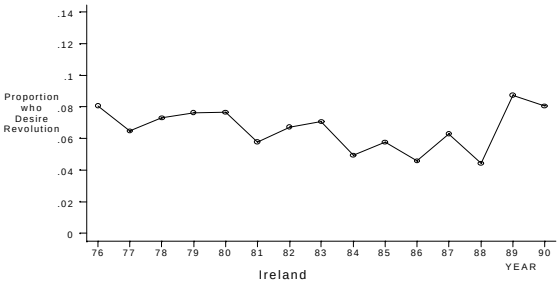
Denmark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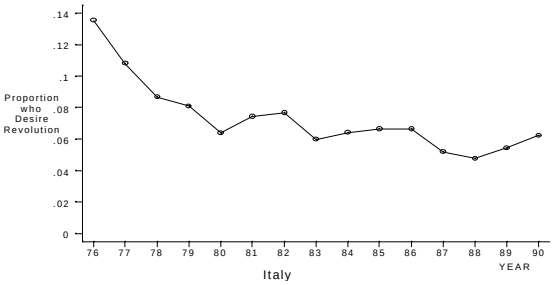
Ireland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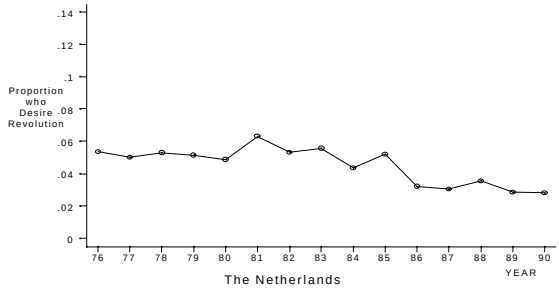
Italy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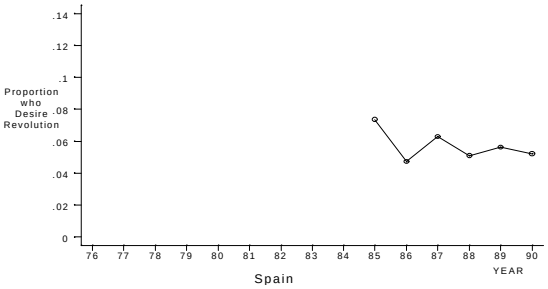
The Netherlands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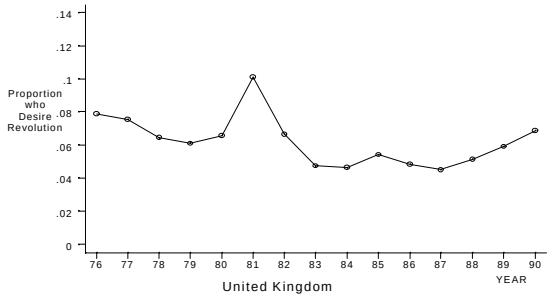
Spain


Proportion who Desire Revolution
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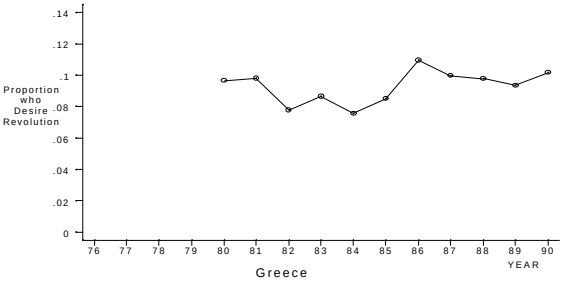
YEAR
United Kingdom


Proportion who Desire Revolution
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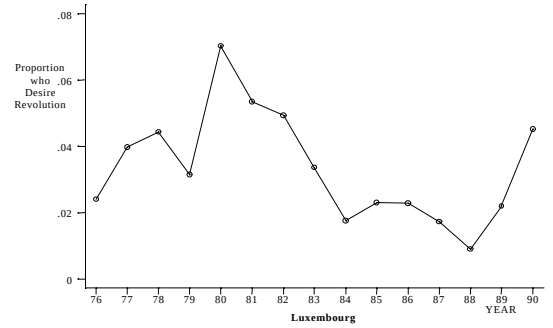
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
YEAR
Greece


Proportion who Desire Revolution
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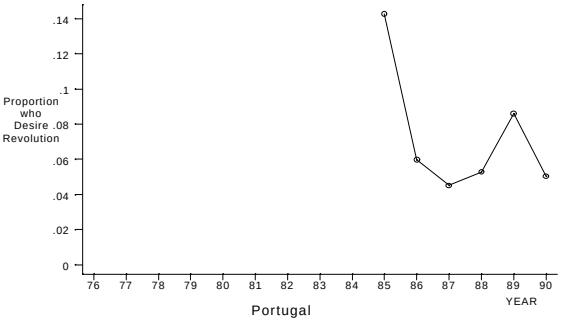
YEAR
Luxembourg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YEAR
Portugal

Appendix III

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

Dep Var: Revolution Desired?		U.K.	Italy	Germany	Belgium
Unemployed		0.373	0.287	-0.176	0.247
		(0.122)	(0.106)	(0.211)	(0.108)
Self employed		0.150	0.164	0.063	0.110
		(0.124)	(0.075)	(0.173)	(0.110)
Male		0.115	0.403	0.278	0.430
		(0.071)	(0.059)	(0.096)	(0.071)
Age		-0.009	-0.015	-6.7e-4	-0.038
		(0.012)	(0.011)	(0.016)	(0.012)
Age Squared		-7.7e-5	-3.7e-5	1.9e-5	2.9e-4
		(1.3e-4)	(1.2e-4)	(1.7e-4)	(1.3e-4)
Education to age: 15-18 years		-0.279	0.043	-0.210	-0.058
		(0.096)	(0.073)	(0.105)	(0.079)
≥ 19 years		-0.530	0.090	-0.143	-0.291
		(0.133)	(0.073)	(0.139)	(0.096)
Marital Status: Married		-0.243	-0.204	-0.416	-0.041
		(0.094)	(0.076)	(0.122)	(0.093)
Divorced		-0.016	0.794	-0.044	0.467
		(0.163)	(0.260)	(0.192)	(0.177)
Separated		0.184	0.696	-0.066	0.373
		(0.216)	(0.193)	(0.400)	(0.185)
Widowed		-0.287	-0.346	-0.480	0.038
		(0.155)	(0.152)	(0.194)	(0.164)
No. of children ≥ 8 & 15 yrs:	1	0.127	-0.082	-0.039	0.078
		(0.089)	(0.067)	(0.133)	(0.081)
	2	0.238	-0.154	0.111	0.095
		(0.100)	(0.100)	(0.168)	(0.112)
	3	-0.135	0.224	0.324	0.241
		(0.173)	(0.169)	(0.274)	(0.160)
Income Quartiles: Second		-0.231	-0.166	-0.292	-0.162
		(0.092)	(0.071)	(0.111)	(0.087)
Third		-0.415	-0.282	-0.601	-0.311
		(0.098)	(0.075)	(0.122)	(0.092)
Fourth (highest)		-0.764	-0.301	-0.866	-0.447
		(0.109)	(0.079)	(0.133)	(0.101)
Retired		-0.040	-0.107	-0.634	-0.393
		(0.134)	(0.118)	(0.185)	(0.138)
School		0.275	0.113	0.060	0.054
		(0.174)	(0.104)	(0.168)	(0.135)
At home		0.022	-0.099	0.006	0.035
		(0.095)	(0.095)	(0.135)	(0.105)
Obs.		19954	25066	21237	18992

Notes [1] All regressions include region dummies 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. [2] Standard errors in parentheses.

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 regressions in Tables IIA and IIB is France.

REVOLUTION: The coefficients on the year dummies from an Ordinary Least Squares Regression which explains whether or not a respondent answers that "The entire way our society is organised must be radically changed by revolutionary action", by the respondent's personal characteristics. Regressions are run for each country to give the observations, $REVOLUTION_{nt}$.

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. The linearly interpolated years are 1976-78, 80-83 for France; 1979-80, 82 for Germany; 1981-86 for Ireland; 1985, 88, 90 for Italy; 1976, 78, 80, 84, 90 for The Netherlands; 1980-84, 86-87, 89-90 for Belgium; 1977-80, 82-86, 88-90 for Denmark; 1985-87 for Greece; and 1985-89 for Portugal. No interpolated years were used for Spain, Britain or Luxembourg.

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

GROSS HOURLY EARNINGS: A real index of the gross hourly earnings in manufacturing 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].

HAPPINESS: The coefficients on the year dummies from an Ordinary Least Squares regression of Life Satisfaction on personal characteristics. Regressions are run for each country to give the observations, $HAPPINESS_{nt}$. The country regressions have the same form as the micro-revolution regressions reported in Appendix III, except that the discrete dependent variable takes on four values and is generated from the answer to the Eurobarometer Survey Series question which asks: *"On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?"*. The four relevant response categories are: *Very satisfied*, *Fairly satisfied*, *Not very satisfied* and *Not at all satisfied*.

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ISSN 1436 - 6053

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