University of Cyprus
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Working Paper 03-2024

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May 10, 2024

Abstract

We introduce a notion of political polarization that takes into account not just the distance between agents' preferred policies, but also the intensity of this preference. We refer to this notion as "political divide" and we quantify it as the monetary cost, as a share of the total economy, that an agent is willing to incur to attain its ideal policy rather than the policy preferred by another agent. Groups with a large political divide are more likely to fall into affective polarization and political conflict. Holding ideological preferences constant, we show that the link between growth and the political divide between two ideologically separate groups depends on the curvature of the utility over wealth, as measured by the coefficient of relative risk-aversion: if agents' relative risk aversion is below one, economic growth reduces the political divide; whereas, if agents are very risk-averse, growth increase the divide, exhacerbating political conflict.

Keywords: Polarization, risk-aversion.

JEL Codes: D72, H20, E62.

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In a environment in which agents have preferences over an Euclidean policy space, "political polarization" is typically defined as the distance between the ideal policies of two individual agents (Gordon and Landa 2017), or the distance between the mean or median (McCarthy, Poole and Rosenthal 2016), or the modal (Fiorina and Abrams 2008) ideal policies of each of two distinct sets of agents.

Such notion of ideal policy distance does not capture the intensity of disagreement, and thus, it is only an inadequate proxy for the agents' willingness to incur costs to advance their preferred policy at the expense of policies preferred by other agents (Gordon and Landa 2018, 2021). We propose a notion of political distance that better captures the latent potential for affective polarization (Iyengar et al. 2019), antagonism and political conflict induced by heterogeneous ideological preferences. We define the **political divide** between two agents as the monetary transfer, as a share of the total economy, that makes an agent indifferent between paying this transfer and obtaining her ideal policy, or accepting the other agent's ideal policy and receiving the transfer as compensation.

The larger the political divide, the more expensive it is to build a coalition that bridges ideological differences with side payments, and the more willing that agents will be to engage in costly contests of uncertain resolution to determine the collective policy choice.

We wonder: does economic development alleviate or exacerbate the political divide and thus the potential for ideologically motivated conflict? At the individual level, as an agent becomes individually wealthier, her marginal value of money decreases. Holding ideological preferences and the size of the economy constant, the agent's political divide from others increases; the agent treats satisfaction on the ideological dimension as a luxury good, to be increasingly demanded as she becomes rich (Enke, Polborn and Wu 2022). But what if the entire economy grows? Does the agents' willingness to pay for gains on the ideological dimension increase faster or slower than the economy as a whole? If the nominal increase is slower, the political divide -the share of the economy that suffices as compensation for a loser on the ideological dimension- shrinks with aggregate wealth; i.e. societies can grow their way out of ideological conflict.

Whether growth increases or reduces (or leaves invariant) the political divide depends on the rate of decrease of the marginal utility of consumption with wealth. Assume that agents are expected utility maximizers, with preferences over degenerate lotteries representable by a utility function with two additively separable terms: the utility over policy, and an indirect utility function v over wealth. Then $v'(w)$ is the marginal indirect utility of optimal consumption at wealth w, and an agent's marginal willingness to pay (in wealth) for a marginal improvement on the policy dimension is $\frac{1}{v'(w)}$, i.e. the inverse of her marginal indirect utility of wealth.

Consider the marginal willingness to pay not in absolute terms, but rather as a share of the agent's total wealth; this marginal share willingness to pay is $= \frac{1}{v'(w)w}$. As economic growth makes every agent proportionally wealther, agents are willing to spend a decreasing share of the economy fighting over ideology (i.e. growth heals the political divide) if and only if the derivative of the marginal share willingness to pay with respect to wealth is negative. And —this is our main observation— this derivative is negative if and only if the agents' relative risk aversion coefficient is less than one.

For a motivating application, let us analyze the conditions that foster separatist movements. Secessionist campaigns are seldom determined by a solitary factor, with identity and the economy being typically two predominant driving forces. For example, differences in national identity and the per capita financial net gains or costs of independence emerged as the two major themes of the campaigns for the 2014 Referendum on Scottish Independence from the United Kingdom, (Keating 2017), or the 2017 Referendum on Catalan Indepence from Spain (Della Porta and Portos 2021). On these grounds, we see two likely explanations for the rise or fall of separatist sentiments: a) a shift in foundational elements (identity and/or the relative economic performance of each group), or b) an alteration in aggregate economic conditions across both groups, which influences the dynamics between identity and economic attitudes through wealth effects that alter the relevance of transfers from wealthier to poorer regions.

Traditional indicators of polarization often focus on the foundational elements and fail to account for common economic growth or downturns as potential catalysts for the increase or decrease in divisive attitudes. This paper suggests an approach to gauge political division that responds to both shifts in fundamental factors and economic changes. While estimates of national relative risk-aversion vary (Gandelman and Hernández Murillo 2015), if the true value is small, then spikes of identity-related tensions after sudden recessions are to be expected. When recession hits a country with low risk aversion, the transfers necessary to mitigate identitarian conflict by compensating the losers of the identitarian dispute represent a larger share of a shrinking economy, so ideological divisions flare up, while of course this comparative static is reversed if agents are very risk-averse.

We note that we are not the first to propose measuring political disagreement by the size of the transfers that would make agents indifferent about a switch from one policy to another. To our knowledge, such first would be Gordon and Landa (2018), who define the "absolute resistance potential" as the utility transfer that would make a group of agents acquiesce to a policy change. We depart from their approach by introducing a richer domain of preferences over policy and wealth and quantifying in wealth units (instead of utility units) the transfer that makes an agent indifferent to a policy change. Measuring the political divisions in monetary terms enables us to distinguish conditions under which economic growth exacerbates or tampers political divisions. Namely: if agents are not very risk averse (if their relative risk aversion is less than one), then proportionally distributed growth (one that leaves inequality constant) reduces the political divide; whereas if agents are very risk-averse (with relative risk aversion greater than one), then growth increases the political divide.

1 Formal Framework

The agents, and their preferences and endowments.

Let L and R be two sets of agents with sizes $n_\ell \in \mathbb{N}$ and $n_r \in \mathbb{N}$; let ℓ be a representative agent of set L; and let r be a representative agent of set R. Let $X \subseteq \mathbb{R}$ be a convex set of policies. An outcome is a triple $(x, w_\ell, w_r) \in X \times \mathbb{R}_+^2$ specifying a policy x, the wealth w_ℓ of each agent $\ell \in L$, and the wealth level w_r of each agent $r \in R$.

Each agent $i \in \{\ell, r\}$ has separable preferences over policy and over her own wealth. Agent i's preferences over X are continuous and single-peaked with ideal point x_i. Assume, without loss of generality, that $x_\ell \leq x_r$. Agent i has strictly increasing preferences over wealth $w_i \in \mathbb{R}_{++}$.

It follows from these assumptions that, for each $i \in \{\ell, r\}$, there exists a strictly quasiconcave function $u_i^X : X \to \mathbb{R}$ with maximum at $u_i(x_i) = 0$, and a continuous, strictly increasing function $v_i : \mathbb{R}_+ \to \mathbb{R}$ such that the preference of agent i over $X \times \mathbb{R}_+$ is representable by a utility function

$$u_i(x, w_i) = u_i^X(x) + v_i(w_i).$$

We interpret u_i^X as the utility over policy, and v_i as an indirect utility of wealth, and we assume that v_i is twice continuously differentiable and weakly concave. We assume that agent i is an expected utility maximizer whose preferences over lotteries are to maximize the expected value of u_i.

Each agent i is endowed with wealth $\bar{w}_i \in \mathbb{R}_{++}$ such that for $j \in \{\ell, r\} \backslash \{i\}$, $u_i^X(x_j) + v_i(w_i) > v(0)$, so that no agent is willing to spend all her wealth to change policy from the ideal of another agent to her own ideal.[1]

Let $\bar{w} = \frac{n_\ell \bar{w}_\ell + n_r \bar{w}_r}{n_\ell + n_r}$, so that $\bar{w}$ is the wealth per capita in society.

Risk aversion.

With preferences over lotteries over wealth representable by the expectation of $v_i(w)$, for any $w \in \mathbb{R}_+$, agent i's **relative risk-aversion coefficient** at wealth $w_i = w$ is

$$\rho_i(w) = -\frac{w v_i''(w)}{v_i'(w)}.$$

Relative risk aversion is the elasticity of the marginal utility of wealth. The greater the risk aversion coefficient ρ_i, the greater the share of her wealth that an agent is willing to give up to avoid risk over her wealth. Relative risk risk aversion is a local property, computed pointwise at each wealth level. Risk neutrality corresponds to zero risk aversion. We categorize possible values of positive risk aversion into two ranges, with a special case separating the two.

Definition 1. *For any $w \in \mathbb{R}_+$, we say that agent i is "modestly" risk-averse at w if $\rho_i(w) \in (0, 1)$; "moderately" risk-averse at w if $\rho_i(w) = 1$; and "very" risk-averse at w if $\rho_i(w) > 1$.*

From local risk aversion defined pointwise, we can define degrees of risk aversion over a range of values of wealth, or globally. For any interval $I \subseteq \mathbb{R}_+$, we say that agent i is "modestly" [or "moderately", or "very"] risk-averse over I if she is so at w for any $w \in I$. We say that i is "modestly" [or "moderately", or "very"] risk-averse if she is so over $\mathbb{R}_+$.

The political divide.

Definition 2. *Let $\{i, h\} = \{\ell, r\}$. The **political divide** from agent i to j, denoted by $d_{i,j}$ is the proportion of per capita wealth $\bar{w}$ such that agent i with ideal policy x_i and wealth endowment $\bar{w}_i$ is indifferent between outcome $(x_i, \bar{w}_i - d_{i,j}\bar{w})$ and outcome $(x_j, \bar{w}_i + d_{i,j}\bar{w})$.*

The political divide $d_{i,j} \in \mathbb{R}_+$ is a distance quantified in wealth. It measures the monetary compensation, as a proportion of per capita wealth, that makes agent i indifferent between accepting the compensation and compromising fully on policy, or paying the compensation and attaining her own ideal policy.

Notice that this distance is not necessary symmetric: agent i might perceive the difference between policies x_i and x_j to be worth a lot of money, while j perceives this policy difference

[1]Standard Inada conditions such that $\lim_{w_i \to 0} v_i(w_i) = -\infty$ suffice, and are not necessary, for this condition to hold.

to be worth very little. We refer to the average of the political divide from ℓ to r and from r to ℓ, weighted by population, as the political divide "between" groups L and R. This political divide between groups quantifies in monetary terms the per capita cost of ideological disagreements over policy.

The result.

We ask in the title: "*can growth heal the political divide?*" More precisely, do fights over ideology ease as society gets wealthier, or do they only become more intense? Do different groups perceive the disagreements over policy to be worth an increasing, or a decreasing share of total resources? What is the derivative of the political divide between groups with respect to changes in wealth endowments?

Assume society experiences a multiplicative wealth shock $\gamma \geq 1$ that transforms each individual wealth endowment. Formally, let $\hat{w}_\ell \in \mathbb{R}_{++}$ and $\hat{w}_r \in \mathbb{R}_{++}$ be exogenously given, and for each $i \in \{\ell, r\}$, let the wealth endowment w_i be a function of the growth parameter γ, so that $w_i(\gamma) = \gamma \hat{w}_i$. Define $\hat{w} = \frac{n_\ell \hat{w}_\ell + n_r \hat{w}_r}{n_\ell + n_r}$. It follows that the per capita wealth endowment $\bar{w}$ is also proportional to growth, namely, $\bar{w}(\gamma) = \gamma \hat{w}$. The political divide $d_{i,j}$ as defined in Definition 1 is similarly a function of the growth parameter. If $x_\ell = x_r$, then the political divide is zero, and constant in growth. We are interested in the derivative of the political divide $d_{i,j}(\gamma)$ with respect to growth γ, in an environment with heterogeneous ideal policies.

Proposition 1. *Assume $x_\ell \neq x_r$. The political divide $d_{i,j}(\gamma)$ is strictly positive. Further, it strictly decreases in γ if agents are risk neutral or modestly risk-averse; it is constant in γ if agents are moderately risk-averse; and it strictly increases in γ if agents are very risk-averse.*

Proof. By the definition of $d_{i,j}$,

$$-u_i^X(x_j) = v_i(\gamma \hat{w}_i + d_{i,j}(\gamma)\gamma \hat{w}) - v_i(\gamma \hat{w}_i - d_{i,j}(\gamma)\gamma \hat{w}).$$

Using the implicit function theorem, we obtain the derivative of d with respect to γ,

$$d'_{i,j}(\gamma) = -\frac{(\hat{w}_i + d_{i,j}(\gamma)\hat{w})\, v'_i\left[\gamma(\hat{w}_i + d_{i,j}(\gamma)\hat{w})\right] - (\hat{w}_i - d_{i,j}(\gamma)\hat{w})\, v'_i\left[\gamma(\hat{w}_i - d_{i,j}(\gamma)\hat{w}\right]}{\gamma \hat{w}\left[v'_i\left(\gamma \hat{w}_i + d_{i,j}(\gamma)\gamma \hat{w}\right) + v'_i\left(\gamma \hat{w}_i - d_{i,j}(\gamma)\gamma \hat{w}\right)\right]} \tag{1}$$

This derivative is strictly positive if and only

$$(\hat{w}_i + d_{i,j}(\gamma)\hat{w})\, v'_i\left[\gamma(\hat{w}_i + d_{i,j}(\gamma)\hat{w})\right] < (\hat{w}_i - d_{i,j}(\gamma)\hat{w})\, v'_i\left[\gamma(\hat{w}_i - d_{i,j}(\gamma)\hat{w}\right]$$

$$\Longleftrightarrow \gamma\left(\hat{w}_i + d_{i,j}(\gamma)\hat{w}\right) v'_i\left[\gamma(\hat{w}_i + d_{i,j}(\gamma)\hat{w})\right] < \gamma\left(\hat{w}_i - d_{i,j}(\gamma)\hat{w}\right) v'_i\left[\gamma(\hat{w}_i - d_{i,j}(\gamma)\hat{w}\right], \tag{2}$$

and strictly negative if the inequality is reversed.

Define function $f : \mathbb{R}_+ \to \mathbb{R}_+$ by $f(w) = wv_i'(w)$ for any $w \in: \mathbb{R}_+$. Then a sufficient condition for Inequality (2) to hold and the political divide to decrease with γ is that f be strictly decreasing, or, equivalently, that $v_i'(w) + wv_i''(w) < 0$, or, equivalently, that $\rho(w) > 1$ for any $w \in (\hat{w}_i - d_{i,j}(\gamma), \hat{w}_i + d_{i,j}(\gamma))$; similarly, $\rho(w) \in (0,1)$ for any $w \in (\hat{w}_i - d_{i,j}(\gamma), \hat{w}_i + d_{i,j}(\gamma))$ is a sufficient condition for Inequality (2) to hold with the reversed inequality and thus for the political divide to increase with γ.

□

For an intuition, consider the marginal willingness to pay for marginal policy changes at wealth w, for the simpler case in which all agents are endowed with wealth w and share a common indirect utility function v. The marginal indirect utility of wealth is $v'(w)$. The marginal willingness to pay for a marginal policy change of unitary marginal utility is thus $1/v'(w)$, and the willingness to pay as a share of per capita wealth is $1/(wv'(w))$. The derivative with respect to w of this marginal relative willingness to pay is

$$-\frac{v''(w)w + v'(w)}{(wv'(w))^2} = -\frac{v''(w)}{w(v'(w))^2} - \frac{1}{w^2 v'(w)},$$

which is positive if and only if

$$-\frac{wv''(w)}{v'(w)} > 1,$$

so the curvature of v as captured by the coefficient of relative risk aversion ρ determines whether the marginal willingness to pay increases or decreases, as a share of the total economy, with increases in wealth. The proof of Proposition 1 only extends this intuition from the marginal incentives, to the willingness to pay for a full policy change from x_j to x_i.

2 Interpretation

Economic growth reduces the political divide if the curvature of the utility over consumption is such that $\frac{wv''(w)}{v'(w)}$ is greater than one; whereas, the political divide increases it if this ratio is below one. Whether v is such that this ratio is above or below the threshold is an empirical question.

Horowitz, List and McConnell (2007) show experimental evidence of decreasing willingness to pay in units of Good 2 for additional units of Good 1. Extrapolated to our environment, their result implies $v''(w) < 0$ and $\frac{wv''(w)}{v'(w)} > 0$. Based on data on labor supply,

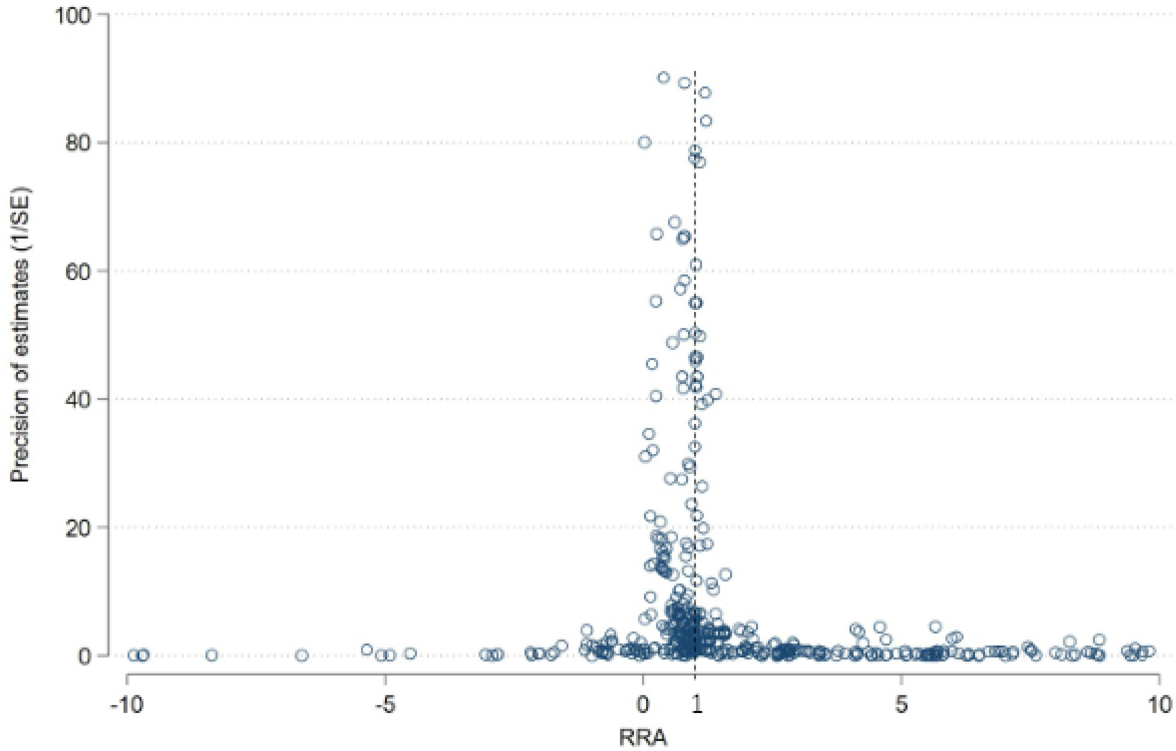

Figure 1: Relative Risk Aversion estimates (Elminejad, Havranek and Irsova 2022).

Chetty (2006) estimates $\frac{wv''(w)}{v'(w)}$ at approximately 1.

Since $\frac{wv''(w)}{v'(w)}$ is also the coefficient of relative risk aversion of utility function v, we turn to the voluminous literature on estimating this coefficient for additional evidence. Estimates vary greatly, with a preponderance of evidence in support of a value around one, as shown in Figure 1, adapted from data in a meta-analysis by Elminejad, Havranek and Irsova (2022).[2] Proposition 1 implies that if the curvature of the indirect utility of wealth is indeed one, then growth that delivers a proportional increase in wealth to every citizen has no effect on the political divide: political conflict over ideological differences is likely to remain similarly intense as societies get richer.

What if the relevant curvature of v changes with wealth? Arrow (1965) argues that in the limit, for very low wealth relative risk aversion must be below one, and for very high wealth above one. If so, and if the coefficient is monotonic, then the political divide is U-

[2] Arrow (1965) notes that on theoretical grounds, if relative risk aversion is constant, its value must be one

shaped in wealth, first decreasing with wealth as long as relative risk aversion is below one, then increasing thereafter. If, on the contrary, the relative risk aversion decreases in wealth, then the effect of wealth on the political divide is single-peaked: growth first exacerbates, then mitigates, political conflict. So which is it? Does relative risk aversion increase, stays constant, or decreases with wealth? Once again, the literature is all over the place. Besides Arrow (1965), Siegel and Hoban (1982) find that relative risk aversion increases in wealth, while Ogazhi and Zhang (2001) find that it decreases. Whereas, Chiappori and Paiella (2011) use panel data to categorically inform us that, quoting their article's title: "*Relative risk aversion is constant.*"

The correct interpretation of our result is contingent on correctly settling the question on the curvature of the utility over consumption. If Chetty (2006) and Chiappori and Paiella (2011) are correct and the curvature is such that the coefficient of relative risk aversion is one and is constant across wealth levels, then growth does not affect the political divide: we cannot grow our way out of political tension, but at least economic development will not hurt. For ideology to be a luxury good that raises in relative salience as material needs are met (Enke, Polborn and Wu, 2022), the utility over wealth must be curved enough so that relative risk aversion is over one.

Extensions. Other applications.

Our definition of the political divide is underpinned by an implicit bargaining process, in which policy winners pay a monetary compensation to policy losers, who in exchange, concede on the policy dimension. Our proposition is robust if we consider instead an environment in which policy is determined through a costly contest for office, with the office-holder choosing the policy she prefers, and we define the political divide as the cost that agent $i \in \{\ell, r\}$ is willing to pay to win office, rather than letting $i \in \{\ell, r\}$, $j \neq i$ hold office.

The notion of political divide as a measure of the intensity of disagreement is also applicable to environments with a non-monetary second dimension. We consider two such applications.

1. Party cohesion. Assume that L and R are two factions of a party, and that all agents are both policy-motivated and office-motivated. A citizen-candidate emerges from each faction in each election cycle. Candidates have independently drawn valence, distributed over $[0, 1]$, and representing their probability of winning the election and carrying the party into office. In this application, we can quantify the factional political divide over policy in terms of the valence (probability of election victory) that a faction is willing to sacrifice to run on its preferred policy. The probability that factions ℓ and r agree on which is the best candidate decreases in their political divide $d_{i,j}$ and $d_{j,i}$ for a fixed polarization as traditionally measured; whereas, it does not decrease in polarization as traditionally measured, for a fixed political divide.

2. Intersectional alliances. Return to the benchmark model, with preferences over policy and wealth, but now assume that the policy set X is two dimensional, and there are four groups $\{LL, LR, RL, RR\}$ with the labels capturing their ideal policy on each dimension. The notion of political divide allows us to categorize groups who are can more easily compromise and work together, because their disagreements are less intense, and these are not necessarily the ones whose ideal points are close to each other; indeed, agents with an ideal point at $(1, 1)$ are more willing to compromise with others at, say, $(3, 1)$ than with those at $(1, 2)$ if the political divide —the willingness to give up resources to change a policy for another— is greater from $(1, 1)$ to $(1, 2)$ than to $(3, 1)$, which can explain, for instance, whether political cleavages form along an economic left vs right axis, or along others such as a cultural progressive vs reactionary axis, or a centralization vs separatism or globalization vs nativism axis.

In any of these applications, it is not the distance between ideal points, but rather the willingness to incur costs in pursuit of policy gains, as measured by the political divide, that drives the intensity of political disagreements that arise in a polarized society.

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