

# Income Polarization in Latin America: Patterns and Links with Institutions and Conflict

LEONARDO GASPARINI, MATÍAS HORENSTEIN, EZEQUIEL MOLINA &  
SERGIO OLIVIERI

**ABSTRACT** *This paper presents a set of statistics that characterize the degree of income polarization in Latin America and the Caribbean (LAC). The study is based on a dataset of household surveys from 21 LAC countries in the period 1989–2004. Latin America is characterized by a high level of income polarization. On average, income polarization mildly increased in the region in the period under analysis. The paper suggests that institutions and conflict interact in different ways with the various characteristics of the income distribution. In particular, countries with high income polarization and inequality are more likely to have high levels of social conflict.*

## 1. Introduction

There is increasing concern about issues of polarization and social cohesion arising from the observation that some societies may be separating into groups that are internally homogenous and increasingly distinct from each other. That concern is particularly relevant in Latin America and the Caribbean (LAC), a region with traditionally very high levels of inequality, and increasing income disparities over the last two decades.<sup>1</sup>

The economic literature has stressed the differences between polarization and inequality.<sup>2</sup> Whereas inequality basically refers to differences between individuals, the concept of polarization adds a concern for homogeneity within groups. Similarities among members reinforce identification within the group, and alienation from other groups, and hence foster an environment more prone to conflict.

Although there is a large literature on income inequality in Latin America, the evidence on polarization is almost non-existent.<sup>3</sup> This study documents the levels and trends of income polarization in LAC by using a large database of household surveys carried out in

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Leonardo Gasparini, Matías Horenstein, Ezequiel Molina and Sergio Olivieri, CEDLAS (Center for Distributional, Labor and Social Studies), Universidad Nacional de La Plata, Argentina. Emails: leonardo@depeco.econo.unlp.edu.ar, mdhzip@yahoo.com.ar ezequiel.molina@gmail.com and solivieri@depeco.econo.unlp.edu.ar.

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21 countries in the period 1989–2004. The paper gives evidence suggesting that Latin America is characterized by a high level of income polarization compared with other regions in the world. On average, income polarization mildly increased in the region in the period under analysis. The country experiences, however, have been heterogeneous. Although income polarization increased substantially in some countries, the income distributions of other LAC economies became less polarized.

It is argued that when people have access to substantially different sets of opportunities, and enjoy (or suffer) very different living standards, social tensions are likely to emerge. An economically polarized country is more likely to be socially and politically unstable. In this paper, a set of correlations between measures of income polarization and other dimensions of the income distribution, and measures of institutions, conflict and corruption is presented. Although far from a causality analysis, the paper provides evidence on some interesting links that deserve further analysis.

The rest of the paper is organized as follows. In Section 2, the concept and measurement of income polarization are discussed; Section 3 presents empirical evidence on income polarization in LAC, and discusses the main patterns and trends; in Section 4 an exploratory analysis is carried out of the empirical links between indicators of polarization, inequality and poverty, and measures of institutions, conflict and corruption. The paper closes with some concluding remarks in Section 5.

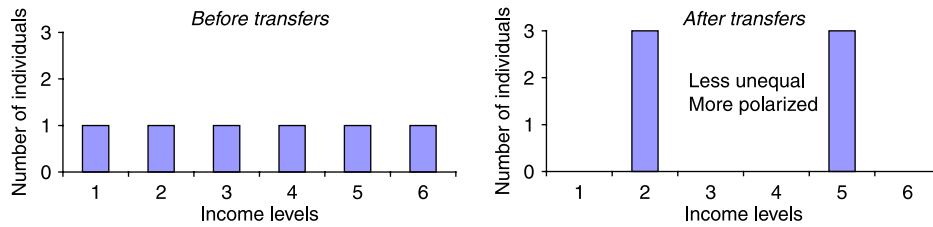
## 2. Polarization: Concept and Measurement

The concept of polarization is directly linked to the sources of social tension. The notion has its roots in sociology and political science, with Karl Marx arguably being the first social scientist to study it. In economics, its formal analysis has its origins in the 1990s, in the works of Esteban & Ray (1994), Foster & Wolfson (1992) and Wolfson (1994). Following Esteban & Ray (1994), we rely on the *alienation-identification* framework. A population is polarized if there are few groups of important size in which the members share an attribute (e.g. religion, income, race, education) and feel some degree of identification with members of their own group, and at the same time members of different groups feel alienated from each other. These three elements (group size, identification and alienation) produce antagonism among the population, which may generate a hostile environment.

The concern for differences in economic variables across groups has always been part of the agenda of economists. That concern has fuelled a large literature on the measurement of inequality. At the heart of the concept of inequality is the Dalton-Pigou principle of transfers: a transfer from an individual with higher income to another individual with lower income generates a more equal distribution.

To understand the difference between polarization and inequality, let us imagine a country with six persons labeled as A, B, C, D, E and F with incomes equal to 1, 2, 3, 4, 5 and 6, respectively. Assume now two transfers of \$1: the first one from C to A, and the second one from F to D (Figure 1).

The two transfers are equalizing (from richer to poorer persons), so all inequality indices complying with the Dalton-Pigou criterion will fall, or at least not increase. Notice, however, that in this example the new income distribution has three persons with \$2 (A, B and C), and three persons with \$5 (D, E and F). The population in this country is now divided into two clearly differentiated groups that are internally perfectly homogeneous.



**Figure 1.** Histograms of income distribution: before and after an inequality-decreasing but polarization-increasing transfer.

Although less unequal, this society has probably become more polarized. The notion of polarization refers to homogeneous clusters that potentially antagonize each other. In the new situation set out in the example, people may identify themselves as part of clearly defined groups that are significantly different from the rest. This polarization may result in greater social tension than in the initial distribution, and then in more social and political instability.

The analysis of polarization should be viewed as complementary to that of inequality. Polarization and inequality are different, although closely related dimensions of the same distribution. In fact, and unlike in the previous example, in most cases the two concepts are not contradictory. Two reasons led us to focus on polarization. First, polarization is the distributional dimension that is far less studied in the economic literature. As stated above, although the inequality literature is large in Latin America, we are not aware of studies computing a large set of polarization measures for all the countries in the region. Second, polarization measures may potentially be more relevant than inequality measures to study issues of socio-political instability. This point is explored with LAC data in Section 4.

### 2.1 Measurement

This paper restricts the analysis of polarization to the income dimension. Income polarization measures can be classified into two main sets: polarization by characteristics and pure income polarization. Although both sets use income as the variable for alienation, they differ in the nature of identification. Whereas the first uses a relevant discrete characteristic to provide the population grouping (e.g. race), the latter uses income. In this paper, we focus on pure income polarization.<sup>4</sup> The first approach to implementing a pure income polarization measure is based on the idea of discrete groups, or socio-economic classes. Following this logic, it is necessary to identify the number and the support interval of each disjoint income group. Wolfson (1994), Esteban & Ray (1994) and Esteban *et al.* (2007) provide the main contributions to this approach. Wolfson's (1994) measure assumes two groups of equal size, whereas the ER measure (Esteban & Ray, 1994) allows  $n$  groups of potentially different sizes. Esteban *et al.* (2007) leaves the determination of the number of groups to the researcher, while implementing a methodology to determine group sizes endogenously based on the idea of minimizing income heterogeneity within groups.

Although the framework discussed so far follows an intuitive way of referring to different socio-economic strata, the division of the income distributions into a finite number of groups is unnatural, owing to the fact that income is a continuous variable. This implies some drawbacks: (i) there is a degree of arbitrariness in the choice of the number

of income groups; and (ii) continuous changes in polarization are not captured in some cases, given that the population is divided into a finite number of groups.

In order to alleviate these problems Duclos *et al.* (2004) propose a measure of pure income polarization (the DER index) that allows for individuals not to be clustered around discrete income intervals, and lets the area of identification influence be determined by non-parametric kernel techniques, avoiding arbitrary choices.<sup>5</sup> The authors establish that a general polarization measure that respects a basic set of axioms must be proportional to

$$P_{\alpha}(F) = \int f(y)^{\alpha} g(y) dF(y),$$

where  $y$  denotes income and  $F(y)$  its distribution. The function  $g(y)$  represents the alienation effect and  $f(y)^{\alpha}$  captures the identification effect. The higher the parameter  $\alpha$ , the larger the weight attached to identification in the polarization index. The value of  $\alpha$  should be set by the analyst, the policy-maker or in general the person who is evaluating income polarization in a given economy. In that sense  $\alpha$  implicitly captures the value judgments of the analyst in relation to the importance of cluster formation in a society. For instance, if  $\alpha$  is set at zero, no attention is paid to this issue. In fact, in that case the polarization index coincides with the Gini coefficient, the most widespread measure of inequality. By contrast, if a large value of parameter  $\alpha$  is chosen, the index becomes particularly concerned about the formation of income groups in a society. In the empirical part of the paper we present polarization statistics for alternative values of the parameter  $\alpha$ .

It is possible to account for changes in polarization through the contribution of alienation, identification and their joint co-movements. Increased alienation is associated with an increase in income distances, whereas increased identification implies a sharper definition of groups. When taken jointly, these effects may reinforce or counterbalance each other.

### 3. Empirical Evidence of Income Polarization in LAC

This paper is based on data from a large set of household surveys carried out by the National Statistical Offices of the LAC countries in the period 1989–2004. The database used for this study is a sample of a larger one put together by CEDLAS and the World Bank: the Socioeconomic Database for Latin America and the Caribbean (SEDLAC).<sup>6</sup> The sample covers all countries in mainland Latin America and four of the largest countries in the Caribbean (Table 1). Most household surveys included in the sample are nationally representative. In each period the sample of countries represents more than 92% of the total LAC population. Whenever possible we select three years in each country to characterize the two main periods between 1989 and 2004: the growth period of the early and mid-1990s when several structural reforms were implemented, and the stagnation and crisis period of the late 1990s and early 2000s. Unfortunately, there is not enough information to characterize the recent recovery of the LAC economies that started around 2003.

For comparability purposes we compute income using a common method across countries and years. In particular, we construct a common household income variable that includes all the ordinary sources of income and estimates of the imputed rent from home ownership.<sup>7</sup>

**Table 1.** Household surveys used in the study

Country	Name of survey	Acronym	Years	Coverage
Argentina	Encuesta Permanente de Hogares	EPH	1992–2003	Urban
	Encuesta Permanente de Hogares-Continua	EPH-C	2003–2004	Urban
Bolivia	Encuesta Integrada de Hogares	EIH	1993	Urban
	Encuesta Nacional de Empleo	ENE	1997	National
	Encuesta Continua de Hogares- MECOVI	ECH	2000–2002	National
Brazil	Pesquisa Nacional por Amostra de Domicilios	PNAD	1990–2003	National
Chile	Encuesta de Caracterización Socioeconómica Nacional	CASEN	1990–2003	National
Colombia	Encuesta Nacional de Hogares - Fuerza de Trabajo	ENH-FT	1992	Urban
	Encuesta Nacional de Hogares - Fuerza de Trabajo	ENH-FT	1996–2000	National
	Encuesta Continua de Hogares	ECH	2000–2004	National
	Encuesta de Calidad de Vida	ECV	2003	National
Costa Rica	Encuesta de Hogares de Propósitos Múltiples	EHPM	1992–2003	National
Dominican R.	Encuesta Nacional de Fuerza de Trabajo	ENFT	1996–2004	National
Ecuador	Encuesta de Condiciones de Vida	ECV	1994–1998	National
	Encuesta de Empleo, Desemple y Subempleo	ENEMDU	2003	National
El Salvador	Encuesta de Hogares de Propósitos Múltiples	EHPM	1991–2003	National
Guatemala	Encuesta Nacional sobre Condiciones de Vida	ENCOVI	2000	National
	Encuesta Nacional de Empleo e Ingresos	ENEI-2	2002	National
Haiti	Enquête sur les Conditions de Vie en Haïti	ECVH	2001	National
Honduras	Encuesta Permanente de Hogares de Propósitos Múltiples	EPHPM	1992–2003	National
Jamaica	Jamaica Survey of Living Conditions	JSLC	1990–2002	National
Mexico	Encuesta Nacional de Ingresos y Gastos de los Hogares	ENIGH	1992–2002	National
Nicaragua	Encuesta Nacional de Hogares sobre Medición de Nivel de Vida	EMNV	1993–2001	National
Panama	Encuesta de Hogares	EH	1995–2003	National
Paraguay	Encuesta Integrada de Hogares	EIH	1997	National
	Encuesta Permanente de Hogares	EPH	1999–2003	National
	Encuesta Integrada de Hogares	EIH	2001	National
Peru	Encuesta Nacional de Hogares	ENAHO	1997–2003	National
Suriname	Expenditure Household Survey	EHS	1999	Urban/Paramaribo
Uruguay	Encuesta Continua de Hogares	ECH	1989–2004	Urban
Venezuela	Encuesta de Hogares Por Muestreo	EHM	1989–2003	National

### 3.1 How Polarized are the LAC Countries?

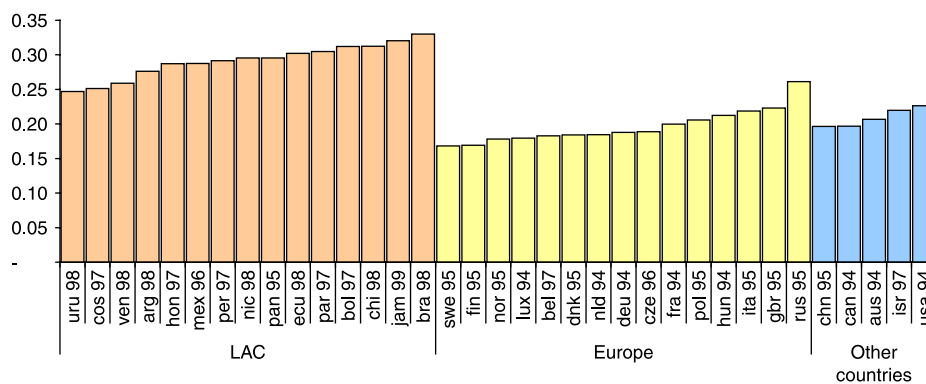
We start the analysis of the income polarization measures by comparing our estimates for LAC countries with those reported for the OECD. We make the comparisons in terms of the recently developed DER index. Duclos *et al.* (2004) computed this measure for a large sample of OECD countries using the Luxembourg Income Study database. Figure 2 shows these estimates along with our results for LAC countries for roughly the same period (mostly late 1990s). Although we apply the same methodology as in Duclos *et al.* (2004), there might be some differences in the treatment of the data that may bias the comparisons (e.g. outliers, zero incomes). Fortunately, Mexico 1996 is in both studies, and the two estimates are pretty close (difference of 2%), a fact that gives us some degree of confidence to take the comparison more seriously.

The average DER pure polarization index in Latin America and the Caribbean is 44% higher than the average for Europe, and 40% higher than the average for the rest of the OECD countries included in the Duclos *et al.* (2004) study. The most polarized country in Europe, Russia, is almost at the same level as the least polarized country in LAC, Uruguay. This small and largely urban South American country, the prototype of social cohesion in Latin America, would be considered a very polarized society in the European context.

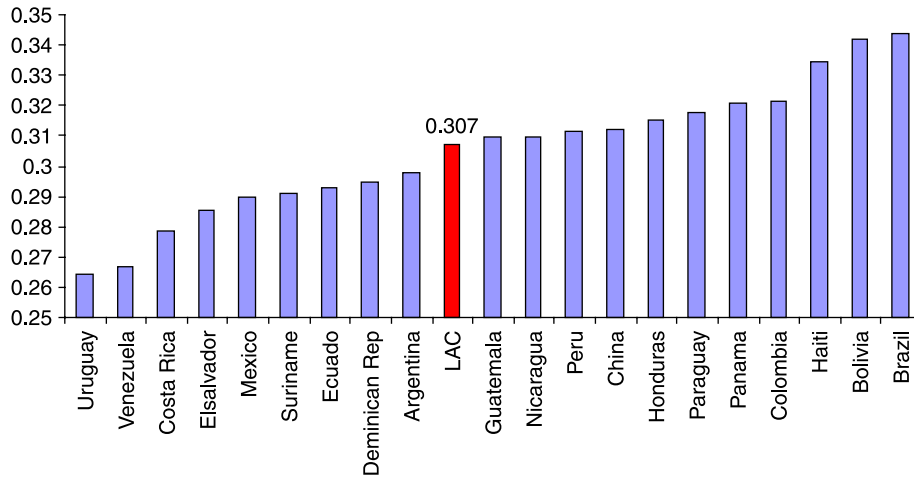
This picture of Latin America as a set of highly income-polarized economies does not come as a surprise. It has long been argued that inequality in the region is among the highest in the world. Figure 2 suggests that the statement is also probably true when referring to income polarization.

### 3.2 What is the Income Polarization Ranking Across LAC Countries?

Figure 3 shows the polarization ranking for the most recent survey in each country (early 2000s) for the DER with  $\alpha = 0.5$ . All indicators are computed for the household per capita income distribution, taking individuals as the units of analysis, and using sample weights. Brazil ranks as the most polarized country in the region. Bolivia, Haiti and Colombia are also highly income-polarized countries. On the other hand, Uruguay, Venezuela and Costa Rica are the least polarized countries in the region. The rankings are in general robust to the change in index and to the weight to identification (parameter  $\alpha$ ). Most of the



**Figure 2.** Pure income polarization, LAC and OECD countries, DER index ( $\alpha = 0.5$ ).  
Source: Duclos *et al.* (2004) and own calculations based on household surveys.



**Figure 3.** Pure income polarization, DER index ( $\alpha = 0.5$ ) for the household per capita income distribution. Last survey available for each country. *Source:* Own calculations based on household surveys. See Table 1.

Spearman rank-correlation coefficients are higher than 0.90 (Table 2). Although some re-rankings occur (e.g. Uruguay ranks as the least polarized country with all indicators, except with the DER with  $\alpha = 0.75$ ), they do not modify our general picture of polarization in the region.

Polarization measures differ by area. Figure 4 illustrates the DER for urban and rural areas for the last survey available for each country in our sample. The income distributions in urban areas have more antagonism than in rural ones in most LAC economies. On average, the DER in rural areas is two points lower than in urban areas. Panama, Mexico, Paraguay and Bolivia are the only countries where polarization is significantly higher in rural areas.

### 3.3 How has Income Polarization Evolved Over the Last 15 Years?

Table 3 presents several polarization indices for the distribution of household per capita income in 21 LAC countries in various years.

Four main general results emerge from the table:<sup>8</sup>

- (i) *Heterogeneity.* Experiences have been heterogeneous across LAC countries. On average, 10 out of 16 economies have experienced some increase in polarization over the period under analysis.<sup>9</sup> Distributional changes have been large in some countries, and negligible in others. Differences in patterns are noticeable even at the level of supranational regions. For instance, in the Mercosur, while polarization went down in Brazil and to some extent in Chile, most indicators of this distributional dimension increased dramatically in Argentina, Paraguay and Uruguay.

This heterogeneity of patterns is striking, as LAC economies share many structural characteristics and were subject to similar shocks. The political cycle is also similar across Latin American nations. In particular, during the 1990s most countries implemented market-oriented reforms. Despite these similarities,

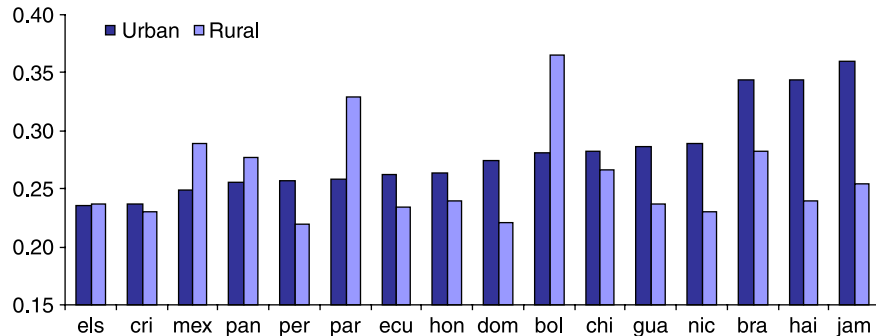
**Table 2.** Spearman rank correlation coefficients, pure income polarization indices and Gini coefficient

		Gini	WLF	EGR (2) $\alpha$			EGR (3) $\alpha$			DER $\alpha$			
				1	1.3	1.6	1	1.3	1.6	0.25	0.5	0.75	1
Gini		1	0.90	0.95	0.93	0.88	0.99	0.98	0.99	0.97	0.93	0.92	0.85
Wolfson			1	0.90	0.86	0.79	0.89	0.92	0.92	0.96	0.92	0.88	0.84
EGR (2)		1		1	0.99	0.96	0.96	0.97	0.96	0.96	0.95	0.95	0.90
	$\alpha$	1.3			1	0.99	0.95	0.95	0.94	0.94	0.93	0.94	0.90
		1.6				1	0.91	0.90	0.90	0.89	0.89	0.92	0.88
EGR (3)		1					1	0.98	0.99	0.97	0.94	0.94	0.88
	$\alpha$	1.3						1	0.99	0.99	0.96	0.94	0.88
		1.6							1	0.99	0.95	0.93	0.87
DER		0.25								1	0.97	0.95	0.90
	$\alpha$	0.5									1	0.99	0.96
		0.75										1	0.98
		1											1

*Source:* Own calculations based on household surveys.

*Note:* WLF: Wolfson index of bipolarization; EGR: Esteban, Gradin and Ray index of polarization; DER: Duclos, Esteban and Ray index of polarization.





**Figure 4.** Pure income polarization, DER index ( $\alpha = 0.5$ ) for the household per capita income distribution. Urban and rural areas. Last survey available for each country. *Source:* Own calculations based on household surveys. See Table 1.

economic performances have been substantially different, including changes in income polarization. The heterogeneity of results provides a useful instrument to identify specific policies and scenarios under which some countries have managed to grow and/or become more equitable.

- (ii) *On average, small increase in polarization and inequality.* As mentioned above, more than half of the countries experienced increases in their levels of polarization. However, changes in most countries have been rather small. On average, polarization and inequality increased mildly in the region over the period 1989–2004. Table 4 reports an increase of around 2.5% in the polarization indicators. The average increase in the Gini was about the same.
- (iii) *Larger increase in polarization and inequality in South America in the 1990s.* The increase in the LAC average is driven by changes in South America (Table 4). In most Central American countries changes have been almost negligible. By contrast, in most (but not all) South American countries inequality and polarization went up significantly. The increase seems to have been particularly relevant in the early and mid-1990s, a period of relatively fast growth and structural reforms. The pattern described fits the cases of Argentina, Bolivia, Colombia, Paraguay, Peru, Uruguay and Venezuela, and probably Ecuador. This process may be closely linked to the generation of social tension as well as the existence of social unrest.
- (iv) *Convergence.* Changes have implied some sort of convergence across LAC countries: polarization and inequality have especially increased in the group of less polarized/unequal countries: Argentina, Costa Rica, Uruguay and Venezuela. The coefficient of variation of the polarization indicators and the Gini coefficient have declined over time (see last row in Table 4).

### 3.4 What is the Difference Between Inequality and Polarization in Practice?

As explained in previous sections, income polarization and inequality are different although related dimensions of the income distribution. The correlation between these two dimensions is positive and statistically significant. Figure 5 displays the Gini coefficient and the DER income polarization index for different  $\alpha$  parameters. As  $\alpha$  goes up, the weight of

**Table 3.** Pure income polarization, household per capita income, national statistics

	Wolfson	EGR (2) $\alpha$			EGR (3) $\alpha$			DER $\alpha$			
		1	1.3	1.6	1	1.3	1.6	0.25	0.5	0.75	1
<b>Argentina</b>											
15 cities											
1992	0.410	0.204	0.150	0.107	0.730	0.494	0.339	0.334	0.284	0.269	0.289
1998	0.485	0.228	0.168	0.121	0.803	0.545	0.373	0.355	0.294	0.270	0.272
28 cities											
1998	0.488	0.230	0.170	0.122	0.808	0.548	0.376	0.359	0.300	0.274	0.277
2004	0.500	0.233	0.172	0.123	0.828	0.560	0.384	0.363	0.298	0.268	0.261
<b>Bolivia</b>											
Urban											
1993	0.477	0.242	0.183	0.137	0.843	0.568	0.387	0.367	0.303	0.272	0.259
1997	0.497	0.251	0.190	0.142	0.861	0.580	0.395	0.372	0.309	0.278	0.265
2002	0.485	0.255	0.195	0.149	0.886	0.590	0.406	0.376	0.311	0.282	0.268
National											
1997	0.552	0.271	0.205	0.155	0.945	0.635	0.432	0.403	0.331	0.297	0.286
2002	0.578	0.277	0.209	0.157	0.982	0.653	0.450	0.413	0.342	0.314	0.313
<b>Brazil</b>											
1990	0.648	0.302	0.233	0.181	0.998	0.666	0.460	0.425	0.363	0.344	0.354
1998	0.607	0.292	0.226	0.175	0.977	0.651	0.449	0.414	0.356	0.350	0.395
2003	0.569	0.279	0.214	0.164	0.949	0.639	0.436	0.402	0.344	0.346	0.399
<b>Chile</b>											
1990	0.501	0.267	0.206	0.160	0.908	0.604	0.415	0.385	0.319	0.289	0.275
1998	0.518	0.270	0.209	0.161	0.912	0.607	0.418	0.384	0.318	0.289	0.276
2003	0.476	0.258	0.199	0.153	0.888	0.590	0.406	0.376	0.312	0.283	0.269
<b>Colombia</b>											
ENH-Urban											
1992	0.456	0.238	0.181	0.137	0.822	0.555	0.379	0.367	0.310	0.289	0.299
2000	0.546	0.276	0.212	0.163	0.933	0.628	0.427	0.409	0.343	0.320	0.341
ECH-Urban											
2000	0.492	0.263	0.203	0.157	0.911	0.605	0.415	0.381	0.323	0.307	0.325
2004	0.518	0.263	0.201	0.153	0.905	0.609	0.415	0.396	0.321	0.299	0.316

Costa Rica												
1992	0.406	0.195	0.140	0.097	0.715	0.485	0.333	0.326	0.262	0.223	0.199	
1997	0.412	0.199	0.144	0.100	0.725	0.493	0.338	0.324	0.260	0.221	0.195	
2003	0.464	0.223	0.164	0.118	0.794	0.538	0.368	0.345	0.278	0.241	0.219	
Dominican Rep.												
2000	0.494	0.240	0.179	0.132	0.853	0.575	0.393	0.365	0.297	0.262	0.243	
2004	0.464	0.238	0.179	0.133	0.841	0.567	0.386	0.360	0.295	0.263	0.246	
Ecuador												
1994	0.468	0.243	0.183	0.137	0.873	0.587	0.399	0.377	0.305	0.267	0.248	
1998	0.497	0.253	0.191	0.144	0.905	0.603	0.414	0.379	0.310	0.275	0.258	
2003	0.464	0.233	0.173	0.126	0.839	0.566	0.386	0.361	0.293	0.258	0.242	
El Salvador												
1991	0.481	0.237	0.176	0.129	0.853	0.575	0.392	0.367	0.297	0.260	0.240	
2000	0.491	0.234	0.172	0.124	0.844	0.567	0.388	0.369	0.295	0.252	0.227	
2003	0.472	0.224	0.164	0.116	0.822	0.556	0.380	0.358	0.286	0.244	0.218	
Guatemala												
2000	0.480	0.255	0.194	0.147	0.890	0.592	0.407	0.377	0.309	0.276	0.259	
Haiti												
2001	0.558	0.285	0.221	0.171	0.973	0.646	0.443	0.406	0.334	0.300	0.283	
Honduras												
Only labor incomes												
1992	0.522	0.247	0.185	0.136	0.873	0.590	0.402	0.372	0.304	0.270	0.251	
1997	0.503	0.249	0.187	0.139	0.890	0.600	0.408	0.379	0.310	0.275	0.257	
All incomes												
1997	0.476	0.239	0.178	0.131	0.852	0.574	0.391	0.369	0.300	0.263	0.241	
2003	0.515	0.258	0.196	0.147	0.883	0.596	0.406	0.383	0.315	0.281	0.263	
Jamaica												
1990	0.639	0.257	0.189	0.135	0.924	0.624	0.434	0.397	0.311	0.260	0.226	
1999	0.626	0.269	0.200	0.146	0.961	0.650	0.444	0.408	0.334	0.308	0.317	
2002	0.610	0.275	0.205	0.150	0.974	0.658	0.449	0.419	0.345	0.316	0.318	
Mexico												
1992	0.478	0.255	0.195	0.149	0.894	0.600	0.407	0.375	0.308	0.276	0.264	
1996	0.474	0.241	0.181	0.135	0.856	0.577	0.393	0.364	0.297	0.264	0.248	

Table 3. Continued

	Wolfson	EGR (2) $\alpha$			EGR (3) $\alpha$			DER $\alpha$				
		1	1.3	1.6	1	1.3	1.6	0.25	0.5	0.75	1	
Nicaragua												
2002	0.467	0.232	0.173	0.126	0.834	0.563	0.384	0.362	0.290	0.256	0.239	
1993	0.548	0.261	0.195	0.144	0.919	0.620	0.422	0.391	0.318	0.281	0.261	
1998	0.475	0.244	0.183	0.136	0.876	0.584	0.401	0.379	0.308	0.271	0.251	
2001	0.478	0.249	0.188	0.142	0.886	0.589	0.404	0.375	0.310	0.279	0.263	
Panama												
1995	0.545	0.257	0.192	0.141	0.900	0.609	0.416	0.385	0.306	0.262	0.233	
2003	0.572	0.265	0.200	0.149	0.922	0.623	0.426	0.393	0.321	0.285	0.269	
Paraguay												
1997	0.557	0.256	0.190	0.138	0.920	0.621	0.425	0.395	0.319	0.281	0.261	
2002	0.557	0.259	0.193	0.141	0.927	0.625	0.426	0.392	0.318	0.281	0.262	
Peru												
1997	0.514	0.243	0.180	0.131	0.871	0.589	0.402	0.378	0.306	0.267	0.243	
2002	0.502	0.247	0.185	0.137	0.885	0.590	0.407	0.382	0.312	0.274	0.251	
Suriname												
1999	0.493	0.253	0.191	0.143	0.849	0.573	0.390	0.370	0.291	0.244	0.212	
Uruguay												
1989	0.366	0.181	0.130	0.089	0.680	0.459	0.313	0.311	0.252	0.217	0.193	
1998	0.401	0.194	0.140	0.097	0.709	0.485	0.331	0.320	0.257	0.218	0.191	
2003	0.418	0.203	0.148	0.105	0.728	0.495	0.340	0.325	0.265	0.230	0.207	
Venezuela												
1989	0.376	0.184	0.131	0.090	0.683	0.463	0.316	0.318	0.265	0.243	0.246	
1998	0.433	0.209	0.152	0.107	0.762	0.517	0.355	0.338	0.272	0.233	0.210	
2000	0.408	0.194	0.140	0.097	0.709	0.481	0.331	0.320	0.259	0.222	0.199	
2003	0.430	0.205	0.149	0.104	0.745	0.506	0.347	0.332	0.267	0.229	0.207	

Source: Own estimates based on household surveys.

Note: Wolfson: Wolfson index of bipolarization; EGR: Esteban, Gradin and Ray index of polarization; DER: Duclos, Esteban and Ray index of polarization.

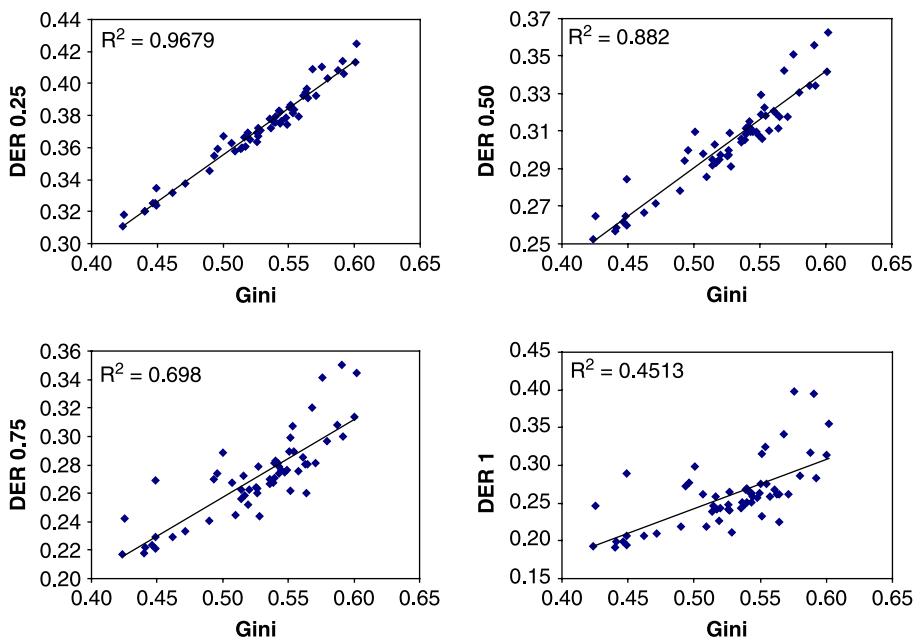
**Table 4.** Changes (%) in polarization measures and Gini coefficient: estimated changes 1989–2004

	Wolfson	EGR (2)	EGR (3)	DER			Gini
				0.25	0.5	0.75	
<i>Change in index (%)</i>							
South America	4.9	4.8	4.6	2.5	1.1	0.7	4.5
Central America	0.5	0.6	0.5	0.4	0.8	1.7	-0.3
Latin America	2.1	3.1	2.9	1.9	1.7	2.5	2.5
<i>Change in coefficient of variation of index (%)</i>							
Latin America	-35.7	-28.8	-25.4	-17.5	-9.1	4.3	-24.3

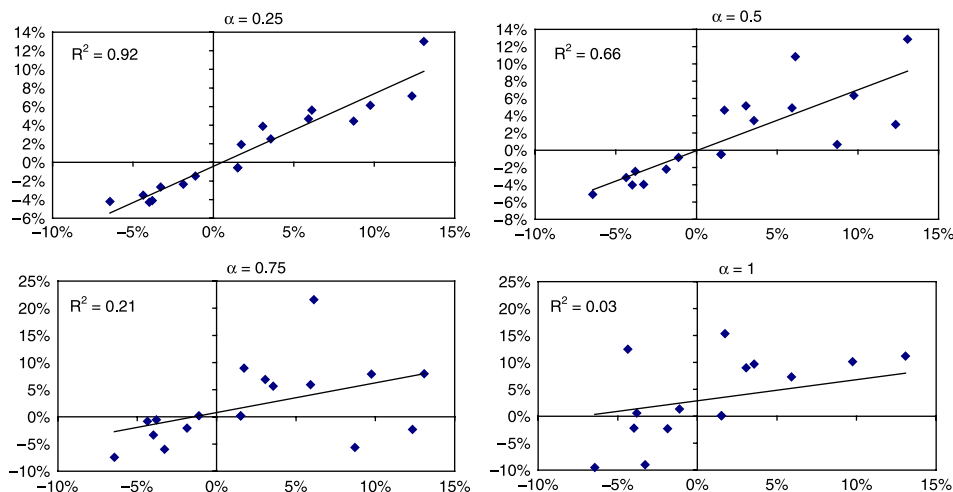
Source: Own estimates based on household surveys.

identification in the polarization measures is increased, and hence the linear relationship between polarization and inequality loses strength. As Duclos *et al.* (2004) state, "... the extent to which inequality comparisons resemble polarization comparisons depends on the parameter  $\alpha$ , which essentially captures the power of the identification effect". When  $\alpha = 0.25$  the linear fit is very precise: the  $R^2$  is 0.98. Instead, for  $\alpha = 1$  the  $R^2$  is 0.45.

Figure 6 presents the proportional changes in polarization and inequality between the first and the last survey available for each country. When  $\alpha = 0.25$  (first panel) the signs of the changes in polarization and inequality coincide. The strength of this relationship weakens as  $\alpha$  goes up because the polarization index attaches more weight to the identification within income groups. In some cases the identification effect shifts the sign



**Figure 5.** Inequality and polarization. Gini coefficient and DER with alternative values for parameter  $\alpha$ . Last survey available for each country. Source: Own calculations based on household surveys.



**Figure 6.** Changes in inequality and polarization. Gini coefficient and DER with alternative values for parameter  $\alpha$ . Source: Own calculations based on household surveys.

of the overall polarization change. For instance, Brazil exhibits a decrease in polarization for most indicators in the period 1990–2003, mainly because the decline in alienation outweighs the increase in identification over the period. However, for a large  $\alpha$ , polarization stays roughly unchanged.

### 3.5 Who Contributes More to Income Polarization?

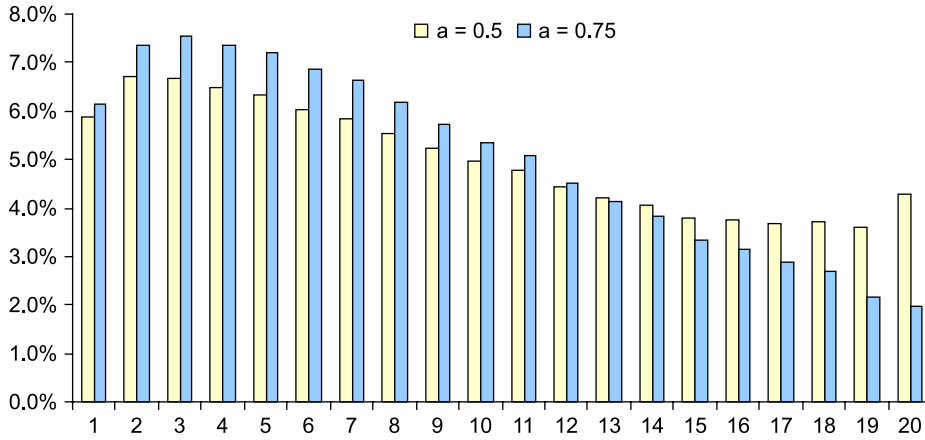
The DER polarization measure is the sum of all individual antagonisms in the society. It is interesting to know how the different income strata contribute to overall polarization. In order to accomplish this task, the population is partitioned into 20 income vintiles so the sum of the antagonism of each vintile is the total DER measure.

Figure 7 indicates that the poorer vintiles contribute the most to total antagonism because of their high identification. The lower the parameter  $\alpha$ , the larger the contribution to total polarization. The contribution of the richest vintiles is smaller due to their relatively low identification, even though they have a more intense alienation. In other words, although the richest vintiles are relatively farther away in the income dimension, they are relatively more heterogeneous and thus less identified with their vicinity.

Given a level of total polarization, a homogeneous distribution of antagonism over the population may lead to lower tension. By contrast, if the lowest vintiles are highly polarized, then the high-level antagonism of this population potentially creates more tension and would disrupt social cohesion. That seems to be the situation in most LAC countries: on average, the first eight vintiles exceed their theoretical participation of 5% by more than 1 percentage point.

### 3.6 A Decomposition

The DER polarization measure could be decomposed into three multiplicative components: mean alienation (equal to the Gini coefficient), mean identification, and



**Figure 7.** Decomposition of the DER index: participation in DER by vintiles. Mean values across LAC countries. Last survey available for each country. *Source:* Own calculations based on household surveys.

the rescaled correlation between individual alienation and identification.<sup>10</sup> This decomposition allows us to explore how these components interact in each income distribution to determine total polarization.<sup>11</sup> Table 5 considers the case of  $\alpha = 0.5$ . Brazil has a lower level of average alienation (Gini coefficient) than Jamaica or Haiti, but the

**Table 5.** DER decomposition: alienation (Gini), identification and correlation effects, DER index ( $\alpha = 0.5$ )

	Year	Effects			DER
		Alienation	Identification	Correlation	
Uruguay	2003	0.449	0.730	0.808	0.265
Venezuela	2003	0.462	0.709	0.814	0.267
Costa Rica	2003	0.490	0.716	0.794	0.278
El Salvador	2003	0.509	0.703	0.797	0.286
Suriname	1999	0.528	0.702	0.785	0.291
Mexico	2002	0.514	0.729	0.780	0.292
Ecuador	2003	0.517	0.737	0.768	0.293
Dominican Rep	2004	0.514	0.755	0.760	0.295
Argentina	2004	0.507	0.733	0.802	0.298
Guatemala	2000	0.545	0.761	0.746	0.309
Nicaragua	2001	0.543	0.770	0.741	0.310
Peru	2002	0.543	0.745	0.770	0.312
Chile	2003	0.540	0.783	0.738	0.312
Honduras	2003	0.542	0.757	0.769	0.315
Paraguay	2002	0.571	0.729	0.764	0.318
Panama	2003	0.561	0.736	0.776	0.321
Colombia	2004	0.551	0.772	0.774	0.329
Haiti	2001	0.592	0.762	0.741	0.334
Bolivia	2002	0.601	0.749	0.760	0.342
Jamaica	2002	0.599	0.732	0.788	0.345
Brazil	2003	0.576	0.799	0.763	0.351

*Source:* Own calculations based on household surveys.

average identification and the correlation counterbalance the first effect. Consider now two countries with the same level of average alienation, such as Mexico and Dominican Republic. They end up with different levels of polarization because of a higher level of identification in the latter country.

#### 4. Income Distribution, Institutions and Conflicts

It has long been argued that the income distribution of a country is associated with its institutional development and its degree of social cohesion and unrest. An economy in which income is more equally distributed is probably characterized by better and more stable institutions, fewer conflicts and a stronger sense of social cohesion. However, although intuitive, the links are theoretically ambiguous and have not been well established by the empirical literature. The difficulties are enormous: (i) there are no obvious empirical counterparts for concepts such as institutions, social cohesion and conflicts; (ii) the theory stresses that causality may go in all directions; (iii) it is not clear which dimension of the income distribution (inequality, polarization, poverty, mobility) is the most relevant; and (iv) the data at hand are insufficient to implement valid tests for causality.

Despite these empirical limitations, the topic is sufficiently important to have attracted the attention of social scientists for decades. The academic community is continuously searching for new datasets and ideas that contribute to the understanding of the links between income distribution, institutions and conflicts. The issue is particularly relevant for Latin America and the Caribbean. This region has arguably the highest levels of income disparities in the world, and it is also one of the regions with weakest institutions, and highest levels of unrest and violence. Moreover, the evidence suggests increasing income disparities in several LAC countries over the last two decades, raising questions about the implications for socio-political instability.

In this section we analyze the interactions between several measures of institutions and conflict with three different dimensions of the income distribution: polarization, inequality and poverty. As suggested above, causality issues are extremely difficult to solve, so in this paper we just show the structure of correlations among variables, and try to lay down consistent interpretations of the results based on theoretical considerations.

##### 4.1 Institutions

The literature linking income distribution with institutions has been growing at a fast pace. Ritzen *et al.* (2006) put forward the hypothesis that social cohesion—in their paper measured by income inequality, share of middle class and ethnic fractionalization—determines institutional quality, which in turn is a key determinant for economic growth. In a similar vein, Keefer & Knack (2002) conjectured that social polarization—measured as income inequality, land inequality and ethnic fragmentation—affects growth through the institutional channel. Glaeser (2005) found that a balanced income distribution is highly correlated with high-quality institutions, but is very careful not to speak of causality given the identification problems noted above. Chong & Gradstein (2004) found supporting evidence for the idea of bidirectional causality making use of Generalized Method of Moments (GMM) techniques and Vector Auto Regression (VAR). They concluded that the link that goes from income inequality to institutions is stronger than the one that goes the other way. Cervellati & Sunde (2005) also support the idea of



bidirectional causality between institutions and inequality. Engerman & Sokoloff (2002, 2005) argue that initial factor endowments, such as the distribution of wealth, human capital and political power, play a key role in accounting for the dissimilar degree of institutional development among former colonies. Boix (2003) also argues that higher income inequality induces a lower probability of democratization.

In short, the literature points out that the income distribution may interact with the broad-based institutions of a country. Empirical measures for these institutions typically combine information on formal constraints with measures of the actual functioning of certain institutions and rules. In the Appendix we provide details on the set of indices used in this paper, which includes measures of democracy, government effectiveness, security of property rights, political constraints, rule of law, and voice and accountability. Naturally, these indicators are just proxies of very complex phenomena, and then subject to all sorts of measurement errors. However, in the absence of better data and to complement the theoretical analysis, the empirical literature has used these indicators extensively in search of regularities and associations with other variables.

In the following, we explore the correlations between measures of institutions and indicators of three dimensions of the income distribution: polarization, inequality and absolute poverty. We measure inequality with the traditional Gini coefficient, polarization with the DER for  $\alpha = 0.5$ , and absolute poverty with the headcount ratio with a poverty line of US\$2 Purchasing Power Parity (PPP) a day.<sup>12</sup> The first column in each panel of Table 6 shows correlations for the pooled dataset, and in the following two columns the

**Table 6.** Correlations between indicators of income distribution and institutions

	Correlations			controlling for GDP pc
	pooled	period 1	period 2	
Rule of Law	-0.5457*	-0.6011*	-0.4523*	-0.4176*
Voice and Accountability	-0.4180*	-0.4317*	-0.3966*	-0.2802*
Legal structure	-0.2688	-0.161	-0.3336	-0.106
Gov't Effectiveness	-0.4704*	-0.5236*	-0.3946	-0.2941*
Democracy	-0.2058	-0.2019	-0.2291	-0.1648
Political constraints	-0.0393	0.0522	-0.114	-0.089
Inequality (Gini)				
Rule of Law	-0.6272*	-0.6467*	-0.5831*	-0.4289*
Voice and Accountability	-0.5136*	-0.5032*	-0.5267*	-0.3303*
Legal structure	-0.3454*	-0.2393	-0.4468*	-0.1128
Gov't Effectiveness	-0.6044*	-0.6702*	-0.5218*	-0.3531*
Democracy	-0.2772	-0.2623	-0.3264	-0.2358
Political constraints	-0.1476	-0.1215	-0.1385	0.025
Poverty (headcount ratio)				
Rule of Law	-0.6802*	-0.7298*	-0.7071*	-0.3916*
Voice and Accountability	-0.5230*	-0.4888*	-0.5679*	-0.2532*
Legal structure	-0.4992*	-0.5127*	-0.5562*	-0.1814
Gov't Effectiveness	-0.6858*	-0.7065*	-0.6967*	-0.2882
Democracy	-0.3869*	-0.1622	-0.6911*	-0.4336*
Political constraints	-0.3850*	-0.4429*	-0.319	-0.2144

\*Significant at 10%.

Note: period 1 = 1989–98, period 2 = 1999–2004.

sample is divided into two periods: 1989–98 (a period of economic growth) and 1999–2004 (recession and start of the recovery). The last column shows correlations when controlling for per capita GDP.

There is a close link between the income distribution and the institutional strength of a country. The correlations in Table 6 suggest that more polarized/unequal/poor countries are on average also those with weaker institutions. The correlations seem particularly strong with the Rule of Law index, the Voice and Accountability indicator, and the Government Effectiveness index. Poverty is also significantly negatively correlated to the Democracy index. Most of the correlations remain significant when controlling for per capita GDP, although the values are substantially reduced. The links become weaker or even vanish when considering changes over the period under analysis. Poverty is the only distributional variable for which some of the institutional indicators are significant in a panel data regression (see Table 7). When considering polarization or inequality as the left-hand-side variables, the coefficients of the institutional variables are significant in a cross-section regression, but non-significant when controlling for fixed effects. By contrast, the coefficients remain significant when using poverty as the left-hand-side variable. Poverty is the only distributional dimension for which the negative link with institutions holds when considering changes. This result makes sense. An improvement in the institutional environment may be quickly translated into a better business climate and better conditions for investments, which in turn may foster economic growth, which implies lower poverty given a stable income distribution. Although some Latin American countries seemed to have experienced this virtuous process (Chile and some Central American countries are the main examples), some others have suffered a similar process but with the opposite sign: Argentina, Paraguay and Venezuela are the main examples. Although the income distribution may quickly translate horizontally, reducing or increasing poverty, the shape of the distribution is much more difficult to transform.

#### 4.2 Conflict and Corruption

Now we turn to the relationship between conflict and income distribution. In a seminal contribution, Alesina & Perotti (1996) argue that income inequality generates social discontent that translates into political conflict and instability. They found empirical

**Table 7.** Models of indicators of income distribution on institutional measures: cross-section and panel data

	Cross-section			Panel		
	Polarization DER	Inequality Gini	Poverty Headcount	Polarisation DER	Inequality Gini	Poverty Headcount
Rule of Law	-0.019*	-0.036*	-11.2*	-0.008	-0.027	-9.5*
Voice and Accountability	-0.024*	-0.044*	-9.2*	-0.006	-0.029*	-10.7*
Legal structure	-0.007	-0.012	-3.6*	-0.001	-0.003	-1.8*
Gov't Effectiveness	-0.019	-0.035	-8.98	-0.001	-0.020	-9.4
Democracy	-0.001	-0.002	-2.7*	-0.001	-0.003*	-0.4
Political constraints	0.015	0.015	-8.3	-0.006	-0.020	-17.3

\*Significant at 10%.

**Table 8.** Correlations between indicators of income distribution and conflict and corruption

	Correlations			controlling for GDP pc
	pooled	period 1	period 2	
Polarization (PER 0.5)				
Conflict	-0.4486*	-0.4859*	-0.4120*	-0.4346*
Control of Corruption	-0.1799	-0.0687	-0.2768	-0.0465
Inequality (Gini)				
Conflict	-0.4522*	-0.4417*	-0.4710*	-0.4097*
Control of Corruption	-0.2977*	-0.1892	-0.4273*	-0.0757
Poverty (headcount ratio)				
Conflict	-0.5123*	-0.5313*	-0.5023*	-0.2747*
Control of Corruption	-0.4766*	-0.4191*	-0.5351*	-0.1593

\*Significant at 10%.

evidence validating the hypothesis in a sample of 70 countries for the period 1960–85. Sachs (1990) studied how high income inequality in Latin America stimulates social disorder and political conflict. The literature linking corruption and income distribution is also vast and growing. The theoretical underpinnings for this link are drawn from the ideas of Krueger (1974), who asserts that corruption distorts institutions of governance, and through the institutional channel affects the income distribution. More recently, Li *et al.* (2000), Sanjeev *et al.* (2002) and Dincer & Gunalp (2005) found significant correlations between corruption and income inequality.

As discussed above, our dataset does not allow us to disentangle causal relationships. However, and following most of the literature, in the discussions of this section we implicitly tend to view conflicts as caused, among other factors, by different dimensions of the income distribution. We also briefly examine the potential relationship between the income distribution and corruption. In order to capture the level of conflict in the society we use the Political Stability and Absence of Conflict index of Kaufmann *et al.* (2005), and to measure corruption we use the Control of Corruption index constructed by the same authors (see the Appendix for details).

The correlations in Table 8 suggest that more polarized/unequal/poor countries are on average also those with higher levels of conflict. The correlations with the conflict index remain significant when controlling for per capita GDP. In fact, the values are almost unchanged when including controls. The correlations with the measures of control of corruption have the expected sign (negative), although the relationships do not seem strong, in particular when we control for other variables.

Table 9 shows the results of panel regressions where we control for fixed effects. Changes in polarization, inequality and poverty seem to be related to changes in conflict. This piece of

**Table 9.** Models of indicators of income distribution on conflict and corruption measures: panel data

	Conflict	Control of Corruption
Polarization (DER)	-14.498*	5.886
Inequality (Gini)	-8.757*	0.920
Poverty (Headcount)	-0.015*	-0.005

\*Significant at 10%.

**Table 10.** Models of conflict on income distribution and institutional measures: panel data

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
<i>Distribution</i>															
Polarization (DER)	-12.9*	-11.9*	-14.6*	-13.3*	-13.8*										
Inequality (Gini)						-7.3*	-6.9*	-8.2*	-8.1*	-8.2*					
Poverty (Headcount)											-0.008	-0.007	-0.012	-0.01	-0.014
<i>Institutions</i>															
Voice and Accountability	0.475*					0.333*					0.460*				
Rule of Law		0.598*					0.507*					0.625*			
Gov't Effectiveness			0.367*					0.187					0.244		
Political constraints				0.546*					0.503*					0.494	
Democracy					0.057*					0.048					0.058

\*Significant at 10%.

evidence is consistent with the idea that increasing levels of polarization, inequality and poverty generate a hostile atmosphere within society that could imply higher levels of social conflict and political instability. The relationship with corruption, by contrast, is not clear.

In what follows we include a set of institutional controls to the analysis. It has long been argued that institutions are key features for understanding social conflicts. The regression results for the conflict index when institutions are included in the analysis are shown in Table 10. On the right-hand side we include income distribution measures, along with institutional indicators and various other controls (e.g. GDP per capita). The results suggest that both polarization and inequality are closely related to situations of conflict. The measures of these distributional dimensions are always significant when controlling for different institutional variables. That is not the case with the poverty headcount ratio: coefficients have the expected signs but seem to be non-significant.

Some interesting results emerge from the analysis of this section. First, the results of the regressions suggest that both income distribution and institutions do matter for social conflict and instability. Second, only distributional measures that capture income disparities seem to be particularly relevant to understanding conflicts. Finally, the LAC data do not support the idea that polarization, not inequality, is the main distributional characteristic associated with social instability. The high correlation between polarization and inequality found in the data implies that most results apply to both income distribution dimensions. In particular, polarization does not turn out to be a better predictor of conflict than inequality.

## 5. Concluding Comments

It has long been argued that Latin American and Caribbean countries are among the most unequal economies in the world. From the evidence shown in this study the region is also characterized by a high degree of polarization, i.e. a situation in which homogeneous groups antagonize each other. Moreover, there are some worrying signs of increasing or at least non-decreasing economic polarization in the region over the last 15 years, which may reinforce the latent sources of social tension.

Experiences have been heterogeneous across LAC countries. Distributional changes have been large in some countries, and negligible in others. On average, income polarization increased in most of South America, and stayed roughly unchanged in Central America.

The paper suggests that institutions and conflict interact in different ways with the various characteristics of the income distribution. There is some evidence that in the LAC context institutional development has been associated with lower absolute poverty, but not significantly with lower polarization and inequality. Instead, conflicts seem to be more related to polarization and inequality than to poverty.

Polarization and inequality measures are highly correlated in the data. At least in the Latin American context and for the indicators used in this paper, income inequality seems a good proxy for income polarization.

## Notes

<sup>1</sup> See IADB (1998), Morley (2000), Ganuza *et al.* (2001), Bourguignon & Morrison (2002) and Gasparini (2003) for evidence on inequality in LAC.

<sup>2</sup> See Esteban & Ray (1994) and Foster & Wolfson (1992).

<sup>3</sup> Gasparini (2003) includes evidence on bipolarization for a set of Latin American countries.

- <sup>4</sup> The literature on polarization by characteristics has recently been increasing rapidly. Collier & Hoeffler (2001) measure polarization in an empirical analysis of civil war, Reynal-Querol (2001) studies polarization by religion groups and its relationship with the probability of a conflict in sub-Saharan countries, D'Ambrosio (2001) argues that the region of residence accounts for polarization in the Italian distribution of personal income, Gradín (2000) finds that education and socio-economic condition are the key variables to explain polarization in the Spanish distribution of income and Zhang & Kanbur (2001) apply some polarization measures to regional disparities in China.
- <sup>5</sup> See Duclos *et al.* (2004) for methodological details. The DER index ranges from zero (absence of polarization) to one (full polarization).
- <sup>6</sup> See the web site of the SEDLAC at [www.cedlas.org](http://www.cedlas.org) for details.
- <sup>7</sup> See the Guide in the web site of the SEDLAC for methodological details.
- <sup>8</sup> More information on changes in polarization by country can be found in Gasparini *et al.* (2006).
- <sup>9</sup> Changes can be studied for a sample of 16 countries. There are not enough comparable surveys to analyze patterns over the 1990s and 2000s in Dominican Republic, Ecuador, Guatemala, Haiti and Suriname.
- <sup>10</sup> For further details see Duclos *et al.* (2004).
- <sup>11</sup> Of course, it is impossible to move these components independently, because they are all interrelated dimensions of the same distribution.
- <sup>12</sup> See Gasparini *et al.* (2007) for a discussion on poverty measurement and trends in LAC using a similar database as in this paper.

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## Appendix

### *Broad-based Institutions Indices*

*Rule of Law index.* This index is measured in units ranging from –2.5 to 2.5, with higher values corresponding, in broad terms, to the respect of citizens and the state for the institutions that govern their interactions. *Source:* Kaufmann *et al.* (2005).

*Voice and accountability index.* This index is a measure of the extent to which citizens of a country are able to participate in the selection of governments. It includes a number of indicators measuring various aspects of the political process, civil liberties and political rights. The index is measured in units ranging from –2.5 to 2.5, with higher values corresponding to a system where citizens have more voice and accountability. *Source:* Kaufmann *et al.* (2005).

*Legal structure and security of property rights index.* This index is a measure of the functioning of the legal system in a country. It is measured in units ranging from 0 to 10,

with higher values corresponding to a system with a better working of the legal system. *Source:* Gwartney & Lawson (2005).

*Government effectiveness index.* This index is a measure of the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of government commitment to policies. It is measured in units ranging from  $-2.5$  to  $2.5$ , with higher values corresponding to a more effective government. *Source:* Kaufmann *et al.* (2005).

*Democracy index.* This index is a measure of the degree of institutionalized democracy. The index is measured in units ranging from  $-10$  to  $10$ , with higher values corresponding to a system with a more consolidated democracy. *Source:* Polity IV Project.

*Political constraints index.* This index estimates the feasibility of policy changes. The index is measured in units ranging from  $0$  to  $1$ , with higher values corresponding to a system where policy changes are more feasible. *Source:* Henisz (2002).

#### *Conflict and Corruption Indices*

*Political stability and absence of violence index.* This index is measured in units ranging from  $-2.5$  to  $2.5$ , with higher values corresponding to a system that is least likely to be destabilized or overthrown, and where conflicts play no part in the society. *Source:* Kaufmann *et al.* (2005).

*Control of corruption index.* This index is a measure of perceptions of corruption, defined as the exercise of public power for private gain. It is measured in units ranging from about  $-2.5$  to  $2.5$ , with higher values corresponding to less corruption. *Source:* Kaufmann *et al.* (2005).