Economic Growth and Political Extremism*

Markus BRÜCKNER[a] and Hans Peter GRÜNER[b]

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Abstract: We argue that the growth rate, but not the level of aggregate income, affects the support for political extremism. In our model extreme parties offer benefits to a subset of the population; and there exists uncertainty over whether the same subset of individuals will receive these benefits in the future. Based on a panel of 16 European countries, our empirical analysis shows that lower growth rates are associated with a significant increase in right-wing extremism. We do not find a systematic effect on left-wing extremism. Uncertainty over what group will have incomes expropriated in the future may explain these results.
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1 Introduction

There are distributional consequences associated with political extremism, in the short run and in the long run. Extreme political parties often propose to redistribute resources away from specific subgroups of society such as the rich, ethnic minorities, or citizens of specific regions. This paper analyzes the impact of economic growth on the support for extreme political parties. We argue that the growth rate, but not the level of aggregate income, affects the support for extremism.

In the first part of our paper we discuss three alternative explanations for why an increase in the economic growth rate reduces the support for extreme political parties. Two well known explanations are related to retrospective voting and behavioral effects, the latter meaning that voters may react more strongly to changes than to levels of economic well-being. The third, novel explanation is that parties with extreme political platforms are perceived to create considerable uncertainty about the future distribution of income.

We develop a simple game theoretic model that analyzes this uncertainty effect. In our model, extreme political parties offer short-run gains from redistribution to a group of individuals. However, the same individuals also face long-run losses due to higher income risk that is associated with an extreme regime.[1] The model permits a comparative static analysis with respect to several key variables of interest. The growth rate is associated with a higher cost of future income risk. This reduces the number of voters in favor of extreme parties. The level of aggregate income has no effect on the support for extremism. Income inequality raises the support for redistribution and affects the impact that a change in the growth rate has on the support for extremism.

An important feature of our model is that the effect of economic growth on the support for extremism depends on uncertainty of income redistribution in the future. If redistributive policies are perceived as predictable – in the sense that the same group has income taken away from it in the future – then political support of this party is unaffected by growth.

In the empirical part of our paper we estimate the relationship between economic growth and the support for extreme political parties using a panel data set comprising 16 European countries. Our dependent variable is a survey-based measure, compiled by Eurobarometer, of peoples' support for extreme right-wing parties and extreme left-wing parties. We use this data, which spans more than three decades and contains data entries on a semi-annual frequency, to estimate the effects of economic growth on the support for extremism.

Our empirical analysis shows a significant negative effect of real per capita GDP growth on the support for extreme right-wing parties: controlling for

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[1] Our theoretical model concentrates on purely economic motives and does not consider other, in particular social motives of political choices that have been discussed in the literature (see e.g. Lipset (1967); Corneo and Grüner (2000)). Our analysis applies to democratic countries, i.e. countries in which there exists political competition. In this context, we call a political platform extreme if it entails major redistribution of resources compared to standard policies. See, for related theoretical analysis, Artale and Grüner (2000).

country and time fixed effects, a one percentage point decrease in real per capita GDP growth increases the vote share of extreme right-wing parties by up to one percentage point. We document that the negative effect of economic growth on the support for right-wing extremism is robust across estimation techniques and model specifications. We do not find a systematic effect of growth on the support for left-wing extremism.

An explanation for the differential effect between left-wing and right-wing extremism, which follows from our theoretical model, is that especially right-wing extremism is associated with uncertainty over who will be subject to income stigmatization in the future. Left-wing extremism is associated with significant income redistribution, but there is little uncertainty over who will be the target. Communist doctrine, see, for example, the *Communist Manifesto* by Karl Marx and Friedrich Engels (1848), envisions a classless society; i.e. a society where incomes are equally distributed. Over the past century, extreme left-wing parties have followed closely this doctrine by advertising to implement policies that redistribute incomes from rich to poor; as opposition parties they have voted against laissez faire policies; and when in power, they have implemented policies that reduced wealth and income prospects of the rich (see e.g. Brown, 2010).

Right-wing extremism, in contrast to left-wing extremism, does not advocate a classless society. Instead, it is often associated with the discrimination of specific groups of society for racial, religios, political or other reasons.[2] An extreme case was the German fascist movement during the first half of the 20th century. Adolf Hitler (1925) in *Mein Kampf*, for example, propagated a society ruled by the "Herrenvolk" (master race). Hitler used the term Aryan in reference to this group. However, in Hitler's own writing, the "Aryan race" has evolved (i.e. changed) over time: "The Aryan gave up the purity of his blood and, therefore, lost his sojourn in the paradise which he had made for himself. He [the Aryan] became submerged in a racial mixture...." (*Mein Kampf*, Volume 1, Chapter 11). 2.) The fact that - from Hitler's own point of view - what was an "Aryan" has apparently evolved over time suggests that, from the beginning of his regime, there was uncertainty over who could safely consider himself as belonging to that category. Thus, already from this perspective, there was uncertainty over who might be stigmatized, imprisoned or killed in the future. Indeed, from the Nazi period we know that various groups were stigmatized for different reasons [3] and that stigmatization was also particularly erratic[4].

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[2] Glaeser (2005) provides political economy insights on hatred.

[3] According to Porter (1998), there were many kinds of victims in the Nazi concentration camps: "Different groups wore different triangles, and different triangles denoted different crimes. Jews wore yellow stars but also red triangles [and] political triangles. One of the biggest groups consisted of Germans who were made to wear black triangles, meaning saboteurs. Green triangles were worn by murderers. There were other triangles or strips for Jehovah's Witnesses, vagrants, emigrants, Gypsies, race defiler (male), race defiler (female), escape suspects, special inmates, repeaters (those who were incarcerated more than once), and members of armed forces. A bewildering array of stigmatization."

[4] The presence of a party of right-wing extremists who govern the country does not mean that there is no uncertainty of who becomes stigmatized in the future. One such example is the stigmatization of homosexuals in the Nazi era. Porter (1998) writes: "The Nazis' murder of some homosexuals started earlier than that of the Jews with the murders of Ernst Roehm

The empirical analysis of our paper is related to Stevenson (2001) who examines determinants of aggregate policy preferences in a panel of 14 European countries. One of Stevenson's main findings is that decreases in economic growth lead policy preferences to shift to the right while increases in economic growth lead policy preferences to shift to the left.[5] Our paper differs from Stevenson in at least three important aspects. First, in contrast to Stevenson, our empirical analysis controls for country fixed effects. Recent research by Acemoglu et al. (2008, 2009) has shown the importance of controlling for country fixed effects when examining the relationship between income and democracy. Second, we argue that our empirical findings reflect a causal effect of growth on extremism. We employ an instrumental variables approach that exploits the significantly more negative effect on GDP per capita growth of growth in the international oil price in European countries with a greater ratio of net-imports of oil over GDP (a terms-of-trade effect). Third, we distinguish in our empirical analysis between extreme right-wing and extreme left-wing parties. This distinction matters: there is a robust negative effect of economic growth on the support for extreme right-wing parties; whereas no systematic effect exists for the support of extreme left-wing parties. Our finding of a significant negative effect of economic growth on the support for right-wing extremism is in line with the finding of Bromhead et al. (2013) who show that the vote share of right-wing extremists during the Great Depression was significantly higher in those countries that experienced a more severe economic crisis.

In the next Section we introduce the theoretical model. We also discuss towards the end of Section 2 alternative theories that may explain why economic growth affects the support for political extremism. In Section 3 we describe our data set. In Section 4 we present the main empirical results and we discuss how these results relate to our theoretical model and alternative theories. In Section 5 we conclude.

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and other brown shirts in his paramilitary group known as the SA. (...) Roehm was a major Nazi leader, second only to Hitler as they rose to power in the 20's and early 30's. He and his cadre of "brownshirts" were homosexuals, which was not a problem at the beginning for Hitler, but later did prove an embarrassment and a threat. Roehm and other SA leaders were murdered without warning in a famous blood purge which was led by Himmler and other SS officers at the instigation of Hitler and began on June 30, 1934, which has been called "The Night of Long Knives"."

[5] Using time series analysis and US data, Durr (1993) finds that changes in consumers' economic expectations are significantly positively correlated with a survey-based measure that takes on larger values for liberal policy sentiment and lower values for conservative policy sentiment.

2 Theoretical Predictions

In this section we discuss three alternative explanations for why actual or anticipated growth influences individuals' support for extreme political platforms. The first effect, which we call the uncertainty effect, arises when individuals anticipate that more growth increases the importance of redistributive risk that an extremist party may create. The second effect (the incentive effect) arises when individuals condition their voting behavior on the past performance of the political establishment. The third effect (the behavioral effect) arises when individual well-being is strongly affected by income changes. In this case, the satisfaction with the political establishment requires economic growth – even in an economy with high levels of income. We begin by formally studying the empirical implications of the most complex effect, the uncertainty effect. The other two effects are discussed verbally.

2.1 The Uncertainty Effect

2.1.1 The Moderate Regime

Consider a continuum of individuals indexed by $i \in I$ who live for two periods $t = 1, 2$ called the present and the future. In each of the two periods, the economy is either in the moderate regime (M) or in the extreme regime (E). In regime M, all individuals receive a given gross income, $\tilde{y}_{it}$, that grows with a given growth rate $g - 1$:

$$\tilde{y}_{i2} = g\tilde{y}_{i1}. \tag{1}$$

The average income in period 1 is denoted by $\bar{y}$. All individuals care about the discounted utility derived from net income y_{it}. They are risk-averse and maximize the expected discounted sum of their CRRA utilities,

$$\sum_{t=1}^{2} \delta^{t-1} u(y_{it}) = \sum_{t=1}^{2} \delta^{t-1} y_{it}^{\alpha}, \tag{2}$$

where $\alpha \in (0, 1)$.

At the beginning of period 1, individuals may support one of the two regimes in a vote under simple majority rule. The selected regime persists for both periods.[6] Each individual supports the regime that yields a higher expected utility.

2.1.2 Regime E

At the beginning of each period $t \in \{1, 2\}$, nature randomly selects a subset $S_t \subset I$ of relative size s_t of all individuals who are stigmatized in that period and have incomes expropriated. In period 1, stigmatization takes place before the

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[6] A similar assumption is made by Benhabib and Przeworski (2006). An exogenous probability of returning to the moderate regime would not affect any of our comparative static results.

vote. Stigma is observable for the individual and verifiable for the state. Income and stigma are not correlated which is why average incomes are the same in both groups. The probability that an individual which has not been stigmatized in the present becomes stigmatized in the future is denoted by p. The probability that an individual that has been stigmatized in the present remains stigmatized in the future is denoted by q. Hence, $s_2 = s_1 q + (1 - s_1) p$. In regime E all incomes $\tilde{y}_{it}$ of stigmatized agents are collected by the state and redistributed via identical lump sum transfers to individuals that are not stigmatized.

In addition to random stigmatization, the state may engage in redistribution by imposing a (linear) tax, τ, on individuals' incomes. Tax revenues are redistributed to individuals (who are not stigmatized) in form of identical lump sum transfers. Thus, in period t net incomes are given by:

$$\mathbf{y}_{it} = \begin{cases} g^{t-1}\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s_t}{1-s_t}\right)\bar{y}\right) & \text{if } i \notin S_t \\ 0 & \text{if } i \in S_t \end{cases}, \tag{3}$$

where average income in the economy is denoted by $\bar{y}$. Under regime E, discounted expected utility of agents in $I \smallsetminus S_1$ is given by:

$$U^E \quad : \quad = u\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s_1}{1-s_1}\right)\bar{y}\right) \tag{4}$$

$$+\delta\,(1-p)\,u\left(g\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s_2}{1-s_2}\right)\bar{y}\right)\right). \tag{5}$$

2.1.3   Voter preferences

Consider now the choice of a voter in period 1. An agent who is not stigmatized in period 1 weakly prefers regime M to regime E if and only if

$$U^M \quad \geq \quad U^E \Leftrightarrow \tag{6}$$

$$\tilde{y}_{i1}^{\alpha} + \delta g^{\alpha}\tilde{y}_{i1}^{\alpha} \quad \geq \quad \left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s_1}{1-s_1}\right)\bar{y}\right)^{\alpha} \tag{7}$$

$$+\delta\,(1-p)\left(g\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s_2}{1-s_2}\right)\bar{y}\right)\right)^{\alpha}. \tag{8}$$

In what follows, we assume that the relative size of the group of stigmatized agents does not change over time, i.e. $s_1 = s_2 =: s$ and $p\,(1-s) = (1-q)\,s$. This assumption simplifies the formal analysis because it permits a closed form solution for the minimum income required to support regime M. In appendix A we study the more general case where s_1 need not equal s_2 using the implicit function theorem. For $s_1 = s_2$ we obtain:

$$U^M \quad \geq \quad U^E \Leftrightarrow \tag{9}$$

$$(1 + \delta g^{\alpha})\,\tilde{y}_{i1}^{\alpha} \quad \geq \quad (1 + (1-p)\,\delta g^{\alpha})\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s}{1-s}\right)\bar{y}\right)^{\alpha} \Leftarrow \tag{10}$$

$$\frac{1 + \delta g^{\alpha}}{1 + (1-p)\,\delta g^{\alpha}} \;\geq\; \frac{\left((1-\tau)\,\tilde{y}_{i1} + \left(\tau + \frac{s}{1-s}\right)\bar{y}\right)^{\alpha}}{\tilde{y}_{i1}^{\alpha}} \;\Leftrightarrow \tag{11}$$

$$\frac{1 + \delta g^{\alpha}}{1 + (1-p)\,\delta g^{\alpha}} \;\geq\; \left((1-\tau) + \left(\tau + \frac{s}{1-s}\right)\frac{\bar{y}}{\tilde{y}_{i1}}\right)^{\alpha}. \tag{12}$$

Inequality (12) implicitly characterizes a threshold $\hat{\mathbf{y}}$ for the individual income $\tilde{y}_{i1}$ below which individuals support regime E. The explicit solution for this threshold is

$$\hat{\mathbf{y}} = \frac{\tau + \frac{s}{1-s}}{\left(\frac{1+\delta g^{\alpha}}{1+(1-p)\delta g^{\alpha}}\right)^{\frac{1}{\alpha}} - 1 + \tau}\,\bar{y}. \tag{13}$$

The analysis of (13) yields the following results. When there is no random stigmatization (i.e. $s_1 = s_2 = p = 0$), then only the concern for taxation (τ) − that is, income redistribution from rich to poor − determines individuals' choices of what regime to support. For any given value $\tau > 0$, individuals with less than average income prefer regime E, individuals with more than average income prefer regime M, i.e. $\hat{\mathbf{y}} = \bar{\mathbf{y}}$. Moreover, if non-stigmatized individuals can be sure that they will not be stigmatized in the future ($p = 0$) we get that $\hat{y} = \frac{\tau + \frac{s}{1-s}}{\tau}\bar{y} > \bar{y}$. The threshold exceeds average income because of the uniform gains from stigmatization. Obviously, this may change if the probability p that an individual becomes stigmatized in the future is positive.

Most importantly, equation (13) implies that for all tax rates $\tau \in R$ and for $p > 0$ a higher rate of economic growth unambiguously reduces the critical income value $\hat{y}$ since

$$\frac{d\left(\left(\frac{1+\delta g^{\alpha}}{1+(1-p)\delta g^{\alpha}}\right)^{\frac{1}{\alpha}}\right)}{dg} > 0 \text{ if } p > 0.$$

Thus, we obtain a negative relationship between expected economic growth and the size of the group of voters that support political extremism.[7]

Another important consequence of equation (13) is that all distributions of national income that preserve the relative personal incomes $\gamma_i := \tilde{y}_{i1}/\bar{y}_1$ are associated with identical political outcomes. Accordingly, a higher level of income need not be associated with more support for the moderate regime.

2.1.4 Testable Hypotheses

According to equation (13), all non-stigmatized individuals favor the moderate regime if and only if their income lies above some threshold $\hat{y}$. The analysis

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[7] In Appendix A we permit that $s_1 \neq s_2$ and we explore the conditions under which this negative relationship prevails.

of equation (13) produces the following five testable hypotheses regarding this threshold, economic growth, and income inequality.[8]

1. A higher rate of economic growth reduces the critical income value $\hat{y}$. A higher economic growth rate thus increases the share of individuals who favor the moderate regime.

2. Consider an alternative distribution of income at date 1 that preserves the income ratio $\gamma_i := \tilde{y}_{i1}/\bar{y}$ for all individuals. All non-stigmatized individuals favour the moderate regime if and only if they did so under the old income distribution. Hence, ceteris paribus, the initial average income $\bar{y}_1$ does not affect the support for the moderate regime.

3. Inequality (measured by the share of individuals who earn less than $\hat{y}$) reduces non-stigmatized individuals' support for the moderate regime.

4. Consider a uniform distribution of initial income with a given mean. Inequality - measured by the coefficient of variation - reduces the marginal effect of growth on the support for regime M.[9]

5. When $s_1 = s_2 = p = 0$ and $\tau \geq 0$, there is no effect of growth on individuals' support for regime E. This implies that the support for a regime that merely redistributes from the rich to the poor does not change when the growth rate increases.

In the empirical analysis that follows, we concentrate on the effect of economic growth on the support for extremism (hypothesis 1). We also present empirical evidence on the role of the average income level (hypothesis 2) and income inequality (hypotheses 3 and 4). Moreover, in relation to hypothesis 5, we compare the effects of economic growth on the support for extreme left-wing and extreme right-wing parties.

2.2 The Incentive Effect

Another possible reason why a decrease of economic growth may be associated with an increase in the support for political extremism is that voting is used as an incentive device for incumbent politicians. According to this view, voters support extreme parties when they observe or expect a weak growth performance in order to incentivize incumbent policymakers.

Retrospective voting has been given considerable attention in the literature. Several theoretical contributions provide reasons why retrospective voting may be reasonable or even optimal (e.g. Barro, 1973; Ferejohn, 1986; Fiorina, 1981; Key, 1966; Maskin and Tirole, 2004, de Mesquita and Friedenberg, 2006). Moreover, many empirical papers have shown that past economic performance plays

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[8] Hypotheses 1, 2, and 4 arise from results that are derived formally in Appendix A. Hypothesis 3 directly follows from the definition of $\hat{y}$. Hypothesis 5 follows directly from the definition of net income in regime E.

[9] One obtains the same result for other distributions and measures of inequality if more inequality robustly reduces the density for all gross income values.

an independent and important role in determining voting decisions. Moreover, some recent empirical research has compared the relative importance of prospective and retrospective voting (Alesina et al., 1993, Norpoth, 1996, Elinder et al., 2015).

As simple as it seems at first glace, this explanation raises a couple of questions. One question is why extreme parties should benefit from a poor performance of the incumbent government. Given that moderate parties are closer to each other, a more natural decision of disappointed voters may be to vote for the moderate opposition. This behavior should also have better incentive effects when the moderate opposition has a larger expected vote share than the extremists so that a change of government becomes more likely.

2.3 The Behavioral Effect

Friedman (2005) has put forward another possible reason why growth may play a role for political preferences. He argues that individuals' satisfaction considerably depends on changes in their material well-being. According to this view, changes of individual well-being trigger changes in the voting behavior whereas the actual standard of living should be rather unimportant. Similar to what we discussed above related to retrospective voting it is unclear why individuals should turn to extremists rather than a moderate opposition.

To summarize, all three theories predict that there is a link from growth to voting behavior. The first theory is about the role of growth expectations whereas the other two theories are about past growth performance. Given the serial correlations of growth rates it is hard to distinguish the theories empirically. However, predictions 4 and 5 of our theory on the uncertainty effect are difficult to reconcile with the incentive or the behavioral effect.

3 Description of the OECD Vote Share Dataset

Our empirical analysis will be based on a semi-annual panel data set that comprises 16 European countries and spans the period 1970-2002.[10] Our measure of individuals' support for political extremism is from Eurobarometer.[11] Eurobarometer conducted from 1970 to 2002 semi-annual surveys of individuals' voting intentions in European countries.[12] After 2002 the collection of this data was discontinued. We are not aware of any other consistent data set of voting intentions of comparable length covering a comparable number of countries. The question asked in the Eurobarometer survey was the following: "If

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[10] The countries (time-period) covered in our data set are: Austria (1994-2002), Belgium (1970-2002), Denmark (1973-2002), Finland (1993-2002), France (1970-2002), West-Germany (1970-2002), Great Britain (1973-2002), Greece (1980-2002), Ireland (1973-2002), Italy (1970-2002), Luxembourg (1973-2002), Netherlands (1970-2002), Norway (1990-1995), Portugal (1985-2002), Spain (1985-2002), and Sweden (1994-2002). This is the largest possible sample given the availability of data from Eurobarometer.

[11] The data are publicly available at http://zacat.gesis.org/webview/index.jsp.

[12] The average survey size was 1088, with an interquantile range of [1000, 1049].

there were general elections tomorrow, which party would you vote for?" Based
on individuals' answers we constructed three variables that proxy the support
for extremism in a country-period. The first variable proxies the support for
extreme right-wing parties. This variable is constructed by summing over all
individuals that selected extreme right-wing parties (extreme right-wing par-
ties are identified according to the ZEUS party code) and dividing this number
by the total number of individuals in the survey. The second variable prox-
ies the support for extreme left-wing parties. This variable is constructed by
summing over all individuals that selected extreme left-wing parties (extreme
left-wing parties are identified according to the ZEUS party code) and dividing
this number by the total number of individuals in the survey. The third variable
proxies the total support for extremism and is constructed by adding the first
and second variable.

We use the Eurobarometer survey data to proxy the support for extremism
because this data maximizes the number of observations. The Eurobarometer
survey data is available at a semi-annual frequency. Data on actual voting
outcomes are available on a much lower frequency since elections are held in
most countries in our sample only once every four to five years. For a study
that shows that the vote intentions measured by Eurobarometer in the surveys
are reliable and valid measures of the actual vote choice close to an election, see
Arceneaux (2001).

Basic summary statistics of our variables proxying the support for extrem-
ism are as follows. The mean support for right-wing extremism is 0.016. The
between-country standard deviation is 0.031 and the within-country standard
deviation is 0.016. The interquantile range is [0, 0.026]. For extreme left-wing
parties the mean support is 0.041. The between-country standard deviation is
0.044 and the within-country standard deviation is 0.025. The interquantile
range is [0, 0.071].

We plot in Figures 1 and 2 the time-series of the support for right-wing
extremism and left-wing extremism for 4 of the 16 European countries in our
panel (Denmark, Italy, West-Germany, and France). These graphs show that
there is considerable variability in the support for extremism, both across time
as well as across countries in a given time period.

4   Empirical Results

4.1   Baseline Estimates

We use the following econometric model to estimate the effect that real per
capita GDP growth has on the support for extremism:

$$Extremism_{c,t} = \theta Growth_{c,t-1} + \Gamma Controls_{c,t-1} + u_{c,t},$$

In the above equation $u_{c,t}$ is an error term that is clustered at the country
level. *Controls* is a vector of variables that we will discuss and elaborate on

further in the text below. As a baseline we use least-squares to estimate the effect that real per capita GDP growth has on individuals' support for extremism. We use in our baseline specification growth measured in period t-1 because this information is available to individuals in period t. We will discuss results for the case when growth is measured over longer time periods in the past as well as when growth is measured in the future in Sections 4.2 and 4.5, respectively.

Table 2 presents our baseline estimates of the average effect that lagged real per capita GDP growth has on the support for right-wing extremism. In column (1) we show estimates from a least squares regression with no control variables. In this specification the coefficient on per capita GDP growth is negative (-0.07) and statistically significant at the 1 percent level. In column (2) we introduce the natural logarithm of per capita GDP to the right-hand side of the estimating equation. In line with our theoretical predictions from Section 2, the coefficient on the level of GDP per capita is not significantly different from zero. In column (3) we include both GDP per capita growth and the natural logarithm of GDP per capita in the model. We see that only the coefficient on GDP per capita growth is significantly different from zero at the 1 percent significance level.

In column (4) we add country fixed effects. The country fixed effects capture time-invariant cross-country differences in the support for extremism. The country fixed effects absorb time-invariant differences in countries' ethnolinguistic diversity, religion, legal origin, geography, and history. The country fixed effects also absorb cross-country differences in the electoral system and other institutional characteristics that remained constant in these countries during the 1970-2002 period. The main result is that controlling for country fixed characteristics leaves the estimated coefficient on real per capita GDP growth negative and significantly different from zero at the 1 percent level.

In column (5) we add time fixed effects. The time fixed effects capture major global events, such as the end of the Cold War. Controlling for time fixed effects somewhat increases the estimated coefficient on GDP per capita growth (in absolute size). The estimated coefficient is now -0.14 and statistically significant at the 1 percent level. In quantitative terms, the estimated coefficient on GDP per capita growth suggests that a one percentage point decrease in real per capita GDP growth during the past two quarters increases the support for right-wing extremism by over 0.1 percentage points.

We visualize the negative relationship between growth and right-wing extremism in Figure 3. The figure provides a scatter plot between lagged GDP per capita growth (x-axis) and the support for right-wing extremism (y-axis) after both variables have been demeaned from the time and country fixed effects.

4.2 Robustness Checks

4.2.1 Non-Linearities

We have carried out a number of robustness checks to examine whether our linear specification misses out on important non-linearities. First, we have tested for significant asymmetry in the effects of positive and negative growth rates.

Column (1) of Table 3 shows that there is no evidence of such asymmetry. The coefficient on negative per capita GDP growth is -0.17 and this coefficient is significant at the 5 percent level; the coefficient on positive per capita GDP growth is -0.11 and this coefficient is significant at the 5 percent level as well. We cannot reject the hypothesis that the coefficient on negative GDP per capita growth is equal to the coefficient on positive GDP per capita growth (p-value 0.4). Column (2) of Table 3 shows estimates from a regression that includes a squared term of GDP per capita growth. The main finding is that only the linear GDP per capita growth term is significantly different from zero while the quadratic term is insignificant. In columns (3) to (5) of Table 3 we show that economic growth continues to have a significant negative effect on the support for extreme right-wing parties when we exclude the top and bottom 1st percentile (5th and 10th percentiles, respectively) of GDP per capita growth.

In Table 4 we document that there continues to be a significant negative effect of economic growth on individuals' support for extreme right-wing parties if instead of the growth rate over the past two quarters, we use an average of the growth rate over a longer time period. Using growth rates over longer periods allows us to smooth out business-cycle variations and thus examine whether changes in GDP per capita growth that are of more persistent nature have a significant effect on right-wing extremism. In columns (1) and (2) of Table 4 we report estimates that use the average growth rate over the past two years; in columns (3) and (4) we report estimates that use the average growth rate over the past five years. The coefficients on these longer-run growth rates are always negative and significant. Moreover, we cannot reject the hypothesis of symmetry in the effects of negative and positive growth rates.

4.2.2   Dynamic Panel Estimates

In Table 5 we present estimates that control for individuals' support of right-wing extremism in the previous period. Because the time-series dimension of our panel is relatively large (the average T is around 38) the Nickell bias on the least squares estimator that arises from inclusion of the lagged dependent variable in the fixed effects regression should be relatively small (see e.g. Wooldridge, 2002). Indeed, Table 5 shows that the least squares estimates are not very different from system-GMM estimates that correct for bias arising from the inclusion of the lagged dependent variable.

Columns (1) and (3) of Table 5 present estimates where only the t-1 lagged dependent variable is included on the right-hand side of the estimating equation. The coefficient on the t-1 lagged dependent variable is around 0.7; this indicates that the support for right-wing extremism is quite persistent. The t-2 lag is quantitatively small and not significantly different from zero.

The estimates from the dynamic panel model show that the effect of economic growth on the support for extreme right-wing parties is negative and significantly different from zero at the conventional significance levels Quantitatively, the dynamic panel estimates suggest that a decrease in the GDP per capita growth rate of 1 percentage point increases the support for right-wing

extremism by around 0.15 percentage points in the long-run; the short-run effect is around 0.05 percentage points.

4.2.3 Controlling for Income inequality and unemployment

In Table 6 we report estimates from an econometric model that includes measures of income inequality and the unemployment rate. Column (1) of Table 6 shows that in these model specifications economic growth has a significant negative effect on the support for right-wing extremism. The coefficient on GDP per capita growth is of similar size as in model specifications that do not include these variables. It is interesting to note that in the static panel model, see column (1) of Table 6, a higher labor income share and a lower unemployment rate are associated with a significant decrease in the support for extreme right-wing parties. However, the coefficients on these variables are insignificant in the dynamic panel model, see columns (2) and (3) of Table 6. The only variable that has a robust negative effect across these specifications is GDP per capita growth.

4.2.4 IV-Estimates

In Table 7 we present instrumental variables estimates. Our instrument for GDP per capita growth is the change in the international oil price weighted with countries' average shares of net-exports of oil in GDP.[13] The terms of trade effects of changes in the international oil price on countries' real per capita GDP growth depends on whether a country is an oil importer or an oil exporter; and it also on the importance of oil in the economy. We thus construct the country-specific oil price instrument as $Z_{c,t} = \triangle Log(OilPrice_t) * \theta_c$, where $\triangle Log(Oilprice_t)$ is the change of the natural logarithm of the international oil price (obtained from IMF statistics) and θ_c is the country-specific average share of oil net-exports in GDP (obtained from OECD statistics).

The main message of the instrumental variables estimates is that economic growth has a significant negative effect on the support for right-wing extremism. This is true regardless of whether we use the GDP per capita growth rate over the past two quarters (column (1)) or averages of GDP per capita growth over longer periods (see columns (2) and (3)). While the 2SLS estimates are larger in absolute size than the least squares estimates, the Hausman test is insignificant (the p-value is above 0.5). In other words, we cannot reject the hypothesis that the IV estimates are equal to LS estimates.

Concerning the quality of the instrumental variables estimates we note that the first stage fit between the excluded instruments and GDP per capita growth is reasonable. The first-stage Kleibergen Paap F-statistic is always above 10.

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[13] Brückner et al. (2012) use this instrument to estimate effects of persistent income on democracy in a world panel. Weather shocks, that have been used by Brückner and Ciccone (2011) to estimate effects of transitory income on democracy in sub-Saharan African countries, are not suitable for this paper's analysis.

According to the tabulations in Stock and Yogo (2005) we can reject at the 5 percent significance level that the maximum relative IV bias is larger than 10%.

We examine the exclusion restriction with the Hansen J-test. Specifically, we use the t-2 to t-5 lags of the oil price instrument as excluded instruments in the IV regressions shown in Table 7. For all specifications the p-values from the Hansen J-test are above 0.1. Hence, the test fails to reject the assumption that the instruments are valid.

4.3 Insignificant Effects of Economic Growth on Left-Wing Extremism

In Table 8 we report estimates of the effect that economic growth has on the support for left-wing extremism. The main finding is that economic growth does not have a systematic effect on this type of extremism.[14] In column (1) we show that neither GDP per capita growth nor the level of GDP per capita has a significant effect on the support for left-wing extremism. In column (2) we add country and time fixed effects. In this case the coefficient on GDP per capita growth continues to be statistically indistinguishable from zero. In columns (3) and (4) we show estimates for GDP per capita growth averaged over two and five years. In these specifications the coefficients on growth are insignificant. Further, instrumental variables estimation yields coefficients on GDP per capita growth that are statistically indistinguishable from zero; see columns (5) to (7).

In Table 9 we report the effect that growth has on the overall support for extremism, i.e. the dependent variable is the sum of the support for left-wing extremism and right-wing extremism. Column (1) shows that it is GDP per capita growth and not the level of GDP per capita that has a significant negative effect on the support for extremism. Columns (2) to (4) show that the negative coefficient on growth is robust to controlling for country and time fixed effects as well as using averages of GDP per capita growth over longer time periods. The two-stage least squares estimates, reported in column (5) to (7), are also negative. They are in the majority of specifications larger in absolute size but less significant than the least squares estimates.

The main message is that when the dependent variable is the sum of the support for right-wing and left-wing extremism the coefficient on growth is negative. This suggests that growth has a negative effect on the overall support for extremism. However, as the previous tables showed, this effect arises because economic growth has a systematic effect on the support for right-wing extremism while no such effect is present for left-wing extremism.

4.4 Inequality and the Marginal Effect of Growth

According to our theoretical analysis in Section 2, more income inequality should be associated with a smaller effect of GDP per capita growth on the support

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[14] This can also be seen from Figure 4 that displays a scatter plot between lagged GDP per capita growth and the support for left-wing extremism.

for extremism. In Table 10 we examine the impact of inequality on the effect that economic growth has on the support for extreme right-wing parties. We do this by ordering the countries in our data set according to their median-to-mean income ratio (net of taxes and transfers) and then splitting them into two subsamples with an equal number (8) of countries.

Panel A of Table 10 reports least squares and instrumental variables estimates for the sample with the highest median-to-mean income ratio; Panel B reports the estimates for the sample with the lowest median-to-mean income ratio.[15] The main message of Table 10 is that the effect of GDP per capita growth on the support for extreme right-wing parties is quantitatively larger (in absolute value) and statistically stronger in the group of countries with high median-to-mean income ratios (low inequality) than in the group with low median-to-mean income ratios (high inequality). For example, the coefficient in column (1) of Panel A suggests that a one percentage point drop in GDP per capita growth increases the support for right-wing extremism by nearly 1 percentage point. For the majority of specifications in Panel B the coefficients on GDP per capita growth are negative; and statistically indistinguishable from zero. The results in Table 10 are consistent with the theoretical prediction in Section 2.1 that the effect of economic growth on the support for extremism is stronger in countries with low income inequality.

4.5   Future GDP Growth

In the theoretical analysis of the uncertainty effect, see Section 2.1, individuals' expectations of future GDP per capita growth matter. There is significant serial correlation in GDP per capita growth so that the previous period's GDP per capita growth is a strong predictor of future GDP growth. For example, regressing t+1 GDP per capita growth on period t and t-1 GDP per capita growth yields coefficients (standard errors) on period t and t-1 GDP per capita growth of 0.37 (0.03) and 0.17 (0.03) and a R-squared of 0.54.

Columns (1) and (2) of Table 11 show that future (t+1) GDP per capita growth has a significant negative effect on the support for right-wing extremism in the low inequality sample. This result holds regardless of whether we use GDP per capita growth in period t+1 that is predictable by period t and t-1 GDP per capita growth (see Panel A) or actual t+1 GDP per capita growth (Panel B). Columns (3) and (4) of Table 11 show that in the high inequality sample the effects of t+1 GDP per capita growth on the support for right-wing extremism is quantitatively smaller and statistically insignificant.

In conclusion, our results regarding the effect of economic growth on the support for political extremism are compatible with all three theoretical explanations that we discussed in Section 2. However, only the theory of the uncertainty effect yields two other testable hypotheses that were also in line with the empirical findings: (i) the support for extreme left-wing parties, which

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[15] The median median-to-mean after-tax income ratio in Panel A is 0.92; in Panel B the median median-to-mean after-tax income ratio is 0.83.

are perceived to redistribute incomes from rich to the poor, does not change when the growth rate changes; (ii) the marginal effect of economic growth on extreme right-wing parties varies with income inequality. The two other explanations that were based on retrospective voting do not readily produce these hypotheses.

5   Conclusion

This paper showed that economic growth is a significant determinant of right-wing extremism. Lower GDP per capita growth increases the support for extreme right-wing parties. The level of national income has no significant effect. A rise of right-wing extremism can thus occur even at high levels of material well-being.

The theoretical model developed in this paper showed that it is uncertainty, with regard to which group in society will have their incomes expropriated, that generates a significant negative relationship between economic growth and the support for right-wing extremism. In contrast to extreme right-wight parties, the primary objective of extreme left-wing parties is to redistribute incomes from rich to poor. Thus, in an economic sense, there exists relatively little uncertainty in terms of what group is the target of redistributive efforts in an extreme left-wing regime. Consistent with this view, the empirical analysis showed that economic growth has no significant effect on the support for left-wing extremism.

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6 Appendix A

In the main text, the positive relationship between economic growth and the support for the moderate regime has been established for the case where $s_1 = s_2$. When it may be the case that $s_1 \neq s_2$ there is no closed form solution for $\hat{y}$. The following analysis addresses this.

PROPOSITION 1 For any given $p \in [0, 1]$ the following holds. Consider given values of s_1 and q. If p is sufficiently large, and if the critical income value $\hat{y}$ satisfies $\hat{y} < \bar{y}_1$ then $d\hat{y}/dg < 0$.

PROOF First note that s_1, p, and q determine $s_2 = s_1 q + (1 - s_1) p$. Define

$$F(\delta, g, p, q, \hat{y}, s_1) \quad : \quad = \hat{y}^\alpha + \delta g^\alpha \hat{y}^\alpha \tag{14}$$

$$- \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1}{1 - s_1} \right) \bar{y} \right)^\alpha \tag{15}$$

$$- \delta (1 - p) \tag{16}$$

$$\cdot \left(g \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1 q + (1 - s_1) p}{1 - s_1 q - (1 - s_1) p} \right) \bar{y} \right) \right)^\alpha \tag{17}$$

When $F(\delta, g, p, q, \hat{y}, s_1) = 0$ then non-stigmatized voters with income $\hat{y}$ are indifferent between the two regimes, i.e. $U^M = U^E$. We have

$$F_g \quad = \quad \alpha \delta \hat{y}^\alpha g^{\alpha - 1} \tag{18}$$

$$- \delta (1 - p) \alpha \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_2}{1 - s_2} \right) \bar{y} \right) \tag{19}$$

$$\cdot \left(g \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_2}{1 - s_2} \right) \bar{y} \right) \right)^{\alpha - 1}, \tag{20}$$

and

$$F_{\hat{y}} \quad = \quad \alpha \hat{y}^{\alpha - 1} + \delta \alpha g^\alpha \hat{y}^{\alpha - 1} \tag{21}$$

$$- \alpha (1 - \tau) \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1}{1 - s_1} \right) \bar{y} \right)^{\alpha - 1} \tag{22}$$

$$- \delta \alpha (1 - p) g (1 - \tau) \tag{23}$$

$$\cdot \left(g \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_2}{1 - s_2} \right) \bar{y} \right) \right)^{\alpha - 1}. \tag{24}$$

Now let $p = 1$. In this case

$$F_g = \alpha \delta \hat{y}^\alpha g^{\alpha - 1} > 0,$$

and

$$F_{\hat{y}} = \alpha \hat{y}^{\alpha - 1} + \delta \alpha g^\alpha \hat{y}^{\alpha - 1} - \alpha (1 - \tau) \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1}{1 - s_1} \right) \bar{y} \right)^{\alpha - 1}. \tag{25}$$

Hence

$$F_{\hat{y}} > 0 \Leftrightarrow (1 + \delta g^\alpha) \hat{y}^{\alpha-1} > (1 - \tau) \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1}{1 - s_1} \right) \bar{y} \right)^{\alpha-1}. \quad (26)$$

When $\hat{y} < \bar{y}$ we have

$$(1 - \tau) \left(\hat{y} + \frac{s_1}{1 - s_1} \hat{y} \right)^{\alpha-1} > (1 - \tau) \left((1 - \tau) \hat{y} + \left(\tau + \frac{s_1}{1 - s_1} \right) \bar{y} \right)^{\alpha-1}.$$

Hence

$$F_{\hat{y}} \quad > \quad 0 \Leftarrow (1 + \delta g^\alpha) \hat{y}^{\alpha-1} > (1 - \tau) \left(\hat{y} + \frac{s_1}{1 - s_1} \hat{y} \right)^{\alpha-1} \quad (27)$$

$$\Leftrightarrow \quad 1 + \delta g^\alpha > (1 - \tau) \left(\frac{1}{1 - s_1} \right)^{\alpha-1} \quad (28)$$

$$\Leftrightarrow \quad 1 + \delta g^\alpha > (1 - \tau) (1 - s_1)^{1-\alpha}. \quad (29)$$

This obviously holds. Therefore, using the implicit function theorem we get $d\hat{y}/dg < 0$. The proposition follows from the continuity of the functions F, F_g, and $F_{\hat{y}}$ in all their arguments. Q.E.D.

PROOF OF RESULTS 2 AND 4
Result 2: Result 2 follows from

$$U^M \quad = \quad U^E \Leftrightarrow \quad (30)$$

$$(1 + \delta g^\alpha) \gamma_i^\alpha \quad = \quad \left((1 - \tau) \gamma_i + \left(\tau + \frac{s_1}{1 - s_1} \right) \right)^\alpha \quad (31)$$

$$+ \delta (1 - p) \left(g \left((1 - \tau) \gamma_i + \left(\tau + \frac{s_2}{1 - s_2} \right) \right) \right)^\alpha. \quad (32)$$

Only relative income γ_{i1} is an argument in this equation, not absolute income.

Result 4: Economic growth shifts the threshold income $\hat{y}$ to the left. The mass of individuals between the new and the old value of the threshold gives us the additional support for the extreme party. Result 4 follows from the fact that, with a uniform income distribution, more inequality is associated with less individuals being located in any given income bracket. Q.E.D.