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An International Comparison

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Abstract

This paper tackles the issues of social polarization and income polarization in several North American, European and Australian countries in the perspective of redistribution patterns. Presenting a simple theoretical framework, we argue that comparing both types of polarization can help predict the level of redistribution in those countries. We thus propose an accuracy test that consists in predicting a redistribution ordering between countries and compare it with the observed one. Only countries where social polarization ranking and income polarization ranking differ are considered. As a result, we find that our prediction is accurate for about 70% of these pairs of countries.

Keywords: Polarization; Self-reported social status; Income distribution

JEL Numbers: D31; D63

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1 Introduction

This paper aims to examine with an original approach an enduring discrepancy in economic and socio-political terms: while income mobility in the US proves not to be particularly high according to statistics¹, yet, nowhere else in the world has the discourse over social mobility had such a strong impact on people's minds and on the nation's political choices. The 2008 US presidential campaign is a case in point, the theme of the "American dream" being forcefully revived with one of the democrat candidates appearing as its embodiment. Moreover, in that discourse, the issue of social mobility has come to be paralleled with that of redistribution –notably when raising the question of cutting tax advantages for the richer, or of having a more liberal health system. Hence, it appears relevant for economists to examine in what ways these two notions are connected.

Indeed, social mobility factors have been inserted in a number of recent studies whose main point was to better understand what determines redistribution levels². Such approaches all stem from the same observation which is supported by empirical evidence: no solid correlation appears between economic growth and the levels of redistribution and taxation (Benabou (1996)). Indeed, countries with very similar economic circumstances and interrelated economies such as the countries of Northern America and Europe have already had quite contrasting evolutions in terms of income redistribution. Hence, other types of causality have to be considered.

Unlike more standard types of approach which are normative by nature and aim to maximize social well-being, in these studies, the various groups that constitute society are respectively assigned socio-political weights; these social groups and the ways they are formed are considered in connection with individual beliefs concerning social mobility³. According to these various theories, people's attitude

¹See for instance Björklund and Jäntti (1997), Cecchi, Ichino, and Rustichini (1999), Lefranc and Trannoy (2004) for comparisons of the U.S. with European countries.

²See Piketty (1995), Benabou and Ok (2001), Alesina and Glaeser (2004), and Benabou and Tirole (2006) among others.

³The approach developed by Piketty (1995), for example, backs up the idea that the various points of view over redistribution are determined by individual experiences in terms of social mobility. A key result in this model is that, at equilibrium, players with a high income tend to have a stronger belief in the value of effort, and hence are in favor of a lesser level of redistribution, even in the case where no one is selfish and where everybody aims to reach a social goal. In other words, people's attitude toward redistribution (whether they are in favor of it or not) is biased by their individual income, because of effort-related beliefs. More recently, Alesina and Glaeser (2004) showed how ethnic issues in the USA may well have determined the attitude of American people concerning redistribution. From another perspective, Benabou

toward inequalities is thus more induced by the ideas or beliefs concerning social mobility rather than by actual social mobility. That's why social structures regarded as more inegalitarian or rigid may lead to more redistribution, and consequently to lower income inequalities, and conversely.

In what follows, we present a simple theoretical model which can reveal causal relations between the level of redistribution in one country and its social and economic determinants: among these determinants, we will focus more particularly on income gaps, social status, income mobility and economic growth. Our approach departs from the conventional median voter approach to the extent that the socio-political weights of individuals are expressed according to the absolute difference between income and median income. Other social groups than the median one are thus influential in the analysis. Redistribution issues are shown to be different for those various groups and the median voter model appears to be a special case of our model. More polarization should thus induce greater conflict redistribution-wise. Moreover, these results depend on the degree of income mobility and income growth since, of course, the more mobile the income, the less preference for redistribution.

Recent methodological advances in polarization measurement show that the absolute distance from the median can be used in order to test for the robustness of polarization comparisons. What is more, those tests can be performed either with ordinal variables (as it is the case for self-reported social status) or with continuous variables (as it is the case for income). Using various datasets, we thus make polarization comparisons in order to assess the inversions in the ranking of countries when switching from social polarization to income polarization. Classifying countries according to their level of redistribution and according to their long-term economic growth, we can thus discuss the results and interpret them according to our theoretical framework.

The paper is structured as follows. In the second section, the theoretical model is explained. In the third section, polarization measurements are presented. In the fourth section, results are estimated and discussed. Conclusive remarks are offered in the last section.

and Tirole (2006) use a form of cognitive reasoning to explain the enduring discrepancy between the actual experiences of social mobility and the way the people think of them.

2 A model of social status and redistributive politics

In this section, we provide a simple model for the determinants of the level of income distribution that accounts for the relationship between income and social status. In particular, this model considers income mobility as a central determinant for redistribution when modeling social preferences for redistribution. This is a clear link with several previous approaches⁴.

The main difference with Alesina, Glaeser, and Sacerdote (2001) –with their formal model to synthesize the previous approaches– is that we propose to adapt the model in order to take into account socio-political weight as a function of the absolute distance between individual income and median income. Results are then discussed in accordance with this specificity of the model.

In this model, there are two periods. y_0 is the income from the first period and y is the income from the second period. In the first period, individuals choose the tax rate on income τ and, in the second period, each person receives net transfers equal to $\tau(\bar{y} - y)$ with \bar{y} the average income. Revenues from taxation are thus entirely spent in transfers.

In the second period, individuals are supposed to consume all their income. Income mobility is represented by parameter θ and expected income is noted $E(y)$ ⁵, so that income in the second period is $y(y_0) = (1 - \theta)y_0 + \theta E(y) = y_0 + \theta(E(y) - y_0)$. In the absence of mobility, $\theta = 0$ means that the second period income is equal to the first period income. Note, finally, that the intensity of income mobility depends on the mobility parameter θ as well as on the expected rise or fall of income $E(y) - y_0$.

In a first approach, considering welfare optimization according to the median voter hypothesis leads to the well-known result that the median voter, whose median income is m_y , will redistribute as long as $\bar{y} > m_y$. Since the median voter goes to a corner solution, redistribution is thus complete.

One step further, we propose to relax the median voter hypothesis and introduce social disparities. Socio-political weights are, in that case, functions of the absolute gap between income and median

⁴See Benabou and Ok (2001), Piketty (1995), etc.

⁵Expected income is regarded as an exogenous variable depending on income growth in the society considered.

income. Let's define $s(y_0)$, the socio-political weight for group with income y_0 as follows⁶:

$$s(y_0) = 1 - \lambda(1 - \tau)|m_y - y(y_0)|. \quad (1)$$

Using those socio-political weights, and noting individual well-being $u(c(y_0))$ with disposable income $c(y_0) = (1 - \tau)y(y_0) + \tau\bar{y}$, the optimization problem has changed and is now related to the following social welfare function:

$$\int_{y_0} s(y_0)u(c(y_0))f(y_0)dy_0 \quad (2)$$

where $f(\cdot)$ is a density function. Then, derivative according to τ gives:

$$\int_{y_0} (\lambda|m_y - y(y_0)|u(c(y_0)) + s(y_0)(\bar{y} - y(y_0))u'(c(y_0)))f(y_0)dy_0 = 0 \quad (3)$$

Equation (3) is composed of two terms that represent two redistribution motives. On the one hand, the first component of the derivative is always positive since each group can increase its socio-political weight when redistributing. On the other hand, the second component represents the variation of well-being due to an increase in redistribution: it is positive when $\bar{y} < y(y_0)$ and negative when $\bar{y} > y(y_0)$. Overall that second component should be negative.

Hence, it is interesting to note that social conflict can arise from that model as it does, for instance, in Esteban and Ray (1999). Indeed, in our setting, social polarization determines conflict on redistribution due to the different views on both sides of the median group. When socio-political weights decrease for both rich and poor, the median voter problem dominates.

An other particularity of the model is that socio-political weights can vary according to the tax rate so that the rich will accept a certain level of redistribution in order to be more influential in the social decision. As a consequence, under certain conditions it is possible to show that two social preferences for redistribution can be ordered unambiguously. Those conditions are expressed in the

⁶Note that normalizing median social status to one ($s(m_y) = 1$) and considering that in any case $s(m_y) \geq s(y_0)$ we thus have $|s(m_y) - s(y_0)| = \lambda(1 - \tau)|m_y - y(y_0)|$.

following proposition.

Proposition 1. *Considering τ that maximizes social welfare, then a sufficient condition for $\frac{\delta\tau}{\delta\lambda}$ to be positive is that $\frac{\delta s(y_0)}{\delta\lambda} \leq 0$.*

Proof of proposition 1. *The proof of this proposition follows the proof of proposition 1 in Alesina, Glaeser, and Sacerdote (2001), except that we have to consider that socio-political weights can vary according to the level of the tax rate. Then, when deriving equation (3) according to λ , we get:*

$$\begin{aligned} & \int_{y_0} (|m_y - y(y_0)|u(y_0) + \frac{\delta s(y_0)}{\delta\lambda}(\bar{y} - y(y_0))u'(y_0))f(y_0)dy_0 \\ = & -\frac{\delta\tau}{\delta\lambda} \int_{y_0} (\lambda|m_y - y(y_0)|(\bar{y} - y(y_0))u'(c(y_0)) + s(y_0)(\bar{y} - y(y_0))^2u''(c(y_0)))f(y_0)dy_0. \end{aligned}$$

Considering that $u > 0$, $u' > 0$, $u'' < 0$ and $\bar{y} > m_y$, we can prove that $\frac{\delta s(y_0)}{\delta\lambda} \leq 0$ is a sufficient condition for $\frac{\delta\tau}{\delta\lambda} > 0$. Indeed, the left-hand side of the equality is positive, so it is sufficient to prove that the term multiplying $\frac{\delta\tau}{\delta\lambda}$ is negative. From equation (3), we know that: $\int_{y_0} (s(y_0)(\bar{y} - y(y_0))u'(c(y_0)))f(y_0)dy_0 = -\int_{y_0} (\lambda|m_y - y(y_0)|u(c(y_0)))f(y_0)dy_0 \leq 0$.

Hence $\int_{y_0} (\bar{y} - y(y_0))u'(c(y_0))f(y_0)dy_0 = 0$ when posing $\lambda = 0$. It thus follows that $\int_{y_0} (\lambda|m_y - y(y_0)|(\bar{y} - y(y_0))u'(c(y_0)))f(y_0)dy_0 \leq 0$ and $\int_{y_0} \frac{\delta s(y_0)}{\delta\lambda}(\bar{y} - y(y_0))u'(y_0))f(y_0)dy_0 \geq 0$ when $\frac{\delta s(y_0)}{\delta\lambda} \leq 0$, and thus $\frac{\delta\tau}{\delta\lambda}$ is positive. ■

Let us finally note that, in a context of ascending social mobility ($\theta > 0$ and $E(y) - y_0 > 0$), the poor will tend to be less in favor of redistribution (Benabou and Ok (2001)). In that case, the level of social polarization (which rises together with λ) has less impact over redistribution.

Thus, according to this simple model, it appears that social polarization and income polarization are linked, a link that depends upon parameter λ which acts upon income redistribution. The lower this parameter, the greater the weight of groups at both ends of the spectrum in the choice of redistribution level.

We now propose to measure social polarization and income polarization in order to account for the

determinants of redistribution, via comparisons and inversions in the ranking of countries according to their income and social status distribution patterns.

Let us consider countries A and B: it follows from proposition 1 that, if A has a higher degree of social polarization while B has a higher degree of (net) income polarization, then more redistribution should be observed in A than in B. Conversely, if A has a lesser degree of social polarization while B has a lesser degree of (net) income polarization, then more redistribution should be observed in B. On the other hand, if rankings in terms of social and (net) income polarization are not reversed, then it seems difficult to conclude.

Mobility factors also appear to be essential in order to account for redistribution patterns. Beside the socio-political weights of the sub-groups, mobility parameter θ as well as income growth also act upon redistribution. Redistributive politics may thus be more or less liberal according to the value of these parameters.

3 Measuring bi-polarization

In this section, we propose to measure polarization using two classes of polarization indices with an ethical "preference for the middle"⁷. The first class of indices concerns a cardinal variable (say income) and the second class of indices concerns an ordinal variable (say social status). Both classes of indices are used in order to test for first-order bi-polarization orderings of income and social status distribution.

Applying the Allison and Foster (2004) approach is very useful when comparing discrete distributions, since measuring standard indicators of inequality is not possible when using qualitative variables. Indeed, they show the non-robustness of a mean-based approach and propose a median-based approach that is clearly related to the first-order bi-polarization dominance.

However, while both approaches –continuous and discrete– rely on the same concept of bi-polarization dominance –that is not related to the Pigou-Dalton principle– one major difference be-

⁷See in particular Wolfson (1994), Wang and Tsui (2000), Duclos and Echevin (2005) when using continuous distributions and Allison and Foster (2004) for discrete ones.

tween the Allison-Foster index and the Duclos-Echevin index of bi-polarization is that, in the former, the median should be constant from one distribution to the other, while it is not necessary in the latter approach. This difference comes from the use of an ordinal variable in the first approach, and of a cardinal variable in the second approach. Hence, Allison and Foster point that "a potential drawback of [their] approach is that inequality comparisons are limited to situations in which medians coincide. This can prove to be restrictive, particularly when first order effects are in evidence, causing medians to vary across group." However, it does not prove to be a major problem in practice.

Whatever the variables used for comparisons, cardinal or ordinal, the measurement of bi-polarization can be stated as follows (see Duclos and Echevin (2005)). Let $x = (x_1, x_2, \dots, x_n)$ be an n -dimensional vector of positive incomes, ordered in increasing values so that $x_1 \leq x_2 \leq \dots \leq x_n$, and letting x_i be the income, a cardinal variable (resp. the social status, an ordinal variable) of the i th person. Let's consider $d_x = (d_x(1), d_x(2), \dots, d_x(n))$, with $d_x(i) = |1 - x_i/m_x|$; $d_x(i)$ is the proportional "spread" of i 's income (resp. social status) from the median. Plotting $d_x(i)$ against i yields a bi-polarization curve. Then, using population invariance, monotonicity and symmetry axioms, we get a test of (symmetric) first-order bi-polarization dominance. Posing d_x^* the vector d_x rearranged in increasing values of the $d_x(i)$, we have: $P(d_x) \geq P(d_y)$ iff $d_x^*(i) \geq d_y^*(i)$, $\forall i = 1, \dots, n$. Hence, testing for first-order bi-polarization dominance consists in checking that proportional spread of distribution y is *everywhere* below that of distribution x . Furthermore, testing for second-order (symmetric) bi-polarization dominance simply consists in integrating the first-order bi-polarization curve in order to obtain a second-order bi-polarization curve defined as $D_x^*(i) = n^{-1} \sum_{j=1}^i d_x^*(j)$. Distribution x dominates distribution y when $D_x^*(i) \geq D_y^*(i)$, $\forall i = 1, \dots, n$. Naturally, first-order dominance implies second-order dominance.

4 International comparisons

The data used for comparison purposes come from the surveys of the International Social Survey Programme (ISSP)⁸, where self-reported social scale variables appear. Data from the Luxembourg Income Studies (LIS)⁹ concerning the same countries provide information over the standards of living as well as on the level of redistribution in each of these countries. Finally, the growth rates by country for years 1980-1990 were calculated according to the Penn World Table (PWT)¹⁰. The labels for these countries are described in Table 1. Table 2 presents the level of redistribution for each country, as measured by the Musgrave index –which measures the gap between the Gini index calculated according to primary incomes and the Gini index calculated according to disposable incomes– as well as the yearly mean growth rate for those countries.

In the table 3, social status is divided into 5 classes¹¹. The median values for social status are all found in class 3, the middle one.

We first measure social polarization and make comparisons between countries. Table 4 presents the results of these comparisons and shows whether country A's first-order bi-polarization dominates that of country B; if not, we mention whether country A's second-order bi-polarization dominates that of country B. Over 105 pairs of countries, 49 can be distinguished at the first-order level (47%) and 32 extra ones at the second-order. In total, 81 pairs of countries (77%) can be distinguished.

We then turn to the polarization of living standards¹². Table 5 presents the results. Over 105 pairs of countries, 79 can be distinguished at the first-order level (75%) and 24 extra ones at the second order. In total, 103 pairs of countries (98%) can be distinguished.

Finally, over 105 pairs of countries, there are 47 ranking inversions (45%). As mentioned pre-

⁸The ISSP (<http://www.issp.org/>) is a yearly survey program encompassing about thirty countries; various questions are taken up each year; inequalities were tackled in 1987, 1992 and 1999.

⁹<http://www.lisproject.org/>.

¹⁰<http://pwt.econ.upenn.edu/>.

¹¹10 classes were initially available, but they were grouped together to make it easier to compare countries. Household observations are weighed by the ISSP sample weights (when available) times the number of people in the household.

¹²Living standards are measured according to the household's disposable income (net of taxes and transfers) divided by the squared root of the household size. Observations with negative incomes are removed as well as those with incomes exceeding 50 times the median. Household observations are weighted by the LIS sample weights times the number of people in the household.

viously, such ranking inversions should reveal the level of redistribution in each of these countries. Formally, we have performed the following accuracy test. Noting $SP(A)$ social polarization in country A, $IP(A)$ income polarization in country A, and $R(A)$ the level of redistribution in country A, we predict:

$$(SP(A) > SP(B)) \cap (IP(A) < IP(B)) \Rightarrow R(A) > R(B),$$

$$(SP(A) < SP(B)) \cap (IP(A) > IP(B)) \Rightarrow R(A) < R(B).$$

Other cases where polarization rankings are not inverted lead to indetermination. Using data from previous tables, our predictions give accurate observed redistribution ranking in 33 out of 47 cases (70%).

However, those predicted rankings could also well be undetermined if growth in country A differs from growth in country B. Noting $g(A)$ growth rate in country A, an additional test consists in checking for those differences:

$$(SP(A) > SP(B)) \cap (IP(A) < IP(B)) \cap (g(A) < g(B)) \Rightarrow R(A) > R(B),$$

$$(SP(A) < SP(B)) \cap (IP(A) > IP(B)) \cap (g(A) > g(B)) \Rightarrow R(A) < R(B).$$

Other cases are not determined. Overall, we find that 28 predictions out of 47 cases are accurate (60%), 10 are false and 9 are undetermined.

5 Conclusion

The empirical influence of income mobility on income redistribution remains a challenging issue. The difficulty is that, on the one hand, according to recent literature (*e.g.* Benabou and Tirole (2006)), income mobility parameter in economic model should be interpreted as a subjective one, hence it is not even observed. On the other hand, social groups and the ways they are formed are considered in connection with individual beliefs concerning social mobility. Using self-reported social status thus

reveals socio-political weights for these groups and can be considered jointly with other determinants of redistribution in a simple welfare optimization framework. Assuming those socio-political weights to be functions of the absolute distance between income and median income makes the link explicit between the level of redistribution and both social polarization and income polarization. According to this model, a sufficient condition for a country with a higher degree of social polarization to redistribute more is to exhibit a lower degree of (net) income polarization. Testing this prediction using cross-country data suggest that the prediction is accurate for many pairs of countries.

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Table 1: LIS COUNTRY CODES

as = Australia (1994)
at = Austria (1997)
ca = Canada (2000)
cz = Czech Republic (1996)
fr = France (1994)
ge = Germany (2000)
ie = Ireland (1996)
il = Israel (2001)
nw = Norway (2000)
pl = Poland (1999)
sk = Slovak Republic (1996)
si = Slovenia (1999)
sw = Sweden (2000)
uk = United Kingdom (1999)
us = United States (2000)

Table 2: REDISTRIBUTION AND GROWTH

	Musgrave index	% growth rate (80-90)
Australia	0.16	2.1
Austria	0.23	1.9
Canada	0.12	1.7
Czech Republic	0.25	-0.1
France	0.26	1.7
Germany	0.23	2.0
Israel	0.13	1.9
Ireland	0.20	4.0
Norway	0.19	2.8
Poland	0.09	1.2
Slovakia	0.26	1.1
Slovenia	0.10	1.8
Sweden	0.22	1.5
UK	0.14	2.1
USA	0.11	2.1

Sources: *Luxembourg Income Study* (Musgrave index)
and *Penn Word Table* (% growth rate in the 80-90's).

Table 3: SOCIAL STATUS FREQUENCIES (%)

	as	at	ca	cz	fr	ge	uk	il	ie	nw	pl	sk	si	sw	us
1st	2.7	2.3	2.9	0.4	0.9	1.1	2.0	4.4	1.0	2.5	1.5	1.6	0.7	1.5	5.9
2nd	32.1	21.7	28.8	10.9	17.8	18.1	15.1	23.3	23.3	34.9	11.0	12.5	11.2	30.0	26.0
3rd	49.6	54.9	43.2	43.5	45.5	54.8	51.6	49.5	53.2	48.8	40.8	34.9	58.1	48.5	48.2
4th	11.8	17.8	20.6	33.2	29.9	21.7	24.1	14.9	17.9	11.0	30.1	33.9	21.7	16.3	16.2
5th	3.8	3.3	4.5	12.2	5.9	4.3	7.3	8.0	4.6	2.8	16.7	17.2	8.3	3.6	3.7

Sources: *Internal Social Survey Programme, 1999*. Social status classes are ranked from top to bottom. Sample weights are used for almost all countries except Israel, Slovakia and Sweden.

Table 4: FIRST AND SECOND-ORDER SOCIAL BI-POLARIZATION ORDERINGS

	as	at	ca	cz	fr	ge	uk	il	ie	nw	pl	sk	si	sw	us
as	> _F	< _F	< _F	< _F	< _F	> _F	> _S	?	> _F	< _S	?	< _F	> _S	< _S	?
at		< _F	< _F	< _F	< _F	< _S	?	?	< _S	< _S	< _F	< _F	> _S	< _S	< _F
ca			?	> _F	> _F	> _F	> _S	> _F	> _F	> _F	?	< _F	> _S	> _F	> _S
cz					?	> _F	> _F	> _F	> _F	?	?	< _F	> _F	?	> _F
fr						> _F	> _S	> _S	> _F	> _F	?	?	> _S	> _F	> _S
ge						?	?	?	< _F	< _S	< _F	< _F	> _S	< _S	< _F
uk								?	?	< _S	< _F	< _F	> _F	< _S	< _F
il									?	< _S	< _F	< _F	> _F	< _S	< _S
ie										< _S	?	< _F	> _S	< _S	< _F
nw										< _S	?	< _F	> _S	< _S	?
pl											?	< _F	> _S	< _S	?
sk												< _F	> _F	?	?
si												< _F	> _F	> _F	> _F
sw														> _F	> _F
us														< _S	< _F

Sources: *International Social Survey Programme, 1999*. **Notes:** ? indicates that curves cross, subscript *F* indicates first-order bi-polarization dominance and subscript *S* indicates second-order bi-polarization dominance.

Table 5: FIRST AND SECOND-ORDER INCOME BI-POLARIZATION ORDERINGS

	as	at	ca	cz	fr	ge	uk	il	ie	nw	pl	sk	si	sw	us
as	> _S	> _S	> _S	> _S	> _S	> _F	< _F	< _F	< _S	> _F	> _S	> _F	> _S	> _S	< _F
at	< _F	> _S	> _S	< _F	< _F	> _F	< _F	< _F	< _F	> _F	< _F	> _F	> _F	> _F	< _F
ca			> _F	> _S	> _S	> _F	< _F	< _F	< _F	> _F	> _S	> _F	> _F	> _F	< _F
cz				< _F	< _F	?	< _F	< _F	< _F	> _F	> _S	> _F	> _F	> _F	< _F
fr					> _F	> _F	< _F	< _F	< _F	> _F	> _S	> _F	> _F	> _F	< _F
ge							< _F	< _F	< _F	> _S	< _F	> _S	> _S	> _S	< _F
uk							< _F	< _S	?	> _F	> _F	> _F	> _F	> _F	< _S
il								< _S	> _S	> _F	> _F	> _F	> _F	> _F	> _S
ie										> _F	> _F	> _F	> _F	> _F	< _S
nw											< _F	< _S	< _F	< _F	< _S
pl											< _F	> _F	> _S	> _F	< _F
sk												> _F	< _F	< _F	< _F
si													< _F	> _F	< _F
sw														> _F	< _F
us															< _F

Sources: *Luxembourg Income Study*. **Notes:** ? indicates that curves cross, subscript *F* indicates first-order bi-polarization dominance and subscript *S* indicates second-order bi-polarization dominance.