

# Polarization and Conflict

## 1. Polarization, Ethnicity and Civil War

Debraj Ray, New York University

R.C. Dutt Lectures

# Outline

Ethnic dimensions of civil war

[introduce and use the idea of *polarization* to capture this]

Tomorrow: why might ethnicity be focal in conflict?

[theory: will introduce a simple model to study salience]

## Wars over 1945–1999

battle deaths in 25 interstate wars: approx.  
3.33m

deaths in civil wars: approx. 16.2m

civil wars in 73 states, median duration 6 years

25 ongoing in 1999

Not counting immense welfare costs of conflict: 8% of world GDP as estimated by Hess (2003)

It has been argued “ethnic divisions” — broadly defined — may be a significant determinant of conflict.

E.g., Huntington (1996) has argued for a cultural perspective on conflict and war.

“Ethnicity” is far less mutable than ideology, economic differences or nationality.

Donald Horowitz (1985):

“The Marxian concept of class as an inherited and determinative affiliation finds no support in [the] data. Marx’s conception applies with far less distortion to ethnic groups. Ethnic membership is generally given at birth, . . . and have considerable power to generate conflict . . .

In much of Asia and Africa, it is only modest hyperbole to assert that the Marxian prophecy has had an ethnic fulfillment.”

This doesn't mean, of course, that ethnicity is a “primordial” or intrinsic source of conflict.

E.g., Ethnicity may be a marker for carving a larger share of a given pie.

[salience question related to tomorrow's lecture]

The primordial/constructivist issue is an important one

But a more basic question needs to be settled first

Is it really true that ethnic divisions matter for conflict?

Two ways to approach this question.

Historical study of conflicts, one by one. E.g.:

Prunier on Rwanda

Gagnon on Bosnia

Deng on the Sudan

Kalyvas on Greece

Tambiah on Sri Lanka

Horowitz on everything

A bit of a wood-for-the-trees problem. E.g.,  
Horowitz.

Alternative is statistical study:

Collier-Hoeffler

Fearon-Laitin

Miguel-Satyanath-Sergenti

Montalvo-Reynal

## Typical Variables for a Test

Of course, many measures of “conflict”:

demonstrations, processions, strikes, riots and on to civil war.

Even with a specific choice such as civil war (used here) need defining criteria

See Singer-Small (1994), Licklider (1995), Doyle-Sambanis (2000), Fearon-Laitin (2003)

## Explanatory Variables

*Economic*: per-capita income, inequality of income or wealth, resource holdings . . .

*Geographical*: mountainous terrain, separation from capital city . . .

*Political*: “extent of democracy” , prior war . . .

And, of course

*“Ethnic”*

*Ethnolinguistic diversity:* World Christian Encyclopedia, Encyclopedia Britannica, Atlas Narodov Mira, CIA FactBook

*Religious diversity:* L’Etat des Religions dans le Monde, World Christian Encyclopedia, The Statesman’s Yearbook

Index with the widest currency

The *ethnolinguistic fractionalization index*, or ELF [Taylor and Hudson (1972)]

[Of course, nothing to stop its use for religious diversity as well.]

Say there are  $M$  groups.  $n_j$  is the population share of group  $j$ . Then

$$E = \sum_{j=1}^M n_j (1 - n_j)$$

Trivial to rewrite as

$$E = \sum_{j=1}^M \sum_{k=1}^M n_j n_k * [\text{“Distance” between } j \text{ and } k]$$

“distance” = 1 if the two groups are distinct,  
and 0 otherwise.

So closely related to Gini inequality measure.  
More on this later.

ELF widely used in empirical work

Taylor and Hudson (1972)

Mauro(1995)

Easterly and Levine (1997)

Alesina *et al.* (2003)

Vigdor (2002)

Collier and Hoeffler (2002)

Fearon and Laiton (2003)

Miguel-Satyanath-Sergenti (2005)

... and many others.

*But it shows no correlation with conflict*

(when other variables — including per-capita income — are controlled for).

See Collier and Hoeffler (2002), Fearon and Laitin (2003), Miguel-Satyanath-Sergenti (2005).

Fearon and Laitin (*American Political Science Review* 2003)

“The estimates for the effect of *ethnic* and *religious fractionalization* are substantively and statistically insignificant . . . The empirical pattern is thus inconsistent with . . . the common expectation that ethnic diversity is a major and direct cause of civil violence.”

In contrast,

“Per capita income (measured as thousands of 1985 U.S. dollars and lagged one year) is strongly significant in both a statistical and a substantive sense . . . .”

Correction for endogeneity (see Miguel-Satyanath-Sergenti (2005)).

Of course, ethnic or religious fractionalization might indirectly affect conflict

*via* reduced GDP (Alesina et al. (2003))

reduced GDP growth (Easterly and Levine (1997))

poor governance (Mauro (1995))

But the claim is that there is no *direct* effect.

But ... is ELF the right measure?

But ... is ELF the right measure? Horowitz again:

“I have intimated at various points that a system with only two ethnic parties ... is especially conflict prone ... In dispersed systems, group loyalties are parochial, and ethnic conflict is localized; it ‘could put one of a series of watertight compartments out of order, but it could not make the ship of state sink ...’ The demands of one group can sometimes be granted without injuring the interests of others ...”

On the other hand,

“A centrally focused system [with few groupings] possesses fewer cleavages than a dispersed system, but those it possesses run through the whole society and are of greater magnitude. When conflict occurs, the center has little latitude to placate some groups without antagonizing others.”

The conflictual power of broad cleavages is of course an older theme:

“As the struggle proceeds, the whole society breaks up more and more into two hostile camps, two great, directly antagonistic classes: bourgeoisie and proletariat. The classes *polarize*, so that they become internally more homogeneous and more and more sharply distinguished from one another in wealth and power.”  
(Morton Deutsch, 1971)

More a notion of *polarization* rather than *fragmentation*.

# The Identity-Alienation Framework

(work with Joan Esteban and more recently with Jean-Yves Duclos)

Society is divided into “groups” (economic, social, religious, spatial...)

*Identity.* There is “homogeneity” *within* each group.

*Alienation.* There is “heterogeneity” *across* groups.

Axiomatic approach *presumes* that such a situation is inherently conflictual.

“We begin with the obvious question: why are we interested in polarization? It is our contention that the phenomenon of polarization is closely linked to the generation of tensions, to the possibilities of articulated rebellion and revolt, and to the existence of social unrest in general . . . .”

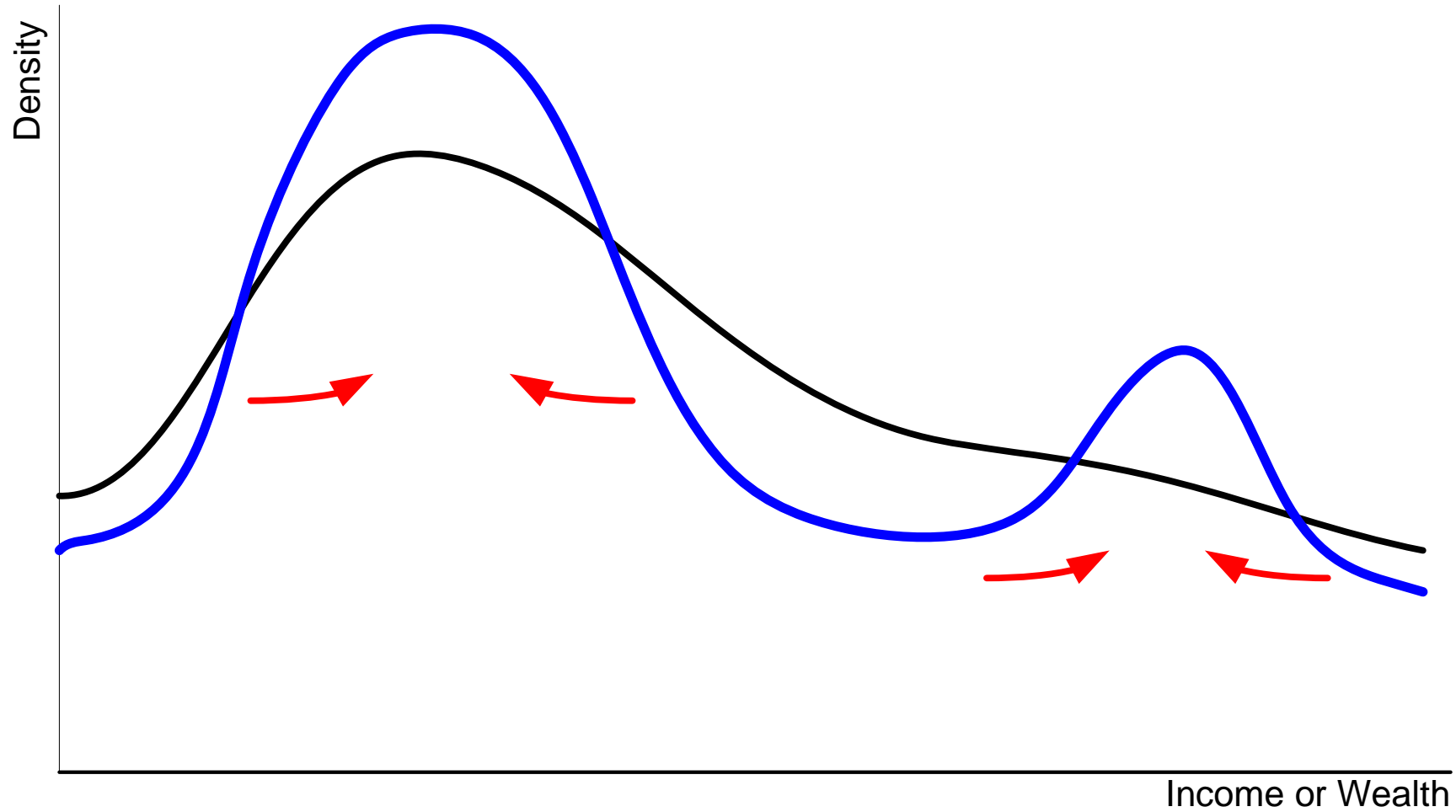
Esteban and Ray, *Econometrica* 1994

Does the standard theory of inequality measurement fit?

*Pigou-Dalton Transfers Principle.* A transfer of resources from a relatively poor to a relatively rich individual must raise income inequality.

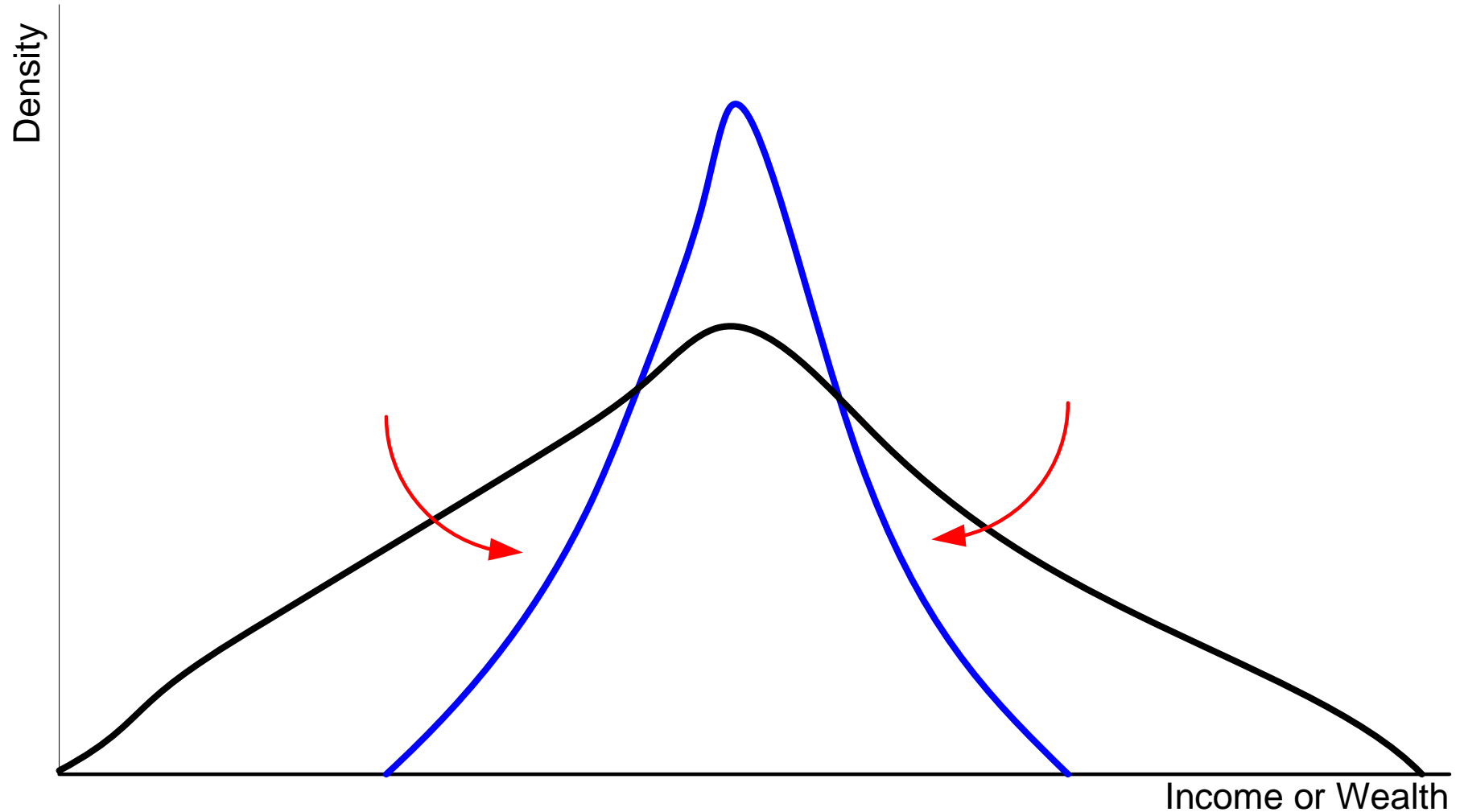
Forms the building block for all measures of inequality.

# A “Local Compression” Raises Polarization.



Of course, this isn't to suggest that polarization is *always* different from inequality . . .

# A “Global Compression” Lowers Polarization.



Local reconfiguration has different effects depending on the overall distribution.

[Very different from inequality, a local construct.]

Observe that the notion of “groups” may be quite general:

*Economic*: income- or wealth-based (class)

*Social*: religious, linguistic, geographical, political groupings.

But a natural notion of “distance” across economic groups makes this an easier starting point.

# Polarization for Economic Groupings

“Inputs”: various distributions of income or wealth on different populations.

[More precisely, *density functions* with varying populations.]

“Outputs”: a measure of polarization for each distribution.

Objective: axiomatically try and pin down a class of measures

Each individual feels two things:

*Identification* with people of “similar” income.

[Use as proxy the height of density  $n(x)$  at income  $x$ .]

*Alienation* from people with “dissimilar” income.

[Income distance  $|y - x|$  of  $y$  from  $x$ .]

*Effective antagonism of  $x$  towards  $y$*

*depends on  $x$ 's alienation from  $y$*

*and on  $x$ 's sense of identification.*

More formally, write effective antagonism of  $x$  towards  $y$  as

$$T(i, a)$$

where  $i = n(x)$  and  $a = |x - y|$ .

View *polarization* as the “sum” of all such antagonisms over the population.

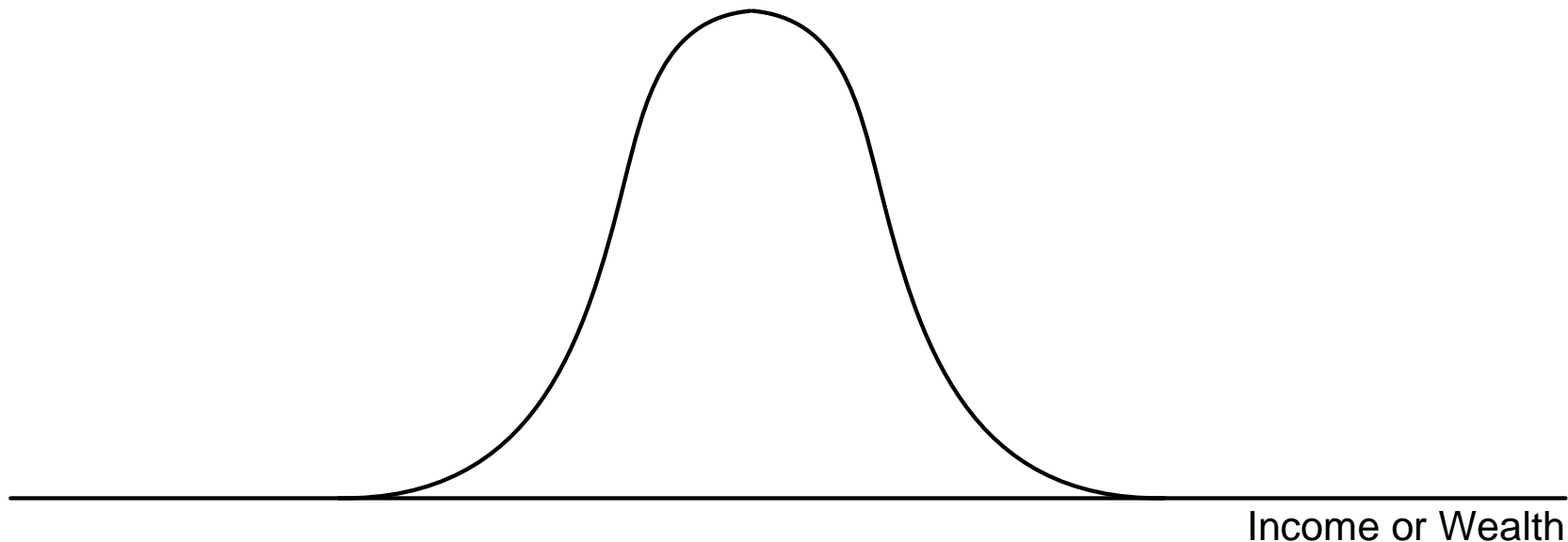
$$P(f) = \int \int T(n(x), |x - y|) n(x)n(y) dx dy$$

Not very useful as it stands, but hopefully a good starting point.

# Axiomatic Approach

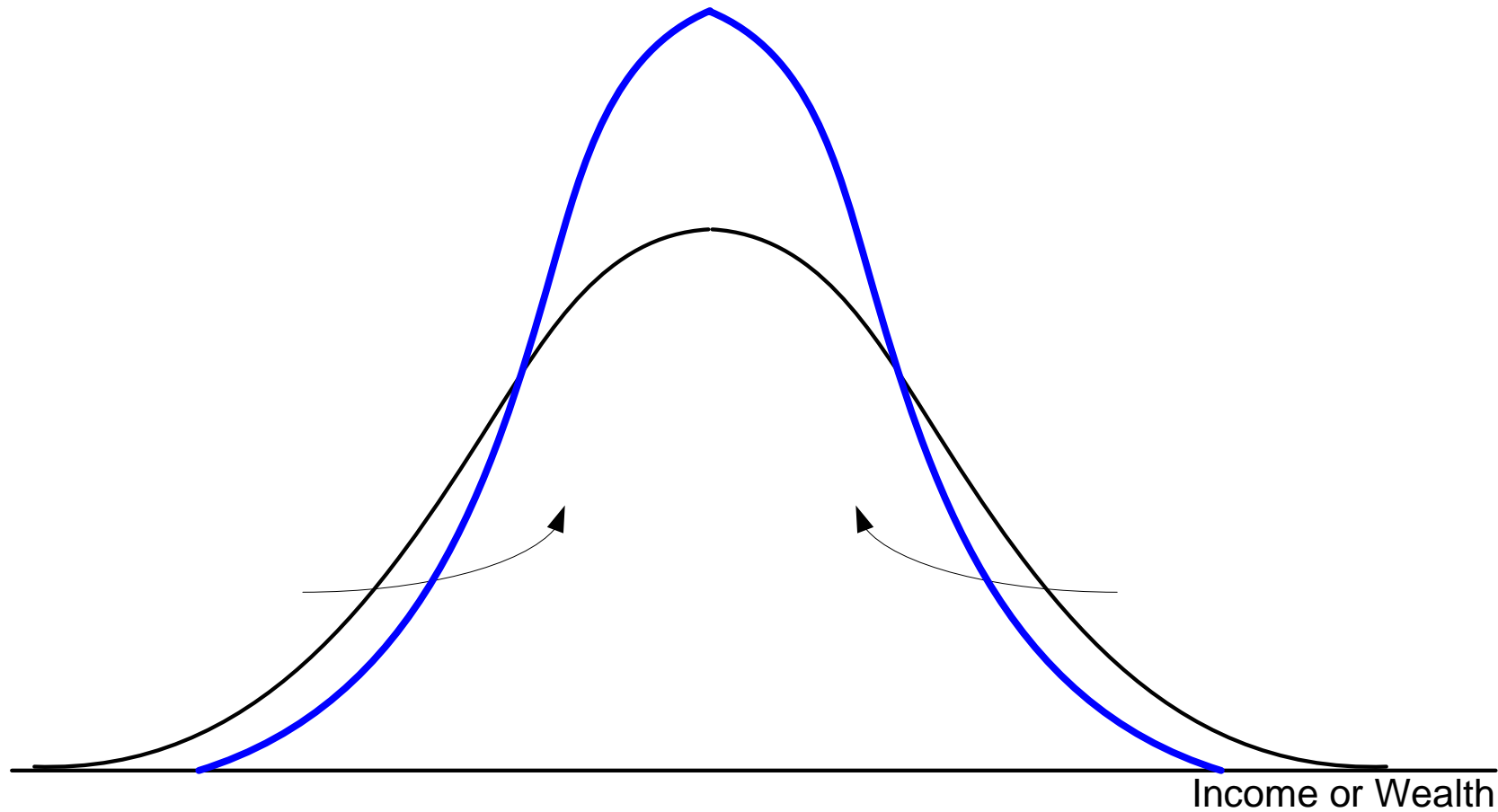
Axioms based on very special distributions: *basic densities* . . .

. . . symmetric, single-peaked distributions on a bounded range.



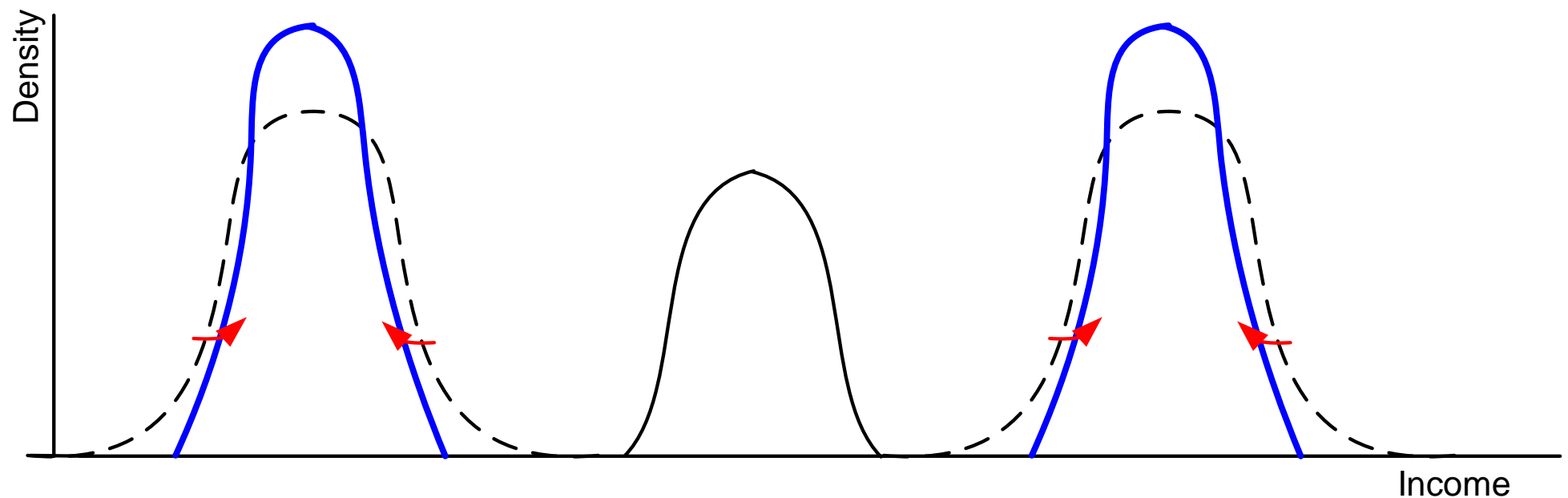
*Axiom 1.* If a distribution is just a single basic density, a “global compression” of that density cannot increase polarization.

# Global compression cannot raise polarization

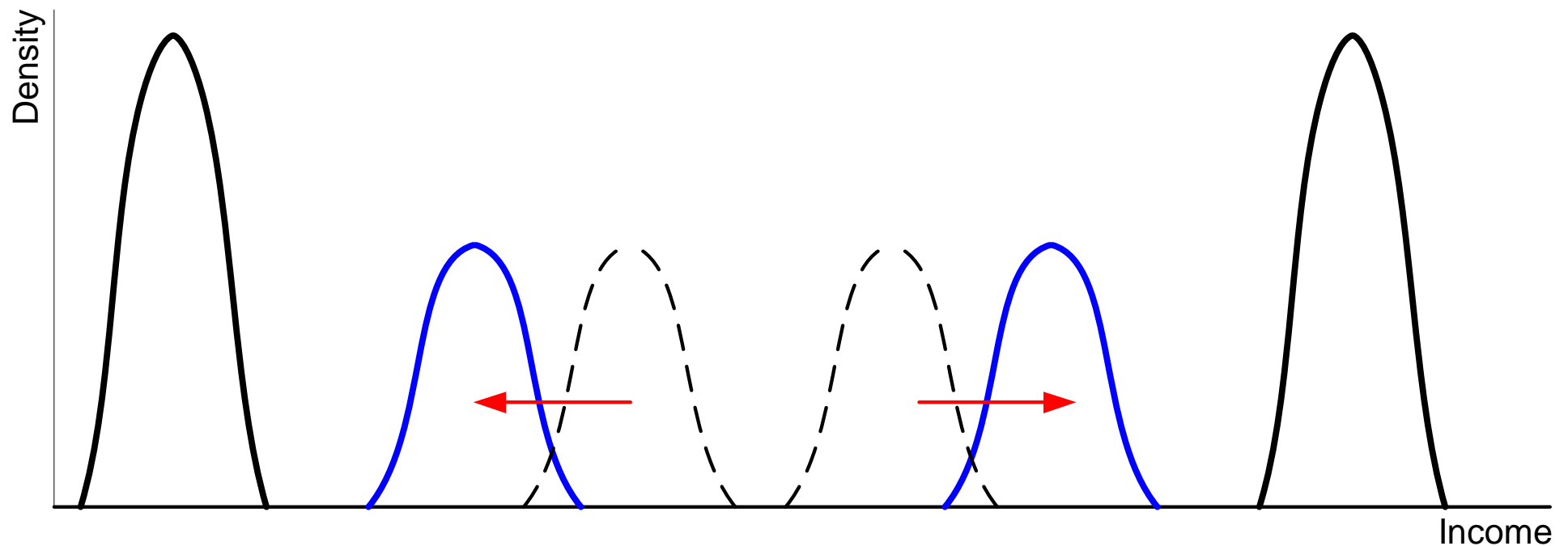


$$f^\lambda(x) \equiv \frac{1}{\lambda} f \left( \frac{x - [1 - \lambda]m}{\lambda} \right)$$

*Axiom 2.* If a *symmetric* distribution is composed of three disjoint scalings of the same basic density, then a compression of the *side* densities cannot reduce polarization.



*Axiom 3.* Consider a *symmetric* distribution composed of four basic densities drawn from the same root. Slide the two middle densities to the side as shown. Then polarization must go up.



*Axiom 4.* [Population Neutrality.] Polarization comparisons are unchanged if both populations are scaled up or down by the same percentage.

**Theorem 1** *A polarization measure satisfies Axioms 1–4 if and only if it is proportional to*

$$\int \int n(x)^{1+\alpha} n(y) |y - x| dy dx,$$

*where  $\alpha$  lies between 0.25 and 1.*

## Polarization and Inequality

$$\text{Pol} = \int \int n(x)^{1+\alpha} n(y) |y - x| dy dx,$$

where  $\alpha$  lies between 0.25 and 1.

Compare with the Gini coefficient / fractionalization index:

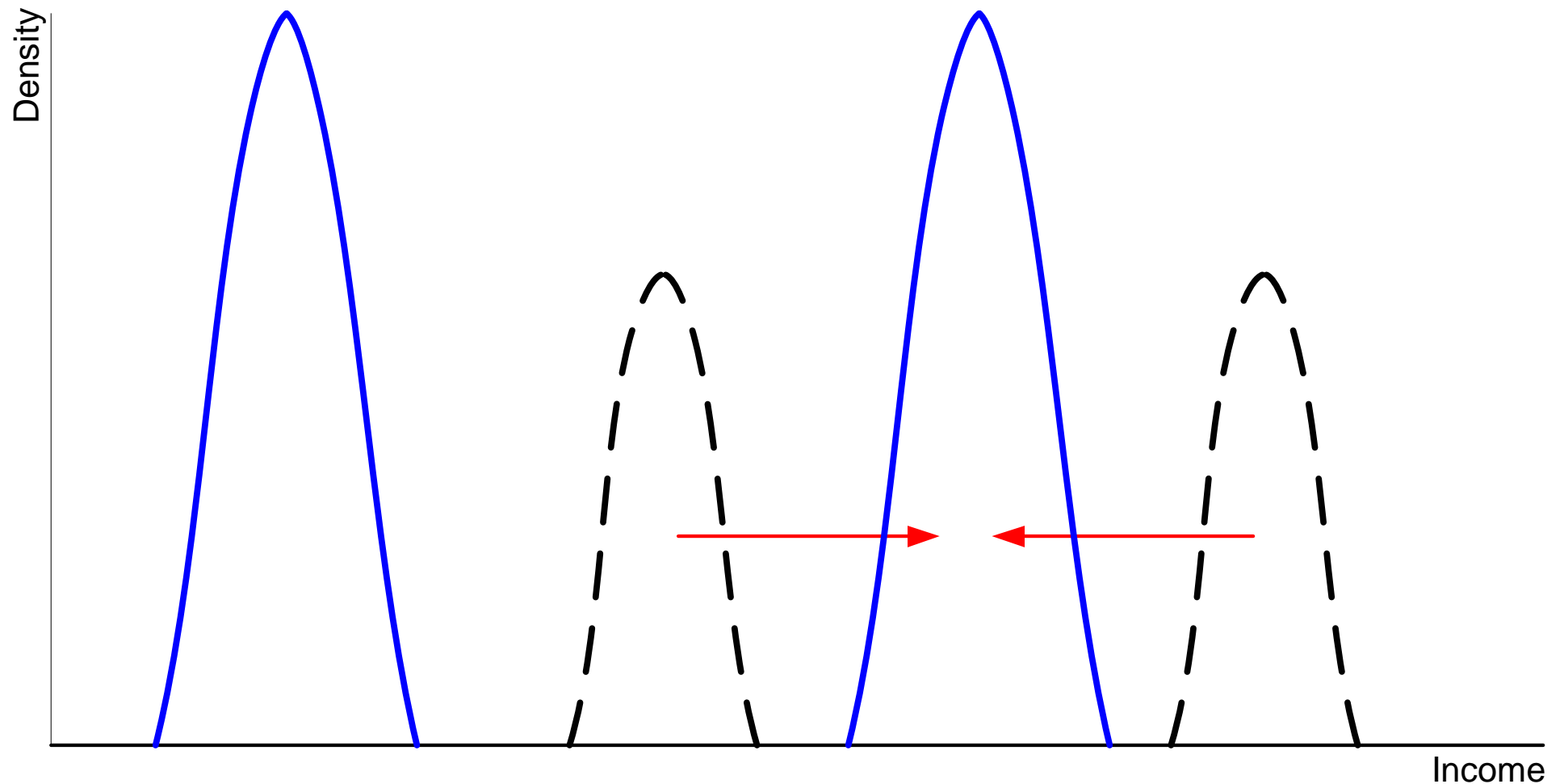
$$\text{Gini} = \int \int n(x) n(y) |y - x| dy dx,$$

It's  $\alpha$  that makes all the difference.

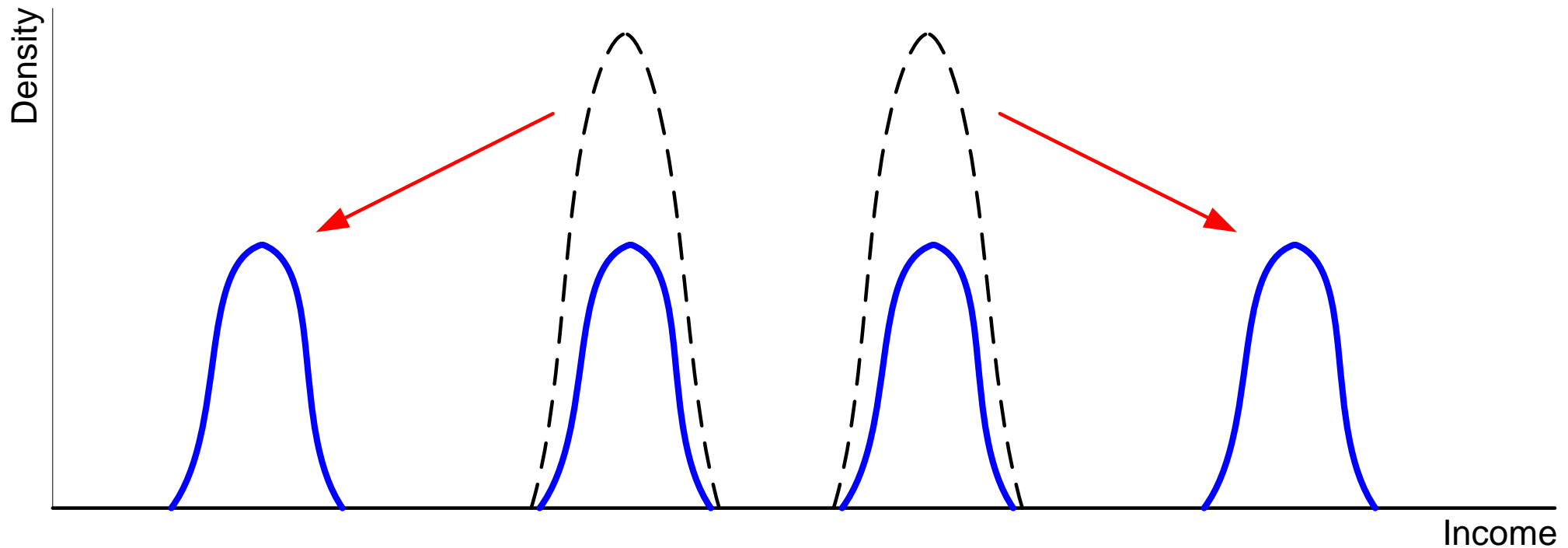
# Three Properties

1. *Bimodality.* Polarization maximal for bimodal distributions, but defined of course over all distributions.

2. *Globality*. The local “merger” of two groups has effects that depend on the shape of the distribution elsewhere.



3. *Nonlinearity.* Same direction of population or income movement may cause polarization to go down or up, depending on context.



More on  $\alpha$

$$\text{Pol} = \int \int n(x)^{1+\alpha} n(y) |y - x| dy dx,$$

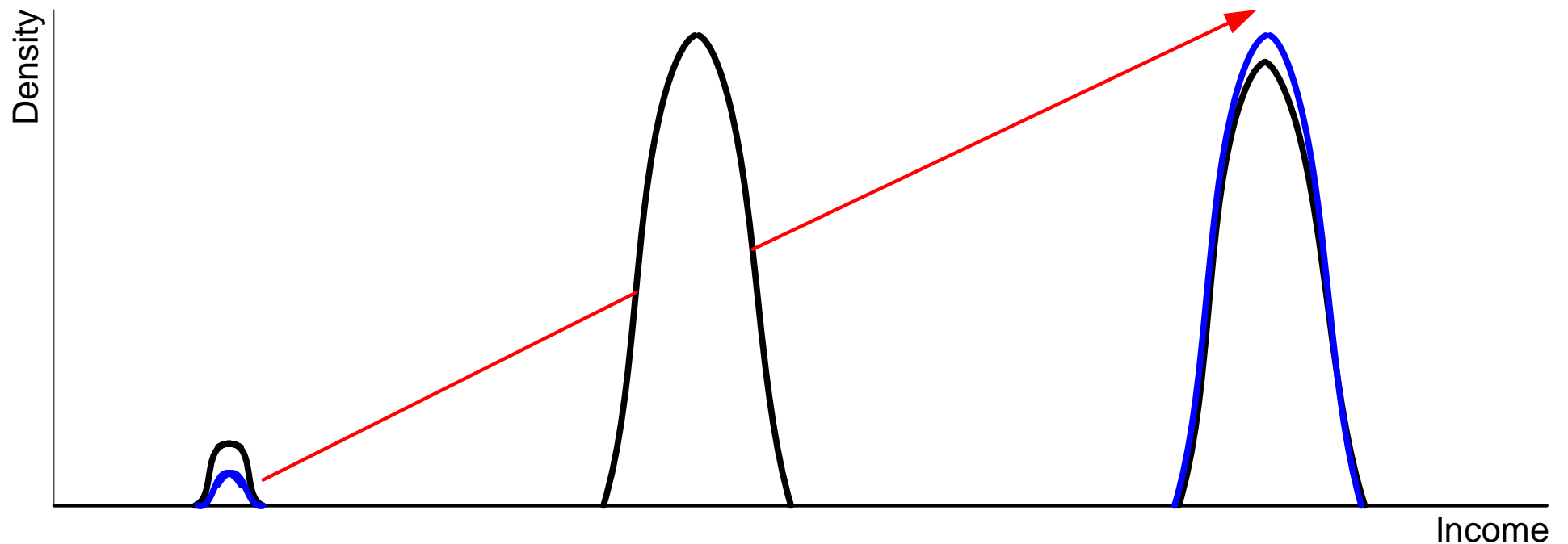
where  $\alpha$  lies between 0.25 and 1.

Family of possible values of  $\alpha$ , but in many cases can be narrowed further behaviorally or axiomatically.

[Behavioral] Esteban and Ray (1999) provide a game-theoretic argument for  $\alpha = 2$  (see also Montalvo and Reynal-Querol (2005)).

[Axiomatic]

*Axiom 5.* If  $p > q$  but  $p - q$  is small and so is  $r$ , a small shift of mass from  $r$  to  $q$  cannot reduce polarization.



Theorem 2 *Under the additional Axiom 5, it must be that  $\alpha = 1$ , so the unique polarization measure that satisfies the five axioms is proportional to*

$$\int \int n(x)^2 n(y) |y - x| dy dx.$$

# Social Polarization

Polarization measures easily applicable to ethnolinguistic or religious groupings.

$M$  “social groups”, based on region, kin, ethnicity, religion...

$n_j$  is population proportion in group  $j$ .

An index of “pure” social polarization:

$$\text{Pol} = \sum_{j=1}^M \sum_{k=1}^M n_j^2 n_k$$

# Social Polarization

Polarization measures easily applicable to ethnolinguistic or religious groupings.

$M$  “social groups”, based on region, kin, ethnicity, religion...

$n_j$  is population proportion in group  $j$ .

An index of “pure” social polarization:

$$\text{Pol} = \sum_{j=1}^M \sum_{k=1}^M n_j^2 n_k = \sum_{j=1}^M n_j^2 (1 - n_j).$$

[Used by Montalvo and Reynal-Querol, *American Economic Review* 2005.]

$$\text{Pol} = \sum_{j=1}^M n_j^2 (1 - n_j).$$

Compare with fragmentation:

$$\text{Frag} = \sum_{j=1}^M n_j (1 - n_j).$$

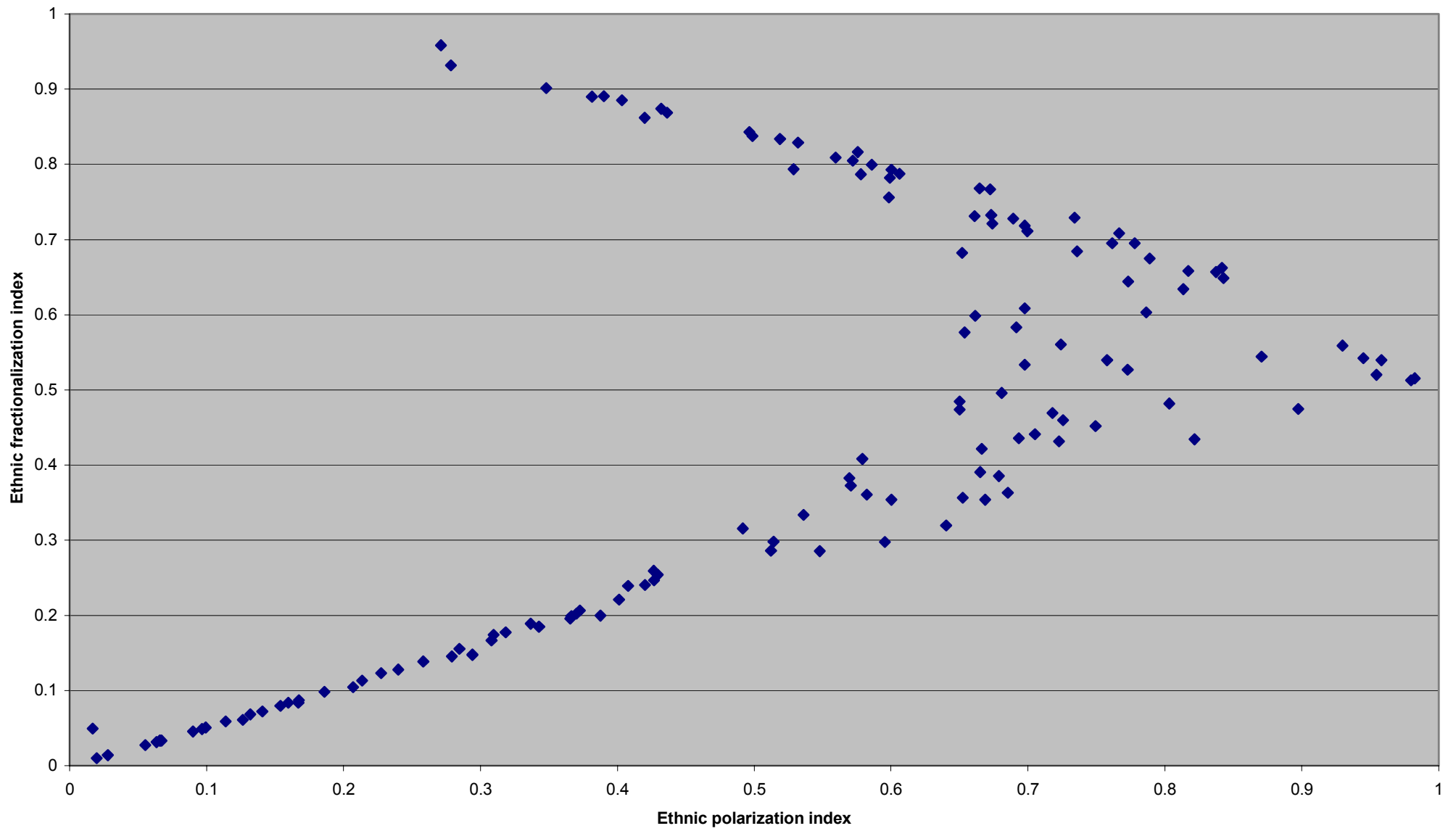
Makes a difference (to put it mildly).

For instance, if all groups are of equal size

Polarization peaks at two groups then steadily declines

Fractionalization rises throughout

And, as Montalvo and Reynal-Querol show, it matters empirically too . . .



Guatemala, Sierra Leone: examples of countries in which ethnic polarization is high but ethnic fractionalization is low

Nigeria, Bosnia: examples of countries in which religious polarization is high but religious fractionalization is low

Continue to discuss Montalvo/Reynal-Querol.

Ethnic fractionalization versus ethnic polarization

Religious fractionalization versus religious polarization

Same basic specification as Fearon-Laitin (2003) — and others — but this time with polarization instead of fractionalization indices.

138 countries, 1960–1995.

Dependent variable: incidence of a civil war over a five year period.

[Definition of civil war comes from Doyle and Sambanis (2000).]

*Explanatory Variables* include

per-capita income

population size

terrain (proxy for ease of insurgency)

primary exports (proxy for payoff in event of victory)

democracy indicators

... and of course indices of ethnic or religious polarization

First run a logit of war on ethnic fractionaliza-  
tion

Now for the logit using ethnic polarization

	[1]	[2]	[3]	[4]
<b>EthFrac</b>	<b>0.81</b>	0.22	-0.18	0.49
	(2.04)	(0.53)	(0.16)	(0.97)
LogPcGdp	<b>-0.62</b>	<b>-0.76</b>	<b>-0.79</b>	<b>-0.93</b>
	(5.07)	(5.90)	(5.96)	(5.40)
Constant	2.47	-0.42	-0.18	1.57
	(2.47)	(0.38)	(0.16)	(0.94)
LogPop		<b>0.46</b>	<b>0.46</b>	<b>0.35</b>
		(6.75)	(6.03)	(3.69)
PrimExp			0.25	0.50
			(0.26)	(0.48)
Mountains				0.00
				(1.67)
NonContiguous				-0.20
				(0.61)
Democracy				0.49
				(1.87)
Pseu $R^2$	0.07	0.15	0.15	0.14
Obs	860	860	840	741

Ethnic polarization not just significant; the effect is pretty big too.

If polarization raised from 0.51 (the average) to 0.95 (Nigeria) the predicted probability of conflict doubles.

[An increase by one standard deviation (0.24) raises conflict probability by 50%.]

	[1]	[2]	[3]	[4]
<b>EthPol</b>	<b>1.56</b>	<b>1.95</b>	<b>1.98</b>	<b>1.82</b>
	(3.31)	(3.76)	(3.71)	(3.23)
LogPcGdp	<b>-0.71</b>	<b>-0.77</b>	<b>-0.78</b>	<b>-0.93</b>
	(6.16)	(6.53)	(6.57)	(5.50)
Constant	2.65	-1.56	-1.43	-0.93
	(3.01)	(1.47)	(1.27)	(0.16)
LogPop		<b>0.49</b>	<b>0.48</b>	<b>0.38</b>
		(7.15)	(6.46)	(4.33)
PrimExp			-0.09	0.17
			(0.09)	(0.16)
Mountains				0.00
				(1.13)
NonContiguous				-0.00
				(0.00)
Democracy				0.41
				(1.58)
Pseu $R^2$	0.09	0.17	0.17	0.16
Obs	860	860	840	741

Now try the same logit with religious variables instead

Contrast with the use of a religious polarization variable

	[1]	[2]	[3]	[4]
<b>RelFrac</b>	<b>1.41</b>	0.53	0.35	0.92
	(2.31)	(0.76)	(0.49)	(1.17)
LogPcGdp	<b>-0.61</b>	<b>-0.84</b>	<b>-0.87</b>	<b>-1.03</b>
	(4.91)	(5.75)	(5.85)	(5.27)
Constant	1.53	-1.24	-1.15	0.45
	(1.42)	(0.97)	(0.86)	(0.25)
LogPop		<b>0.50</b>	<b>0.51</b>	<b>0.41</b>
		(6.41)	(5.88)	(4.09)
PrimExp			0.63	1.15
			(0.61)	(1.04)
Mountains				0.01
				(2.17)
NonContiguous				0.10
				(0.31)
Democracy				0.36
				(1.29)
Pseu $R^2$	0.10	0.16	0.16	0.16
Obs	853	853	833	734

*These observations are robust to several different specifications*

Ethnic polarization is significant when entered into same regression with ethnic fractionalization; latter is not.

Same is true if a measure of ethnic dominance (Collier 2001 and Collier and Hoeffler 2002) is used instead.

Both observations above still true if “ethnic” is replaced by “religious”.

	[1]	[2]	[3]	[4]
<b>RelPol</b>	<b>1.09</b>	0.71	0.65	<b>1.06</b>
	(2.93)	(1.71)	(1.50)	(2.20)
LogPcGdp	<b>-0.57</b>	<b>-0.76</b>	<b>-0.78</b>	<b>-0.98</b>
	(4.46)	(5.22)	(5.26)	(5.08)
Constant	1.17	-1.93	-1.85	0.17
	(1.10)	(1.52)	(1.40)	(0.10)
LogPop		<b>0.49</b>	<b>0.50</b>	<b>0.39</b>
		(6.36)	(5.75)	(3.94)
PrimExp			0.41	0.93
			(0.39)	(0.84)
Mountains				0.01
				(2.12)
NonContiguous				0.16
				(0.47)
Democracy				0.35
				(1.26)
Pseu $R^2$	0.10	0.17	0.17	0.17
Obs	853	853	833	734

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	0.17 (0.10)	0.45 (0.25)	1.00 (0.54)	0.77 (0.44)	-0.17 (0.10)	0.95 (0.52)	0.49 (0.27)
LGDPC	-0.98 (5.08)	-1.03 (5.27)	-1.01 (5.13)	-1.06 (5.55)	-1.01 (5.28)	-1.08 (-5.56)	-1.02 (-5.22)
LPOP	0.39 (3.94)	0.41 (4.09)	0.45 (4.42)	0.43 (4.56)	0.39 (4.03)	0.44 (4.55)	0.37 (3.81)
PRIMEXP	0.93 (0.84)	1.15 (1.04)	1.31 (1.16)	1.35 (1.26)	0.74 (0.66)	1.61 (0.50)	-3.46 (-0.87)
MOUNTAINS	0.01 (2.12)	0.01 (2.17)	0.01 (1.73)	0.01 (2.15)	0.01 (2.01)	0.01 (2.12)	0.01 (1.87)
NONCONT	0.16 (0.47)	0.10 (0.31)	0.33 (0.92)	0.08 (0.24)	0.16 (0.47)	0.08 (0.25)	0.19 (0.56)
DEMOCRACY	0.35 (1.26)	0.36 (1.29)	0.40 (1.43)	0.34 (1.23)	0.38 (1.39)	0.38 (1.35)	0.39 (1.37)
RELPOL	1.06 (2.20)		6.84 (3.78)		1.96 (2.91)		1.38 (2.53)
RELFRAC		0.92 (1.17)	-9.97 (3.27)				
RELDOM				0.04 (0.19)	-0.68 (1.65)		
RELLRG*PRIMEXP						-0.25 (-0.06)	5.54 (1.18)
N	734	734	734	734	734	734	734
Pseudo R-squared	0.17	0.16	0.19	0.16	0.18	0.16	0.17

*Also robust to the use of different datasets and classifications*

World Christian Encyclopedia — used here

Encyclopedia Britannica

Atlas Nadorov Mira

Use alternative classifications as in Alesina et al (2003)

*Robust to “joint indices” of ethnic and religious polarization*

[measure along each dimension, pick the max]

*Robust to alternative definitions of civil war*

Replace Doyle-Sambanis definition with Fearon-Laitin. Same results.

*Robust to pure cross-section logits*

Incidence of civil war over the entire period 1960–1995 with base variables from 1960.

# Taking Stock

*Two goals*

Conceiving of a measure of polarization

Using it to address a debate on the determinants of conflict

Partially successful, in that the measure “works” .

But this in turn raises new issues.

## Going Further: Multidimensional Polarization

The conflict application feeds back to questions about theory

Related to old question: is ethnicity primordial or instrumental as a determinant of conflict?

The findings on per-capita income certainly support an instrumentalist position

But the ethnicity marker is all too frequently invoked.

What is more, ethnic and religious conflicts are often “horizontal” :

Attacks on competing businesses, reduction of labor supply, reallocation of specific public goods.

Listen to Horowitz again:

“In study after study, it has been assumed that ethnic relations are necessary relations between superiors and subordinates . . . In fact, many ethnic groups *are* enmeshed in a system of subordination. But the relations of many other ethnic groups — on a global scale, most ethnic groups — are not accurately defined as superior-subordinate relations . . .

Unlike ranked groups, which form part of a single society, unranked groups constitute incipient whole societies. It is not so much the politics of subordination that concerns them, but rather the politics of inclusion and exclusion.”

How then to augment our polarization measure for wealth differences across and within groups?

Answer may depend on the observer's feel for the sort of conflict that is relevant.

If “vertical” ,

income differences *across* groups conducive to conflict

so is income homogeneity *within* groups

If “horizontal” ,

income or occupational *similarities* across groups  
may drive conflict

and so might income *inequality* within groups

(the buying of “conflict labor” , as with Dalits  
in the Gujarat carnage)

Interaction of economics and ethnicity creates  
new conceptual challenges for the measure-  
ment of polarization.

## Summary

1. Several authors, notably Samuel Huntington, have argued for cultural explanations of economic development (or lack thereof).
2. Extending this line of thinking, scholars such as Donald Horowitz have suggested links between conflict and ethnic differences.
3. But statistical studies that employ a well-known measure of ethnic and religious fragmentation show no links with conflict. [Though there are links with economic growth.]

4. In this lecture, I argue for the use of a measure very different from fragmentation — a *polarization index*.

5. The measure has a philosophical foundation — the *identity-alienation* framework — which may turn out to be useful in other applications. [See, e.g. Jozwiak and Schneider (2005) on government survival.]

6. Empirically robust and positive relationship between (ethnic or religious) polarization and the incidence of conflict.

7. This does *not* mean that we buy Huntington on the primordial nature of cultural differences. An economic war may still be waged behind the ethnic veil.

8. For reasons I have described, we are not (yet) in a good position to test that last theory.