# INCOME POLARIZATION: MEASUREMENT, DETERMINANTS, AND IMPLICATIONS

## INTRODUCTION TO THE SPECIAL ISSUE

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"Polarization is one of those ideas of which most social scientists believe they have an implicit understanding. However, as is often the case, the overhasty acceptance of the seemingly obvious has contributed to a considerable carelessness in the application of this concept. In recently published work, polarization is equated with, for instance, income inequality (Keefer and Knack, 2002), the range of political positions taken by party supporters (Layman and Carsey, 2002), the electoral strength of post-communist parties in transition countries (Frye, 2002), and highly aggregated index measures including information on income, ethno-linguistic fractionalization and institutional quality (Woo, 2005). Given the overstretch of 'polarization' as a social scientific concept, it seems mandatory to define clearly what we understand here by this notion." (Esteban and Schneider, 2008)

The desire to better understand the concept of "polarization" was indeed the main reason for convening an international symposium on "Income Polarization: Measurement, Determinants and Implications" in May 2008 in Israel. Most of the papers in this special issue were presented at this conference and discuss various aspects of polarization. The two first papers discuss the concept of polarization itself and the basic axioms underlying it. The next two papers are mainly theoretical and propose an "intermediate" approach to bi-polarization measurement, one that lies between the so-called "absolute" and "relative" approaches. The three papers that follow are more empirically oriented but they all develop some new ideas. One suggests using the concept of bi-polarization to make a distinction between the poor and the rich; the second recommends using "mixture" models rather than kernel estimation methods to detect convergence clubs and examine changes in polarization; while the third shows how to decompose the change over time in polarization in a component reflecting a change in "anonymous polarization" and another one measuring the impact of variations in individual ranks. The next two papers examine the link between health and income polarization, each one offering a very careful analysis of the data they examine. The final paper is mainly policy oriented insofar as it applies behavioral microsimulation methods to analyze the impact on polarization of a change in the tax system. We will now review in more detail each of the papers in this issue.

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In his paper entitled "Is There Room for Polarization?" Shlomo Yitzhaki attempts to discuss the similarities and differences between the concepts of polarization originally introduced by Esteban and Ray (1994)[1] and that of relative deprivation which was coined by Runciman (1966). Yitzhaki argues that both notions are based on the idea of reference groups, but while relative deprivation begins with the individual and introduces only at a later stage axioms about the social behavior of the individual, polarization seems to skip the micro-economic base and to start immediately with a macro-economic point of view stressing the importance of reference groups. He then describes the main features of both the polarization and relative deprivation approaches. Of particular interest is Yitzhaki's argument, according to which the reference group in Runciman's approach seems to be the group that causes the feelings of deprivation rather than the group with which an individual identifies himself, which is the relevant group in the polarization literature. Yitzhaki therefore argues that the reference group for comparisons and the group with which one identifies himself with may well be different. The paper continues by summarizing what has been called ANOGI and refers to the decomposition of the Gini coefficient.[2] This breakdown of the Gini coefficient leads Yitzhaki to conclude that it is the component measuring inequality between groups that has the greatest similarity with the concept of polarization, at least in a relative deprivation framework of analysis. He argues nevertheless that in his paper he did not analyze differences in power and suggests that introducing power as a non-linear increasing function of group size may offer an explanation for the appearance of social unrest. In other words, for Yitzhaki, the concept of polarization may have a stronger link with the notion of power than with that of deprivation or inequality in economic well-being.

The paper by Amiel, Cowell, and Ramos, entitled "Poles Apart? An Analysis of the Meaning of Polarization," starts by summarizing the axioms described respectively by Esteban and Ray (1994) in their analysis of polarization and by Chakravarty and Majumder (2001) in their discussion of several bi-polarization indices. They then explain that they used a questionnaire-experimental approach that combined both paper questionnaires and on-line interactive techniques to investigate whether people's perceptions of income polarization were consistent with the key axioms they had previously reviewed. They concluded that there is a substantial majority that supports the axiom of Increasing Spread which assumes that polarization should increase if there are rank-preserving reductions (increments) in income below (above) the median income, that is, if the incomes of some individuals are now farther away from the median. Increased Bipolarity however enjoys little support. Increased Bipolarity assumes that a rank-preserving equalizing transfer between two individuals located on the same side of the median income should increase polarization. The authors found however that students in economics are more inclined to think in accordance with the Increased Bipolarity Axiom than individuals who are taught other social sciences. Since Amiel, Cowell, and Ramos conducted their survey in more than half a dozen countries, they also

[1]Foster and Wolfson (1992) and Wolfson (1994, 1997) also discussed the concept of polarization, but the emphasis in these papers is really only on the idea of bi-polarization.
[2]The term ANOGI (Analysis of Gini) has been introduced (see Frick *et al.*, 2006) as an alternative approach to ANOVA, the analysis of variance.

checked whether the cultural background of the students had an impact on the answers they selected and concluded that this was not the case.

In their paper on "Polarization Orderings of Income Distributions," Chakravarty and D'Ambrosio consider an intermediate notion of polarization defined as a convex mix of relative and absolute concepts of polarization. A similar approach has been proposed by Bossert and Pfingsten (1990) as far as income inequality measurement is concerned.[3] While absolute polarization indices are assumed to be invariant to equal additions to all incomes, relative indices are supposed not to change under equiproportionate variations in all incomes. The authors then identify the class of intermediate polarization indices whose orderings of alternative income distributions agree with the rankings generated by what they have called intermediate polarization curves, a simple graphical device Chakravarty and D'Ambrosio derived to represent such an intermediate polarization ranking. Finally they provide an empirical illustration based on data from Southern European countries and conclude that the results based on the relative or intermediate approach are very different from those derived from an absolute polarization criterion.

Lasso de la Vega, Urrutia, and Diez, in their paper on "Unit-Consistency and Bipolarization of Income Distributions," also take an intermediate approach to the measurement of bipolarization. But they emphasize the idea of unit-consistency which requires that inequality or poverty rankings, rather than their cardinal values, should be invariant when income is measured in different units. More precisely the authors introduce a new family of what they call "Krtscha-type intermediate polarization indices" (see Krtscha, 1994) and characterize a class of intermediate polarization orderings that are unit-consistent. Their empirical illustration, based on regional Spanish data for the period 1973–2003, lead the authors to conclude, like Chakravarty and D'Ambrosio, that the ordering of regions depends strongly on the type of invariance condition that is selected.

Gordon Anderson, in his paper on "Polarization of the Poor: Multivariate Relative Poverty Measurement Sans Frontiers," starts by recalling that when one desires to base poverty measurement on several well-being indicators, it becomes difficult to define a poverty frontier in many dimensions. The goal of his study is to propose multivariate bipolarization indices that allow one to bypass the need to define a poverty frontier. The idea is that the groups of poor and non-poor should correspond to two classes of people that can be clearly differentiated on the basis of a certain number of characteristics. Anderson therefore adopts the concept of bipolarization, but the two groups are evidently not of equal size. More specifically he introduces two new bipolarization measures labeled "overlap" and "trapezoidal" measures. He then reviews the list of axioms proposed by Esteban and Ray (2007) to characterize polarization and checks whether the two measures he proposed obey these axioms. An interesting empirical illustration is provided based on two indicators, the gross national product per capita and the life expectancy. The focus of the analysis is then on the eventual progress of African nations relative to the rest of the world. Anderson concludes that, as a group, the world's poor experienced diminished poverty polarization during the period 1990–2005. However, within the world's poor, the African nations experienced increased poverty polarization.

[3]One should also mention here the idea of compromise index proposed by Kolm (1976a, 1976b).

In their paper on "Mixture Models, Convergence Clubs, and Polarization," Maria Grazia Pittau, Roberto Zelli, and Paul A. Johnson remind us first of the two possible hypotheses concerning the convergence of the per capita income of countries: one assuming that initial conditions do not matter so that in the long run all countries converge to a common level of per capita GDP (or income), regardless of where they begin; the alternative hypothesis assuming that initial conditions matter in the long run so that countries with similar initial conditions will form "convergence clubs." While most of the empirical work examining the cross-country distribution of per capita income employed kernel estimation methods, the authors use the "mixture approach" which amounts to expressing the density of a random variable as the weighted average of a finite number of component densities with specified functional form. Note that this approach may detect multiple components in a distribution even if that multiplicity does not manifest itself as multimodality. Naturally the interpretation of the existence of multiple components as indicative of convergence clubs requires checking whether there was mobility between the components. Pittau, Zelli, and Johnson have applied their approach to cross-country per capita incomes for the period 1960–2000 and found evidence of three components densities in each of the nine years they examined. Since they did not discover much cross-component mobility, they interpret the multiple mixture components as representing convergence clubs. They conclude that there was an increased concentration of the rich countries around their component means, the same being true for poor countries; these two observations leading to a clear increase in polarization during the period examined.

The paper by Ambra Poggi and Jacques Silber, entitled "On Polarization and Mobility: A Look at Polarization in the Wage–Career Profile in Italy," attempts to combine results from two different domains, the literature dealing with income or wage mobility measurement and that focusing on income polarization. Their starting point is a new polarization index proposed by Deutsch *et al.* (2007) which connects the concepts of bi-polarization with that of kurtosis. Poggi and Silber then argue that to compare degrees of polarization over time one cannot ignore the identity of the individuals, and they propose a breakdown of the change in polarization over time into a "structural mobility" component that assumes anonymity and an "exchange mobility" element that takes into account changes in the ranking of individuals. Their approach is then applied to the 1985–2003 Work Histories Italian Panel (WHIP), an employer–employee linked panel database. The goal of the empirical investigation is to try to better understand labor market segmentation in Italy, whether the groups are defined on the basis of the individual wages or derived from other criteria such as white-versus blue-collar workers.

Bénédicte Apouey, in her paper "On Measuring and Explaining Socioeconomic Polarization in Health with an Application to French Data," applies a by now quite vast literature on the measurement of health equity[4] to the analysis of polarization in health. This literature on health inequalities makes a distinction between a univariate setting which focuses on pure health inequalities, and a bivariate approach where the link between the level of health and socioeconomic characteristics is taken into account, usually via the use of the concentration index

[4]For a thorough review of this literature, see O'Donnell *et al.* (2008).

(see Kakwani, 1980). Using the Wolfson index, or even better the formulation of it given by Rodriguez and Salas (2003), Apouey applies the bivariate approach to the case of polarization. On the basis of a linear regression model she is then able first to analyze the determinants of polarization, and second to derive a breakdown of the variation of polarization with age. Her empirical illustration is based on a health survey conducted in France in 2002–03.

Though also looking at the link between income and health, the paper by Cristina Blanco Pérez and Xavier Ramos, entitled "Polarization and Health," takes a different point of view. The emphasis here is on the link between income polarization and individual health. There exists a literature linking income inequality and health, but this paper stresses rather the connection of health with income polarization. The idea is that psychosocial stress, which is related to strategies of dominance, conflict, and submission, has adverse consequences on health, and that income polarization is a concept that is likely to better apprehend this link. The authors also emphasize another pathway, one which, on the basis of quite an abundant literature, links greater polarization with a lower provision of public goods, including health services, so that ultimately polarization may be considered as a health hazard. In their empirical investigation, the authors, using data from the European Community Household Panel survey (ECHP), implement an ordered logit model and conclude that income polarization has, ceteris paribus (in particular controlling for absolute and relative income), a detrimental effect on health. They also stress that the way the relevant population subgroups are defined is important: polarization is only significant if measured between education-age groups for each region, whereas regional polarization is not significant.

The paper by Xisco Oliver, Luca Piccoli, and Amedeo Spadaro, entitled "A Microsimulation Evaluation of Efficiency, Inequality, and Polarization Effects of Implementing the Danish, the French, and the UK Redistribution System in Spain" is essentially policy oriented. Their starting point is that the Spanish social protection model belongs to the "Southern European or Mediterranean welfare state regime"[5] and that there is an ongoing discussion in Spain about reforming the Spanish social protection system. The main goal of the authors is to help clarify this debate by showing, using behavioral microsimulation models, what would be the impact of adopting other European welfare state regimes, such as those of Denmark, France, or the United Kingdom, not only on efficiency but also on inequality and polarization in Spain. They conclude that whereas the adoption of any of these three systems would not have an important impact on efficiency, as measured by labor supply effects, it is the Danish system that would most reduce inequality and polarization. They also stress that adopting the French system would have the strongest effect on polarization and lead to a higher degree of income polarization.

As mentioned previously, most of the papers in this issue were presented at an international research workshop of the Israel Science Foundation on "Income Polarization: Measurement, Determinants, and Implications," organized on May 26–28 in Israel. The first day of this symposium took place at Bar-Ilan University; for the two other days, the Van Leer Jerusalem Institute hosted the participants.

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[5]See Esping-Andersen (1990) for an introduction to the concept of welfare state regimes.

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