

***5.01 Polarization and Middle Class**

https://www.cps.fgv.br/cps/bd/cursos/Middle-Class/1-NMC_Polarization%20and%20Social%20Tension_HO.pdf

Ref Brazil's Middle Classes **2 Neri (2014)

https://www.cps.fgv.br/cps/bd/cursos/Middle-Class/3-NCM_Neri_EPGE_MiddleClass.pdf

On the Measurement of Social Tensions **3 Neri and Kakwani 2014 (this is a section extracted from it)

Brazil's Middle Classes Abstract

This part discusses from first principles the concepts of polarization, alienation, identification and its relationship with the idea of middle class. Then we apply to a specific of the Brazilian middle class, its definition, evolution, profile, attitudes and durability. It describes the methodology that uses per capita household income derived from household surveys to determine economic classes. It gauges their respective aggregate trends and gauges individual income risks using longitudinal data. An income-based approach is only the beginning. This initial approach is integrated with subjective data to measure expectations and attitudes of different economic classes combined with a structural approach that takes into account the roles played by human, physical and social capital in the production factors, in terms of income generation and temporal allocation of resources. In all cases, income is the chosen numeraire by which all dimensions analyzed are projected. In the end of the article, all forms of measurement proposed – current income, consumption smoothing (permanent income), productive assets and subjective aspects – are combined to discuss the design of public policies aimed at the Brazilian middle classes.

Polarization

In order to differentiate polarization from income inequality per se, consider the following useful example, adapted from Gasparini *et al.* (2008). Consider a simple society with six people called A, B, C, D, E and F, with incomes of R\$ 6, 5, 4, 3, 2 and 1, respectively. Suppose that one Real is transferred from D to F and from A to C. Inequality indices that respect the so-called principle of transfers will necessarily decline¹. After these distributive changes, we will have a perfectly divided society in two internally homogeneous groups: an income of R\$ 2 for D, E and F and an income of R\$ 5 for A, B and C. Although less unequal, after these progressive transfers, society has become more polarized.

Polarization and Social Tension

From Section 5 On the Measurement of Social Tensions *3 Kakwani and Neri 2014

Recently, there has been a growing literature on the role of middle class in economic development. An emerging consensus among economists is that an increase in the size of the middle class leads to rise in per capita income and that increase in the middle income shares causes a rise in the growth rate (Easterly, 2001). In addition, a greater income share of the middle class leads to better health and education outcomes. Birdsall (2007) even defined inclusive growth as growth which builds middle class. According to her, a small and weak middle class implies weak state institutions and hence unsustainable growth. Berkowitz and Jackson (2005) pointed out that a powerful middle class is conducive to lower inequality.

The phenomenon of “disappearing middle class” has become a concern among many (Wolfson 1994). The disappearing of middle class has occurred because the society is becoming more polarized. Foster and Wolfson (1992) introduced the idea of bi-polarization that is directly linked to the disappearing of the middle class.

A society is said to be polarized when it is divided into groups, with substantial intra group homogeneity and intergroup heterogeneity. Based on this definition, Esteban and Ray (1994) identified two distinct notions of polarization. The first is the alienation, which measures how far apart are different groups and the second is the identification, which measures how closely the members of a group are aligned with each other sharing common aspirations and values. The existence of such groups has potential for social conflicts.

Suppose a society is divided into three groups: the poor, middle class and the rich. Then the shrinking of the middle class and an increasing gap between the poor and the rich implies increasing polarization in the society. A polarized society has small middle class and sizable poor and rich classes with large income gap between them. This is basically the idea of bi-polarization as articulated by Foster and Wolfson (1992 and 2009).

The concept of polarization is directly linked to social tension. As has been argued in this paper, social tension can be measured by the loss of social welfare if one can find a social welfare function that embodies the essential elements of social tension caused due to polarization. This section derives such a social welfare function. A link between social welfare and polarization has not been discussed in the literature.

The notion of alienation is measured by the degree of spread from the middle position (median) to the tails of the income distribution. The larger spread from the median implies smaller middle class and larger polarization, which is the case where the rich become richer and the poor become poorer. This causes social tension. The social welfare function that incorporates the idea of alienation is derived as following.

A person is assumed to be alienated if his or her income spreads from the middle. Suppose m is the median income, then her alienation is given by the difference of the individual income from the median. The utility that takes account of the alienation from the median may be defined as:

$$\begin{aligned} u(x) &= x - (m - x) \text{ if } x << m \\ &= x - (x - m) \text{ if } x >> m \end{aligned} \tag{13}$$

So the average welfare of the society from (13) is obtained as

$$W_A = \mu - \frac{(m_2 - m_1)}{2} \tag{14}$$

where m_1 and m_2 are the mean incomes of the population having income below and above the median income, respectively. W_A is the social welfare that takes into account alienation in the society. The proportional loss of social welfare due to alienation is given by

$$A = \frac{(m_2 - m_1)}{2\mu} \tag{15}$$

The larger the A the greater is the alienation in the society. A is the proposed measure of social alienation.

The second aspect of bi-polarization refers to the case where incomes below the median or above the median become closer to each other. Nissanov, Poggi and Silber (2011) called this situation as a “bunching of the two groups in the sense that the gaps between the income below the median (or above the median) have been reduced”. The polarization increases when the two groups become homogeneous.

The social welfare function in (14) gives equal weights to the income gaps from the median, which is the reason that it is completely insensitive to any transfer of income on either side of the median. To make it sensitive to

such transfers, different weights need to be given to different income gaps. How should then weights be determined?

Suppose $v(x)$ is the weight give to x . Since the society is most concerned with the welfare of middle income, the weight $v(x)$ should be maximum at the median when $x=m$, which tappers off to 0 at the tails of the distribution. This means that $v(x)$ should be an increasing function of x until it reaches the maximum value at $x=m$ and then it should be decreasing with x until becomes 0 as income reaches infinity. A simple weighting scheme proposed is as follows:

$$\begin{aligned} v(x) &= 4F(x) \quad \text{if } x < m \\ &= 4[1 - F(x)] \quad \text{if } x \geq m \end{aligned} \quad (16)$$

So that the sum of all weights adds to 1:

$$\int_0^{\infty} v(x)f(x)dx = 1$$

Using (13) and (16) the average welfare of the society is then obtained as

$$W_B = \int_0^{\infty} u(x)v(x)f(x)dx = \mu - (m_2 - m_1) + 2\mu G \quad (17)$$

which is the social welfare that takes account of polarization in the society. The proportional loss of social welfare due to polarization is given by

$$B = 2(A - G) \quad (18)$$

where A is the measure of social alienation derived in (15) and G is the Gini index. B is a measure of social tension caused due to polarization in the society. This measure can also be written as

$$B = 2(G_B - G_W)$$

where G_B and G_W are the between and within group inequalities when the two groups are formed of the populations having income less and greater than the median income, respectively. The polarization measure B in (18) is similar to the measure proposed by Foster and Wolfson (1992). This is a measure of social tension due to the existence of polarization in the society.

8.2 Empirical analysis Brazil - Social tension due to alienation and polarization

The analysis presented in this section is based on Brazilian National Household Survey called PNAD for the 1992-2012 period. The survey has extensive information on personal and occupational characteristics of households and individuals. Per capita real household income is used as individuals' welfare measure. The rich information provided by the survey allows for calculating various dimensions of social tensions and their trend in the 1992-2012 period. The trends are calculated for three periods: 1992-2001, 2001-2012 and 1992-2012.

As discussed social tension due to alienation and polarization are closely related to the diminishing middle class. It is assumed that society is concerned with the diminishing middle class, which occurs because the society is polarized. The alienation is concerned with the spread of distribution from the median; the larger is this spread, the smaller the middle class. The polarization in addition is concerned with the degree of homogeneity of the social groups.

Brazil has been suffering from high degrees of alienation and polarization. The empirical results in Table 4 show that both these sources of social tension have been increasing at annual rates of 0.06 and 0.03 percent respectively in the period 1992-2001. But in the subsequent 2001-2012 period both social tensions due to alienation and polarization have been decreasing sharply at annual rates of 1.07 and 0.71 percent, respectively.

This study divides the Brazilian population into three mutually exclusive groups:

- (i) the poor whose per capita income is less 50% of the median;
- (ii) the middle class whose per capita income is above the 50% of the median and below 150% of it
- (iii) the rich whose per capita income is above the 150% of the median.

In the determination of social classes, the median is used as the reference point. There is arbitrariness in the definition of middle class. In the literature there is no consensus on what range around the median should be used in defining middle class. The choice of range determines the size and share of the middle class so any number of alternatives can be justified. This arbitrariness surely weakens the entire analysis of middle class.

The middle class definition used is given in (ii) and it has two components: (1) size of the middle class and (2) income share of the middle class. Figures 6 and 7 show that there is an inverse relationship between the size and income share of the middle class and alienation and polarization. In the period 1992-2001 when both alienation and polarization have been increasing, the size and income share of the middle class have been decreasing. But in the subsequent period of 2001-2012 when both alienation and polarization have been declining, the size and income share of the middle class have been increasing at annual rates of 1.40% and 3.53%, respectively. The share of middle class has been increasing at a much faster rate than the size of the middle class. This means that in relative terms, per capita income of the middle class is growing at a faster rate than the mean income. The alienation and polarization are closely related to middle class and can be measured without specifying any range. To see the closeness of this relationship, the following regressions were fitted using PNAD 1992-2012:

$$\begin{aligned} \text{Log (size middle class)} &= 9.1 - 1.25 \text{ Log (alienation)} & R^2=0.86 \\ & \quad (29.6) \quad (-10.1) \\ \text{Log (share of middle class)} &= 16.9 - 3.2 \text{ Log (alienation)} & R^2=0.97 \\ & \quad (28.5) \quad (-23.3) \\ \text{Log (size middle class)} &= 6.62 - 0.85 \text{ Log (polarization)} & R^2=0.43 \\ & \quad (8.0) \quad (-3.5) \\ \text{Log (share of middle class)} &= 11.0 - 2.3 \text{ Log (polarization)} & R^2=0.55 \\ & \quad (6.1) \quad (-4.4) \end{aligned}$$

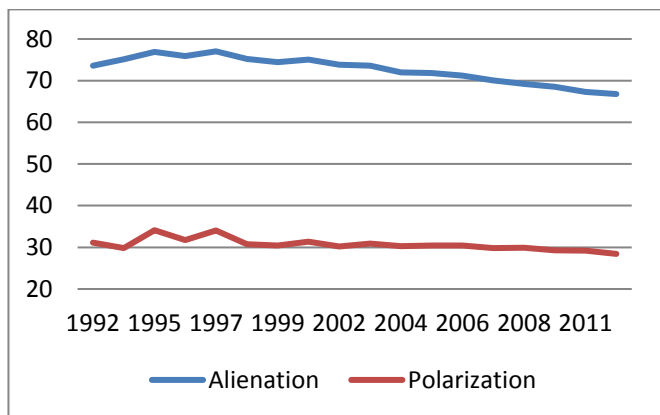
These results show that the relationship between size and income share of the middle class with alienation is so strong that it may be possible to conclude that a decrease (increase) in alienation leads to an increase (decrease) in the size and income share of the middle class. Although this relationship is established in terms of the specific range of 50% to 150% of the median, simulations were performed with alternative ranges around the median. The conclusions emerging were found to be robust for alternative ranges. Thus one does not need to arbitrarily specify the range of the middle class in order to know whether middle class is increasing or decreasing. This analysis does not exactly inform how much is the size and income share of the middle class but it can tell whether the social concern due to diminishing middle class is increasing or decreasing for all possible ranges around median.

Table 4: Social tension due to alienation and polarization in Brazil 1992-2012

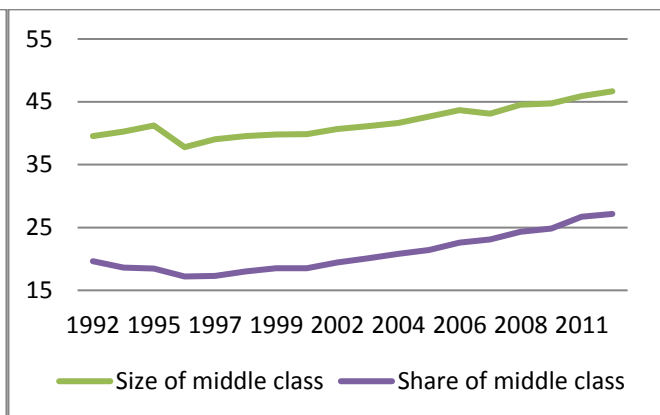
	Alienation	Polarization	Size of middle class	Share of middle class
1992	73.62	31.16	39.54	19.62
2001	75.07	31.36	39.88	18.49
2012	66.78	28.43	46.67	27.16
Growth rates: 1992-2001	0.06	0.03	-0.08	-0.52
Growth rates: 2001-2012	-1.07	-0.71	1.40	3.53
Growth rates: 1992-2012	-0.65	-0.51	0.87	2.12

Source: PNAD/IBGE. Prepared by the author.

6: alienation and polarization:



7: Size and share of middle class: Brazil 1992-2012



Source: PNAD/IBGE. Prepared by the author.

Conclusions Middle Class - One particular contribution here is to derive from an explicit social welfare function alienation and polarization measures and to study their relationship with measures of the size of the middle class. Our results have shown that alienation movements which does not need to use specific income brackets, as do middle class definitions, are particular useful variables to predict both changes in the population size of the middle class as well as its share in total income.

Brazil has been suffering from high degrees of alienation and polarization and both sources of social tension were roughly stable in the period 1992-2001. However, in the subsequent period of 2001-2012 both social tensions due to alienation and polarization have been decreasing sharply at annual rates of 1.07 and 0.71 percent, respectively. These was consistent with the occurrence of an emerging middle class.

Polarization Measures (from section 2 Brazil's Middle Classes)

This subsection addresses relative and absolute measures of economic classes. We move from a relative to an absolute measure fixing the lines in real terms for further periods. Our definition of middle class income brackets is theoretically consistent and empirically close to that determined by the extended polarization concept proposed by Esteban, Gradin and Ray (2007, called EGR). The EGR strategy generates, in a more general setting of polarization measures, endogenously cuts of the observed income distribution. The chosen cuts obtained are those that maximize the criterion of polarization. That is, they are the ones that best distinguish the income groups in order to make the internal differences of these groups as small as possible and on the other hand maximize the differences between these groups.

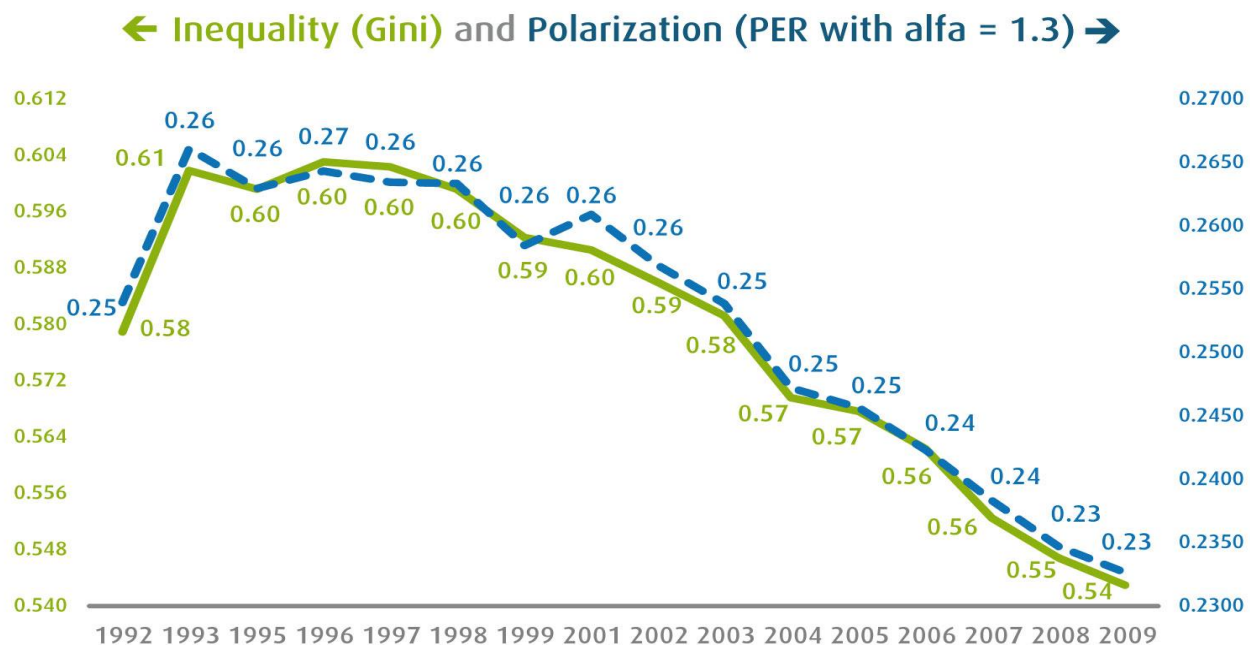
How does our initial approach (using 2002-03 data) compare to the results derived from the EGR methodology? In first place, the combination of our economic classes D and E results almost perfectly in the bottom EGR stratum, corresponding to the 52.3 per cent poorest against 52.6 per cent in our criterion, a negligible difference. Second, our central economic class based on national household survey data is four percentage points smaller than the intermediate stratum produced by the EGR methodology (34.95 per cent versus 38.95 per cent). As a result, our classes A and B differ from the top EGR stratum. We call this difference residual class B2 to illustrate the move from the C class to the EGR middle stratum.

Next, we apply the EGR results within these initial classes to further divide them into even finer subgroups, in addition to using other institutional parameters, including the official parameters of poverty and extreme poverty lines. Let us begin with the three large groups (AB, C, and DE classes). Similarly, we applied the EGR methodology of three stratum in our AB class, resulting in B1 class with 4.31 per cent, A2 class with 2.84 per cent and A1 class with 1.28 per cent of the population, respectively. Within the lower stratum of the EGR, taking advantage of the convergence of the values, we subdivided the D and E classes using the traditional Brazilian poverty line, which is close to the highest eligibility income allowed to be a beneficiary of the Bolsa Família Program. We use a similar rationalization adopting R\$70.00 - which is the lowest benchmark value of the Bolsa Família and was adopted as the national poverty line under the Brazil Without Misery Plan - to define the division between the E1 and E2 classes. This value amounted, in mid-2011, for the extreme poverty line of US\$1.25 PPP per day, used in the first of the UN Millennium Development Goals.

BOX 1: Polarization and Inequality

In the figure below, we apply the Esteban and Ray (1994) measure of polarization, labeled PER and shown on the left axis. The graph illustrates that Brazilian society grows less polarized from 1998 onwards. In general, inequality (as measured by the Gini coefficient) and polarization move in the same direction. Polarization (left scale) has a milder fall than the inequality before 2001, but the reverse occurs thereafter.

←-- Inequality (Gini) and Polarization (PER with alfa=1.3) →



Source: PNAD/IBGE microdata

¹ This principle tells us that if we transfer income from the richest to poorest without changing the ranking between people, the measure of inequality should fall.