The Changing Distribution of Earnings
In Poland from 1989 to 1996

by

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Abstract

In this paper we investigate the changing earnings distribution in Poland from 1989 to 1996 using Gini coefficients, other economic inequality indicators and Generalized Lorenz Curves.

Introduction

The first aim of our paper is to study the earnings distribution in Poland from 1988 to 1996: we estimate the inequality indexes for every year after the beginning of the transformation in order to assess the dynamic pattern of the earnings distribution. Moreover we show which are the winning or losing social categories in the reform process. The time period is long enough to capture the depression period 1990-1992 and the strong recovery period beginning in 1993.

The second aim is to assess, through the use of generalized Lorenz Curves, the gains or losses in terms of general economic welfare before and after the beginning of the reform period, giving a more vivid picture of the changing pattern of earnings distribution in Poland in this crucial time period.
The distribution of earnings 1988-1996

In table 1 we show four earnings inequality indicators: Gini coefficient, Robin Hood index, variation coefficient and decile ratio.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>RHI</th>
<th>Gini</th>
<th>Coef. of Var</th>
<th>Decile Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>14.8</td>
<td>0.212</td>
<td>0.384</td>
<td>2.6</td>
</tr>
<tr>
<td>1989</td>
<td>14.4</td>
<td>0.207</td>
<td>0.380</td>
<td>2.432</td>
</tr>
<tr>
<td>1990</td>
<td>16.7</td>
<td>0.237</td>
<td>0.436</td>
<td>2.759</td>
</tr>
<tr>
<td>1991</td>
<td>16.8</td>
<td>0.239</td>
<td>0.447</td>
<td>2.858</td>
</tr>
<tr>
<td>1992</td>
<td>17.4</td>
<td>0.246</td>
<td>0.464</td>
<td>2.92</td>
</tr>
<tr>
<td>1993</td>
<td>17.9</td>
<td>0.253</td>
<td>0.475</td>
<td>3.028</td>
</tr>
<tr>
<td>1994</td>
<td>19.7</td>
<td>0.277</td>
<td>0.534</td>
<td>3.384</td>
</tr>
<tr>
<td>1995</td>
<td>20.1</td>
<td>0.282</td>
<td>0.545</td>
<td>3.395</td>
</tr>
<tr>
<td>1996</td>
<td>20.8</td>
<td>0.292</td>
<td>0.574</td>
<td>3.504</td>
</tr>
</tbody>
</table>

Source: Rocznik Statystyczny, GUS, Warsaw; Author’s calculations based on paretoan interpolation

The Gini coefficient for earnings goes from 20.7 in 1989 to 29.2 in 1996, showing quite a big change, 8.5 percentage points, in the earnings distribution during the period. We can observe two substantial jumps in the value of the coefficient: the first one in 1990 and the second one in 1994, afterwards increasing at a rate of one percentage point per year for 1995 and 1996. This substantial change in the earnings distribution is confirmed by the other indexes (table 1).

The picture which emerges from these estimates is a process of an economic system that is quite quickly becoming less egalitarian, overtaking the values in the earnings distribution typical of a capitalistic economy. Atkinson and Micklewright (92) calculated a value of a Gini coefficient of 28.3 for United Kingdom in 1989. According to these values Poland 1996 is less egalitarian than the United Kingdom 1989.
Some interesting features of the earnings distribution in Poland.

We consider the earnings distribution of white collar workers and blue collar workers and the changing relationship between the two distributions.

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>INEQUALITY STATISTICS FOR WHITE AND BLUE COLLAR WORKERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gini Coefficient</td>
</tr>
<tr>
<td>Blue collars</td>
<td>0.210</td>
</tr>
<tr>
<td>White collars</td>
<td>0.191</td>
</tr>
</tbody>
</table>

Source: Rocznik Statystyczny, GUS, Warsaw; Author's calculations based on paretoan interpolation.

From table 2 we see that the Gini coefficient for blue collar workers goes from 0.21 in 1989 to 0.264 in 1996, while the corresponding value for white collar workers goes from 0.191 in 1989 to 0.303 in 1996. The interesting feature is that the earnings distribution for white collar workers was more egalitarian in 1989 than the blue collar one, reflecting a socialist wage structure. In only seven years this structure is completely reversed in favour of white collar workers.

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>RATIO OF THE CORRESPONDING DECILES OF THE TWO CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( Decilei_white collar/Decilei_blue collar)</td>
</tr>
<tr>
<td></td>
<td>first</td>
</tr>
<tr>
<td>1996</td>
<td>132.4</td>
</tr>
<tr>
<td>1989</td>
<td>109.1</td>
</tr>
</tbody>
</table>

Source: Rocznik Statystyczny, GUS, Warsaw; Author's calculations.

From table 3 we can see that from 1989 onwards for every decile of the two distributions white collar workers earn more than the corresponding blue collar workers; the magnitude of this wage differential varies from 23.9% to 35.5% showing a radical transformation of the wage structure of the Polish economy during the 90s. In 1989 the ratio for the highest deciles was still in favour of blue collar workers, as can be seen from the table.
<table>
<thead>
<tr>
<th>TABLE 4</th>
<th>SUMMARY STATISTICS ON GENDER DISTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Gini coefficient</td>
<td>0.1773</td>
</tr>
<tr>
<td>Male Gini coefficient</td>
<td>0.2382</td>
</tr>
</tbody>
</table>

Source: Rocznik Statystyczny, GUS, Warsaw; Author's calculations based on paretoian interpolation.

It is interesting to investigate the behaviour of the male Gini coefficient and the female one in order to assess how much the gender distribution has changed. The female Gini coefficient in 1985 was 17.7, while in 1996 it was 25.4, with an increase of 7.7 percentage points. The male Gini coefficient for earnings was 23.8 in 1985, rising to 30.2 in 1996, with an increase of 6.4 percentage points (see table 4). What is clear is that the female distribution of earnings is widening more than the male one.

**Generalized Lorenz curves for earnings distribution**

In order to investigate if the distribution of earnings during the transformation process is welfare enhancing, we computed two generalized Lorenz curves (Shorrocks 83, Kakwani 84, Thistle 89) for the earnings distribution for the same time period considered above.

The Lorenz curve provides only a partial ranking of the distribution, its distributional judgment is independent of the size of the earnings. For this reason, in order to make comparisons of distributions of various years and therefore with different income and earning mean, we use the generalized Lorenz curve. Shorrocks and Kakwani define the generalized Lorenz curve as the Lorenz curve scaled up by the mean of the distribution: \( GL_y (i/N) = \mu L_y (i/N) \) with \( 1 \leq i \leq N \)

so that \( GL_y (i/N) = \sum_{n=1}^{x_n} y_i N \). The generalized Lorenz curves are usually graphs which enable to compare the earnings distribution of different populations at
the same period; in our case the comparison is on the same population for three different years (Caselli and Battini 97).

In graphs 1 and 2, we have tabulated three normal Lorenz curves – years 1989, 1995, 1996 - and three generalized Lorenz curves for the same years. From Graph 1 we immediately see that the three normal Lorenz curves show a continuous worsening of earnings distribution from 1989 to 1996. On the contrary, if we look at the three generalized Lorenz curves for the same period, the picture in welfare terms is different. In fact the 89 curve dominates the two other ones, but the 96 generalized curve lays on the left of the 95 one, meaning that the 96 distribution is better in welfare terms of the previous year; the improvement is surely due to the continuous growth process of the polish economy, which is still going on.
Conclusions

Our general conclusion on the evolution of the pattern of earnings distribution is that a substantial change has occurred from 1989 to 1996. The general pattern of the distribution has very rapidly approached the highest values of Gini coefficient typical of capitalist countries.

There are gainers and losers in this process. White collar workers are clear winners in comparison to blue collar workers, while the female distribution of earnings is widening more than the male one, and the gap between male and female earnings is narrowing.

Using the generalized Lorenz curve, we found a worsening of the economic welfare for the period from 89 to 96, but the 96 picture shows an improvement on the previous year.
APPENDIX

Sources and methodology

In this section we briefly describe the data source and the methodology we used in estimating the distribution of earnings. The main source is the statistical yearbook of Poland (Rocznik Statystyczny).

The data on earnings collected up to 1996 by the September inquiry on the labour market are published every year by the Statistical Yearbook. The earnings are defined as gross monthly earnings of full time workers, and include base pay plus bonuses, overtime, premiums, compensation for hazardous work conditions, additional payments related to job tenure or holding of managerial position and profit shares. The data on earnings are comprehensive of the private sector firms with more than six employees.

We are well aware of the statistical differences caused by the change of economic systems, and for a detailed description of all the difficulties and shortcomings of the comparison between the two periods, we refer to Rutkowski (96, 98) and to Atkinson and Micklewright (92).

The approach we used in order to interpolate the published data, starts from the top two intervals, that are assumed to be Paretian in form, and, working successively down from the top intervals, arrives at the lowest interval assuming that also the density in each interval is Paretian in form (Atkinson and Micklewright 92, Cowell 96).

In order to compute the interpolated values we have used a personal software in MATLAB environment that solves the exponential equations through the Newton-Raphson method. Testing our program on data series already studied by Atkinson and Micklewright, we achieved the same results, thus checking the correctness of our method.
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