

# LIS

## Working Paper Series

No. 731

### **Inequality in Poland: Estimating the whole distribution by g-percentile 1983-2015**

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February 2018



CROSS-NATIONAL  
DATA CENTER  
*in Luxembourg*

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Luxembourg Income Study (LIS), asbl

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# Inequality in Poland: Estimating the whole distribution by g-percentile 1983-2015

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**Abstract.** This paper combines national accounts, survey and tax data to provide consistent series on income distribution in Poland over the 1983-2015 period. We find that official survey-based inequality estimates substantially underestimate the rise of inequality since the end of Communism. The top 10% income share increased from 23% to 40% and the top 1% income share from 4% to 14% between 1989 and 2015. Frequently quoted Poland's transition success has largely benefited top income groups. Over this period, top 1% has captured almost twice as large portion of the total income growth than the bottom 50% (24% versus 13%). We also find that inequality has continued to grow after the initial upward adjustment during the transition in the 1990s, especially since the early 2000s, and today has reached levels found in more unequal European countries. However, the transition from communism to capitalism has led to lower income concentration in Poland than in Russia. We relate this to different transition policies, institutions and natural resources endowments.

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## **1. Data Sources, Concepts and Methodology**

We combine household surveys and income tax data in order to construct new income distribution series in Poland for the 1983-2015 period. More precisely, we use tax data on high-income taxpayers to correct the top of the survey distribution. This way, we aim to provide more reliable estimates of the full income distribution. It is well documented that household surveys suffer from the poor coverage of top incomes due to higher non-response and under-reporting among richer respondents, as well as due to specific survey collection constraints and top coding. The methodology follows the Distributional National Accounts (DINA) Guidelines (Alvaredo et al. 2016), which has been recently applied to China (Piketty, Yang and Zucman 2017), Russia (Novokmet, Piketty and Zucman 2017), the Middle East (Alvaredo, Assouad and Piketty 2017), India (Chancel and Piketty 2017) and Brazil (Morgan 2017).

The general methodology consists of two steps. In the first step we use the raw survey tabulations and generalized Pareto interpolation techniques (Blanchet, Fournier and Piketty 2017) to estimate series on the distribution of survey income by generalized percentiles (g-percentiles).<sup>1</sup> In the second step, we use the tax data on high-income taxpayers to correct upwards the survey series and obtain corrected estimates of the distribution of fiscal income. We have assumed that survey data provide a reasonable description of the income distribution below the 90<sup>th</sup> percentile ( $p_0=0.9$ ). On the other hand, we take that tax data is reliable above the 99<sup>th</sup> percentile ( $p_0=0.99$ ).<sup>2</sup> We then apply the piecewise-linear correction factors  $f(p)$  above  $p_0=0.9$  up to  $p_0=0.99$ .

We use the household survey data used for the entire 1983-2015 period. For the 1980s, we use aggregated the Polish Household Budget Survey (HBS) (*Budżety Gospodarstw*

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<sup>1</sup> As explained in Alvaredo et al. (2016, p. 15) "G-percentiles files use 127 rows: 99 for the bottom 99 percentiles, 9 for the bottom 9 tenth-of-percentiles of the top percentile, 9 for the bottom 9 one-hundredth-of-percentiles of top tenth-of-percentile, and 10 for the 10 one-thousandth-of-percentile of the top one-hundredth-of-percentile."

<sup>2</sup> This is to a large extent conditioned by the small number of brackets in published income tax tabulations; for details regarding the income tax data, see Bukowski and Novokmet 2017, Appendix A3.

*Domowych*) data from Atkinson and Micklewright (1992, Tables PI1 and PI2). The authors provide tabulations of the individual distribution of household income per capita by combining the distribution of income for four types of households (worker, mixed, farmer, and pensioner households) from the official HBS reports. The tabulations are organized by eight income groups, providing in each the number of individuals and the mean income.<sup>3</sup> For the 1992-2015 period, we use harmonised HBS microdata from the Luxembourg Income Study (LIS). The data are available for 1992, 1995, 1999, 2002, 2004, 2007, 2010, and 2013 (survey years). We impute the data for the missing in-between years in two steps. First, we upgrade thresholds and average incomes in two adjacent survey years by the ratio of average fiscal income per adult in the survey and the missing year (obtained from national accounts). Second, we apply linear interpolation between two upgraded estimates to obtain thresholds and average income in missing years. The tax data comes from the official tabulations published by the Ministry of Finance, the Republic of Poland (*Informacja dotycząca rozliczenia podatku dochodowego od osób fizycznych*). For future revisions of the series we are planning to access HBS microdata for all years available at the Central Statistical Office of Poland.

The unit of observation is the individual aged 20-year-old or more. Household income in survey is equally split between all adults who belong to the same household. However, the tax unit in the tax statistics is individual whose income is not necessarily equal to income of other adults belonging to the same household. We should bear in mind that when combining survey and tax data we make implicit assumptions that high-income individuals in tax data are either singles, or that all members of the same household have reported equal income.<sup>4</sup>

Next, we should point out that by combining survey and tax data, we produce the distribution of the so-called fiscal income. This is the income concept used to construct top income shares series - also refereed as gross income, before personal deductions

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<sup>3</sup> One should also bear in mind the survey is fully representative since 1993. Previously, it omitted police, army, and non-agricultural private sector (Milanović 1999, Tab. A1).

<sup>4</sup> The option of joint splitting for couples is available under the progressive income tax schedule; see Bukowski and Novokmet 2017, Appendix A3.

and income taxes (see Bukowski and Novokmet 2017, Appendix A3). It comprises wages and salaries, self-employment income from non-agricultural and agricultural activities (including home consumption), property and business income, and social (cash) transfers.<sup>5</sup>

Several caveats emerge when joining the survey and fiscal data. Firstly, the income reported in the tax data does not cover agricultural activities, therefore we implicitly assume that there are no top income taxpayers in the agricultural sector. Secondly, it is worth noting that income concept in survey data during the socialist period (1983-1989) is that of post-tax (or disposable) income. However, as personal income taxes were negligible during the socialist period and employees did not contribute to social security from their gross wage, there is no practical difference which of the two concepts is used.<sup>6</sup> Finally, fiscal income is typically broader in scope than the so-called taxable income, as the latter is net of certain income tax deductions (whose magnitude varies across countries and over time). Importantly, Polish raw tax tabulations are organized according to thresholds of taxable income, and we have to make several corrections in order to arrive at the fiscal income concept. A largest part of the difference between the two concepts comes from the fact that taxable income is net of social security contributions (SSC) paid by employees (the statutory rate is 13.7% of gross salary).<sup>7</sup> Fortunately, the tax statistics provide the total income by bracket both according to fiscal and taxable income,<sup>8</sup> thus we 'only' need to adjust the raw data thresholds. We account for this by applying upgrade correction factors so that the new (higher) threshold leads to the same inverted Pareto  $b$  coefficient as documented for the income concept net of SSC paid by employees.

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<sup>5</sup> See Atkinson and Micklewright 1992, p. 261 for the income definition in HBS during the socialist period.

<sup>6</sup> Milanović (1999, pp. 322-3), for example, points out that the difference between pre- and post-tax income was less than 1%.

<sup>7</sup> Note that this issue becomes relevant only from 1999, because until then SSC were exclusively paid by employer. Note, in addition, that health insurance is paid from the tax obligation.

<sup>8</sup> For example, we see that SSC paid by employees make on average 5-7% of gross income of the top bracket in the income tax statistics.

Further distinction needs to be made between fiscal and national income (as standardly defined (SNA 2008): GDP minus consumption of fixed capital plus net foreign income (SNA 2008)). A major difference is due to the fact the national income includes in addition tax-exempt capital income, such as undistributed corporate profits or imputed rents. At this stage, we provide only the distribution of fiscal income, but, in general, it has been found that the fiscal correction (using income tax data) accounts for the bulk of upward correction of raw survey inequality, and further adjustment for the distribution of tax-exempt capital income has showed to be of relatively limited impact (see, for example, the above mentioned studies on China and Russia).<sup>9</sup> But in order to allow an international comparison, we scale fiscal income distribution to the national income totals by proportionally upgrading thresholds and average incomes for each percentile of the fiscal income distribution.

## **2. The evolution of Income inequality in Poland, 1983-2015**

Our new series on the evolution of income inequality in Poland show that official survey-based measures strongly underestimate the level of income inequality in Poland. In the same manner, our results suggest a notably higher increase in income inequality in Poland since the end of Communism until today. However, the rise in inequality in Poland has been less pronounced than in Russia or in many developing countries.

The largest increase in income inequality occurred in the early 1990s, especially between 1993 and 1995. The top 10% income share increased from levels around 22-23% in the 1980s to 27% in 1992-1993, and then jumped to 34% by 1995 (Figure 1). This rise was accompanied by a fall in income shares of the middle 40% and of the bottom 50%. These groups experienced a roughly commensurate fall in income shares of around 5pp between 1989 and 1995. Subsequently, we observe a steady rise in inequality, especially between 2003 and 2008, which has been also induced by the rising share of the top

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<sup>9</sup> The distribution of tax-exempt capital income is under construction.

decile.<sup>10</sup> It is important to note that this rise has been altogether overlooked by the official survey measures (Figures 2a-2c). In the 1989-2015 period, the top 10% income share almost doubled, rising from levels slightly above 20% in the 1980s up to 40% in 2015 (as opposed to around 25% suggested by surveys; see Figure 2a). In the same period, the top 1% income share more than tripled, rising from around 4% to 13% (as opposed to 6% suggested by surveys; see Figure 2c).

We next consider distributional effects of the transition in Poland by looking at the growth experience of different income groups. Over the 1989-2015 period, average real national income per adult has increased by 73%, or at about 2.1% per year. Although modest in comparison to the Chinese growth, these are respectable growth figures when compared to former communist countries in Eastern Europe.<sup>11</sup> Overall, there has been a notable increase in the living standards of the Polish population since the fall of Communism (especially when the grave stagnation of the 1980s is taken into account). However, the growth incidence curve for the 1989-2015 suggests that this growth has not been equally shared (Figure 3). The curve displays the upward-sloping shape, suggesting that growth rates increase with income rank, and it is strongly tilted towards groups within the top 10%, who have enjoyed very high growth rates and have been the main beneficiaries of the growth during this period. For example, it can be seen that only groups within the top 10% experienced above-average growth rates. Table 1 shows that real incomes of the top 10% increased by 190% (or 4.2% per year) and of the top percentile by 458% (or 6.8% per year). On the other hand, the income growth of the bottom 90% has been much more modest: the bottom 50% experienced a 31% increase (1% per year) and the middle 40% a 47% increase (1.5% per year) in their real income.<sup>12</sup> The finding that real incomes

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<sup>10</sup> Note that Brzeziński and Kostro (2010, Figure 2) document the same inequality trend over the 1998-2008 period when fitting the Pareto model to the upper tail to the empirical survey distribution from HBS. Our approach differs in that we correct survey-based inequality by combining survey and tax data.

<sup>11</sup> If we take for the starting the year 1991, which is the low point of the transition recession, then the average real growth per adult has increased by 115%, or at about 3.2% per year. The source on real growth per adult is World Wealth and Income Database (WID).

<sup>12</sup> It is worth noting that we apply the same price deflator to all income groups. Poor and rich consume different baskets of goods, and thus a relative change in prices of baskets might affect real inequalities. Unfortunately, we do not have group-specific price deflators. However, it is well documented that food expenditures on food constitute a big part of total consumption of poor and its share is diminishing with

of the Polish bottom 50% have increased, but at the relatively lower rates, is consistent with the finding of Milanović and Ersado (2010) that in the former transition countries growth has been disequalizing in relative but not in absolute terms. The Table 1 also shows that the top 1% has captured almost twice as large portion of the total income growth as compared to the bottom 50% group (24% versus 13%, respectively).

## 2.1. International comparison

In international comparison, it is particularly interesting to compare the evolution of income inequality in Poland and Russia after the fall of Communism in Eastern Europe. Figure 4 looks at the development of the Gini coefficient in Poland and Russia from the 1980s up to the present. It can be seen that income inequality has increased substantially more in Russia than in Poland. While the Gini coefficient assumed similar levels in both countries in the 1980s, slightly below 0.3, the beginning of the transition to the market economy led to markedly divergent inequality patterns. A critical divergence took place between 1991 and 1995/6, when Gini index in Russia surged to levels around 0.6, while in Poland it increased to 'only' 0.4. In this respect, the contrasting development of the bottom 50% income shares in Russia and Poland is particularly striking (Figure 5). The bottom 50% share was around 30% of national income in both countries in the 1980s. But, while the bottom 50% share in Russia more than halved between 1991 and 1996, its Polish counterpart experienced a relatively moderate decline during the same period – from 30% to 25% of national income.

A more robust relative standing of the Polish bottom 50% in the 1990s is often explained by particularly generous social transfers in the early phase of the transition. Keane and Prasad (2002) find that a marked increase in social transfers during first transition years

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income. Therefore, a relative change of food prices compared to the CPI total can be informative about the distributional effects of price changes. The OECD data show that food prices in Poland rose annually on average by 4.3% and the CPI by 5% between 1996 and 2015. This suggests that the difference in prices might favor lower income groups, yet it can only account for a tiny fraction of the gap in real income growth between poor and rich.



played the key role in mitigating the sharp rise in inequality in Poland (as inequality of pre-transfer market income sharply increased).<sup>13</sup> In particular, the extensive transfer system aimed to compensate potential 'losers' from the market reform, providing on larger scale an access to early retirement to older workers and unemployed (and thus safe income), generous unemployment benefits, disability benefits, etc. (Brzeziński et al., 2013, p. 92).<sup>14</sup> Moreover, Keane and Prasad (2000, p. 4) have argued that these social policies ensured the social stability and consequently provided the general political support for the market reforms and enterprise restructuring in Poland. In Russia, on the other hand, a large part of the bottom 50% was made up of pensioners and low-wage workers, who suffered from non-indexation of nominal incomes during hyperinflation, from widespread arrears and rising unemployment (Novokmet, Piketty and Zucman 2017, p. 33). Transfer payments in Russia were less extensive and declining,<sup>15</sup> and a collapse in living standards of the bottom 50% led to a sharp increase in inequality in the early 1990s (Mitra and Yemtsov, 2006). Subsequently, the bottom 50% income share in Poland has moderately declined to levels slightly above 20% in recent years, characteristic for continental European countries, such as France (Figure 5b). The recent stabilization of the bottom 50% share could be related to the increase in the relative level of minimum wage, from 35% of the national average wage in 2008 to almost 45% in 2015 (GUS, 2016).

The recent rise in inequality in Poland has been again driven by the increase in top income shares. The top 10% share has steadily increased since the early 2000s and has reached levels around 40% by 2015. A rise in top business incomes has played the most important role in the recent increase in top shares (Bukowski and Novokmet, 2017). We relate this rise to processes associated with the new phase in globalization, and in this respect, we

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<sup>13</sup> However, Milanovic and Ersado (2010) do not find a positive relationship between the size of transfers and inequality (in contrast to Keane and Prasad 2002).

<sup>14</sup> As a result, social spending substantially increased between 1990 and 1992. However, the rising deficit precluded further increase in social spending in subsequent years, and the fact that inequality increased more substantially exactly after 1993, might be taken, according to Keane and Prasad (2000, p. 21), as an additional evidence of the effectiveness of social transfers in mitigating the sharp rise in inequality between 1990 and 1993.

<sup>15</sup> Transfers in Russia were especially poorly targeted, being actually regressive (see Commander et al., 1999).

could tentatively explain similar trajectories of top income shares in Poland and China since the turn of the century (for example, both China and Poland are members of Baldwin's (2016) 'Industrializing Six' developing countries) (Figures 6 and 7). Since the early 2000s, top income shares in Poland have exceeded top shares in France, but are still below Russian levels. Interestingly, a rise in the top 10% share has been accompanied by a decline in income shares of the middle 40% (Figure 1, Figure 8). A decline in the relative standing of the Polish middle class would be consistent with the recent narrative of the distributional effects of globalization (e.g. Milanović, 2016).

The post-communist transformation has resulted in markedly higher wealth and income concentration in Russia than in Poland and other ex-communist countries in Central Eastern Europe (Figure 7). The top 1% income shares in Poland and Russia were at similar levels, around 5%, before 1990, but the outset of the transition to the market economy led to a rapid upward adjustment of top shares in both countries. The top percentile income share doubled in size in only a few years and reached levels of western capitalist countries by 1993/4 (in 1994, the top percentile share reached 10% in Poland and 12% in Russia). However, top 1% income share virtually exploded in Russia afterwards (rising to 16% already by 1996, to 24% by 2001 and peaked at 27% in 2007) and today is at levels slightly above 20%. In Poland, on the other hand, the top 1% share stabilized between 1995 and 2002 at around 10%, and increased recently to 13-14%. A markedly higher concentration in Russia than in Poland is in line with the Forbes billionaire data, which show a disproportionately high billionaire wealth in Russia (Novokmet, Piketty and Zucman 2017).<sup>16</sup> The timing of the divergence in top shares from the mid-1990s could be related to the ownership consolidation following the mass privatization in Russia (and the new privatization round under the 'loans for shares' scheme) in the environment of legislative and institutional vacuum favoring the rich (Guriev and Rachinsky 2008).<sup>17</sup>

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<sup>16</sup> Brzeziński (2017, p. 7) reports very small wealth of the Polish billionaires in the Forbes data, only 1.3% of Poland's GDP in 2016. In contrast, the wealth of Russian billionaires on the Forbes list has been around 30%-40% of national income in the last decade (Novokmet, Piketty and Zucman 2017, Fig. 2).

<sup>17</sup> Guriev and Rachinsky (2008, p. 142) have referred to this as the 'institutional economies of scale': "large owners were able to influence rules of the game from capturing regulators, courts and legislatures". Importantly, as these authors further note (footnote 13), widespread wage arrears compelled many workers

Importantly, the abundance of natural resource rents in Russia (their lack in Poland) in such an environment has plausibly contributed to markedly higher concentration levels in Russia. On the other hand, it has been often argued that different (western) institutional framework – more favorable to the rule of law and to building market institutions – has emerged in CE Europe as a result of the prospective EU accession (the so-called anchor of EU accession; Berglof and Bolton 2002). Finally, a complementary argument explaining lower top income shares in Poland is substantially higher foreign ownership in the new EU members in CE Europe, whose general convergence strategy has relied on economic integration (and foreign technology transfers) within the EU. The fact that the top capital incomes holders in Poland are disproportionately foreigners removes a large part of the (high-yielding) property income from interpersonal (resident) income distribution, and plays a part in lower top income shares in Poland than in Russia.<sup>18</sup> On the other hand, more considerable foreign ownership has not been an option in Russia.

A markedly different transition experience in Poland and Russia suggests that there was no predetermined trajectory of inequalities during the transition.<sup>19</sup> It clearly shows that policies and institutions play an important role in shaping inequality. However, we need more transparent income data in order to assess their respective importance for inequality dynamics in Poland and to pursue appropriate social policies. Our upward revision of inequality estimates clearly communicates a need to proceed in this direction.

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to sell their shares (from voucher privatization) at very low prices. As a result, a plunge in the Russian bottom 50% was directly related to the high rise in top income shares.

<sup>18</sup> For example, Bukowski and Novokmet (2017, Fig. 20) show that from the total distributed capital income in the country, foreigners have received almost as large portion as the Polish households.

<sup>19</sup> Moreover, it might be conjectured from the relatively more successful transition in Poland that mitigating a more substantial rise in inequality may actually be conducive for growth (Keane and Prasad 2002, Sukiassyan 2007).

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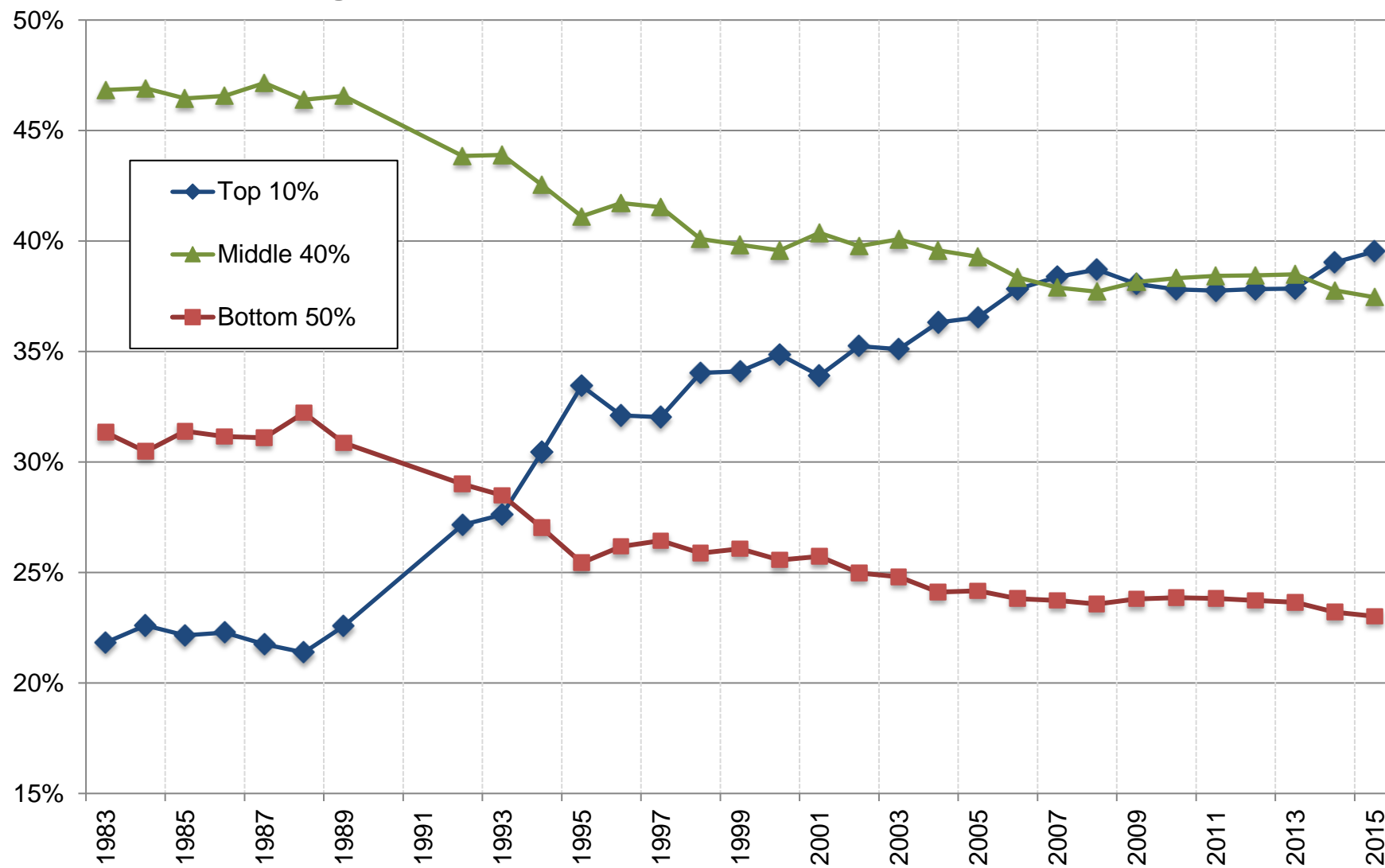
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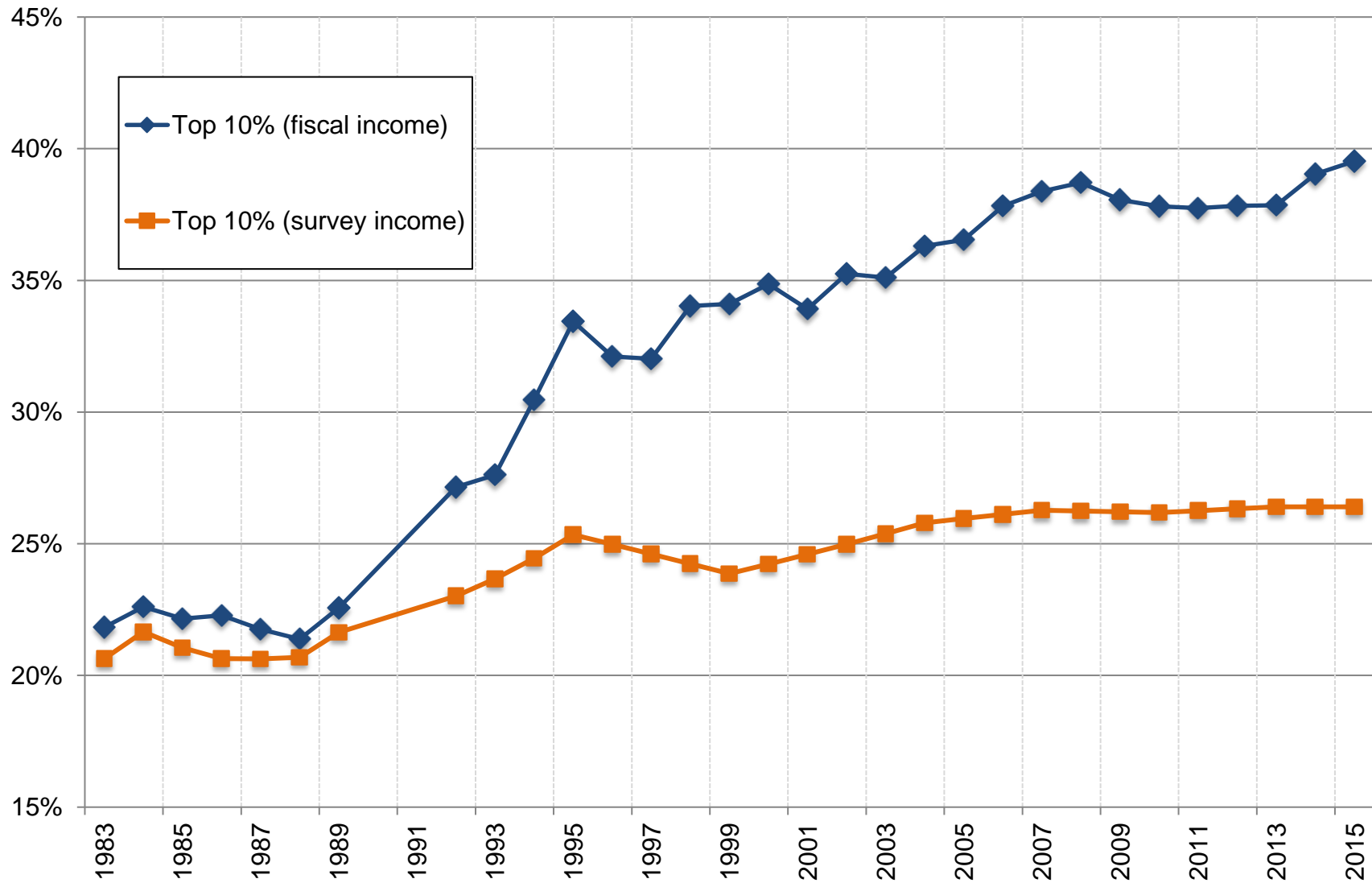
**Figure 1: Income shares in Poland, 1983-2015**



Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

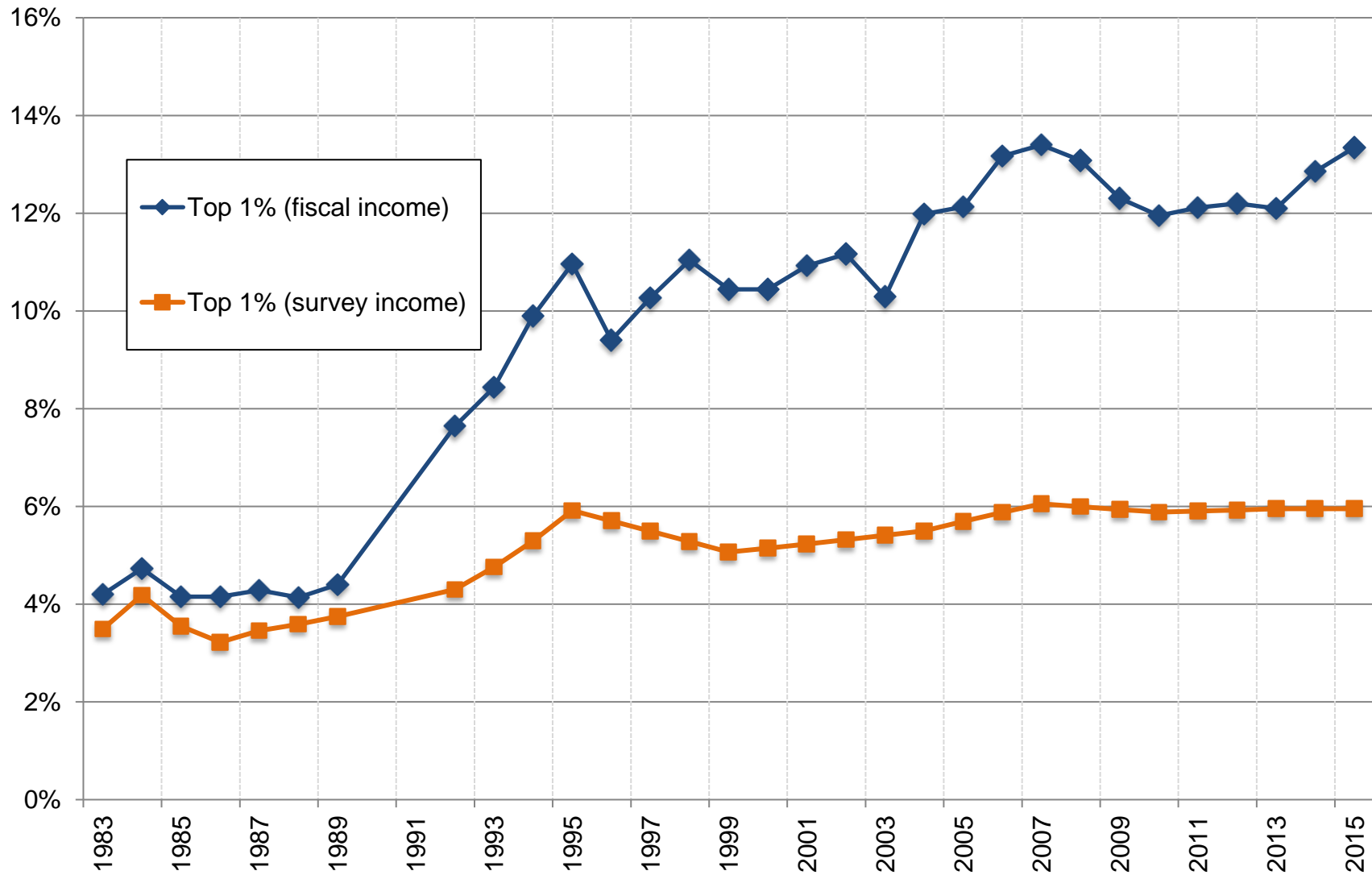


**Figure 2a. Top 10% income share in Poland, 1983-2015**



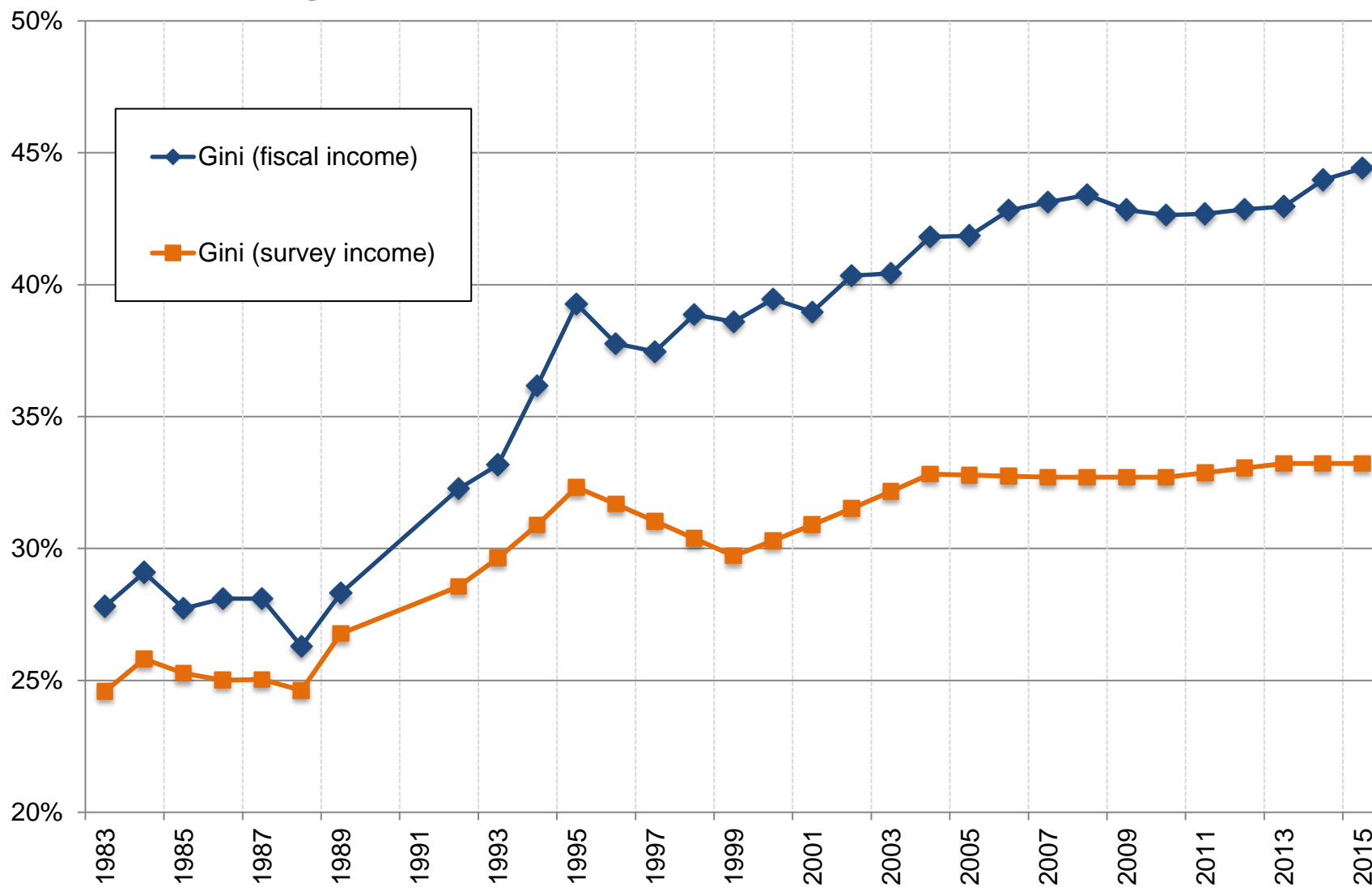
Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

**Figure 2b. Top 1% income share in Poland, 1983-2015**



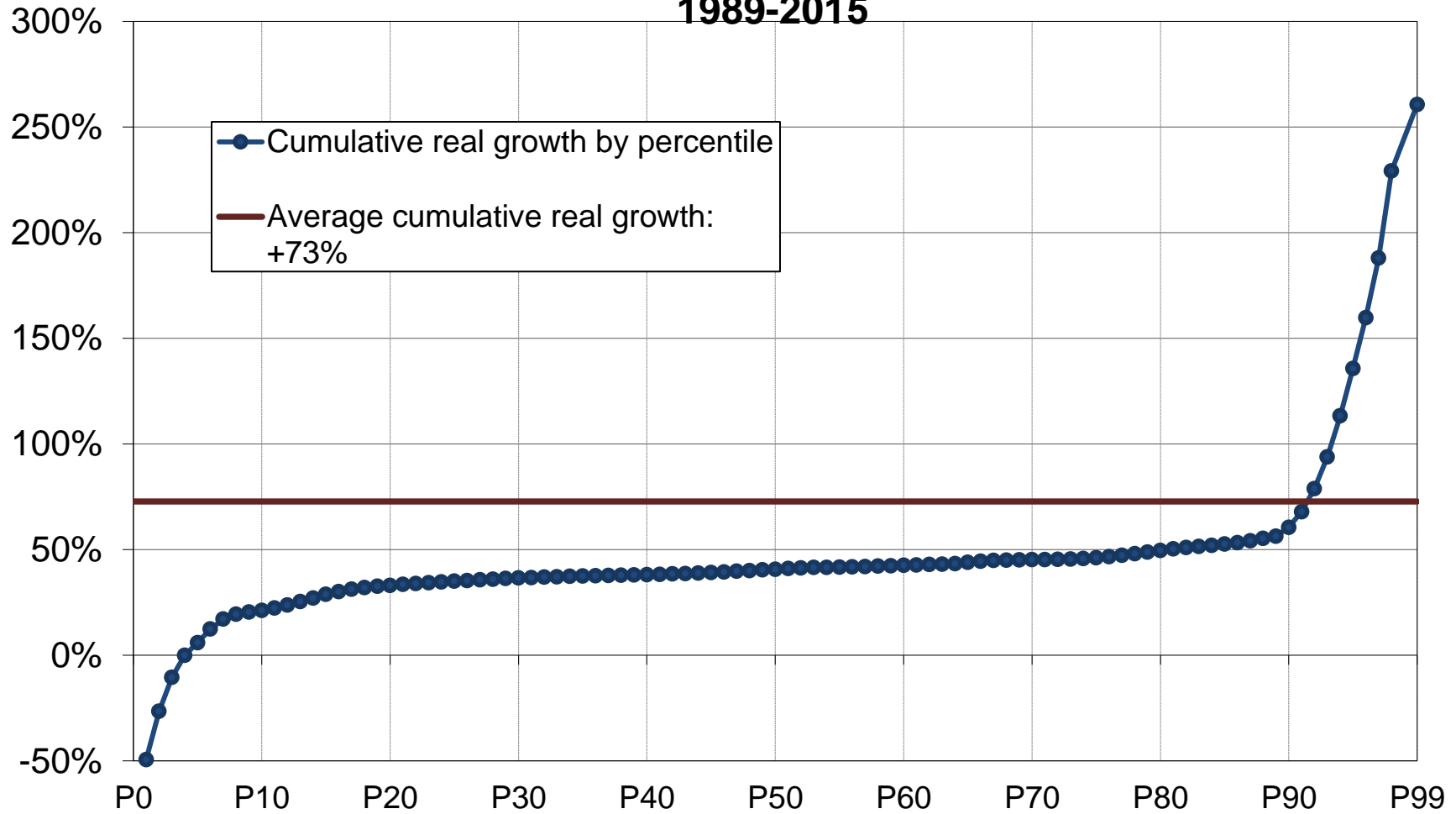
Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

### Figure 2c. Gini coefficient in Poland, 1983-2015



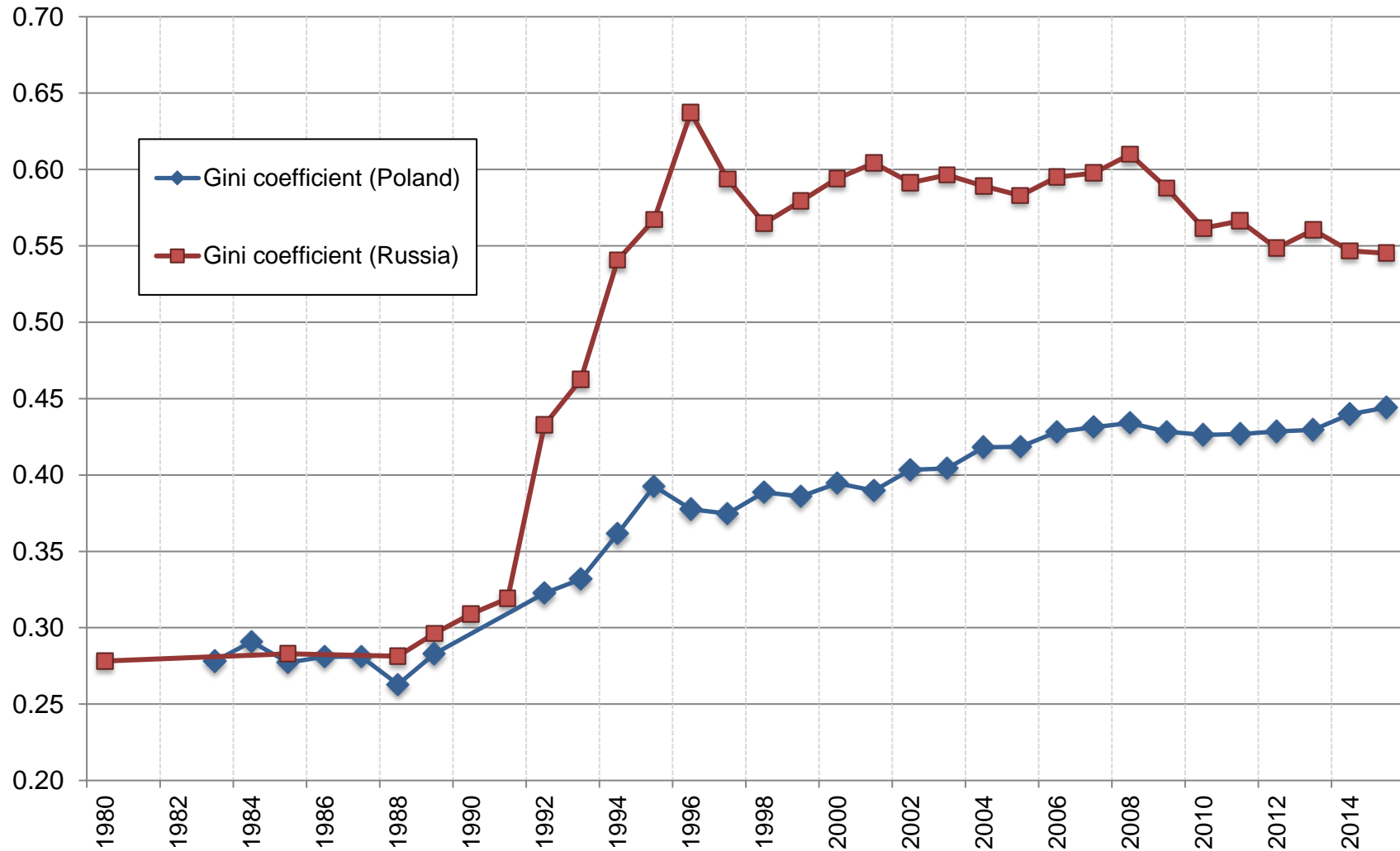
Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

**Figure 3. Cumulative real growth by percentile, Poland  
1989-2015**



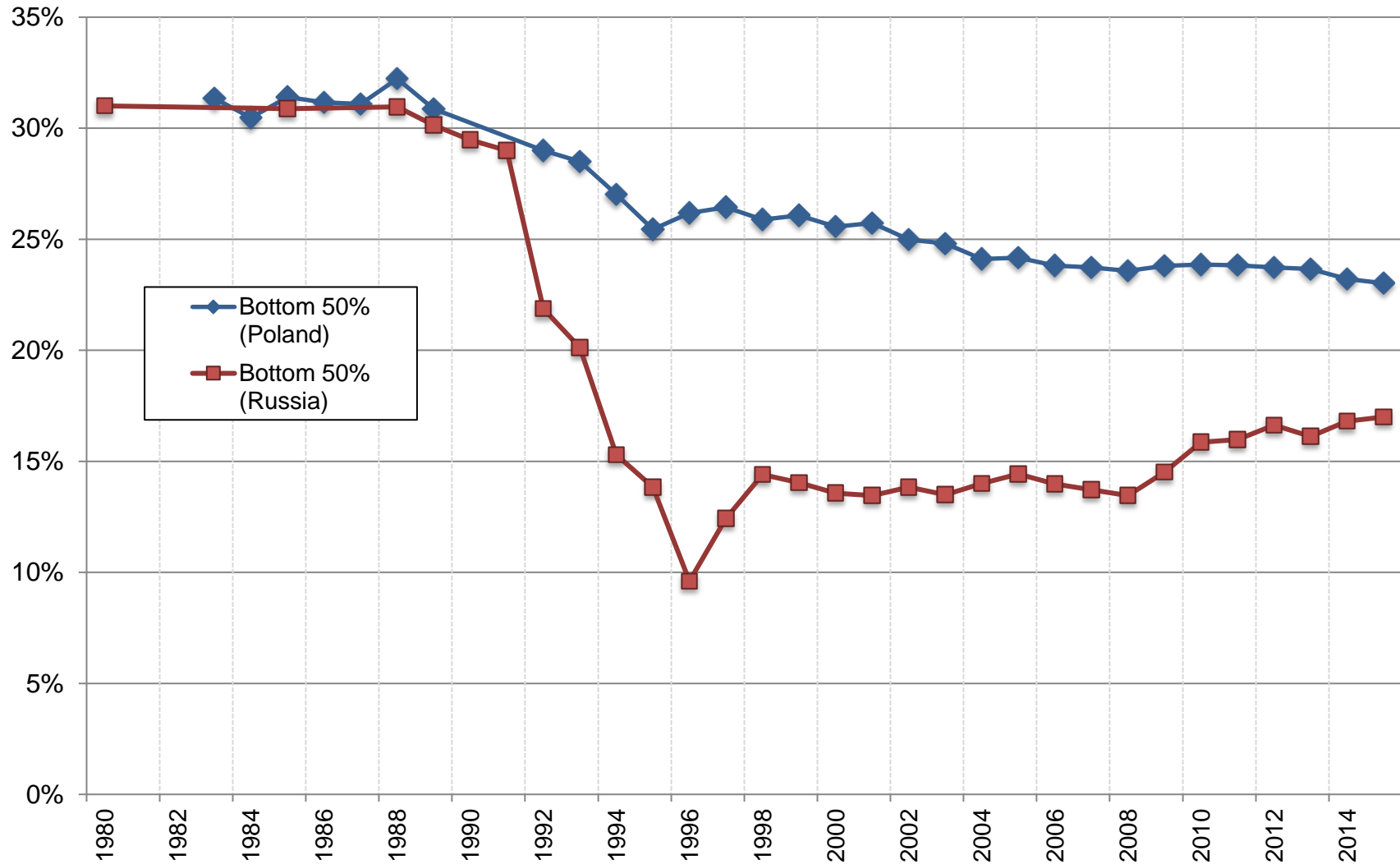
Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

**Figure 4. Gini coefficient in Poland vs Russia**



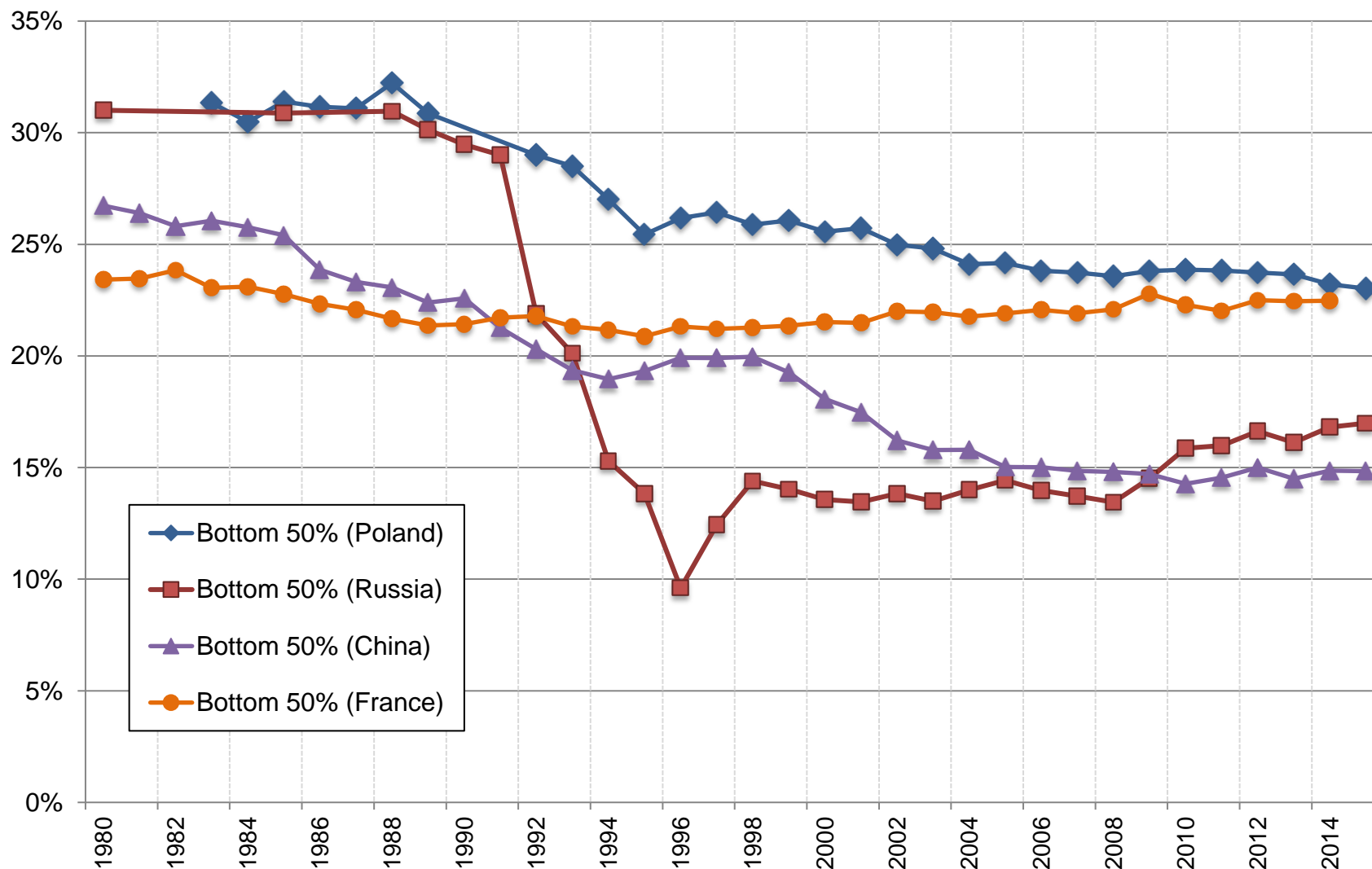
Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for Russia: Novokmet et al. (2017).

**Figure 5a. Bottom 50% in Poland vs Russia**



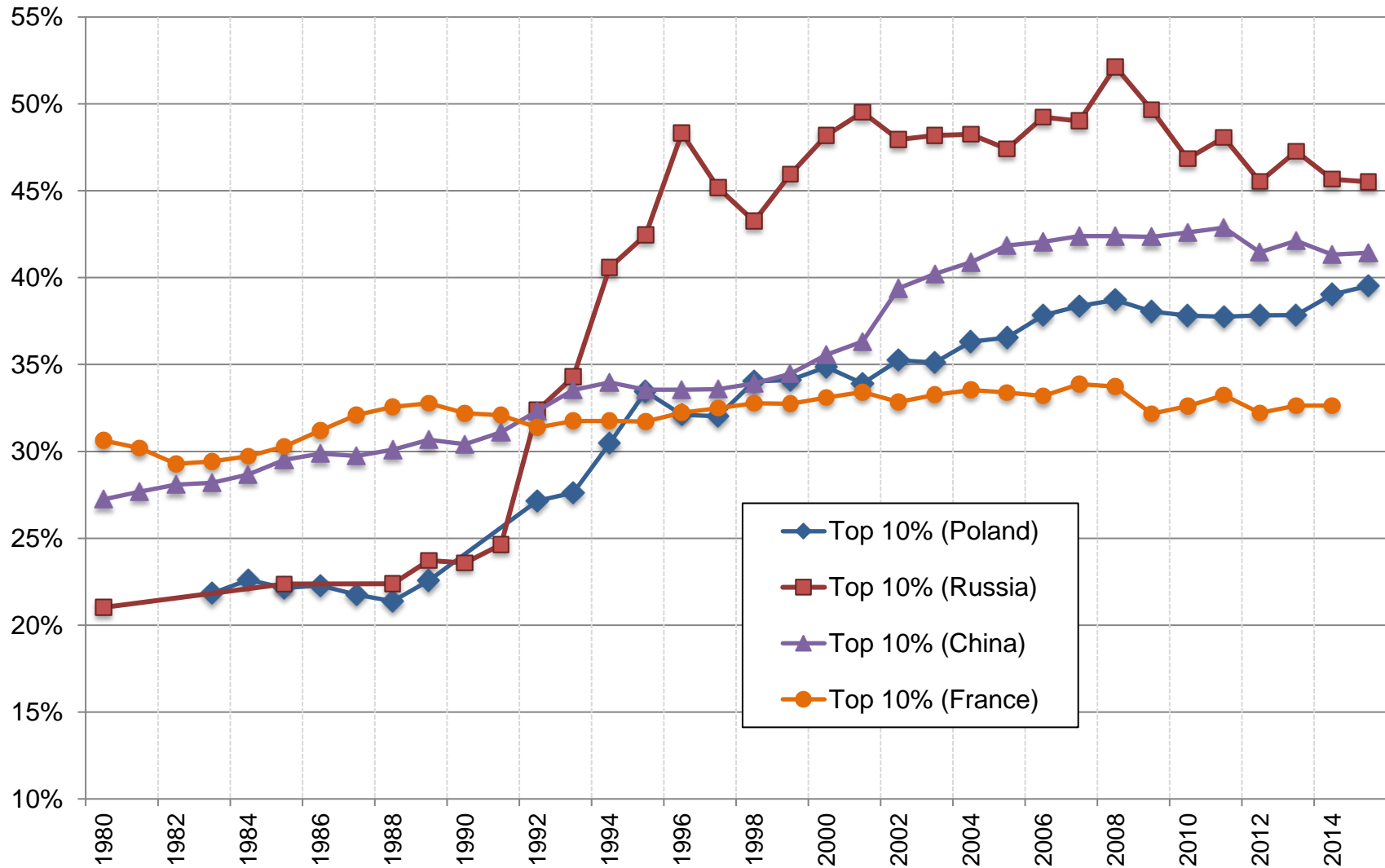
Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for Russia: Novokmet et al. (2017).

**Figure 5b. Bottom 50% in Poland vs Russia, China and France**



Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for China: Piketty et al. (2017); Source for France: Garbinti et al. (2016); Source for Russia: Novokmet et al. (2017).

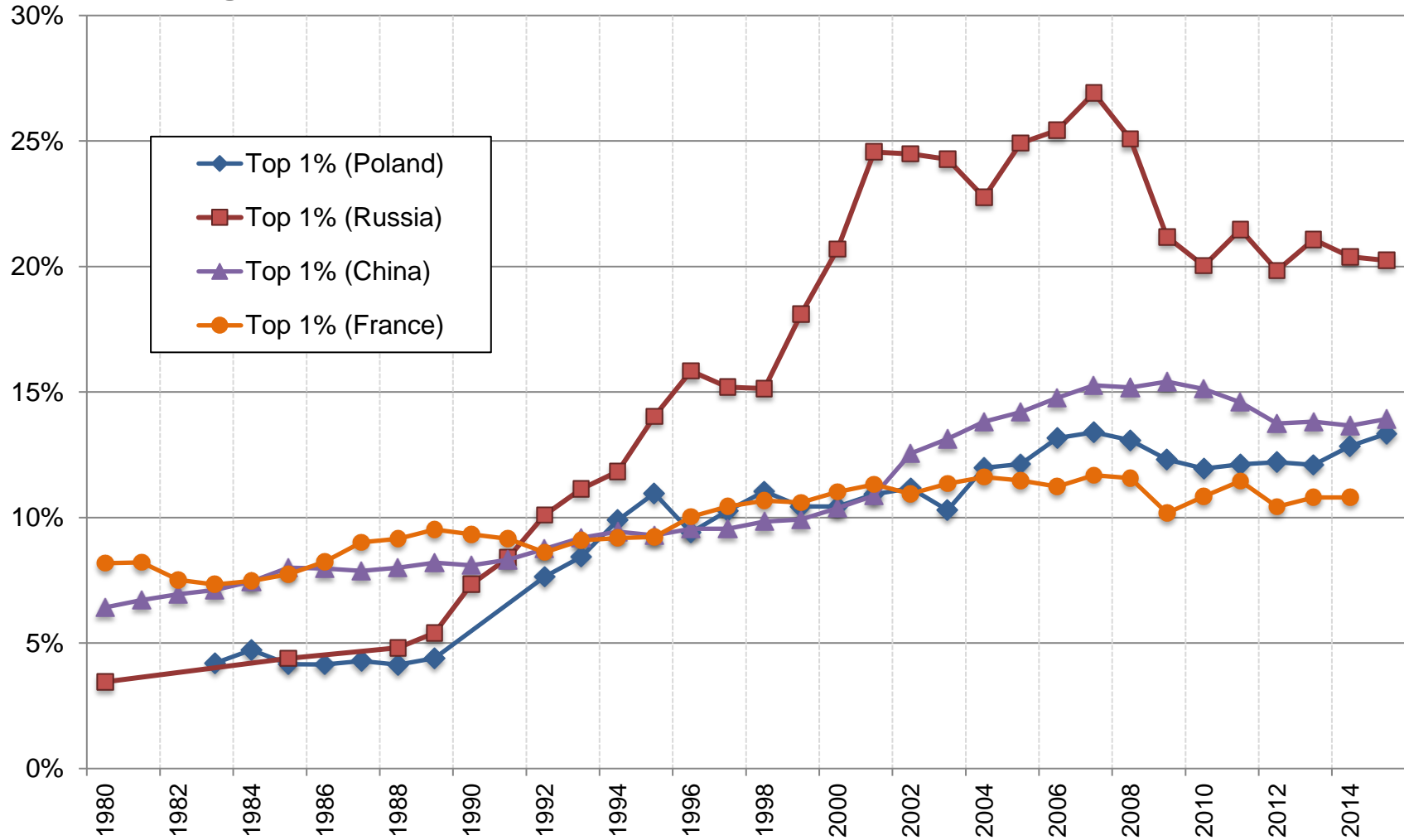
**Figure 6. Top 10% in Poland vs Russia, China and France**



Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for China: Piketty et al. (2017); Source for France: Garbinti et al. (2016); Source for Russia: Novokmet et al. (2017).

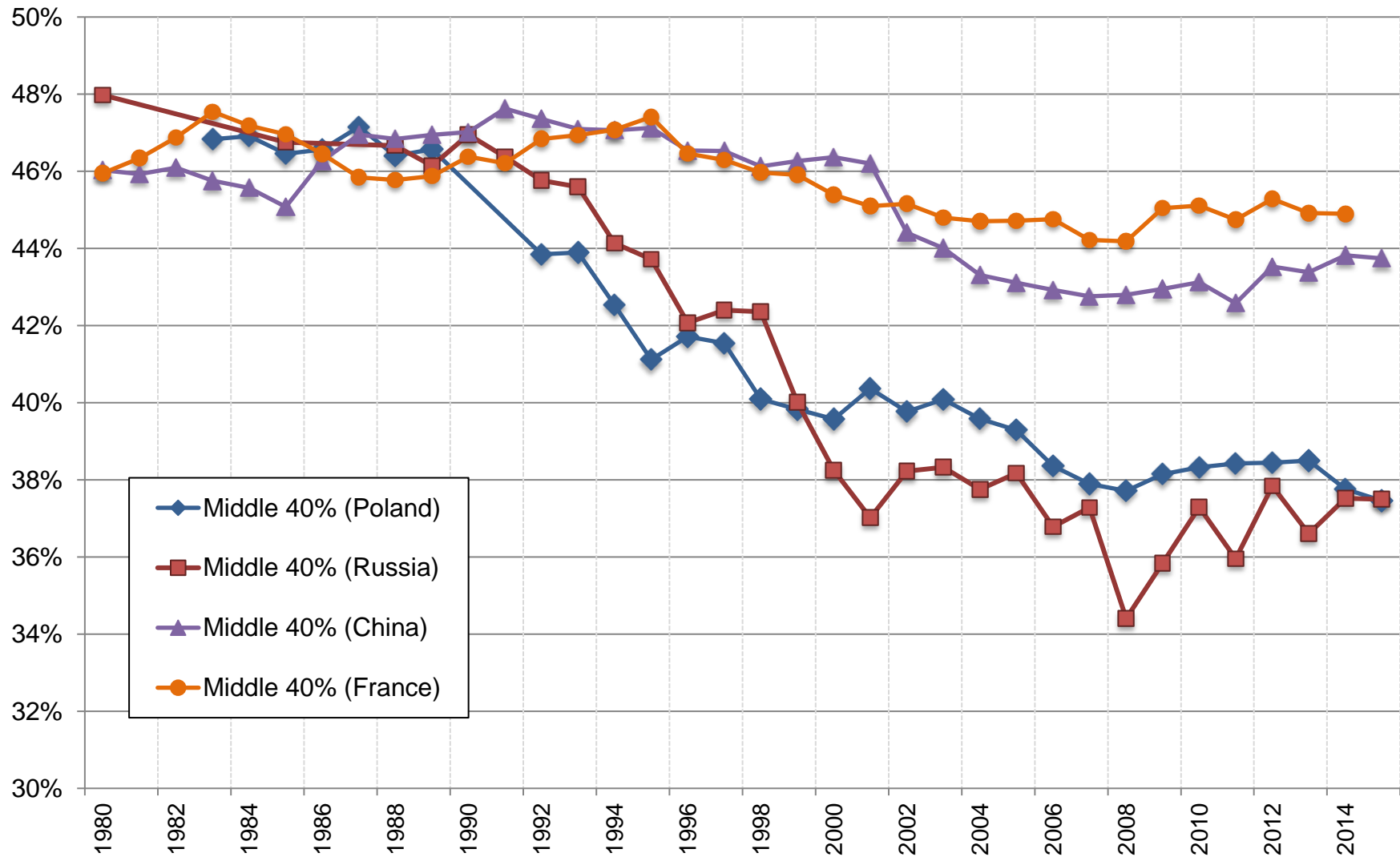


**Figure 7. Top 1% in Poland vs Russia, China and France**



Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for China: Piketty et al. (2017); Source for France: Garbinti et al. (2016); Source for Russia: Novokmet et al. (2017).

**Figure 8. Middle 40% in Poland vs Russia, China and France**



Source for Poland: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for China: Piketty et al. (2017); Source for France: Garbinti et al. (2016); Source for Russia: Novokmet et al. (2017).

**Table 1. Income growth and inequality in Poland 1989-2015**

<b>Income group</b> (distribution of per adult pre-tax national income)	Average annual real growth rate 1989-2015	Total cumulated real growth 1989-2015	Share in total macro growth 1989-2016
Full Population	<b>2.1%</b>	<b>73%</b>	<b>100%</b>
Bottom 50%	<b>1.0%</b>	<b>31%</b>	<b>13%</b>
Middle 40%	<b>1.5%</b>	<b>47%</b>	<b>30%</b>
Top 10%	<b>4.2%</b>	<b>190%</b>	<b>57%</b>
<i>incl. Top 1%</i>	6.8%	458%	24%
<i>incl. Top 0.1%</i>	9.7%	1019%	9%
<i>incl. Top 0.01%</i>	13.0%	2273%	3%
<i>incl. Top 0.001%</i>	16.4%	5066%	1%

Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics.

**Table 2: Income growth in Poland and Russia 1989-2016**

Income group (distribution of per adult pre- tax national income)	Poland		Russia	
	Total cumulated real growth 1989-2015	Share in total macro growth 1989-2015	Total cumulated real growth 1989-2016	Share in total macro growth 1989-2016
Full Population	<b>73%</b>	<b>100%</b>	<b>41%</b>	<b>100%</b>
Bottom 50%	<b>31%</b>	<b>13%</b>	<b>-20%</b>	<b>-15%</b>
Middle 40%	<b>47%</b>	<b>30%</b>	<b>15%</b>	<b>16%</b>
Top 10%	<b>190%</b>	<b>57%</b>	<b>171%</b>	<b>99%</b>
<i>incl. Top 1%</i>	<i>458%</i>	<i>24%</i>	<i>429%</i>	<i>56%</i>
<i>incl. Top 0.1%</i>	<i>1019%</i>	<i>9%</i>	<i>1054%</i>	<i>34%</i>
<i>incl. Top 0.01%</i>	<i>2273%</i>	<i>3%</i>	<i>2134%</i>	<i>17%</i>
<i>incl. Top 0.001%</i>	<i>5066%</i>	<i>1%</i>	<i>4122%</i>	<i>8%</i>

Source: authors' computation based on Atkinson and Micklewright (1992), Luxembourg Income Study (LIS) database and income tax statistics; Source for Russia: Novokmet et al. (2017).