

**Between Communism and Capitalism:
Long-Term Inequality in Poland, 1892-2015**

Pawel Bukowski
Filip Novokmet

May 2019



World Inequality Lab

Between Communism and Capitalism: Long-Term Inequality in Poland, 1892-2015

Paweł Bukowski

Centre for Economic Performance, London School of Economics and Political Science

Filip Novokmet

Institute for Macroeconomics and Econometrics, University of Bonn

World Inequality Lab, Paris School of Economics

Abstract.

How has Polish inequality evolved between communism and capitalism to reach one of the highest levels in Europe today? To address this question, we construct the first series on the long-term distribution of income in Poland by combining tax, household survey and national accounts data. We document a U-shaped evolution of inequalities from the end of the 19th century until today: (i) inequality was high before WWII; (ii) abruptly fell after the introduction of communism in 1947 and stagnated at low levels during the whole communist period; (iii) experienced a sharp rise with the return to capitalism in 1989. Between 1989 and 2015 the top 10% income share increased from 23% to 35% and the top 1% income share from 4% to 13%. Frequently quoted Poland's transition success has largely benefited top income groups.

We find that inequality was high in the first half of the 20th century due to strong concentration of capital income at the top of the distribution. The secular fall after WW2 was largely to a combination of capital income shocks from war destructions with communist policies both eliminating private ownership and forcing wage compression. The rise of inequality after the return to capitalism in the early 1990s was induced both by the rise of top labour and capital incomes. We attribute this to labour market liberalisation and privatisation. However, the strong rise in inequality in the 2000s was driven solely by the increase in top capital incomes, which is likely related to current globalization forces. Yet overall, the unique Polish inequality history speaks about the central role of policies and institutions in shaping inequality in the long run.

* We are grateful to Michał Brzeziński, Paweł Chrostek, Irena Grosfeld, Sergei Guriev, Justyna Klejdysz, Marek Kośny, Guy Michaels, Branko Milanovic, Radosław Piekarz, Thomas Piketty, Aaron Reeves, Jacek Rostowski, Marek Skawiński, and Tomasz Zawisza for helpful comments. All errors are of ours. Paweł Bukowski is from the Centre for Economic Performance, London School of Economics and Political Science, Houghton Street, WC2A 2AE, London, p.bukowski@lse.ac.uk. Filip Novokmet is from the Institute for Macroeconomics and Econometrics, University of Bonn, Kaiserplatz 7-9, 53113 Bonn; fillip.novokmet@uni-bonn.de. Paweł Bukowski's participation in the project was supported by the Economic and Social Research Council at the Centre for Economic Performance and by the European Union's Horizon 2020 research and innovation programme under grant agreement No 724363. Filip Novokmet's participation in the project was supported by the European Research Council under the European Union's Seventh Framework Programme, ERC Grant Agreement number 340831.

1. Introduction

Right from the beginning of modern economics an interest in distributional issues has constantly been present in economic and public discourse, varying strongly in its intensity from the initial enthusiasm of the classical economists,¹ but often finding itself unjustifiably ousted at the margins of economic interest. In the middle of the twentieth century, Simon Kuznets renewed the enthusiasm and taught us about the inextricable interplay of inequality and economic growth in the process of economic development. However, the evolution of inequalities and its determinants are still not well understood. Our understanding of inequalities depends on the available empirical evidence, and as we have obtained new evidence, charting inequality further back in time, the old paradigms have been challenged and new ones developed. The research on top incomes (Kuznets 1953; Piketty 2014; Atkinson and Piketty, 2007, 2010) has played a central role in charting these new modes of understanding by providing the empirical basis for path-breaking theories in the field.

Although numerous developed countries have been extensively studied, surprisingly little attention has been devoted to Central and Eastern Europe. Importantly, Poland has been missing from the picture. The episodes of state formation, wars, socialism, transition into capitalism, and integration into the EU make Poland a particularly compelling case for studying determinants of income inequalities. Poland's post-communist transition success has been frequently quoted (e.g. Piatkowski 2018). The real average national income per capita has more than doubled since 1990, but which income groups and income sources have benefited from it? What is the role of transition policies and emerging institutions in shaping inequality? Similarly, the new wave of globalization and capital-biased technological change have been crucial for the transformation of the Polish economy. Poland is the only major European country, which has recently experienced a substantial re/industrialization and growing share in the World's GDP (Baldwin 2016). But we know little about distributional effects of these processes for the division of national income between capital and labour. Finally, how does Polish experience compare to western European countries, Russia, other former socialist countries in EU, or China and other developing countries?

This paper is a first comprehensive attempt to look at the long-run evolution of inequality in Poland in order to shed light on these questions. We combine tax, survey and national accounts data to provide consistent series on the long-term distribution of national income in Poland. First, we combine household surveys and income tax data in order to provide more reliable estimates of the full income distribution series in Poland for the 1983-2015

¹ For David Ricardo, it presented "the principal problem in political economy".

period. More precisely, we use tax data on high-income taxpayers to correct the top of the survey distribution. Next, we construct top income shares for the whole period from the end of the 19th century until today.² We provide thus first homogeneous series that offer a possibility to compare the level and evolution of income inequality in Poland both through time and across countries. Our motivation is to fill the void in the literature and contribute to the understanding of the long-term determinants of inequality. Our work is also a part of the broader project of incorporating distributional statistics in the national accounts (Stiglitz et al. 2009; Alvaredo et al. 2016; Piketty et al. 2018; Bukowski et al. 2019).

Figure 1 summarizes our main results on the long-run income inequality in Poland. Top income shares in Poland followed a U-shaped evolution from 1892 until today. Inequality was high in the first half of the 20th century due to high concentration of capital income at the top of the distribution. Initially, during the period of Partitions, top income shares experienced different trajectories in the Prussian and Austrian parts. A steady rise in the former contrasts with the stagnation in the latter. The end of the First World War and the immediate post-war development led to the sharp reduction in top income shares, owing to the shocks to capital income such as the wartime destruction, the hyperinflation of the early 1920s and the introduction of the anti-rich policies, including steeply progressive income and wealth taxation. During the interwar period, top income shares recovered from this low-point. The Great Depression resulted in further top concentration since top incomes were less adversely affected than the majority of the population consisting of smallholding farmers. The proportionally lower decrease in incomes of top groups during the depression was largely procured by the rapid cartelization and intensified industrial concentration. As documented now in many countries, the post-WWII downward trend was induced by the fall in capital income concentration. The introduction of communism signified comparatively greater shock to capital incomes relative to other countries, by literally eliminating private capital income with nationalisations and expropriations, while in addition it implied strong reduction of top labour incomes. During the remaining four decades of the communist rule, top income shares displayed notable stability at these lower levels.

We analyse the transition from communism to the market economy by constructing the full income distribution (1983-2015) from combined tax and survey data. Figure 2 presents our series on the income distribution. We show that within one generation, Poland has moved from being one of the most egalitarian to one of the most unequal countries in Europe. Inequality experienced a substantial and steady rise after the fall of communism, which was driven by a sharp increase in income shares of the top groups within

² The reason we focus on top income shares for the earlier period is the absence of household survey data (see Section 2). Nevertheless, it has been found that the evolution of top income shares reasonably well outlines the evolution of the overall income distribution through the 20th century (Roine and Waldenström 2015).

the top decile. The highest increase took place immediately at the outset of the transition in the early 1990s, but we also find a substantial growth since the early 2000s, after Poland joined the EU. In fact, top income groups have been main beneficiaries of strong Polish growth in the 2000s. Over the whole 1989-2015 period, top 1% has captured almost twice as large portion of the total income growth than the bottom 50% (24% versus 13%). The middle 40 per cent and bottom 50 per cent income shares experienced a similar evolution characterized by a stable fall from the transition until the mid-2000s, and a stagnation afterwards. These results stay in contrast to the official survey-based measures, which substantially underestimate the rise of inequality since the end of communism, primarily by underestimating the top of the income distribution

The rise of inequality after the return to capitalism in the early 1990s was induced both by the rise of top labour and capital incomes. We attribute this to labour market liberalisation and privatisation. However, the strong rise in inequality in the 2000s was driven solely by the increase in top capital incomes, which are dominant sources of income for the top percentile group. The labour income, in turn, dominates for the group below the top percentile. We relate the rise in top capital incomes to current globalization forces and capital-biased technological change, which have potentially rebalanced the division of national income in favour of capital.

Today, Polish top income shares are at the level of more unequal European countries, most notably Germany and the United Kingdom, but still substantially below those documented in Russia (Novokmet et al. 2018a). A more moderate increase of inequality in Poland than in Russia is related to more inclusive transition policies, to different institutions and natural resources endowments. However, income concentration in Poland is higher than in other former socialist countries in the EU, owing to relatively higher number of affluent entrepreneurs, plausibly benefiting from the larger domestic market. Finally, the evolution of Polish top incomes bears similarities to China (Piketty et al. 2019; Novokmet et al. 2018b), which suggests that inequality has risen both at middles (e.g., Poland or China) and ends (e.g., the US or Germany) of the global value chains (Autor et al. 2014; 2016; Balsvik et al. 2015).³

³ Baldwin (2016) describes Poland as one of the 'Industrializing Six' countries with growing share of manufacturing (next to China, Korea, India, Indonesia and Thailand) and the 'Rising Eleven' countries with rising global share of GDP.

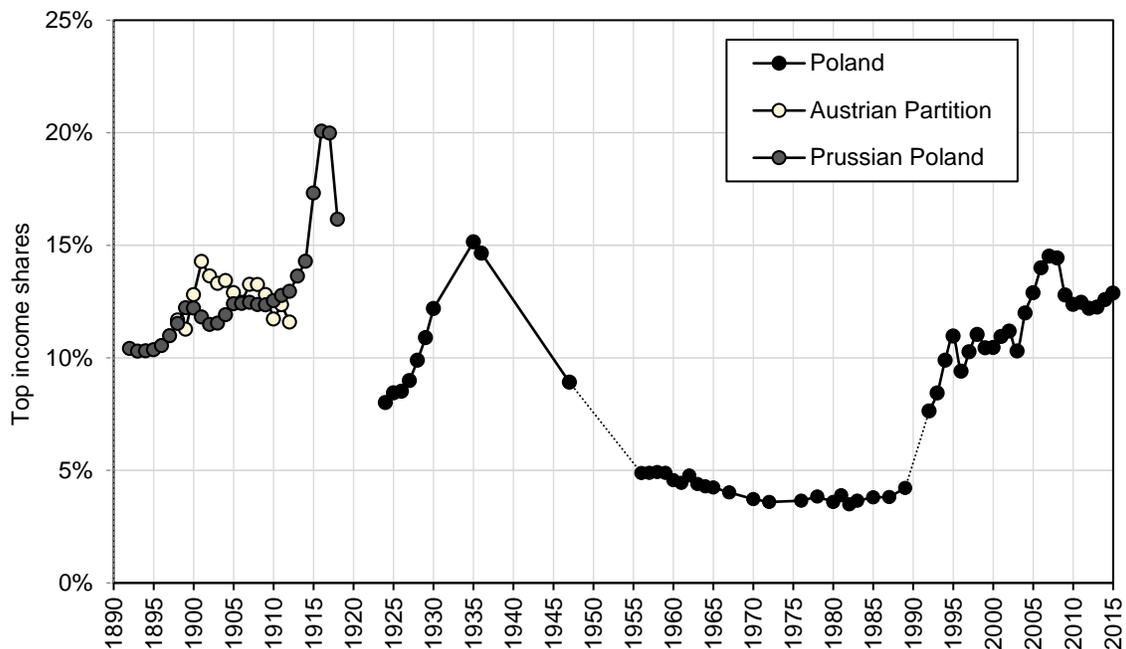


Figure 1: Top 1 per cent income share in Poland 1892-2015

Source: authors' computation based on income tax statistics. Distribution of fiscal income among tax units. Note: the Prussian Poland is the Province of Posen and West Prussia, Galicia is the Austrian partition. For 1925-1937 Poland is the Second Polish Republic (with 1918-1939 borders), for 1992 Poland is the Third Polish Republic (with post-1945 borders).

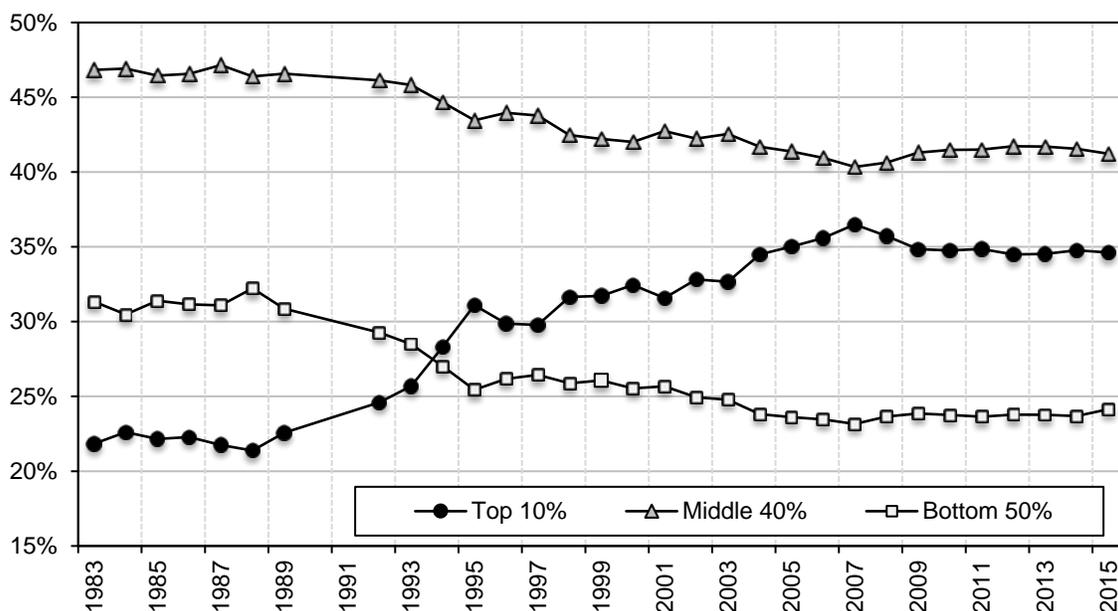


Figure 2: Income shares in Poland 1983-2015

Source: authors' computation. Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults.

Our paper is closely related to the voluminous literature looking at the relationship between inequality and economic growth. Kuznets (1953) has constructed first top income shares for the US, which served as the empirical basis for the inverted-U curve, according to which inequality rises in early phases of economic development but falls eventually as the growth advances (Kuznets 1955). Economists have generally applied the ‘demand and supply of skills’ framework to explain changes in inequality (see i.e. Acemoglu 2002; Card and DiNardo 2002). The recent rise of inequality has been perceived as a by-product of technological change that has been spurring economic growth and bringing exorbitant rewards to few visionary entrepreneurs. But inequality is bound to fall eventually as these innovations permeate the economy and new skills are acquired by the rest of the society, most importantly through education (Tinbergen 1974; Goldin and Katz 2008). But, the revival of the Kuznets’s pioneering study (1953) by Piketty (2001, 2003) has challenged this optimistic view, as we observe continuously growing inequalities.⁴ Piketty (2014) has recently offered a more sombre view of the growth-inequality link, according to which unrestrained capitalist development inevitably leads to rising inequality. He believes that the ‘great levelling’ of the twentieth century was a historically unique episode and that there is no spontaneous fall in inequality.

This study shows the central role of policies and institutions in shaping inequality in the long run. The communist system eliminated private capital income and compressed earnings, which led to the sharp fall and decades-long stagnation of the top income shares. By the same token, the labour market liberalisation and privatisation during the transition instantly increased inequalities and brought them to the level of countries with long histories of capitalism. On the other hand, a marked increase in social transfers during first transition years played the key role in ‘protecting’ the bottom 50% of the distribution and provided the general political support for the market reforms and enterprise restructuring in Poland (Keane and Prasad 2002). This stands in contrast to the Russian transition, where the bottom 50% share collapsed, and suggests that mitigating a more substantial rise in inequality may be actually conducive for economic growth (Banerjee and Duflo 2003, Sukiassyan 2007). Overall, the unique Polish inequality history suggests that the rise of inequality is not inevitable and, most importantly, that the future will depend on the institutions and policies taken.

Finally, the recent developments suggest that the future of inequalities in Poland is likely to be linked with the prominent role of capital income among top incomes. Moreover, one should not expect a weakening of this trend, as processes connected with globalisation

⁴ In addition to the skill-biased technological change, economists have explored alternative explanations, especially processes connected with the new wave of globalization (e.g., Autor et al 2016), institutional changes (e.g., Machin and van Reenen 2007), tax policy favouring the richest, (e.g., Piketty et al. 2014) or increasing wealth inheritance (e.g., Alvaredo et al. 2013).

and technological change seem to contribute to the growing dominance of capital in the economy. Rising inequalities might have adverse social and political implications, as evident in the recent populist anti-globalization backlash in Poland and internationally (Piketty 2018, Eichengreen 2018, Rodrik 2018, Fukuyama 2018). The issue of distribution of gains from economic growth has become thus crucial for sustaining the long-run development. We hope that our work will be a contribution in how to approach these imminent challenges.

The paper is organised as follows. Section 2 describes data sources and methodology. Section 3 presents trends of the top income shares since the end of the 19th century until the end of communism. Section 4 presents the evolution and composition of the full income distribution since 1983 until today, and discusses the potential mechanism at play. Section 5 compares the estimates for Poland with other countries. Finally, Section 6 concludes. The details of the data and estimation are discussed in the appendix.

2. Data and Methodology

We combine tax, survey and national accounts data to construct our measures of long-run income distribution. First, we construct new consistent series on the entire income distribution for the 1983-2015 period. More precisely, we correct the top of the household income survey distribution with administrative tax data on high-income taxpayers. The methodology follows the Distributional National Accounts (DINA) guidelines (Alvaredo et al. 2016). For the earlier period, we focus on top income shares due to the absence of viable household survey data. We combine income tax and national accounts data to construct top income shares for the whole period from the end of the 19th century until today. Appendixes A.1–A.4 discuss in detail the data and methodology.

2.1. Data sources

Income Tax Statistics in Poland. We first present data sources on income tax statistics, which present the central block for the construction of top income shares and the distributional national accounts. The first modern income tax in the Polish lands was established by the Prussian (1891) and Austrian Empires (1898) during the Partitions of Poland. Both Prussian and Austrian income tax statistics provide tabulations of income taxpayers in a regional breakdown, which has allowed us to construct top income shares for provinces with significant Polish population (Pomerania, Posen, Silesia, West Prussia in Prussia; Galicia in Imperial Austria). There is no tax data for the Russian Partition (the Congress Kingdom), as comprehensive income tax was never introduced in the Imperial Russia.

In 1924 the newly independent Poland introduced a unified progressive income tax for its whole territory. Detailed interwar income tax statistics were published separately for unearned income (*fundowany*) and earned income (*niefundowany*), organised by a large number of income brackets containing the number of taxpayers in each bracket and their corresponding tax obligation.⁵ The total income in brackets is missing, but bracket ranges are quite narrow, and consequently, estimates of total bracket income are robust to the specific distributional assumptions (see Appendix A.1.3 for more details).

The communist government was established in 1945, but the interwar income tax system was still in use for several years, and the income tax tabulations are available for 1945-7. However, with the waves of nationalisation and the elimination of the private sector in the late 1940s, the personal income tax de-facto disappeared along with tax statistics. Instead, the communist government published detailed wage statistics annually since 1956, which covered almost the entire workforce.⁶ Since the private capital income played a marginal role in the Polish socialist economy,⁷ top earnings provide a reasonably good approximation of top incomes development.

For the post-communist era, income tax data come from the annual reports on the settlement of the personal income tax (PIT). The tax administration has published annual income tax tabulations since 1992. Tabulations are organised by income ranges that correspond to tax brackets as defined by the progressive tax schedule, with each bracket containing the number of taxpayers, their total income, deductions and the corresponding tax obligation. Due to the limited progressive structure of Polish PIT, the number of brackets in published statistics has been relatively small (generally equal to three for the post-communist period), with more than 90% of taxpayers located in the bottom bracket. As a result, although a great majority of population is subject to PIT, the available income tax tabulations cannot be used to recover the entire income distribution. Instead, we use information on high-income taxpayers in combination with the household survey data. The sources of income tax statistics are provided in Appendix A.1.6.

Household income surveys. Household budget survey (HBS) has been regularly conducted in Poland since 1957. Until 1972, it covered only employees in socialized sector excluding agriculture. Thereafter, it was conducted for four types of households: worker, mixed, farmer, and pensioner households (Atkinson and Micklewright 1992, pp. 258-263). The survey underwent important changes after 1990, becoming fully

⁵ See Appendix A.1.3 on how we combine tabulations for unearned and earned income.

⁶ Covering both state and cooperative enterprises (Atkinson and Micklewright 1992, p. 257).

⁷ The bulk of non-wage private income was largely concentrated in the small-scale agriculture, characterised by the low productivity and the small earning potential, and thus plausibly did not contribute to top incomes.

representative of the population (Kordos et al 2002; Milanović 1999; Keane and Prasad 2000).

For the 1980s, we use the Polish Household Budget Survey (HBS) 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 from the official HBS reports.⁸ The tabulations are organized by eight income groups, providing in each the number of individuals and the mean income. For the 1992-2004 period, we use harmonised HBS microdata from the Luxembourg Income Study (LIS). Finally, for the period 2005-2015, we use the EU Statistics on Income and Living Conditions (EU-SILC) collected by Eurostat. We harmonize the definition of income and the unit of analysis across the surveys (see Appendix A.2.1).

National accounts data. We construct the total income and population controls based on the definition of income and the tax unit in the tax code. For the 1992-2015 period, we use National Accounts data published by the Central Statistical Office of Poland (*GUS*). For the interwar period we rely on historical series published by Kalecki and Landau (1934), as well as series constructed for the Maddison project (Bolt et al. 2018). The data for the period before World War I comes from the Prussian and Austrian censuses, yearbooks and various monographies (see Appendixes A.1.1–1.2.).

2.2. Methodology

There have been long-standing attempts to combine various data sources in order to produce consistent series on the distribution of national income over time and across countries. One of the pioneering works was done on Poland by Jan Wiśniewski (1934), who combined numerous data sources, such as income tax data, occupational ‘social tables’, census data, in order to estimate the income distribution in Poland in 1929. In recent years, the large body of empirical work on the income distribution has estimated long-run series of top income shares, by combining income tax tabulations with national accounts totals for the population and the income, and using Pareto interpolation techniques. The methodology was pioneered by Kuznets (1953) and recently advanced by Piketty (2001, 2003), Atkinson and Piketty (2007, 2010), among others. We produce top income shares in Poland for the whole period from 1892 until 2015. All details are provided in Appendixes A.1–A.4.

⁸ The official HBS reports during socialist Poland give separate presentation for four household types and do not provide distributional data for all households.

Although tax data has proven to be especially useful to chart the long-term dynamics at the upper end of the distribution, they are however silent on the remaining part of the distribution. On the other hand, it is well documented that household income surveys underestimate top incomes,⁹ which can critically impact overall distributional measures and misread the general trends in the income distribution (Piketty and Saez 2003; Atkinson et al. 2011). Consequently, there have been various attempts to combine administrative tax and survey data to obtain more reliable estimates of the income distribution (e.g. Burkhauser et al. 2016; Piketty et al. 2018). A major progress in this direction has been made by the WID.world project. We follow its Distributional National Accounts guidelines (Alvaredo et al. 2016; Piketty et al. 2018) in the construction of comprehensive measures of income distribution in Poland.

The general methodology we use to combine survey and fiscal data consists of two basic steps. In the first step we use the raw survey tabulations and generalized Pareto interpolation techniques (Blanchet et al. 2017) to estimate series on the distribution of survey income by generalized percentiles (g-percentiles).¹⁰ In the second step, we use tax data on high-income taxpayers to correct upwards the survey series and obtain corrected estimates of the distribution of fiscal income. We assume that survey data provide a reasonable description of the income distribution below the 85th percentile. On the other hand, we take that tax data is accurate above the percentile corresponding to the first available income threshold in tax tabulations (generally corresponding to the 95th percentile).¹¹ We then apply the piecewise-linear correction factors $f(p)$ between these percentiles.¹²

In our accompanying work in progress (Bukowski et al. 2019) we show that the above methodology produced series on income inequality remarkably similar to those based on the registry database of the universe of individual-level tax returns for the period 2004-2017 (see also Kośny 2012 for Lower Silesia).¹³

⁹ Most importantly, due to higher non-response and under-reporting among richer respondents, as well as due to specific survey collection constraints and top coding.

¹⁰ 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."

¹¹ We find this assumption fairly robust by checking different variant series using $p_0=0.8$ and $p_0=0.9$.

¹² More precisely, the upgrade factor between survey and fiscal income is 1 for P85 and rises linearly to the observed factor in the tax and survey data. We also apply linear correction factors between empirical thresholds from the tax tabulations.

¹³ Because of the regulation at the Ministry of Finance of Poland, we are not able to use the individual-level tax data in this paper.

Unit of observation. The unit of observation is the individual aged 20-year-old or more. Household income in survey is equally split between adults who belong 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 spouses have reported equal income. Since the option of joint filing for couples is widely used (the tax unit in the tax code is individual), it is reasonable to assume that eligible high-income taxpayers file a joint declaration by equally splitting their income in order to reduce their tax obligation.¹⁴ According to the PIT reports, the majority of eligible taxpayers used the joint taxation.¹⁵

Further issue is that the homogeneity over time can be impaired by changes in the tax unit in the tax code. While the data for the communist and post-communist period relates to individual units, the tax unit in Austria, Prussia, and in interwar Poland was household, with the total income of household members ascribed to the head of the household. This makes a discontinuity in the series after 1947, however, Atkinson, Piketty and Saez (2011) suggest that the potential bias should not affect the general trend in top income shares. The total number of households is estimated as all adult above 20 years of age minus the number of married females. The corresponding data is taken from population censuses and annual figures from the statistics on the movement of the population, and linearly interpolated for missing years.

Definition of Income. We focus on the distribution of pre-tax income, which refers to the sum of all income flows going to labour and capital, plus pensions but before other taxes and transfers. This income concept corresponds to the concept of fiscal income reported in the income tax statistics (Alvaredo et al. 2016; Piketty et al. 2018).¹⁶

¹⁴ We use equal-split-adults series within the household rather than within the couple as our benchmark, because the Household Budget Survey (used for the 1983-2004 period) reports a substantial part of the household income only at the household level. Since the tax data relates to income split within couples, we have implicitly assumed that nuclear families prevail in Poland today (especially in the case of higher income households), and this should not result in any significant bias.

¹⁵ In 2000, almost 62% taxpayers used joint taxation, after the linear taxation has been introduced in 2004, 58% of those using progressive schedule used this option, and in 2016 the share fell to 48%. In comparison, the share of married in working age population was 64% in 2000 and 55% in 2016 (GUS 2017). Therefore, a substantial share of marriages used joint taxation, and the downward trend in the share of joint fillings could be due to a falling share of married people throughout this period.

Furthermore, we have adjusted downwards thresholds and average incomes in the income tax tabulations after 2004, in order to account for the fact that taxpayers under the 'business' flat tax schedule cannot use the joint-filing option and split their income with their spouses. See Appendix A.1.6.

¹⁶ This income concept has been typically labeled as 'gross income', which refers to income before all personal deductions and personal income taxes (Atkinson and Piketty 2007, 2010). Note that the gross definition is after subtraction (from revenues) of costs needed to obtain, secure and maintain income.

Taxable income in both Austria and Prussia, as well as in the interwar period was quite broad and allowed very few exemptions. The post-communist tax data include income from employment, pensions, income from non-agricultural business activity and special agricultural activity, income from self-employment, rental income and income from other sources.¹⁷ We account for the changes in the tax law, which modify the definition of income. There were no major reforms of the tax system during the interwar period. However, the post-communist tax law has been amended several times since 1992. Most importantly, since 2004 income from non-agricultural business activity (further referred as business income) can be taxed separately using a newly introduced flat tax. See Appendix A.1.6. for all details how we combine statistics on business income taxed at linear rates and income taxed using the progressive scale.

As noted, when joining the survey and tax data, we produce the distribution of fiscal income.¹⁸ A distinction needs to be made between fiscal income and national income, which is defined as 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 homeowners' rents. We do not impute these items due to data availability, 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 limited importance (e.g. Piketty et al. 2019). Most importantly, correcting income distribution by imputing corporate retained earnings is less important in Poland, because business income is predominantly taxed according to the pass-through concept and hence attributed to individuals (Kopczuk 2012; Alstadsæter et al. 2017).¹⁹ Alstadsæter et al. (2017, Table 1) show that Poland has by far the highest share of employment in pass-through entities in Europe. Finally, in order to allow an international comparison, we scale fiscal income distribution up to the national income totals by proportionally upgrading thresholds and average incomes for each percentile of the fiscal income distribution.

¹⁷ Capital income in the form of dividends and interests is taxed separately at a source and thus not included in the statistics for the progressive schedule. However, most of the income derived from business activity is taxed at the individual level as income from non-agricultural business (see below).

¹⁸ We calculate income distribution in household surveys consistent with the fiscal income concept.

¹⁹ The 'pass-through' approach of taxing business income is applied to unincorporated entities, where business income is attributed to the owner who is taxed under the personal income tax. Most domestic firms in Poland are unincorporated businesses (Concise Statistical Yearbook of Poland (annual). Chapter: *Privatization. Entities of the National Economy*). Alternatively, business income of incorporated entities is taxed under the corporate tax, and subsequently taxed at the individual level when distributed (Alstadsæter et al. 2017). As we show in Figure A11, this legal form has been chiefly used by foreign-owned corporations.

Table 1: Major Episodes in the Polish History since the 19th Century

1772 – 1918	The Partitions of Poland between Austria, Prussia, and Russia. As a result, Poland was removed from the map of Europe for 123 years. The occupying Empires imposed their own institutions.
1914 – 1918	World War I – the occupying Empires fought on the opposite sides, leading to a massive destruction on the Polish lands.
1918 – 1939	Interwar Poland – the country was re-created and gained a full independence. It drifted from democratic parliamentary republic towards authoritarian presidential republic.
1939 – 1945	World War II – Poland was occupied by Germany and Soviet Union, and experienced the biggest relative war losses. Approximately 17% of the 1939 population were killed.
1945 – 1989	Communism – Soviet communist system with a centrally planned economy was introduced. Almost a complete elimination of private capital income, through e.g. nationalisation or expropriation.
1989 –	Capitalism – a market based economy with parliamentary democracy was re-established. In 2004 Poland joined the European Union.

3. Top Income Shares in Poland 1892-1989

This section presents the evolution of top income shares in Poland since 1892 until 1989. Over this period, Poland has experienced dramatic economic and political transformations. We start with a brief summary of the Polish economic growth and major historical episodes since the end of the 19th century. Throughout the 20th and 21st centuries the real income per adult in Poland has been around half of the income in Western Europe (Figure A1). The gap widened during the communist period, especially in the 1980s, and has narrowed after the transition in 1989. Today, Poland is considered by the World Bank as a high-income country.

Table 1 summarizes the major episodes in the Polish history since the 19th century. We follow this historical periodization in our analysis, as we believe that the specific historical setting and changing institutional frameworks are essential in shaping inequality in the long run.

Partitioned Poland and World War I

The three Partitions displayed different levels of economic development as well as specific institutions and different social conditions.²⁰ Only Prussia and Austro-Hungary introduced a comprehensive income tax in the Polish lands. We construct top income shares for the Austrian and Prussian partitions. Unfortunately, we omit the Russian partition as there are no comprehensive tax sources available.

Figure 1 shows the top 1 per cent income shares in Poland since 1892 until today (see Table A1 - Table A3).²¹ We start with the Prussian Partition. It can be seen that following a moderate rise since the 1890s until 1914, top inequality increased sharply by 7 percentage points after the outbreak of World War I. The overall rise in top income shares was mostly driven by very high-income shares (see Figure A2 and Figure A3, Table A4) and almost exclusively due to a rise of very high incomes in the rural areas, while shares of urban incomes remained surprisingly stable throughout the whole period under consideration (Figure A4).²² We believe that an explanation for the documented rise of top income shares in the Prussian partition should be sought in the growth of the commercial capital-intensive agriculture (Dumke 1991) and development of related industries (such as distilleries, mills or machines for agriculture, etc.) (Perkins 1984, Grant 2005, Eddie 2008).²³ The functional shift towards capital income in agriculture was dominantly captured by the top of the distribution because of relatively high land inequality – an outcome of the Prussian land reforms, which favoured larger estates at the cost of smallholdings (Mieszczankowski 1960; Grant 2005; Eddie 2008, 2013). Large estates were the driving force behind the structural transformation of agriculture in East Elbia, in what has often come to be generalised as the ‘Prussian’ road to industrialisation (Lenin 1908).

The emergence of agrarian capitalism in Prussian Poland was spurred by external and internal factors. Changes in the terms of trade induced a shift from traditionally dominant grain production to capital-intensive industrial crops,²⁴ such as sugar beet. Mass

²⁰ The best economic situation was in the Prussian part, where the authorities carried out many reforms including the abolition of serfdom. The agriculture, rather than industry, was the main driver of the economic progress. In the Russian partition, it was the industry that developed the most. The delayed abolition of serfdom reforms during the second half of the 19th century contributed to the relative backwardness of the agriculture in the Congress Kingdom. However, the worst economic situation was in the Austrian part. Before the end of the 19th century, Galicia had not been industrialized, and the agriculture was under invested and parceled.

²¹ Malinowski and van Zanden (2017) provide the estimates of the income distribution for the preindustrial Poland.

²² To be more precise, the rise of top incomes in rural areas and stagnation in urban areas was a characteristic of the Province of Posen – the largest and most important part of the Prussian Partition. In the second province, Western Prussia, we do not report differences between rural and urban areas. See Bukowski and Novokmet (2017) for more details.

²³ Dumke (1991) finds that the capital share in national income increased during the industrialization in Prussia due to the rise of the capital share in agriculture. There was a concurrent rise in income inequality.

²⁴ This gradual turn from traditionally dominant grain production in the eastern provinces was largely motivated by the availability of the cheap grain import from the ‘New World’ and Russia, caused by a fall in transport costs, and the

migrations from the east to industrial regions in western Germany and across the Atlantic led to the growing shortage of labour and subsequent rise in agricultural wages (Wolf 2006). At the same time, the economic nationalism of the Prussian government curbed immigration of the abundant cheap labour from the Russian and Austrian partitions. Despite the campaigns of Prussian landlords for looser immigration policy, the Prussian authorities endeavoured instead in alternatives such as providing eastern agriculture with additional capital (Wolf 2006). Growing capital-intensity of agriculture likely contributed to a spectacular improvement in productivity in the Prussian partition between 1882 and 1907, surpassing that in the rest of Germany (see Figure A5, Tipton 1976, Grant 2002).²⁵

The Austrian Partition (also known as Galicia) was economically the least developed of the three 'partitioned' Polish regions.²⁶ Top income shares in Galicia showed no clear trend in the two decades preceding WW1 (Figure 1). The top 1 per cent income share increased by almost 3 percentage points in the short period from 1898 until 1901, when it peaked at 14.3 per cent. Afterwards we observe a falling trend during the years preceding WW1. We believe that top incomes in Galicia were dominantly an urban phenomenon. As shown in Figure A6,²⁷ the predominance of employment income might suggest that employees in towns, such as in banks or imperial administration, lived much better than the surrounding rural population – overwhelmingly living at the bare subsistence level.²⁸ Similarly, top incomes presumably included modest business activities in cities, carried on dominantly by Jews engaged in commerce, handicraft and smaller-scale industry (McCagg 1989).²⁹ As we look below, the rural-urban income gap figured prominently during the interwar period. Among the interwar Polish counties, those located in Galicia were characterized by the highest correlation between urbanisation ratio and top 1% income shares (see Appendix A.3).

introduction of the grain tariffs could not have halted this trend (Wolf 2006). Germany gradually became the net importer of grain and lost in addition its traditional grain export markets as Britain.

²⁵ For instance, the yield of potatoes and wheat in quintal per hectare doubled between 1878-1882 and 1909-1913 (Wolf 2006, p.39).

²⁶ The area was fully incorporated into Poland in 1918, but only the western part remained in the country after WWII.

²⁷ We cannot ascertain income sources of particular top groups, as there is no source breakdown for specific tax brackets, but only the income decomposition of those subject to the income tax (approximately the top 2-3 per cent income group).

²⁸ Smallholdings coupled with prevailing backward agricultural techniques remained the main characteristic of the Galician agriculture. In 1902, one-third of agricultural holdings were smaller than 2 hectares and 60% less than 5 hectares (only 1.2% larger than 20 hectares) (Bujak 1908). Clearly, such dwarf holdings could not secure even the minimum existential needs. Regional specialization in agricultural products was further impeded due to more efficient competition from Hungary and Moravia, as well as high tariffs in the Prussian and Russian partitions (Landau and Tomaszewski 1985, p. 16).

²⁹ There were only a few industries of some importance in Galicia, such as the crude oil industry, salt mining or distilling. The former, in particular, was a source of never realized dreams of economic prosperity. Galicia produced in 1909 almost 5 per cent of the world output of crude oil and gave rise to several men of substantial wealth, such as industry pioneers Szczepanowski or McGarvey (Frank 2005).

Top income shares in the Prussian partition soared during World War I (Figure 1 and Figure A2, Table A4). The economic environment favoured the capital owners, especially due to the wartime demand for armament and food. The shortage of raw materials, critical for the war economy, brought huge profits to Silesian mining industry and its 'coal barons' residing at the top of the income distribution. The Allied blockade was the root cause of the German food problem, as it caused a plunge in food imports (Ritschl 2005). Food shortages led to a surge in prices, bringing, in turn, extraordinary profits to agricultural producers, which were proportionally more concentrated in Prussian Poland. It may be thus indicative that the greatest increase in top income shares occurred in 1916. In that year, German food imports had collapsed due to a halt of imports from neutral countries, namely from Denmark and Netherlands, which were important supply source during the first two years of the war (Ritschl 2005, Hardach 1977).³⁰

Interwar Poland

The unification of Poland in 1918 is one of the pivotal events in the Polish history. Poland was established on the world map after 123 years under foreign dominions. This century-long dream had to be, however, realised in quite a tumultuous atmosphere of economic crisis, broken international trade, and recovery from the massive destructions and human losses of the Great War.

Our starting point in the interwar period (1924) coincides with the lowest documented point in top income shares during the existence of interwar Poland, with the share of the top percentile slightly above 8 per cent (Figure 1). There are several arguments in favour of the lower top shares in the first half of the 1920s. First, Poland was among countries that suffered greatest losses during the First World War, both in the number of human casualties as well as in the extent of physical destruction. The level of industrial production in 1919 was less than 15 per cent of its 1913 level (Landau 1968). Deleterious effects of exogenous shocks to capital income in the interwar period are now well documented as the single most important reason behind the secular fall in top incomes initiated after the First World War (Piketty 2001; 2003; Scheidel 2017). One should add on top of that a tremendous effort of German and Russian troops in dismantling factories during their respective retreats (Davies 2005; Landau 1968).³¹ The Polish-Soviet war of 1919-1920 further disrupted the industrial production and broke the supply chains (Landau and Tomaszewski 1984). Second, the risk of political radicalization and the communist upheaval

³⁰ In the same manner, the recovery of food imports with the seizure of Romania in 1918 might have alleviated the pressure on food prices (Ritschl 2005). Note in this respect a surge in top income shares in neutral countries during WW1, such as Netherlands, Denmark or Sweden, who directly benefited from the boom in international food and commodity prices.

³¹ For example, German army transferred complete factories from Łódź to Germany (Davies 2005, p. 130).

pressured the new leadership of Poland into passing the new social legislation, such as eight-hour working day, trade unions or right to strike (Sztrum de Sztrem 1922; Derengowski 1930; Wolf 2007). Further, various anti-capital policies were introduced, including the land reform, a sharp increase in tax progressivity³² and heavier taxation of capital than labour.³³ Industrial capital tied in export sectors especially suffered from the loss of the large and protected Russian market³⁴ and the Polish-German trade war of 1925. The currency stabilization in 1923 further negatively affected the international competitiveness of Polish products (Landau and Tomaszewski 1985, p. 77), while another great shock was hyperinflation.³⁵ Generally speaking, the post-war situation worldwide signified altogether a new page in the distributional history in comparison to the pre-WWI political and social setting (e.g., Piketty 2014, Scheve and Stasavage 2016, Milanović 2016, Scheidel 2017).

The following six years, however, saw a continuous rise in the top percentile share and reached almost 11 per cent in 1930. The economy eventually stabilised in 1926, and the country experienced three years of steady growth, halted only by the advent of the Great Depression in 1929. The economic recovery brought better prospects for top incomes, which experienced an immediate improvement in 1926.³⁶ One important external event was the strike of British miners in 1926, leading to the rise in coal prices, which stimulated Polish coal exports. Figure 3 shows the evolution of the average income of three top income groups constituting the top percentile together with the total average income during the interwar period. It can be seen that the period between 1926 and 1929 was characterised by the substantial increase in top income shares which outstripped the overall income rise. While the economic growth saw an improvement of conditions for all income groups, the rich benefited proportionally more (Landau and Tomaszewski 1985, p. 81).

However, when the tax data become available in 1935, the series on top income shares re-emerge at 15 per cent, which corresponds to its secular peak in the time of peace. All

³² The top marginal rate of the income tax had equaled 5% in pre-WWI Austria and 4% in Prussia (while in Russia the income tax had never been introduced). In contrast, the top marginal rate on rate in interwar Poland was 40% on unearned income and 25% on earned income.

³³ The cabinet of the Prime Minister Władysław Grabski (1923-1925) launched a whole set of stabilization policies placing the largest burden of their financing on the wealthy.

³⁴ It was especially the industry of the former Russian partition, which exported as much as 90 per cent of its products to Russia before WWI (Landau and Tomaszewski 1985, Tab. 1.1, 1.2). The Polish-Soviet war of 1919-1920 further disrupted the industrial production and broke the supply chains (Landau and Tomaszewski 1984).

³⁵ However, there has been surprisingly little research done on the distributional effects of the Polish hyperinflation, and its effects remain ambiguous (in particular between the post-war creeping inflation and the hyperinflation of 1923/4). As an exception see Van Thadden (1995), who sees Polish inflation as beneficial to the post-war reconstruction via redistribution of wealth towards industrialists, first from wage earners (1918-21) and then from agriculture (1921-23) (1995, pp.116-17).

³⁶ The consensus of historians has been that the May coup in 1926 was not motivated by the class struggle (Landau 1978), in line with Piłsudski's general disinterest with economic affairs.

top income groups saw rising shares in this period, suggesting a rising dispersion between the top and the rest of the distribution (e.g. P0-99), rather than within top income groups (see Table A2). Accordingly, it is plausible that this development indicates a deteriorating position of Polish farmers relative to other social groups. Almost two-thirds of the population was made of small farmers and peasants and it was agriculture that was most adversely affected by the Great Depression, in the first place due to a strong fall in agricultural prices. In contrast, the fall in industrial prices was much less steep due to rapid cartelization, which safeguarded industrial profits at the top.³⁷ For example, prices of agricultural products in 1935 were only 33 per cent of their 1928 level, those of industrial goods were 57 per cent, while prices of cartelized products stood at 82 per cent (Landau and Tomaszewski 1985, Tab. 2.6). Consequently, between 1929 and 1934, the rural population's share in national income fell from 46.7 to 39.5 per cent (Landau 1963, p. 37). The deflationary trend was, on the other hand, beneficial to high-salaried employees that were able to keep their job due to rigid salaries, making this group relative winner behind this development (Landau 1933). Kalecki and Landau (1935, p. 450) estimated that between 1929 and 1933 incomes of blue-collar workers halved, while incomes of white-collar workers fell by 30 per cent.³⁸

As can be seen in Figure 3, the Great Depression led to differential income fall for different top groups. The top 0.1 per cent saw a proportionally stronger fall at the start of the crisis (1929-1931) than the lower groups in the top percentile – following on the higher relative growth of the top 0.1 in the late 1920s. Yet, in 1935 (unfortunately, there is no data for three years after 1931) we find that top groups had managed to retain its relative standing, coming out from the crisis unscratched. On the other hand, the average nominal income (P0-100) almost halved in the decade after 1925. The real mean income of top groups actually increased strongly during the crisis. Plausibly, the rapid cartelization should be identified as the main tool allowing top incomes to steer the crisis successfully, and the main beneficiaries should be searched among the capital income recipients, as we look next.

Figure 4 shows the composition of top income groups in 1929 between earnings and other sources of income (defined in the tax statistics as 'unearned' income, roughly corresponding to the broad definition of capital income). Groups below the top percentile, such as the top 5-1 per cent, were dominantly composed of earnings. The importance of earnings, however, decreases with income rank. For the top 0.1 per cent group, for example, unearned income made as much as 80 per cent of the income, while earnings accounted for only 20 per cent of the total income. Although the proportion of earnings

³⁷ Rough estimates indicate that cartels controlled more than a half of the industrial output in the 1930s (Landau 1978).

³⁸ This is obvious if we take those recently unemployed as having zero wage income. For those that kept their job, we observe stability in wage distribution (see Figure 8 below), which is an additional argument for wage rigidity.

increased for top groups during the Great Depression (Figure A7) – thus confirming our hypothesis that top salaries relatively benefited in the depression – top incomes still predominantly derived the bulk of their income from other-than-employment activities.

Further insights could be obtained by looking at the spatial distribution of county-level top income shares in Poland.³⁹ Figure 5 presents the map of Polish counties in 1927 and county-level top 1% income shares (using county control population and total county income). The dashed line marks the former borders between the partitions. The geographic distribution of top income shares has a donut-shape, with high levels at the edges of the interwar Poland and relatively low in the centre. The largest inequalities are in the former Prussian Partition (the west) and the eastern parts of the former Russian Partition (the east). The picture is less clear for the former Austrian Partition (the south and south-eastern parts), where there are no clusters of counties with high top income shares. Figure 6 displays a contribution of each county to the aggregate top 1% income. The map is almost a reverse of the previous one. The most developed counties from Silesia and the core of the former Russian Partition (Warszawa, Łódź) contribute the most to the aggregated top incomes. At the same time, these regions show comparatively lower top income shares. To shed light on the formation of inequality in Interwar Poland, in Appendix A.3 we use the cross-section of county-level data to regress top 1% income share on a rich set of variables, including urbanization, employment structure and land inequality. We find that correlations between these measures and inequality is heterogeneous across the former partitions. In the former Prussian partition, the top income shares are more connected with agrarian capitalism than with classic industrialization or urbanization.⁴⁰ Similarly in the former Russian partition, but the correlations are weaker. On the other hand, in the former Austrian partition top income shares are positively correlated with urbanization, negatively correlated with the measure of agrarian capitalism and do not seem to be related to the level of industrialization.

³⁹ The details of the data and methodology can be found in Appendixes 1.4 and 3.

⁴⁰ We measure agrarian capitalism as the share of agriculture workers in the total population; and industrialization as the share of industry workers in the total population.

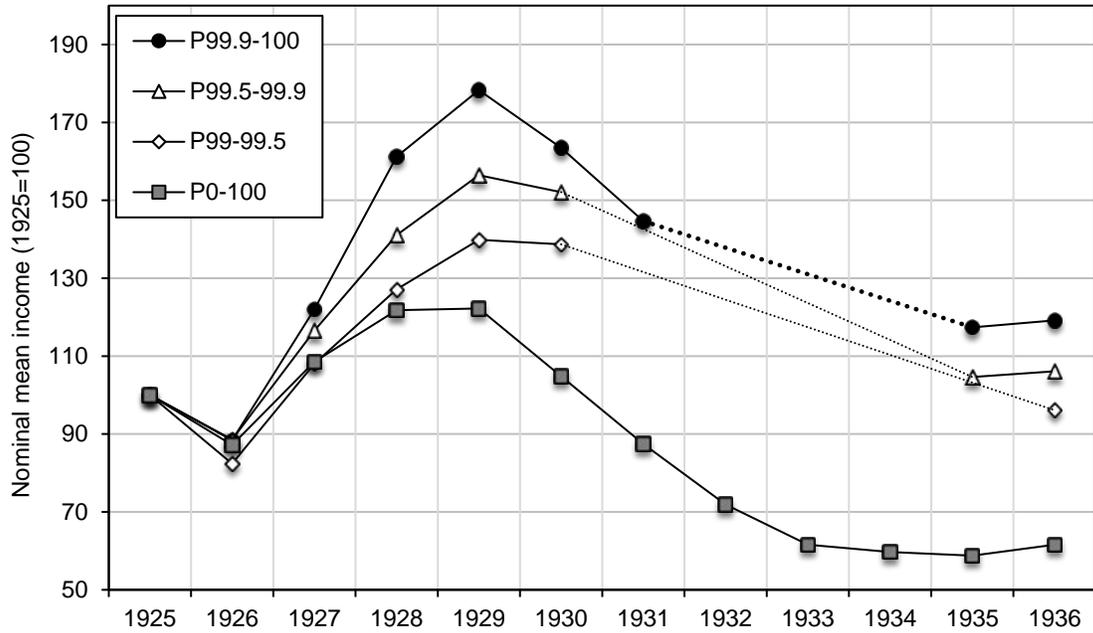


Figure 3 : Evolution of average income of groups within the top percentile

Source: authors' computations based on the income tax data.

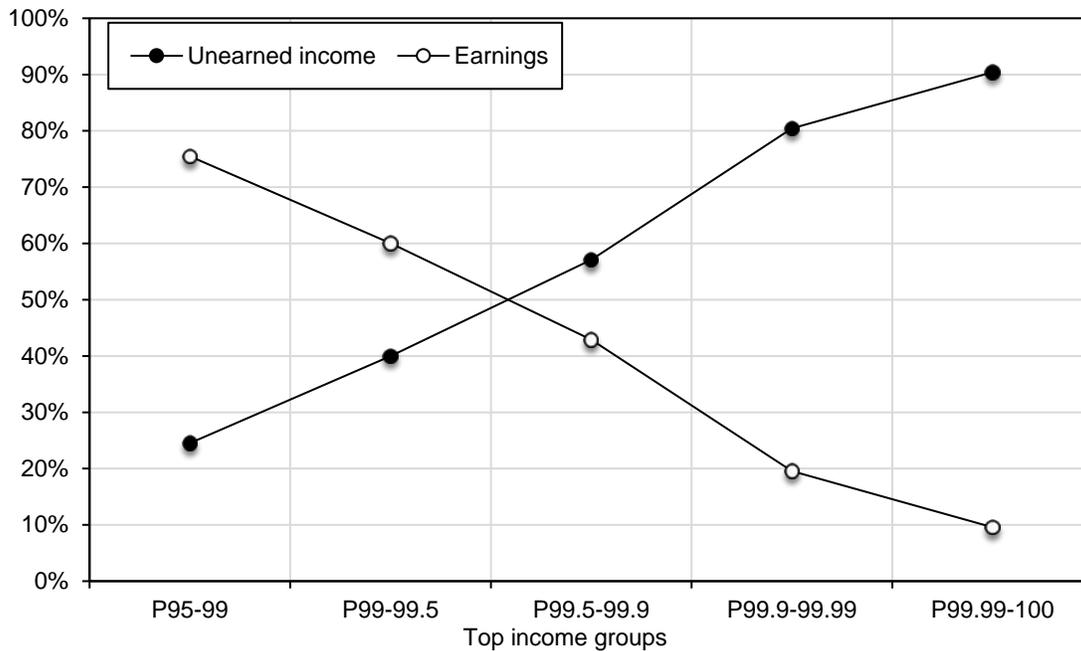


Figure 4: The composition of the top 5 percent, Poland in 1929

Source: authors' computation based on income tax statistics and Wiśniewski (1934)

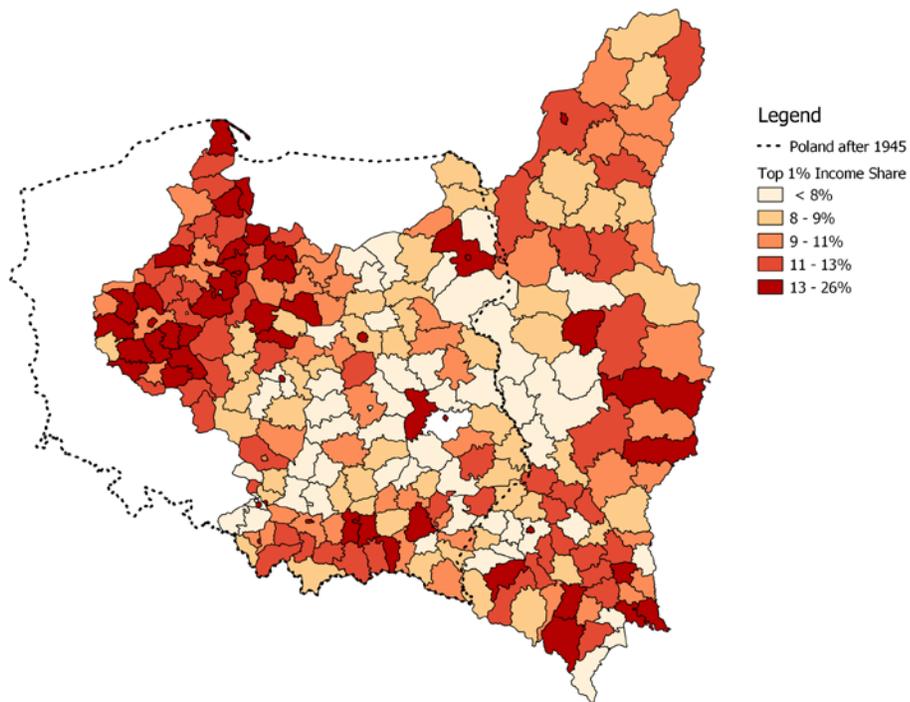


Figure 5: County-level top 1% income share
 Source: authors' computation (see Appendixes 1.4 and 3).

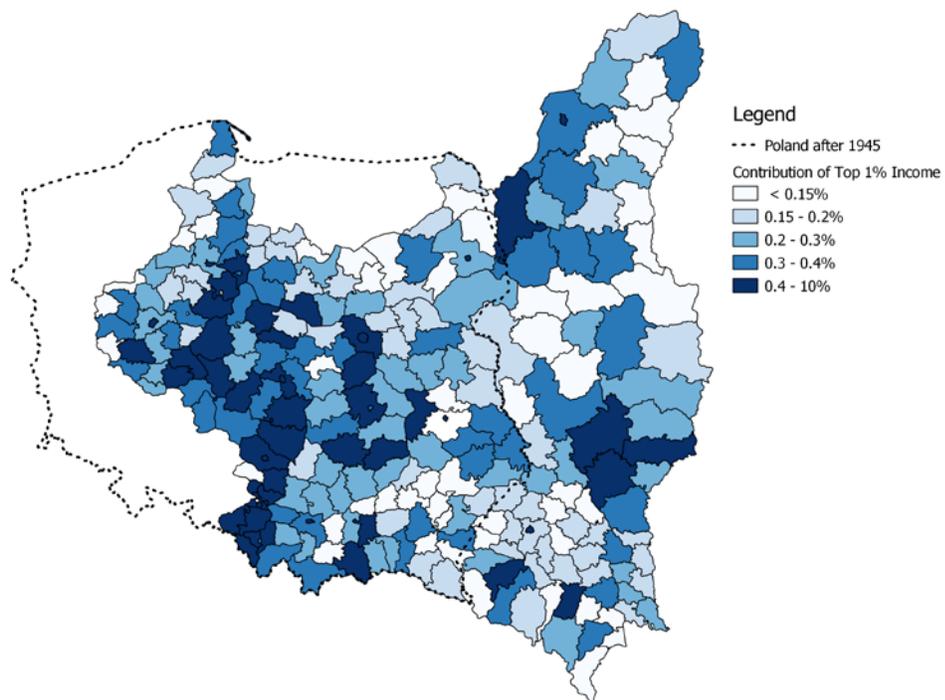


Figure 6: County-level contribution to the aggregate top 1% income.
 Source: authors' computation (see Appendixes 1.4 and 3).

World War II and the Communist Accession to Power

Right after the Second World War, in 1946-7, we find top income shares at the level of 9 per cent – a significant fall from the level of 14.6 per cent in 1936 (Figure 1). In order to understand the fall in top shares one needs again to ascertain a development at the ‘bottom’ of the distribution. The post-WW2 years saw thus a relative improvement in the living conditions of the rural population in comparison to the devastating experience of the Great Depression. This came about in the first place through rising prices of agricultural products, the large land redistribution, debt release and the new social legislation, such as the increased availability of education in the countryside (Landau and Tomaszewski 1985). In fact, the German occupation already brought about changes in the distribution of national income in favour of the rural population, primarily through the “reversal of price scissors” (ibid., p. 175).⁴¹

The tax data for the post-WW2 years, however, do not point to the dramatic deconcentration within the top groups. Tabulations for ‘unearned’ income were published in first years after the Second World War (1945, 1946 and 1947).⁴² Figure 7 compares the shape of the upper tail of the distribution of unearned income before and after the Second World War by looking at the ratio of average income above the given threshold to that threshold. This concentration measure is useful for comparative purposes as it does not depend on changing income levels through time. Note that higher ratio implies higher concentration at the top, while it is constant if the distribution assumes the Paretian form (inverted Pareto coefficient b). The figure presents roughly 200 thousand top taxpayers obtaining unearned income in 1936, 1946 and 1947.⁴³ The top concentration before the war is quite similar to that observed immediately after the war. It seems that the war and the occupation, as well as the immediate effects of the introduction of communism, did not dramatically affect top concentration patterns.⁴⁴

⁴¹ Of course, this relative improvement should not mislead us in idealizing the position of rural population during the occupation. But, the rise in prices of farm products allowed certain surplus that implied a notable amelioration of farmers’ living standard in comparison to the 1930s. Further, Nazis also took measures in earnings equalisation, which basically implied a common immiseration and exploitation of all urban strata. Through the reduction of the skill differential, the Nazis also wanted to ensure higher accumulation funds (a policy later pursued by communists). The only evidence of top income patterns during the German Occupation is for the Protectorate of Bohemia and Moravia (Novokmet 2018), pointing to a sharp rise of very top income shares (top 1% share and above), which was driven by a strong increase in top business profits. At the same time, however, there was a fall in shares of ‘lower’ top groups (such as top 10-1%) predominantly made of employment income due to sharp earnings equalizations pursued by the Nazis (Novokmet 2018; see also Nikolić and Novokmet 2018 on evidence of earnings equalizations in the Protectorate).

⁴² However, both physical and legal persons are grouped, without providing separate presentations as before the war. Yet, we argue that the picture corresponds mostly to physical persons. Only private entities were taxed and most legal big (joint-stock) companies in Poland were nationalised immediately after the war.

⁴³ It should be noted that comparison is not perfect, as clearly cumulative frequencies do not correspond to same shares of population (in particular, due to the huge human casualties).

⁴⁴ Note that this would be in accord with initial speculations of Pareto (1896), as it would suggest unchanging character of inequality, not depending on markedly different political and institutional arrangements.

But it is indisputable that a fall in concentration of unearned income occurred eventually as communist strengthened the rule in the country, which led to an almost complete expropriation of capital income by the state. The turning point was 1947 when the most radical legislation in the direction of nationalisation was passed. The employment in the nationalised sector accounted for 87% of the total (Landau and Tomaszewski 1985, p.199). In the succeeding years, during the so-called Battle for Trade (*Bitwa o handel*), even the majority of small shops and crafts were nationalised. Private income was almost exclusively allowed in the smallholding agriculture. Unsurprisingly, 1947 is the last year for which tax tabulations are available. The next decisive episode was the currency reform in 1950 that virtually confiscated all personal financial wealth.

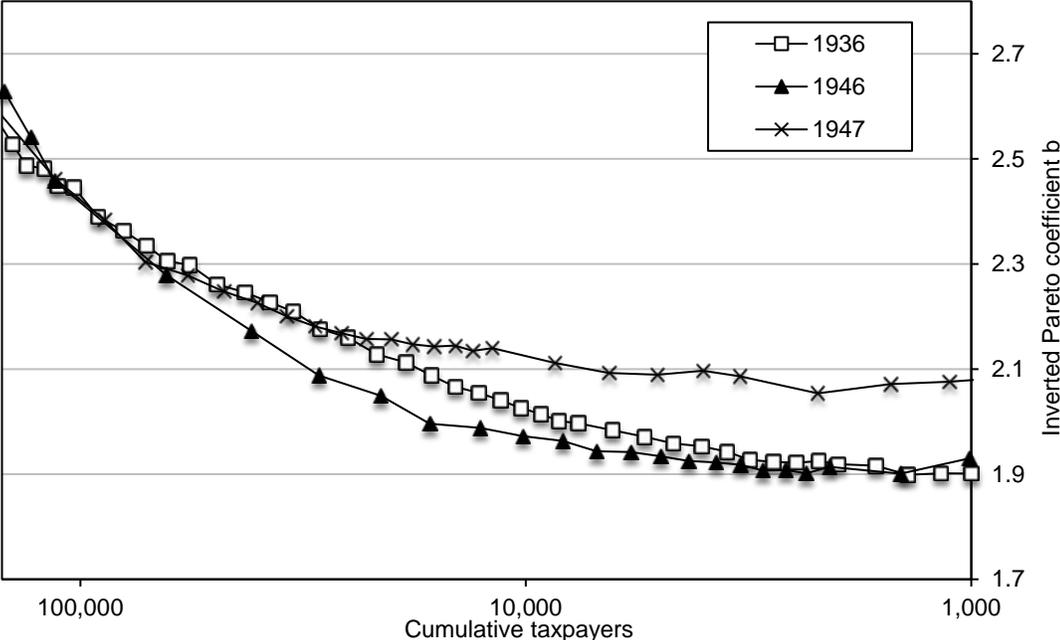


Figure 7: Inverted Pareto coefficient b for 'unearned' income

Source: authors' computation from income tax statistics

Note: dots on lines present the number of cumulated taxpayers above the specific bracket threshold.

Communist Poland

In theory, the distribution of income under a socialist state should be based on the rule “from each according to his ability, to each according to his labour” (Marx 1875; Atkinson and Micklewright 1992). The rule does not imply an inequality-free society, even in the model version of socialism. More important from our standpoint is the abolition of the private ownership of the means of production. As capital ownership is generally very concentrated (Piketty 2014), nationalisation of business capital should inevitably lead to the more egalitarian distribution of income. At the same time, labour income and wage setting process become the main determinants of inequalities in a socialist society. The wage setting process was mainly centralised, with a limited role of incentive schemes. The wage structure across occupations/positions was used as a policy tool, for instance, to provide incentives for people to invest in particular skills, to stimulate the economy by widening earnings differentials or to calm down social dissatisfaction by narrowing them (Flakierski 1986; Atkinson and Micklewright 1992). In addition, bonuses were given to establishments, which performance was higher than expected. In practice, however, the wage levels were often more dependent on the political power of workers, managers and industry groups than on productivity (Brus 1974).

Figure 1 depicts the top 1% income shares during the communist period (see Appendix A.1.5 for more details on the methodology). As noted before, the top labour income approximates the total top income, because in the socialist economy the private income from capital was almost completely eliminated.⁴⁵ The inequalities slightly trended downward from 4.9% in 1956 to 3.4% in 1988, and the average level in this period is roughly half of the total top income shares in 1946 or 1992.

Figure 8 presents the upper part of the earnings distribution, showing the evolution of 90th and 95th percentile (expressed as a proportion to median) from the late 1920s until today. The evolution of wage ratios is more volatile than the top income share, yet the relative levels and trend are similar. It can be clearly seen that the top earnings concentration was substantially lower during communism than in the interwar period. Kalecki (1964) and Beskid (1963, 1964) show that earnings compression was primarily caused by a decline in premium between white-collar and blue-collar workers.⁴⁶ Landau and Tomaszewski (1985, p. 211) note that “salaries [...] were much lower than before 1939, whereas the wages of lowest paid labourers grew considerably.” The fast industrialisation

⁴⁵ Most agriculture remained in private hands, yet it was heavily constrained by the small maximum holding size and the maximum number of employees allowed. The published labour income also misses certain privileges of the political elite, e.g. access to high-quality housing or shops.

⁴⁶ This pattern was already induced by Nazis during the occupation in their attempts to maximise exploitation of the Polish labour force by setting their real wages below the subsistence level.

and urbanisation significantly improved living conditions of low and middle-income workers. In subsequent decades, the communist government used institutional factors, such as unionisation or centrally determined wages and prices, to control real wages.⁴⁷

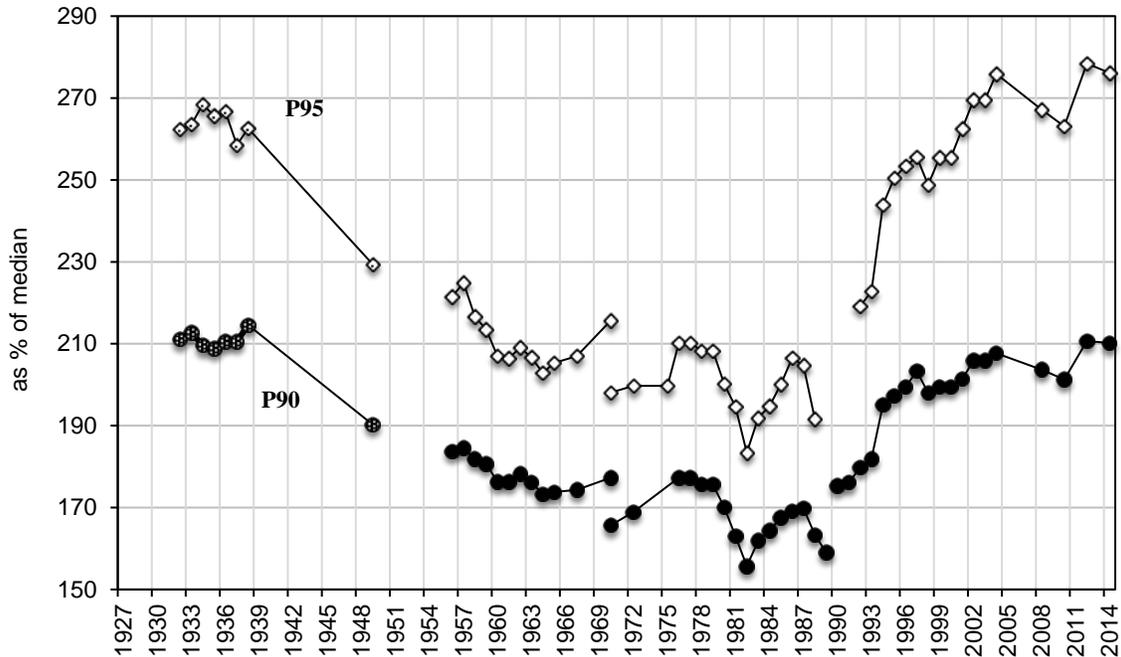


Figure 8: The upper part of earnings distribution in Poland (90th and 95th percentile as proportion of median)

Source: own construction: 1929-1949; 2008-2014; other years: Atkinson and Micklewright 1992; Rutkowski 2001; Atkinson 2008; (see Appendix A.4); Note: 1955-1989: gross monthly wage for employees in socialized sector (1970-1988 net monthly wage); 1929-1949 gross weekly wage in industry for manual workers.

The first mechanism was the extent of unionization of blue-collar workers. During the early years of communism, exceptional power was given to the high-level managers and the workers' representation was weak, which increased within-firm wage dispersion (Brus 1974). The popular dissatisfaction was growing and culminated in massive and violent protests of workers in Poznań in June 1956. The Party leadership, fearing the potential country-wide revolution, introduced a set of reforms improving workers representation. The move towards semi-independent unions is marked by the decline in the wage decile ratios after 1956. Notably, the P95/P50 ratio falls more abruptly than the P90/P50, possibly owing to the decline of the power of the high-level management. Giving too much

⁴⁷ Finally, communists affected another fundamental aspect of inequality, that of inequality in status. It is impossible to quantify this aspect, but it is conceivably one that was essential in shaping the social reality of Poland. Plausibly, these stark inequalities could be responsible for the pervasive anti-democratic elements in the political culture of Poland before WWII. This is actually the role that Dahrendorf (1968) attributed to Nazis in Germany, who made a sharp break with the ('anti-modern') forces in the German society – and (unintentionally) made possible, after their fall, an easier building of democratic society. Ironically, it required radical totalitarian forces in Central Europe to break the fetters of the past. Piatkowski (2018) has recently advanced a kindred view on the role of communism in Poland.

power to unions, however, was also threatening the position of the communist government. The “thaw” of 1956 ended in the early 1960s, when the Party turned towards more centralised economy and scraped the independence of workers’ bodies, leading to a period of modest growth in the wage dispersion.

The second mechanism was the connection between worker’s performance and wages. A low labour productivity was a plague of the socialist economy in the 1960s (Flakierski 1986). The Party reacted in the early 1970s, with a set of limited marketization reforms, which would increase worker’s incentives by directly linking their wages with the output. It is hard to assess whether this policy had any effect on productivity, as it was also a period of foreign loan-financed consumption growth. What can be seen, however, is that wage inequality entered a decade of continuous growth, driven by the growth of within-industry dispersion and to a lesser extent by a shift in industry composition (Flakierski 1986).

The loan-financed economic growth resulted in a profound economic crisis, substantial fall in real wages and growing popular dissatisfaction. The communists reacted by directly controlling the wage dispersion. The massive protests and emergence of the “Solidarność” movement in 1980, coincide thus with a remarkable fall in the wage ratios (Flakierski 1986; Atkinson and Micklewright 1992).⁴⁸ Yet, the communists did not manage to stop the new democratic movement and, in 1989, they were forced to organise the first (partially) free elections in the socialist block. The landslide victory of “Solidarność” is a symbolic end of the communist rules in Poland.

4. The Full Distribution of Income in Poland, 1983-2015

In this section we present the evolution of the full income distribution in Poland during the transition from communism to market economy. 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.

The largest increase in income inequality occurred in the early 1990s, particularly between 1993 and 1995. The top 10% income share increased from levels around 22-23% in the 1980s to 25% in 1992-1993, and then jumped to 30% by 1995 (Figure 2). This rise was accompanied by a fall in income shares of the middle 40% and of the bottom

⁴⁸ The same authors also point that the drop in wage ratios could be a result of the poor data quality and collection, inevitable during the Martial Law (1981-83).

50%. These groups experienced a roughly commensurate fall in income shares of around 5 percentage points 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 decile.

It is important to note that this rise has been altogether overlooked by the official survey-based measures (Figure 9). Between 1989 and 2015, the top 10% income share rose from levels slightly above 20% in the 1980s up to 35% in 2015, as opposed to around 26% suggested by surveys. 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 (Figure A8). Similar conclusions can be drawn from the comparison of Gini coefficients (Figure A9). Overall, these results show the importance of correcting the upper end of the distribution in the survey data.

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.⁴⁹ 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, this growth has not been equally shared. Table 2 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. The finding that real incomes of the Polish bottom 50% have increased, but at the relatively lower rates, is consistent with the finding of Milanović and Ersado (2012) that in the former transition countries growth has been disequalizing in relative but not in absolute terms. Table 2 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).

⁴⁹ 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).

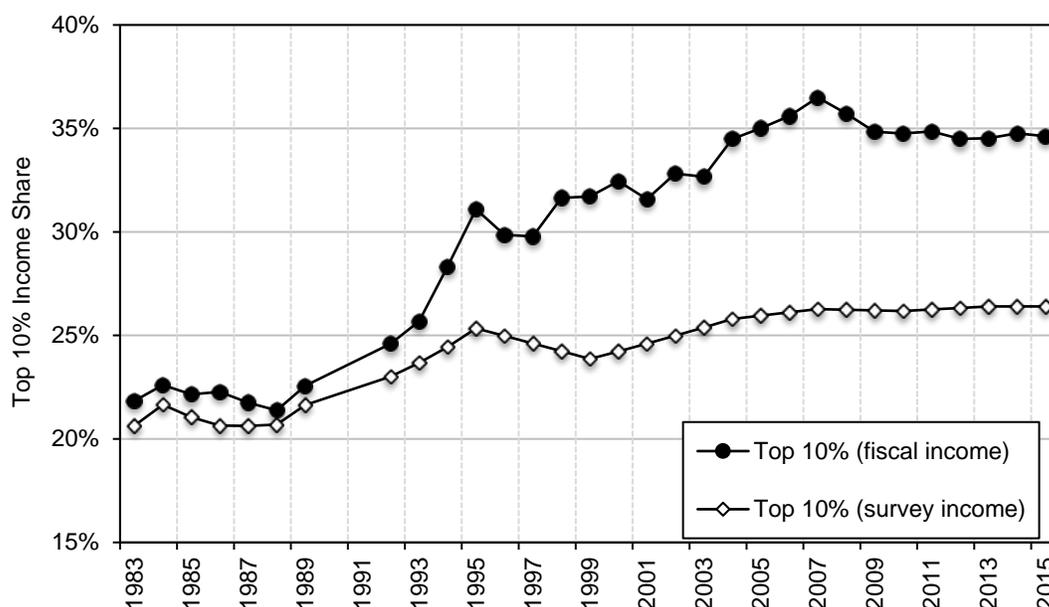


Figure 9: Top 10% Incomes Share in Poland, 1983-2015

Source: Authors' computation. Survey estimates based on HBS (see section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults

Table 2: Income growth and inequality in Poland 1989-2015

Income group (distribution of 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	2.1%	73%	100%
Bottom 50%	1.0%	31%	13%
Middle 40%	1.5%	47%	30%
Top 10%	4.2%	190%	57%
<i>Top 1%</i>	6.8%	458%	24%
<i>Top 0.1%</i>	9.7%	1019%	9%
<i>Top 0.01%</i>	13.0%	2273%	3%
<i>Top 0.001%</i>	16.4%	5066%	1%

Source: Authors' computation (see section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults

Accounting for the Rise of Inequality after 1989

Rising earnings dispersion has been commonly identified as the main cause of rising income inequality in Central Eastern European countries during the first years of transition (Milanović 1999; Flemming and Micklewright 2000; Mitra and Yemstov 2006). Even though the share of wages in the total income dropped, rising wage concentration has spurred the overall inequality increase (Milanović 1999, Rutkowski 2001).⁵⁰ The rise of earnings dispersion at the top in Poland can be clearly seen in Figure 8 above. The rising educational premium, triggered by the decentralisation of wage setting process, has been usually singled out as the main cause of rising wage inequality in Poland (e.g. Rutkowski 2001, Keane and Prasad 2006, Letki et al. 2014).

On the other hand, Keane and Prasad (2002) find that a marked increase in social transfers during first transition years played the key role in mitigating the sharp rise in inequality in Poland (as inequality of pre-transfer market income sharply increased). This is visible in a more robust relative standing of the Polish bottom 50% in the 1990s. 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, generous unemployment benefits, disability benefits, etc. (Brzeziński et al., 2013, p. 92; Lindert 2004).⁵¹ 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 (Figure A10).⁵²

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 35% by 2015 (Figure 2). To understand better this development, we turn to the income composition for top groups. Figure 10 shows that higher top income groups

⁵⁰ Several theories have been offered aiming to explain earnings dispersion in Poland and other transition countries. Thus, Milanović (1999) has proposed that a rise in earnings inequality in transition was induced by a shift of workers from the wage compressed state sector to the more wage-dispersed private sector. In this respect Rutkowski (2001, p. 18) confirms that the higher incidence of both high-paying and low paying jobs in Poland is more characteristic for the private sector. However, Keane and Prasad (2006) indicate that the reallocation mechanism was of secondary importance in Poland since earnings dispersion took place both within the public and the private sector, and thus within-sector inequalities were the dominant force behind the overall delevelling trend.

⁵¹ 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.

⁵² Figure A10 shows that the share of transfers in the total household income from HBS sharply increased from 18% in 1986 to 25% in 1995, and to 33% in 1995. The share of transfers in the bottom 50% income increased from 37% in 1986 to 50% in 1995, while for the middle 40% from 11% in 1986 to 31% in 1995. One further sees that the greatest increase in the transfers for the bottom 50% occurred until 1992, while for the middle 40% between 1992 and 1995.

have been mostly composed of business income, while earnings have dominated for lower top groups constituting the top decile, such as the top 10-1 per cent. Business income clearly combines both the capital and the labour component,⁵³ but in the Polish context, it is plausible that business income at the top reflects in large part the return to capital (Kopczuk 2012; Alstadsæter et al. 2017; see section 2.2.).⁵⁴

A robust rise in top business incomes after 2004 was the main reason behind the structural rise in top income shares. This also calls for a more detailed study of the effect of factor shares (Figure 11). The period after the EU accession has been associated with capital deepening (see Gradzewicz et al. 2014) and rising capital share (falling labour share) (Growiec 2012). With the top 1 percent income group holding almost two-thirds of the total business income reported to the tax administration, any notable change in the functional distribution towards capital could result in rising top concentration.⁵⁵

Before looking at the potential explanations for the concurrent increase in the capital share and top income shares, one should first bear in mind that since 2004 business income can be taxed separately using a flat tax rate, which was beneficial for high-income individuals⁵⁶ and might have induced increased reporting of business income to tax administration.⁵⁷ On the one hand, the rise of top business incomes might have been an

⁵³ For example, the tax statistics mingles here both the owners of large unincorporated businesses and self-employed individuals mostly deriving income from their human capital.

⁵⁴ Unincorporated enterprises are quite frequent business types in Poland, often including those with substantial capital (Johnson 1994, p. 265). Kopczuk (2012, p. 6) points in addition that benefits of incorporated organizations such as limited liability can still be in practice combined with personal income taxation under business income. Accordingly, Alstadsæter et al. (2017, Table 1) show that Poland has by far the highest share of employment in 'pass-through' entities in Europe. On the other hand, corporations distributing profits in the form of dividends are less frequent, predominantly in foreign-owned enterprises (see Figure A11). In the recent study, Smith et al. (2019) attribute three-quarters of private business profit (from 'pass-through' businesses) in the United States as human capital income. Besides the inexactness of these estimates, one needs to point to cross-country differences in corporate legislation and practices (e.g. see La Porta et al. 1997). Accordingly, Poland resembles more central European countries, such as Germany or Italy, where many large businesses are of the unincorporated form (Dell 2007, Bach et al. 2009).

⁵⁵ For general interpersonal inequality to grow with the rise of aggregate capital share, capital income should in general be more unequally distributed than labour income (Atkinson 2009; Atkinson and Bourguignon 2000; Glyn 2009; Milonović 2015). A substantial number of works finds significant relationship between factor shares and inequality either for single countries or in cross-country samples (e.g. Bengtsson and Waldenström 2018; Ryan 1996; Schlenker and Schmid 2013; Checchi and Garcia-Penalosa 2010).

⁵⁶ Before 2003 taxpayers reporting business income were taxed using the general progressive scheme, with three brackets with marginal tax rates of 19%, 30% and 40%. After the reform, they gained an option of reporting business income using the flat rate of 19%.

⁵⁷ For example, should we interpret a strong fall in the top percentile share in 2003 as well as its immediate upswing in the following year partly in the light of this word of caution? Since the reform was introduced in November 2003 and it was widely discussed before (e.g. Antczak 2003), there was an incentive for business owners to postpone income for 2004 instead of 2003. This would be generally in line with recent findings that a prompt response to tax incentives has been mostly a practice of the very high-income individuals, who show much higher overall elasticity of taxable income (Gruber and Saez 2002; Saez 2004).

outcome of lower tax avoidance and evasion (Kopczuk 2012), on the other, an outcome of shifting of high earnings to business income (e.g. Gordon and Slemrod 2000). Although the reform probably did have material effects,⁵⁸ we believe that it is not the whole story. In the on-going work, we use the registry database on individual-level tax returns in an attempt to empirically disentangle the rise of business income due to the real activity and ‘reporting’ effects (Bukowski et al. 2019).

The rise in capital share has been often attributed to the new globalization phase and increasing participation in the international trade. We point to three broad channels how globalization might have potentially induced the rising capital share in Poland. The first channel is the capital-augmenting technological change, which has entered Poland through strong foreign direct investment (FDI) after the EU accession (Olszewski 2009). The attractiveness of technology argument lies in the fact that it can account in addition for increasing returns to skills, as recorded in rising wage inequality (e.g. Krusell et al. 2000). The second channel is a trade-induced shift towards capital-intensive sectors. Traditional labour-intensive industries, such as mining or textile manufacturing, have been in decline due to the increasing trade competition, especially after China joined the WTO in 2001 (Growiec 2012; Balsvik et al. 2015). Finally, being a part of the global value chains, foreign investors or Polish multinational companies do not build a supply chain in Poland, which can break the connection between the productivity of the company and the domestic demand for labour (Timmer et al. 2014; Baldwin 2016). Trade-involved companies are facing thus relatively weak upward pressure on their own wages even though they earn higher profit margins. Relatedly, the rising market power of foreign companies over labour could have also contributed to the falling labour share, as a monopsonistic firm might pay its employers wages below competitive levels (Azar et al. 2017; Benmelech et al. 2018).

The distributional effects of globalization and technological change can also explain a decline in the income share of the middle 40% (Figure 2), which can be attributed to the relative standing of the Polish middle class. It has been documented that the middle-skilled jobs in developed economies have been more likely to be automatized, leading to so called ‘job polarization’ (Autor et al 2006). At the same time, employment in manufacturing – a traditional sector of middle class – has been in decline due to offshoring and trade competition with developing countries (Autor et al 2016).⁵⁹ The relative fall in the importance of middle class, which is the ‘back-bone’ of democracy, might be related to the recent rise of populism across the CEE and Western European countries.

⁵⁸ Kopczuk (2012) estimates very high elasticity of taxable income to the marginal tax rate change, close to one, which is among the highest documented in the literature.

⁵⁹ According to the EU-KLEMS data, the share of value added attributed to manufacturing has increased from 18% in 2000 to 20% in 2015, but the share of employment has declined from 26% to 23% over the same period.

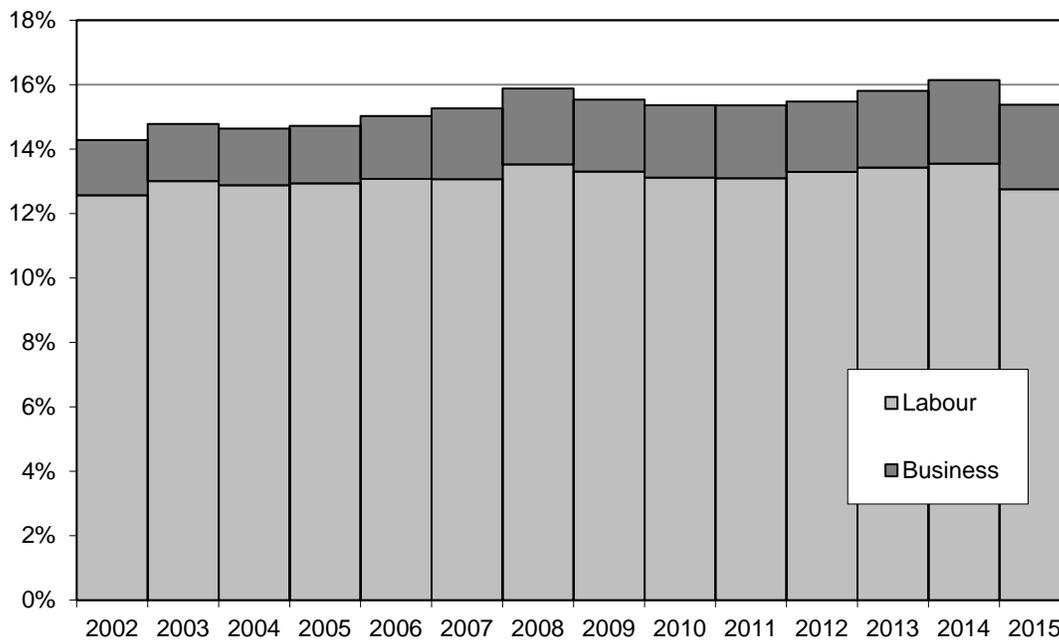
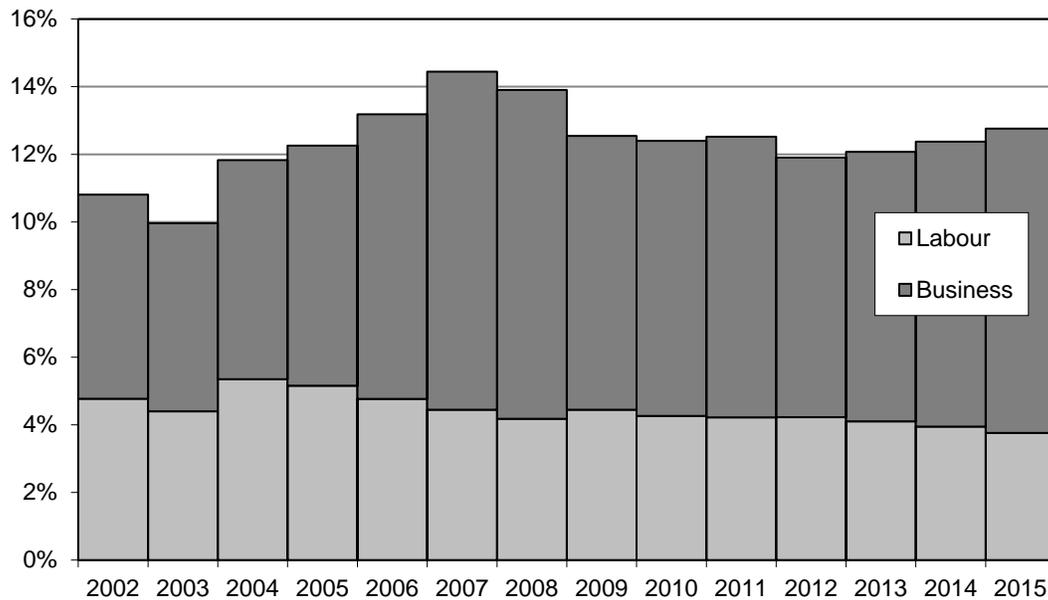


Figure 10: Top 1 per cent and Top 5-1 per cent income decomposition between business and labour income

Source: authors' computation based on income tax statistics; Distribution of fiscal income among tax units.
 Note: labour income includes: income from employment, pensions, as well as other non-business income sources.

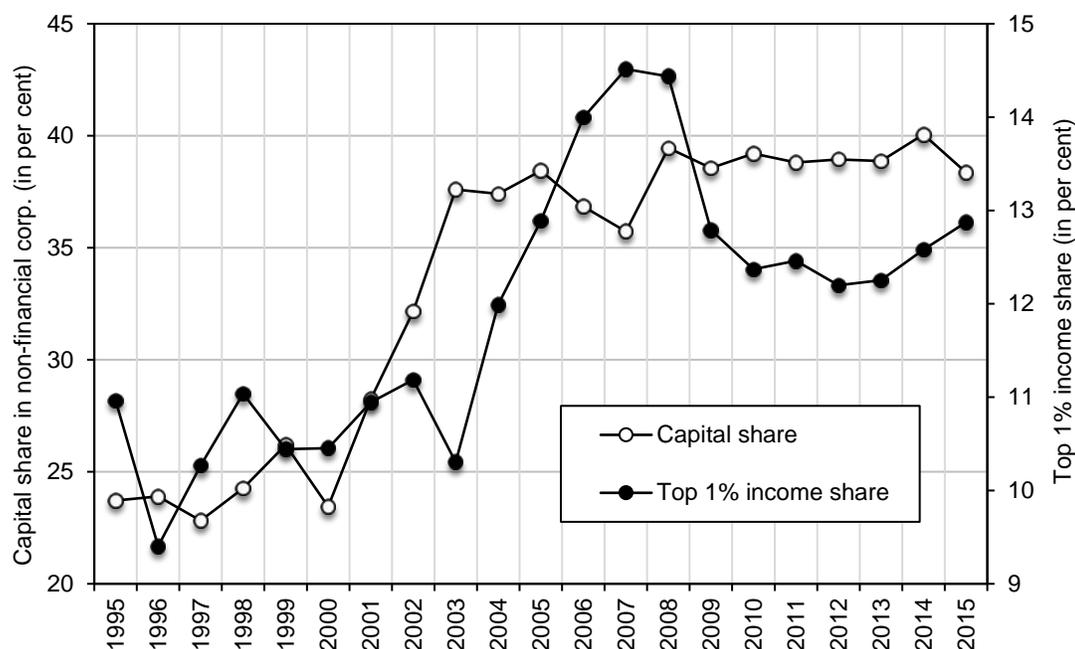


Figure 11: The evolution of capital share in gross value added of non-financial corporations and the top 1 per cent income share, Poland 1995-2013

Source: Capital share: Polish National Accounts; Eurostat. Top 1% income share: authors' computation based on income tax statistics. Distribution of fiscal income among tax units Note: capital income is calculated as 80 per cent of gross operating surplus in non-financial corporations. Capital share is the proportion of thus obtained capital income in factor-cost gross value added of non-financial corporations. We take 80 percent of gross operating surplus since Polish National Accounts place unincorporated enterprises with more than 10 employees in non-financial sector, and we assume that the part of its operating surplus should be attributed to labour income of owners and household members. The obtained estimates of capital share in GVA are consistent with those of Karabarbounis and Neiman (2014).

5. International comparison

We next turn to international comparisons. First, we compare the long-run evolution of income inequality in Poland and Western European countries. Figure 12 shows the evolution of the top 1 per cent share in Poland, Germany, France, Sweden and the UK between 1914 and 2014. Although a broad U-shaped pattern can be observed in all countries throughout the 20th century, it has been especially pronounced in Poland. The period between 1914 and 1945 initiated a secular downward inequality trend worldwide due to wars, political and economic shocks. While WW1 itself was advantageous to top incomes in presented countries, the immediate post-war development hit hard top incomes – with a decline particularly pronounced in Poland. It is now well documented that the evolution of top income shares in developed countries during the first half of the 20th century reveals the fate of top capital incomes (Atkinson and Piketty 2007, 2010; Piketty 2014; Atkinson

2015). In Poland, although industrial and financial capital suffered even more in comparison to other countries, there was a rise in top shares during the Great Depression due to the deterioration of Polish farmers' income relative to top incomes composed dominantly of non-agricultural groups.⁶⁰ Interestingly, top percentile share in Germany saw an increase of a similar magnitude in the 1930s, while top shares in other countries experienced a steady decline between the two wars.⁶¹

While inequality stood at low levels in all countries in the three post-WW2 decades, the introduction of communism dramatically reduced top income shares in Poland and kept them below the levels observed in western European countries. With the fall of communism, the top percentile share substantially increased in Poland from 1989 to 2015, to reach the levels characteristic for more unequal European countries, notably the UK and Germany, and placed Poland significantly above estimates for the group of Continental, Nordic and Southern European countries (e.g. Atkinson, Piketty and Saez 2011).

It is interesting to point to the recent similar evolution of the Polish top percentile income share and that documented in Germany and the UK. In all three countries, the evolution of top incomes has exhibited a strong pro-cyclical character. As we discussed before, it seems that Polish top incomes follow more closely macroeconomic conditions due to the relatively high concentration of business income, which generally displays more pro-cyclical character. In addition, economies in Central Europe are especially sensitive to economic developments in Germany, which is their largest trading partner and direct investor.⁶² For instance, an increasing participation of Poland in German-led global value chains (GVC) might have also contributed to the synchronization of top shares in two countries (Figure A12).

Further, it is of particular interest to compare the experience of Poland to that of other ex-communist countries in Eastern Europe. Figure 13 shows that all countries for which we have historical inequality series – Poland, Hungary, the Czech Republic and Russia – have displayed a marked U-shaped evolution of top income shares in the long-run (Mavridis and Mosberger 2017; Novokmet 2018; Novokmet et al. 2018a). It can be seen that the introduction of communism sharply reduced top income shares in all countries. However, the return to the market economy saw quite divergent development of inequality in Russia in comparison to countries in Central Eastern Europe. The top percentile share in

⁶⁰ Or to put it alternatively, income of top groups fell less than for the rest of the population dominantly made of farmers.

⁶¹ Top capital incomes in Germany recovered from Weimar shocks during the Nazi state economy amid growing war preparations (Dell 2007), while, for example, in Sweden, they were adversely affected due to the Depression shocks such as the well-known Kreuger crash (Roine and Waldenström 2010).

⁶² Germany is by far the most important Poland's trading partner, for example, being a destination for almost a third of total Polish exports. In this respect, the UK comes second in importance, receiving slightly less than 10 percent of total Polish exports.

Russia surged to levels around 20 per cent, while in the latter countries it stabilised at levels between 9-14 per cent – with Poland at the upper end of the spectrum and the Czech Republic and Hungary at the lower end. We speculate that higher income concentration in Poland than in other former socialist countries in EU could be linked to relatively higher number of affluent entrepreneurs, plausibly benefiting from the larger domestic market.

The available series on the entire income distribution for the recent decades provides us with richer insight into the post-communist distributional dynamics in international comparison. Figure 14 and Figure 15 show the evolution of the bottom 50% and the top 10% income share, respectively, in Poland, Russia, China and France from 1980 until 2015. It is particularly interesting to compare the evolution of income inequality in Poland and Russia after the fall of communism in Eastern Europe. While income inequality was similar in both countries in the 1980s (Atkinson and Micklewright 1992; Flemming and Micklewright 2000) – slightly below 0.3 as measured by the Gini coefficient – the beginning of the transition to the market economy led to markedly divergent inequality trajectories. 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 14). 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. More extensive and better targeted social transfers toward low-income groups in Poland have been seen as the most important mechanism in precluding a sharp rise of inequality during the transition (Keane and Prasad 2002; Mitra and Yemtsov 2006). Transfer payments in Russia were small and declining, and a collapse in living standards of the bottom 50% led to a sharp increase in inequality in the early 1990s. 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 14).

The critical divergence occurred concurrently at the upper part of the distribution. The post-communist transformation has resulted in markedly higher top income and wealth concentration in Russia than in Poland and other ex-communist. The decoupling had already occurred by 1996, when top 10% income share in Poland reached levels slightly above 30%, while in Russia it surged to almost 50% (Figure 15). In particular, top-end income concentration is markedly higher in Russia than in Poland (Figure 13). This is in line with the Forbes billionaire data, which show a disproportionately high billionaire wealth

in Russia (Novokmet et al. 2018).⁶³ 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 in the environment of legislative and institutional vacuum favouring the rich (Guriev and Rachinsky 2008).⁶⁴ Broadly speaking, different privatization strategies pursued – ‘big-bang’ in Russia versus more gradual in Poland – have been often highlighted as an important source of the documented divergence of income and wealth inequality trajectories in two countries.⁶⁵ The other factors might have mattered as well. The abundance of natural resource rents in Russia (their lack in Poland) has plausibly contributed to markedly higher concentration levels in Russia. On the other hand, it has been often argued that institutional framework, more favourable to the rule of law and to building market institutions, has emerged in Poland as a result of the prospective EU accession (Berglof and Bolton 2002). Finally, the fact that the top capital incomes holders in Poland are disproportionately foreigners removes a large part of the property income from resident income distribution.⁶⁶ It plays a part in lower top income shares in Poland and Central Eastern Europe than in Russia,⁶⁷ where more considerable foreign ownership has not been an option. Overall, a markedly different transition experience in Poland and Russia (see also Table 3) suggests that there was no predetermined trajectory of inequalities during the transition. It clearly shows that policies and institutions play an important role in shaping inequality.

⁶³ Brzeziński (2017, p. 7) reports much smaller wealth of the Polish billionaires in the Forbes data, equivalent to 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 et al 2018, Fig. 2).

⁶⁴ Guriev and Rachinsky (2008, p. 142) have referred to this as the ‘institutional economies of scale’, where “large owners were able to influence rules of the game from capturing regulators, courts and legislatures”. Importantly, as these authors further note (fn. 13), widespread wage arrears compelled many workers 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.

⁶⁵ In general, the economic theory on wealth accumulation is of little help in explaining how self-made fortunes are created (Davies and Shorrocks 2000, p. 628). One should consider the privatization channel as one important source of large entrepreneurial wealth. The creation of new enterprises in Poland had been closely linked to the liquidation of state-owned enterprises (SOEs). One of the characteristic features of the Polish privatization program was that liquidation of SOEs, followed by the private acquisition of capital assets of liquidated companies, was quite widespread form of disposing public capital (rather than by prolonged mass privatization) (Kolodko and Nuti 1997, T.5; Krajewski and Piasecki 1999). The additional privatization channel contributing to the rise of SMEs was the so-called ‘leasing’, according to which private enterprises could lease a part or the whole SOEs intended as restructuring/liquidating measure, with the future prospect of buying the leased property (Uvalic 2003; Kolodko and Nuti 1997). Moreover, it seems that ownership transfer in Poland largely resulted in ‘asset redeployment’ rather than in ‘asset stripping’. At least, there is no general perception of large-scale plunder (e.g., in contrast to Russia).

⁶⁶ A substantially higher foreign ownership in the new EU members in Central Eastern Europe is the consequence of the general convergence strategy that has relied on economic integration within the EU.

⁶⁷ For example, Figure A11 shows that from the total distributed capital income in the country, foreigners have received almost as large portion as the Polish households.

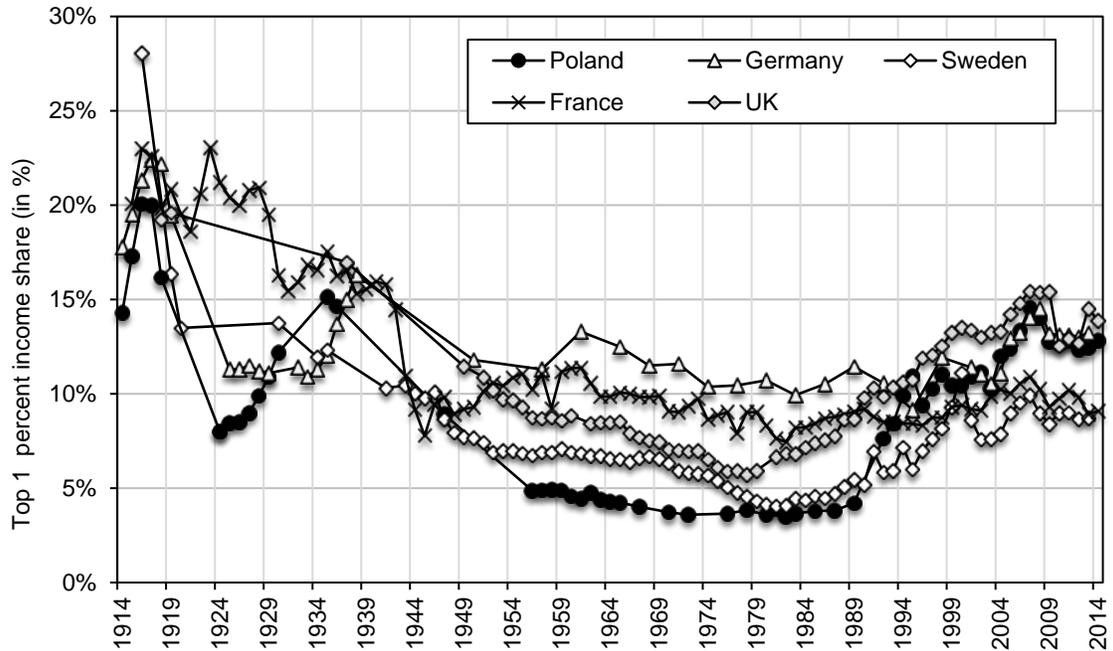


Figure 12: Top 1 per cent in Poland, Germany, France and Sweden, 1914-2014

Source: Poland: authors' computation based on income tax statistics. Distribution of fiscal income among tax units. Other countries: WID.world. Note: 1914-1919 for Poland refers to the Prussian Poland

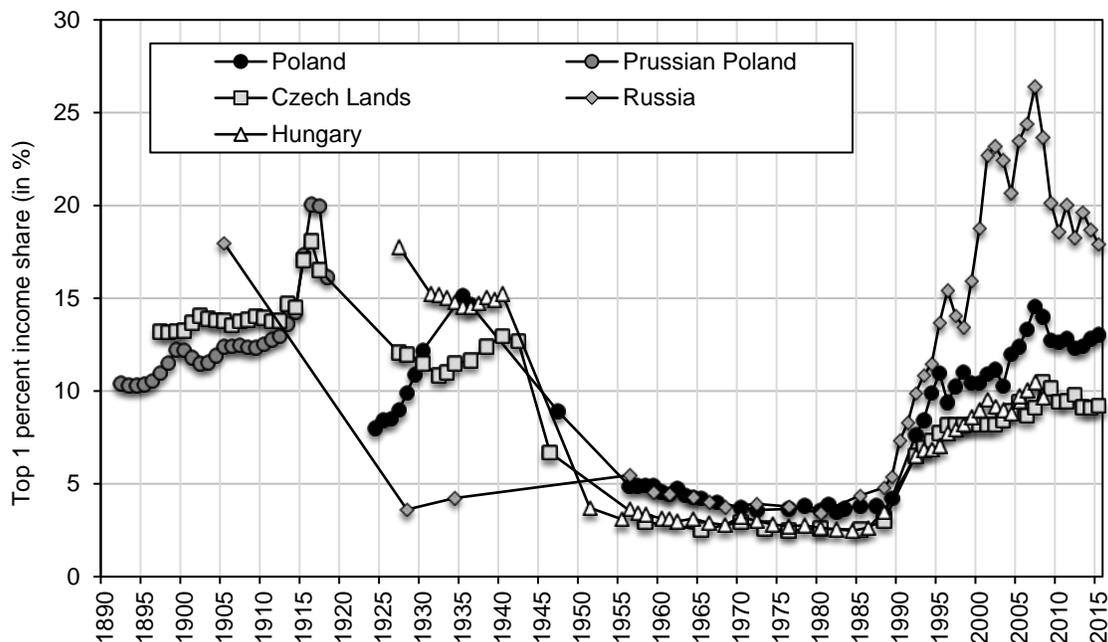


Figure 13: Top 1 per cent in former communist countries, 1890-2015

Source: Poland: authors' computation based on income tax statistics. Distribution of fiscal income among tax units. Other countries: WID.world

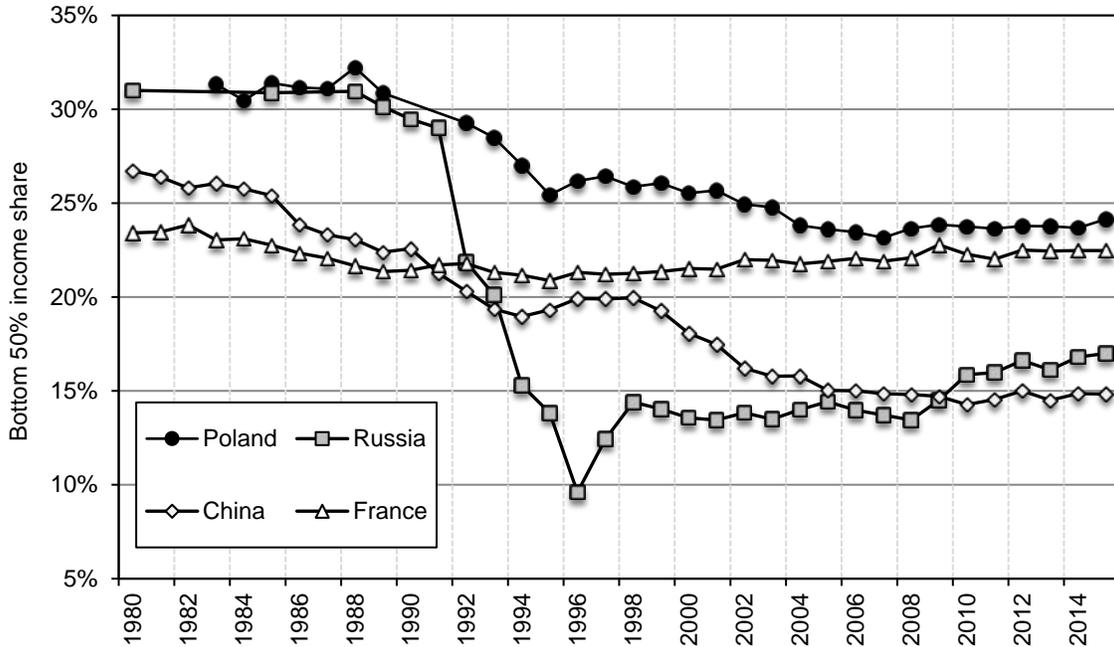


Figure 14: Bottom 50 per cent in Poland, China, France, and Russia, 1980-2015

Source for Poland: Authors' computation (see section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults. Other countries: WID. world

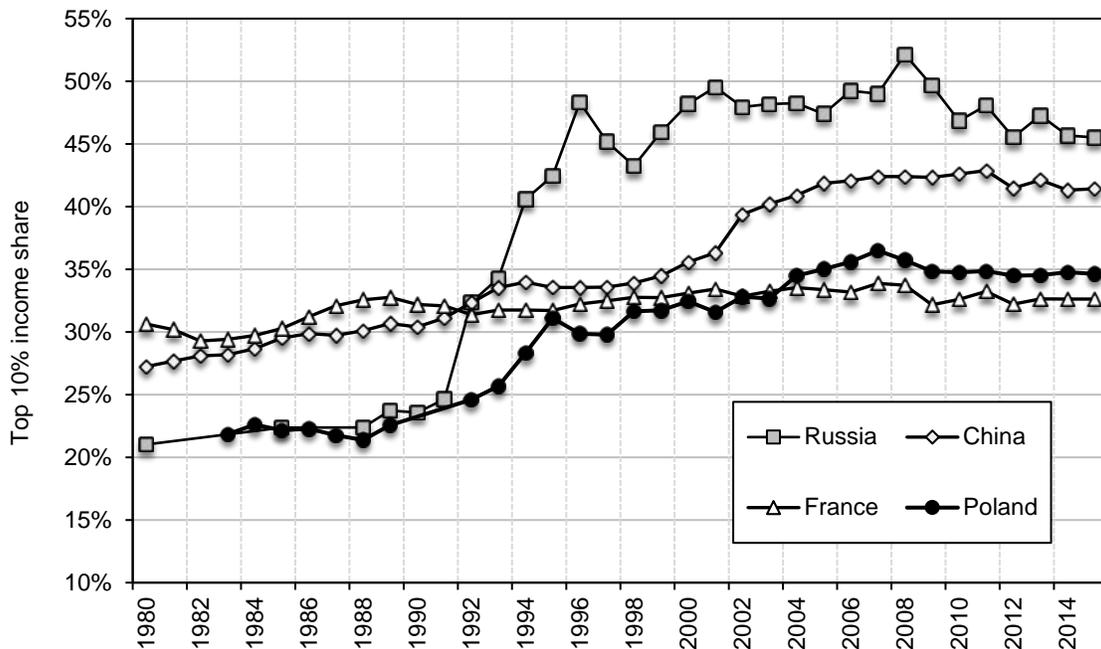


Figure 15: Top 10 per cent in Poland, China, France, and Russia, 1980-2015

Source for Poland: Authors' computation (see section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults. Other countries: WID. world.

Table 3: Income growth and inequality in France 1983-2014 and Russia 1989-2016

Income group (distribution of per adult pre- tax national in- come)	Poland		France		Russia	
	Total cumu- lated real growth 1989-2015	Share in total macro growth 1989-2015	Total cumu- lated real growth 1983-2014	Share in total macro growth 1983-2014	Total cumu- lated real growth 1989-2016	Share in total macro growth 1989-2016
Full Population	73%	100%	35%	100%	41%	100%
Bottom 50%	31%	13%	31%	21%	-20%	-15%
Middle 40%	47%	30%	27%	37%	15%	16%
Top 10%	190%	57%	49%	42%	171%	99%
<i>Top 1%</i>	458%	24%	33%	21%	429%	56%
<i>Top 0.1%</i>	1019%	9%	98%	21%	1054%	34%
<i>Top 0.01%</i>	2273%	3%	133%	8%	2134%	17%
<i>Top 0.001%</i>	5066%	1%	144%	3%	4122%	8%

Source: Poland: Authors' computation (see section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults. France: see Garbinti et al. (2017) (Table 2b). Russia: see Novokmet et al. (2018a) (Table 2).

6. Conclusion

This paper has combined tax, survey and national accounts data to provide first consistent series on the long-term income distribution in Poland. We draw a U-shaped evolution of income inequality in Poland throughout the 20th century. Inequality was high in the first half of the 20th century due to high concentration of capital income at the top of the distribution. As documented now in many countries, the downward trend was induced by the fall in capital income concentration. The introduction of communism signified comparatively greater shock to capital incomes relative to other countries. The communist system eliminated private capital income and in addition compressed earnings. During the four decades of the communist rule, inequality displayed notable stability at the lower levels.

After the fall of communism, the Polish income inequality experienced a substantial and steady rise and today is at the level of more unequal European countries. We show that official survey-based measures substantially underestimate the rise of inequality since the end of communism, primarily by underestimating the top of the income distribution. We correct household surveys with the administrative data on high-income taxpayers and document that top 10% has captured almost two-thirds of the post-communist economic

growth. While the initial growth during the transition in the 1990s was induced both by the rise of top labour and capital incomes, the strong rise of top income shares in 2000s was driven solely by the increase in top capital incomes. We relate the rise in top capital incomes to current globalization forces, which have rebalanced the division of national income in favour of capital.

This study shows that the evolution of inequality is critically shaped by the inextricable workings of economic, social and political forces. The Polish inequality history clearly suggests that that the secular fall in inequality in the first half of the 20th century was not a necessary (or natural) feature of the development process, but equally that the rise of inequality is not inevitable (Kuznets 1955; Piketty 2001, 2014). Dramatic changes in top income shares during the rise and fall of communism in Eastern Europe speak about the central role of institutions and policies in shaping long-term inequality patterns. A claim evidenced by the markedly different distributional outcome of the transition in Russia, on the one hand, and Poland and other former post-communist countries in CE Europe, on the other. Therefore, to understand the future inequality dynamics in Poland we should turn our attention to factors shaping institutions and policy choices, including the ideological debate centered on the growth-equity tradeoff. Communism was the radical solution in part to address high inequalities, and its failure has played a role in accepting higher inequality in post-communist Poland.

Rising income inequality in Poland has important political and social implications. It shows that the official numbers on the average GDP growth might have little in common with the actual lived experience of the most people. By looking at the evolution of income inequality we can understand often quite divergent experience of the strong Polish growth among the population (Grosfeld and Senik 2010). Those “left behind” are often missing from the public discourse, which further fuels the illusion of inclusive growth and limits the demand for social policies. The victory of anti-globalisation Law and Justice party in the 2015 parliamentary elections and the strong support for its flagship redistributive social programs might be a reflection of the Polish post-transition development model. As a result, inequality stands today at the heart of the democratic debate in Poland and worldwide. There is a room for the more inclusive growth to be strived both on the domestic and the EU front, such as education and innovation strategy, the optimal structure of the tax system (Diamond and Saez 2011, Kopczuk 2012), rebalancing bargaining power between capital and labour (Bell et al. 2018; Rodrik 1997), or even the bias of the technological change (Atkinson 2015).

Finally, this paper shows promising avenues for future research. Most importantly, our work presents the central building block for constructing comprehensive Distributional National Accounts for Poland (Bukowski et al. 2019). We emphasize several extensions

directly building on our work. First, it is important to produce both the pre-tax and post-tax income distribution, to assess the redistributive role of the government. Next, the new distributional statistics should also provide insights into the distribution of different socio-economic dimensions such as gender, age, region, etc. As pointed out in the paper, it would be especially useful to provide the breakdown by labour and capital income for the whole income distribution. This could shed light on the role of different economic mechanisms in the inequality dynamics, such as international trade or automation. Lastly, the high concentration of business income in Poland calls for further research on the relative importance of human vs. non-human capital at the top of the income distribution, as well as its future implications for growth and inequality (Piketty 2014, Smith et al. 2019). Relatedly, there is a need to look together at income and wealth distribution (Piketty et al. 2018, Fisher et al. 2018, Kuhn et al. 2018).

Appendix A.1: Top Income Shares, 1892-2015: Methodology and Data Sources

A.1.1. The Prussian Partition 1890-1918

Data. Prussia assumes a special place in the analysis of historical distributional patterns, primarily due to the early introduction of the comprehensive income tax in the nineteenth century, which was accompanied by regular annual publications of the detailed statistics. Most importantly, this coincided with the industrialization and the structural transformation of the country's economy, the emergence of the modern economic growth and the eventual rise of Germany to the global economic pre-eminence.⁶⁸ For the same reason, the Prussian income tax data offer invaluable research opportunities to study the long-term evolution of inequality in Poland.

Data for Prussian Poland come from the annual Statistics of income tax assessment (*Statistik der preußischen Einkommensteuer-Veranlagung*). We use available tabulations for provinces (*Provinzen*) and districts (*Regierungsbezirke*) to construct top income shares for Prussian provinces with predominantly (or significant) Polish population, which formed after WWI the Second Polish Republic (1918-1939). Top income shares are constructed for provinces of Posen, West Prussia and Silesia. The latter should be, however, distinguished from the first two provinces, as Germans accounted there for the predominant part of the population in the pre-WW1 period, and only the district Oppeln (Opole) joined the interwar Poland (as Upper Silesia). The region itself did not form a part of Polish-Lithuanian Commonwealth (moreover, it became a part of Prussia only after Frederick the Great had taken it from Habsburgs during the so-called Silesian Wars) and it was included in Poland after the Second World War. We generally focus our attention on the district Oppeln. Parts of Prussian provinces of Pomerania and East Prussia are today within the Polish borders (the other parts of the former Prussia are in Germany, Russia and Lithuania), but we do not investigate them separately as these were not generally identified as 'historic Polish lands',⁶⁹ and use them in analysis for comparative purposes.

Published tabulations are ranged according to brackets of gross income, giving for each bracket the number of taxpayers and the corresponding tax obligation. Statistics at the level of districts provide almost seventy brackets, which can be aggregated to the provincial level. In addition, there are separate reports for the number of taxpayers in towns and in the countryside at the provincial and the district level (these were ranged by six brackets). However, the sources of income are not available at the bracket level, but only in total for all taxpayers.

⁶⁸ The use of the Prussian data has been used for coining path breaking theories in the development economics concerned with the interaction of inequality and economic growth, or the often-termed literature in the Kuznetsian tradition. One should be thus reminded that the Prussian income data actually served as the basis for the Kuznets' inverse-U evolution of inequality during the economic development. They present an unambiguous evidence of the rising inequality during the industrialization phase of the country in the second half of the nineteenth century until the First World War, as well as the ensuing fall afterwards (Prokopovitch 1926; Kuznets 1955; Müller and Geisenberger 1972; Keable 1986; Dumke 1991).

⁶⁹ For example, Prussians never included them in widely used term of 'our Polish provinces' (Davies 2005).

Population Control. The tax unit in Prussia was household, defined as the married couple with dependants. The total number of households in provinces is estimated from the Population Census (*Die Volkszählung im deutschen Reich*) and the Statistical Yearbook (*Statistisches Handbuch für den Preussischen Staat, Statistisches Jahrbuch für das deutsche Reich*)

Income Control. The income control totals for provinces in Prussian Poland have been obtained by estimating the income of those exempt from the income tax ('non-filers') (e.g. Prokopovitch 1926). The statistics provide both the total number of taxpayers (filers) and non-filers for each province and district. With the reported total income of taxpayers, it remains to estimate the total income of non-filers. We assume that non-filers in each province had the same average income as in Prussia on the whole. The figures for Prussia are obtained from Hoffman and Müller (1959, Tab. 35), who estimated them based on Statistische Reichsamts (1932). The latter also provides the income of tax exempt at the provincial level for 1900, 1907 and 1913. The available estimates for these years are very close to those obtained by the above method. Hoffman and Müller (1959) do not cover the 1914-1918 period, so we take the average income of non-filers in Prussia from Dell (2008), who followed the methodology of the former authors.

A.1.2. The Austrian Partition 1890-1914

Data. Top income shares in Galicia are constructed from income tax statistics for Imperial Austria - Statistical Yearbooks of Imperial Austria (*Österreichisches Statistisches Handbuch für die im Reichsrathe vertretenen Königreiche und Länder*) as well from Annual Report of Ministry of Finance (*Mitteilungen des K. K. Finanzministeriums*). After the income tax was introduced in 1898, the fiscal administration was publishing tabulations of income taxpayers in each province of Cisleithania. Income definition was quite broad allowing very few exemptions. It defined income from following sources: land, buildings, business and self-employment, capital and other sources. Capital gains were not taxed. Tax unit was a family with the total income of family members ascribed to the head of a family.

Population Control. The tax unit in Imperial Austria was household, defined as the married couple with children. The total number of households in Galicia is estimated as the number of adults (above 18 years of age) minus the number of married female. The data come from the Austro-Hungarian censuses of 1890, 1900 and 1910 (*Die Ergebnisse der Volkszählung in den im Reichsrathe vertretenen Königreichen und Ländern*)

Income Control. The control total for income for Galicia during the Habsburg era is derived as follows. We take as our starting point Schulze's (2007) estimates of regional GDP in Austria-Hungary. Schulze provides estimates for 1870, 1880, 1890, 1900 and 1910, expressed in 1990 Geary-Khamis international dollars. In order to convert estimates for Galicia into current Austro-Hungarian crowns, we take the following steps. First, we convert these estimates to 1913 crowns by applying the exchange rate used by Schulze (namely 3.36 GK dollars per crown; see Schulze 1997, p. 14). To obtain GDP for the years between 1890, 1900 and 1910, we apply real growth rates of GDP for Galicia taken from Ciccarelli and Missiaia (2014). Next, nominal values were

obtained by using regional living cost indices in Austria-Hungary estimated by Cvrcek (2013). Finally, we take 60 per cent of nominal GDP as our total control income.

A.1.3. Interwar Poland 1918-1939

Data. The tax data come from the official publications of interwar Ministry of Finance, the Central Statistical Office of Poland, as well as Ministry's archives in *Archiwum Akt Nowych* in Warsaw. For more details see the table below.

Table: Data sources for the period 1918-1939

Source Name:	Years available:	Publisher and Comments
Rocznik Ministerstwa Skarbu 1928 (Yearbook of the Ministry of Finance 1928)	1924, 1925, 1926	The Ministry of Treasury / The Ministry of Finance
Rocznik Ministerstwa Skarbu 1927-1930 (Yearbook of the Ministry of Finance 1927-1930)	1925, 1926, 1927, 1928	The Ministry of Treasury / The Ministry of Finance
Statystyka Podatków Bezpośrednich, Opłat Stemplowych i Danin Pośrednich 1931	1925, 1926, 1927, 1928	The Ministry of Treasury / The Ministry of Finance
Statystyka Wymiaru Państwowego Podatku Dochodowego za Rok Podatkowy 1927	1927	The Central Statistical Office of Poland
Witold Bernhard, "Obciążenie Państwem Podatkami Bezpośrednimi", Kwartalnik Statystyczny VIII (4) 1931, p.901-919	1929	The Central Statistical Office of Poland
Statystyka Skarbowa 1933	1929, 1930	The Central Statistical Office of Poland; the data do not separate legal and physical persons
Statystyka Wymiaru Państwowego Podatku Dochodowego za Rok Podatkowy 1936	1936	The Central Statistical Office of Poland
Ministry's archives in Archiwum Akt Nowych in Warsaw	1929, 1936, 1938	Incomplete, only earnings.

The tax code defined two types of income: unearned (*fundowany*) and earned (*niefundowany*). The unearned category included income earned by either legal or physical person, whose economic activity is independent, for instance, capitalists, entrepreneurs, self-employed, artisans, farmers or petty bourgeoisie. A broad range of activities was taxed this way, including agriculture, forestry, land and real estate rents, business activities, capital income (e.g. interests, dividends), royalties. Non-monetary income, such as natural consumption or imputed rents of owner-occupiers, was not subject to taxation. Earned income was attributed to employees or retired physical persons. Importantly, state workers and state pensioners do not appear in the tax statistics, even though they were liable to PIT.

For physical persons only annual income above 1500zł for unearned income and 2500zł for earned income had to be reported. These two types of incomes were subject to different tax scheme, and the tax statistics provide separate tabulations for each type. However, this implies that physical persons who earned both unearned and earned incomes were reported twice. Similarly, a person was reported multiple times if her earned income came from more than one employer in different tax catchment areas. To our best knowledge, it is impossible to separate these individuals. Therefore, we assume 'Ricardian' system of distinct classes, that is, that of zero overlap between unearned and earned taxpayers at the top and we ignore the multiple employer problem.

The tax code used two definitions of tax unit, household and individual. An individual reported income from self-employment, wages or pensions. All other types of income were reported at the household level. This rises a problem with a clear definition of tax unit for unearned income, since it could be either household or individual. In the case of earned income, it was always individual.⁷⁰

PIT covered a very broad range of economic activities, except incomes coming from inheritance, property selling, income of non-profit oriented entities, lotteries and other minor sources. From the total income, a taxpayer could deduct paid interests on loans, rents and permanent financial obligations originating from the legal requirements, social security (up to 300zł), insurance benefits (up to 300zł per individual or 600zł per household) and other taxes. In the case of unearned income, the actual income was reported by those taxpayers who had accounting books. For others, the administrations imputed income based on a set of payer's characteristics.

Tabulations are ranged according to income before taxation and deductions, for each income bracket there is information on the number of taxpayers and the total tax paid. All income within bracket paid a fixed amount of tax. We estimate the total income in each bracket by assuming Pareto distribution (see below), but since brackets' range is quite narrow our estimates do not depend on particular distributional assumption. A potential problem is that the tabulations contain only taxpayers that paid personal income tax. Even if an individual's income was above the minimum filing threshold, after deductions her income could fall below the threshold and did not appear in the statistics. However, since we look at fractiles whose thresholds are much higher than the minimum filing threshold, this does not lead to underestimation of top income shares.

For the years 1925 and 1926, it is impossible to separate physical and legal persons reporting unearned income. We estimate the number of physical persons in each bracket of unearned tax schedule in 1925 and 1926 by taking the proportion of physical persons in all 'unearned taxpayers' observed in 1927 (note that bracket ranges were unchanged throughout the years). In general, the proportion of legal persons in total unearned taxpayers is very small, corresponding to less

⁷⁰ Wiśniewski (1934) unfortunately does not discuss this issue in detail. Using the census data, for unearned income he estimated the control population assuming that the tax unit are: agriculture holdings, for-profit entrepreneurs, self-employed, petty bourgeoisie. For earned income he distinguished between agricultural workers and other workers

than 1% of all unearned taxpayers (0.8% in 1927, 0.7% in 1928 and 1929), but these are dominantly concentrated at the very top of the income distribution. However, the proportion of legal persons is quite stable throughout the years. For example, when the proportion of physical persons in the total taxpayers in 1926 is taken to correspond that observed in 1927, the top 1 per cent (the top 0.1 per cent) share is 11.68% (3.56%). When the proportion from 1928 is taken instead, the top share is 11.78% (3.65%). Even when we apply the proportion documented a decade later, in 1936, our estimates are not significantly affected (11.57% (3.49%)). These margins of error seem reasonable enough to use our estimates for 1925 and 1926 without raising too much unease.

The same approach is taken for 1930 and 1935 - for which equally the statistics on unearned income does not distinguish between personal and legal persons - by taking the proportions of physical persons in all unearned taxpayers documented in 1929 and 1936, respectively. Unfortunately for these years, the statistics on earned income is also lacking. However, as unearned income accounts for the predominant part of income at the very top (for example, it made almost 90 per cent of income for the top 0.1 per cent and above) and rises with income rank, we provide estimates for the top 0.1 per cent and the groups above by simply taking the number of taxpayers reporting earned income in 1929 and 1936 in the corresponding top brackets. In addition, as top earnings exhibited certain rigidity during the depression, it is probable that the 'crisis years' of 1930 and 1935 saw similar earnings distribution at the very top as in the immediate neighbouring years for which the statistics are available.

Population Control. As mentioned above, the tax unit in interwar Poland was both household and individual depending on the income source obtained. Namely, someone obtaining employment income was individually taxed, while for other sources incomes of all family members were combined and attributed to the 'head of family'. We take as our population control a hybrid construct defined as the total number of adults minus the number of married women not employed or self-employed. Our definition thus treats working females as separate tax units, but note that most of them were actually not married (according to 1931 census, less than 15 per cent of employed females outside agriculture were married (Maly Rocznik 1939, p. 260, Tab. 5)), and therefore the total reference roughly corresponds to the total number of married couples plus singles.

The number of adults is taken from population censuses (and annual figures from the statistics on the Movement of the Population), while the number of non-working females is equally found in censuses and linearly interpolated for in-between years.

Income Control. To arrive at the total control for income, we take the estimate of Kalecki and Landau (1934) for 1929 as our starting point. This estimate has remained the main reference point for all subsequent estimation of national income in interwar Poland up to present day. Kalecki and Landau's (K&L) estimate is gross of depreciation, roughly corresponding to GDP and based on the expenditure approach. K&L extended their calculations only for 1933 (Kalecki and Landau 1935), so we have relied on studies of Klarner (1937) and Petyniak-Sanecki (1939) for

other years in the 1929-1936 period for which the tax data is available. The latter authors followed closely the methodological approach used by K&L (Landau 1976, pp. 110-1).

However, no subsequent study focused on the years before 1929. We adopted the following approach to estimate total income in 1927 and 1928. K&L provide indices of the real development of the national income for the period 1927-1934 (1935, Tab. 116).⁷¹ We take K&L's GDP for 1929 and apply the corresponding growth rates to obtain real GDP figures in 1927 and 1928. We checked the K&L indices by comparing them with the real GDP growth rates in Maddison (2001) (available for 1929 to 1938; from Laski (1956)), and find quite close development. This should come as no surprise since Maddison takes the estimates of the Institute of Economic Sciences of the Polish Academy of Sciences, which are based on the work of K&L. Finally, to obtain the nominal level, we use the average of the wholesale price index and the retail price index (*Maly Rocznik Statystyczny* for 1933, Tab. 1, p. 93).

The next step in using the 'top-bottom' approach for the total income control consists in subtracting from GDP items not included in personal income such as the consumption of fixed capital, public sector income, retained earnings of corporate sector, or non-taxable personal income. Due to the general lack of detailed historical national accounts, especially with respect to the income method, the usual practice for estimating personal income has been to assume some fixed fraction of GDP (Atkinson and Piketty 2007, 2010). Wisniewski (1934) in the study on income distribution in Poland in 1929 estimated the total taxable income as equalling 82 per cent of the K&L national aggregate. However, Wisniewski's total income does not only add the income below the minimum exemption level (that is, the income of non-filers) to the total reported income of filers, but he 'corrects' the tax data through the whole distribution by using alternative sources (such as the distribution of agricultural holdings from the land tax in order to account for the assumed misreporting of income derived from the land). Consequently, we take a smaller proportion of GDP than Wisniewski did, namely 75 per cent of GDP.

For 1925 and 1926 we exploit the available estimates of national income. These are net of depreciation, so we assumed that the total control for income equals 80 per cent of national income. Following Kazimerz Secomski, consumption of fixed capital is taken as 5 per cent of GDP (Landau 1976, p. 110). Landau (1976) reports dozens of national income estimates of various authors for the 1923-5 period. The range of estimates is quite large. Those that explicitly refer to 1925⁷² are in a range between 15 and 20 million zł (in 1927 parity), and as a middle ground, we take 17,5 mil zloty as an estimate of national income. The year 1926 was the last year of post-inflation depression (Landau and Tomaszewski 1985) and we assume no real growth between the years.

One should just note that in 1927 there was a change in parity of zloty to gold franc, with 1 zloty of 1924 worth 1.72 zloty of 1927. However, the tax statistics for 1924-6 was published from 1927

⁷¹ The methodology was developed within the Institute for the Study of Business Cycles and Price. These series are not based on comprehensive estimates of consumption and investment as for the 1929 and 1933 (see Kalecki and Landau 1935).

⁷² As stated by Landau (1976, p. 105): «In many cases, it is also difficult to determine precisely for which year the estimate was made. We know that they relate to the years 1923-1925.

onwards, and taxpayers in the mentioned years are ranged according to the brackets denominated according to the new parity. Consequently, when estimating the total control income for 1924-6 one needs to convert available estimates of national income from 1924 parity to 1927 parity.

Estimation of income in tax brackets. For most of the years in the interwar period, only the number of taxpayers in specific brackets of gross income is reported without providing their corresponding income. We estimate income in each bracket by assuming that top incomes follow Pareto distribution.

Pareto cumulative distribution function $F(y)$ for income y is:

$$1 - F(y) = (k/y)^a$$

where $1 - F(y)$ is the proportion of tax units with income above y . Parameters k and a are given; k presents the minimum income to which the Pareto distribution is applicable ($k > 0$), and a presents the slope of distribution ($a > 1$) (Cowell 2011).

In order to estimate amounts in bracket (s, t) , it is assumed that income in each bracket is distributed according to Pareto law. Let p present the proportion of tax units above s and q the proportion of tax units above t , then:

$$\begin{aligned} p &= (k/s)^a \\ q &= (k/t)^a \end{aligned}$$

From these equations, we obtain parameters a and k :

$$\begin{aligned} a &= \log [(p/q)] / \log [t/s] \\ k &= sp^{(1/a)} \end{aligned}$$

We estimate a and k for each bracket. Finally, the income in bracket (s, t) is estimated as

$$Y = N \int_s^t y dF(y)$$

where N is the total number of tax units. However, this method cannot be applied to the top bracket. We assume that Pareto coefficient in the top bracket to be the same as the bracket immediately below it.

A.1.4. The County-Level Inequality in Interwar Poland

Data. The 1927 Income Tax Statistics published by Ministry of Finance provides the detailed tabulations of earned and unearned income for each tax office in Interwar Poland. In rural areas, there was usually one office per county, whereas in urban areas there were usually more than one, in which case we aggregate the data to the county level. In three cases, Gniezno, Inowrocław and Lublin, the tax office catchment areas were larger than the corresponding county and covered the rural and urban counties. We merge these counties to match the tax office.

Since the data on population and income controls is from the 1931 census, we match the 1927 tax offices with the 1931 counties. It was straightforward for the majority of cases, except those counties where borders changed or which were liquidated between 1927 and 1931. In these cases, we assign a tax office to a 1931 county, which received the largest portion of a 1927 county. We drop Konstantynów and Królewska Huta counties, as it was impossible to determine a corresponding 1931 county.

Similarly as in the aggregate tax tables, the highest bracket for unearned income is open. To determine the average income of the richest, we apply the Pareto extrapolation to each county separately. Finally, to obtain the total amount of income we assume that unearned and earned income taxpayers are different individuals and merge their number for each bracket. The thresholds of earned income brackets are usually narrower than of unearned income, in which cases we combine the earned brackets to match the unearned ones.

Population Control. Similarly as for the country-level analysis, we take as our population control the total number of adults minus the number of married women not employed or self-employed. The county-level data comes from the 1931 census.

Income Control. We construct control income for each county consistently the reported taxable income from the 1927 Income Tax Statistics. We separately estimate the earned income of agriculture and non-agriculture workers; the exempted unearned income of independent in agriculture and non-agriculture activities.

For earned income of non-agriculture workers, the data on the voivodeship-level total compensation of industrial workers in nine industries (mineral, metal, electro technical, chemical, textile, paper, tannery, wood and food) come from the 1931 Industry Statistics (*Statystyka Przemysłowa 1931*). The county-level data on the number of workers in fifteen industries and non-manufacturing sectors come from the 1931 census of population. To obtain the total earned non-agriculture income for each county, we calculate the average compensation for each voivodeship-industry cell and multiply it by the county-level number of workers in the corresponding industry (*Drugi Powszechny Spis Ludności z Dn. 9.XII 1931 r.*). For the industries not covered by the 1931 Industry Statistics we use the average voivodeship-level compensation; for domestic servants, we use one-third of the average; for public administration workers we use 2/3 of the average, and for the remaining workers we assume 1/2 of the average. In other words, we assume that all workers in voivodeship-industry cells earn the same average compensation. To obtain the

total earned non-agriculture income we add the estimated earned income of industry workers, domestic servants, public administration workers and others. In addition, we increase the total amount by 50% to match the country total.

To obtain earned income of agriculture workers, we calculate the average income of agriculture workers and the average income of agriculture 'white collar' workers (*dozorca*) for each voivodeship using the data from Gerlicz (1929). As the original data is in the quintals of rye, we use The Statistics of Prices 1929 (*Statystyka Cen, 1927-37*) to translate the numbers into the Polish Zloty. Next, for each county, we multiply the number of agriculture 'blue collar' workers by the voivodeship average and the number of agriculture 'white collar' workers by the voivodeship average for 'white collar' occupations. To obtain the total earned income of agriculture workers we sum up the total income of ordinary and 'white collar' workers.

Next we estimate exempted unearned non-agriculture income. The 1931 census provides the county-level number of non-agriculture independents, which we multiply by one-third of the average unearned taxed income. Unfortunately, to the best of our knowledge, there is no available separate data on the income of independents in non-agricultural sectors.

Finally, we calculate exempted unearned agriculture income. First, based on the estimates from the Puławy Institute and Wisniewski (1934) we assume that all landholdings smaller than 5ha did not pay the income tax. The total number of these landholdings is taken from the 1927 land tax. Second, we assume that only in certain counties landholdings between 5-10ha paid the income tax. In particular, we take the number of landholdings from the 5-10ha band in the 1927 land tax, if it is smaller than the difference between the hypothetical number of exempted agriculture independent⁷³ and the number of landholdings smaller than 5ha. Otherwise, we use the difference. Finally, we multiply the number of landholdings in each band by 2/3 of the average voivodeship-level agriculture income reported by the Puławy Institute. We take the fraction of the income because the estimates are believed to be upward biased (Wisniewski 1934)

To obtain the total county-level control income, we sum up the earned agriculture income, the earned non-agriculture income, the exempted unearned agriculture income, the exempted unearned non-agriculture income and the unearned taxed income.

⁷³ The number of hypothetical exempted agriculture independents is calculated using the 1937 tax data, which reported the number of taxpayers and income for the total unearned sector and for unearned agriculture. We relate two ratios, the agriculture taxpayers/agriculture income and total taxpayers/total income. Next we apply this relationship to the 1927 tax data to obtain the number of agriculture taxpayers (which is not reported). Finally, we subtract this value from the total number of smallholdings from the 1927 land tax.

A.1.5. Communist Poland 1945-1989

Data. The design of income tax during the first years after the end of WW2 kept broad contours of the interwar legislation. The major change, however, was to exempt earned and agriculture incomes, and tax only non-agriculture unearned income. In addition, the socialised sector was not a subject of taxation, and the law set a relatively high-income threshold. Consequently, with continuous government's attempts to limit private entrepreneurship, the income tax *de facto* lost its economic importance.

Tabulations of taxpayers obtaining unearned income are available for three years in the late 1940s: for 1945, 1946 and 1947. Unfortunately, there are no corresponding tabulations for earnings. But in order to provide an indication of the post-war development of top income shares, we combine the income tax statistics on unearned income for 1947 with the earnings data from employer survey in 1949. Obviously, the critical assumption has been that earnings distribution remained stable between 1947 and 1949.

Earnings survey provides tabulations of employees in industry and construction, respectively, ranged according to monthly earnings. Separate reports are given for manual and white-collar workers, ranged separately for technicians and office workers. We merge respective tabulations according to worker's qualification, and then of all workers in industry and construction. The resulting joint distribution accounts for roughly 70 per cent of employees covered by social insurance in firms with more than 5 employees (exclusive of agriculture). We assume that the remaining 30 per cent of employees (e.g. in telecommunication, wholesale or retail trade, accommodation) is distributed in the same manner as those in (combined) industry and construction. On the other hand, it is assumed that employees in firms with less than 5 employees, or employees in agriculture as well as in those not covered by social insurance, do not end up in higher earnings brackets, and thus do not make up top income groups. We adjust earnings bands in 1949 to the price level of 1947 by using the available retail price index.⁷⁴ Annual earnings were obtained by multiplying bracket middle point by twelve. For the earnings in the open top bracket, we assumed that two top brackets follow Pareto distribution. Finally, as in the interwar period, we assumed no overlap between individuals obtaining unearned income and earnings.

In order to construct top income estimates for the 1956-1990 period (Figure 2) we have used enterprise wage surveys, covering employees in the socialized sector (for sources and details see Appendix A.4). Namely, it has been assumed that only wage earners constituted top income groups in this period since unearned income was to the greatest extent expropriated by the state after a thorough nationalisation wave and the land reform in the late 1940s, coupled with the currency reform in 1950. The remaining non-wage private income was largely concentrated in the small-scale agriculture, characterised by the low productivity and the small earning potential, and thus plausibly did not contribute to top incomes.

⁷⁴ However, as we are aware, this is available only for Warsaw.

Population Control. For the population control in 1947, we used the same definition as for the interwar period. The population unit in the 1956-1990 period is individual. The data is taken from the population censuses and the Demographic Yearbook of Poland (*Rocznik Demograficzny*)

Income Control. To arrive at the total income for 1947, we use the official estimate for the national income (*Rocznik Statystyczny* 1949, p. 27, Tab. 1). This figure, however, refers to the Marxist concept of national income,⁷⁵ corresponding to the net material product (thus exclusive of services, or 'non-productive' activities such as housing, education, administration, etc.). We increase this figure by 15 percent to obtain the estimate of national income according to SNA, as this proportion has been often found to account for services (according to GUS 1949), services in the interwar period accounted for 17 percent of national income).

We take 65 per cent of this adjusted figure to correspond to the total income control. This is somewhat lower proportion than used in the interwar period, because the communist accession to power resulted in the increase of the so-called 'social income' (and thus a fall in personal income) in national income, especially through a rise in retained profits of nationalised enterprises (a fall in the wage fund) needed for investment.

A.1.6. Poland 1992-2015

Data. The table below reports used tax publications for the period 1992-2015. It should be noted that tabulations are presented by ranges of taxable income (thus, after deductions) rather than gross income. But the total income is provided for each interval, both for income before and after employee social security contributions. We apply our preferred income concept and adjust interval thresholds by multiplicative factors. The amount of deductions is negligible and should not affect our estimates in any significant way.

The tax law has been reformed several times since 1992. Because each such event changes the definition of reported income, all modifications have to be taken into consideration when analysing the tax statistics. There were two major reforms, in 2001 and 2004. In 2001, taxation of capital revenue (interest and dividends) and capital gains (i.e. from selling company's shares, stocks, derivatives) has been introduced. While the former needs to be taxed using the presumptive tax and is not reported in the statistics, the latter is taxed using the progressive scale and thus will appear in the published statistics. Note that both were absent from the reports before 2001. The details of the capital income taxation are outlined in below. The reform of 2004 introduced an option for business income from non-agricultural business activity (further referred as business income) to be taxed separately at the flat rate. We deal with the assumptions concerning the imputation of the business income taxed at the flat rate to the top income shares in the next section. Similarly, capital gains can also be taxed at the linear rate.

⁷⁵ Accounting system in communist countries was the Material Product System (MPS).

Table: Data sources for the period 1992-2015

Informacja dotycząca rozliczenia... od osób fizycznych za 1992 rok	p. 2
Informacja dotycząca rozliczenia... od osób fizycznych za 1993 rok	p. 4
Informacja dotycząca rozliczenia... od osób fizycznych za 1994 rok	Biuletyn Skarbowy 3/1995: p. 6
Informacja dotycząca rozliczenia... od osób fizycznych za 1995 rok	p. 2; Tab. 1.1 (p. 6)
Informacja dotycząca rozliczenia... od osób fizycznych za 1996 rok	Biuletyn Skarbowy 6/1997: p. 3; Tab. 1.1 (p. 5)
Informacja dotycząca rozliczenia... od osób fizycznych za 1997 rok	Biuletyn Skarbowy 6/1998: p. 7; Tab. 1.1 (p. 9)
Informacja dotycząca rozliczenia... od osób fizycznych za 1998 rok	Biuletyn Skarbowy 5/1999: p. 5; Tab. 1.1 (p. 7)
Informacja dotycząca rozliczenia... od osób fizycznych za 1999 rok	Biuletyn Skarbowy 5/2000: p. 9; Tab. 1.3 (p. 11)
Informacja dotycząca rozliczenia... od osób fizycznych za 2000 rok	p. 4; Tab. 1.3 (p. 6)
Informacja dotycząca rozliczenia... od osób fizycznych za 2001 rok	p. 5; Tab. 1.3, (p. 8)
Informacja dotycząca rozliczenia... od osób fizycznych za 2002 rok	p. 5; Tab. 1.3 (p. 8)
Informacja dotycząca rozliczenia... od osób fizycznych za 2003 rok	p. 5; Tab. 1.3 (p. 8)
Informacja dotycząca rozliczenia... od osób fizycznych za 2004 rok	p. 5; Tab. 4.4 (p. 10); p. 23
Informacja dotycząca rozliczenia... od osób fizycznych za 2005 rok	p. 5 ; Tab. 4.4 (p. 10); p. 39
Informacja dotycząca rozliczenia... od osób fizycznych za 2006 rok	p.5 ; Tab. 4.4 (p. 11); p. 40
Informacja dotycząca rozliczenia... od osób fizycznych za 2007 rok	p. 5 ; Tab. 4.4 (p. 11); p. 40
Informacja dotycząca rozliczenia... od osób fizycznych za 2008 rok	p. 5 ; Tab. 4.4 (p. 11); p. 36
Informacja dotycząca rozliczenia... od osób fizycznych za 2009 rok	p. 5 ; Tab. 4.4 (p. 11); p. 36
Informacja dotycząca rozliczenia... od osób fizycznych za 2010 rok	p. 5 ; Tab. 4.4 (p. 12); p. 46
Informacja dotycząca rozliczenia... od osób fizycznych za 2011 rok	p. 5 ; Tab. 4.4 (p. 11); p. 38
Informacja dotycząca rozliczenia... od osób fizycznych za 2012 rok	p. 5 ; Tab. 4.4 (p. 11); p. 34
Informacja dotycząca rozliczenia... od osób fizycznych za 2013 rok	p. 5 ; Tab. 4.4 (p. 11); p. 33
Informacja dotycząca rozliczenia... od osób fizycznych za 2014 rok	p. 5 ; Tab. 4.4 (p. 10); p. 30
Informacja dotycząca rozliczenia... od osób fizycznych za 2015 rok	p. 5 ; Tab. 4.4 (p. 10); p. 30

In our estimations of the top income shares, we exclude capital gains and income from real estate. The reasons are twofold. Firstly, these sources of income are negligible. The tax statistics show that, for instance, between 2004 and 2013 the average income from capital gains was less than 1% (min 0.5%, max 2%) of the total income. At the same time, merging these sources of income with the progressive schedule would involve a lot of ad hoc assumptions. Secondly, we want to make our estimates consistent across years as much as possible. Since capital gains were not taxed before 2001, and the real estate income before 2009, their inclusion would distort comparison of the top income shares across the period of interest. In the on-going project (Bukowski et al. 2019) we use the universe of individual tax returns to estimate the distribution for the definition of income including capital gains and real estate income.

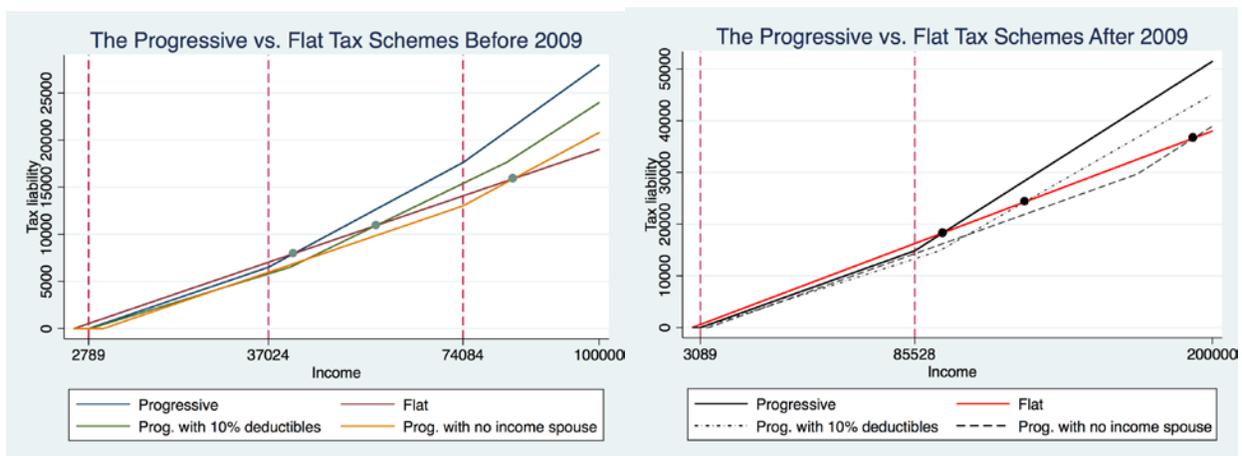
Merging income across tax regimes after 2004. Poland engaged in the flat tax reform in 2004. In comparison to some other countries in Central and Eastern Europe that introduced a flat income tax, the extent of the reform in Poland was less comprehensive and consisted 'only' in the introduction of the flat rate option for certain categories of personal income. Most importantly,

individuals obtaining business income could after that choose between taxation of this income separately at the flat rate or at the progressive scale with the rest of their income as before.⁷⁶

Until 2009 there were three brackets in the progressive schedule with the respective marginal rates of 19, 30 and 40 percent, and afterwards, they were reduced to two with the respective marginal rates of 18 and 32 percent.

All taxable income, even below the tax exemption threshold, should be reported. Taxpayers using only the progressive scale submit only one tax form (PIT 36 or PIT 37, depending on the source of income). In order to use the flat tax for business, an additional form (PIT 36L) must be submitted. Similarly for either capital gains or real estate sales income (PIT 38 and PIT 39 respectively). Therefore, one individual might appear several times in the tax reports, but will only appear once in the progressive tax part.

As a result, the personal income tax statistics has provided distinct reports for the tax returns submitted under the respective tax schedules from 2004 onwards. This has raised a number of methodological challenges when merging the data from the two reports. As the first step in the merging procedure, it should be acknowledged that choosing a flat rate option entails a trade-off (Kopczuk 2012), because on the one hand, the high-income individuals could benefit from lower marginal tax rate, but on the other, it would imply a broader tax base since they would thus give up the right to tax allowances and tax credits as well as the option of joint filling for spouses. This trade-off is presented in the figures below. It is a replication from Kopczuk (2012, Fig. 0) who explains in detail the incentives behind opting for flat tax rate regime, and the following discussion is closely based on his exposition.



Figures: Tax obligations in the progressive and flat tax regimes

⁷⁶ This option has been allowed additionally for rental income.

The dashed vertical lines indicate the tax-free threshold and the bracket thresholds of the progressive schedule. Black lines indicate the tax liability under the progressive tax rule when using the tax credit only (the solid line), the tax credit and taxable income deductions (the dash-dotted line), and previous plus the benefits of filling jointly with no income spouse (the dashed line). The red line indicates tax liability under the flat rate schedule. The tax optimizing behaviour suggests that taxpayers would choose the flat rate option only if their business income exceeds a certain breakeven point (black points) where the benefits of the lower marginal tax rate outweigh the associated costs of losing tax preferences, and the overall tax liability is consequently reduced. Most importantly, the figures show that the flat rate benefits become dominant only at the income levels above the middle bracket threshold and rise depending on the use of available tax preferences. After the reform of 2009 there are only two income brackets (indicated by the vertical dashed lines). In all the income scenarios outlined above, the breakeven points lie above the top income thresholds. In other words, it is profitable to switch to the flat regime only if the business income exceeds the top bracket threshold.

Merging income across the tax regimes is straightforward after 2009, as we simply join the income taxed using the flat tax to the income from the progressive top bracket. The situation is more complicated before 2009 when the break-even point of switching to the flat tax regime might be located within the middle bracket. Fortunately, we can support some important assumptions by the insight into the descriptive statistics of the income tax microdata. These are provided by Kopczuk (2012) and Bukowski et al. (2019), who used the individual-level personal income tax returns covering the 2002-2015 period.

First, using descriptive statistics from Kopczuk (2012, Table 1), we estimate that 40% of flat tax fillers have their income within the range of the middle bracket of the progressive schedule. Then, by assuming that these individuals earn middle bracket's average income (which is likely to be under-estimation), this results that business income of these flat tax fillers accounts for 15% of the total business income taxed at the flat rate (a proportion that is remarkably constant throughout the years). The remaining 60% of flat tax fillers are placed in the top bracket of the progressive schedule with the remaining 85% of total business income taxed at the flat rate.

This number is also supported once we look at changes in the reported flat tax income just before and after the reform of 2009. The rationale is that the reform motivated people with the business income within the range of the previous middle bracket, to switch from the flat to the progressive regime. Assuming a counterfactual increase of business income by 6%, the comparison reveals a drop in the flat tax income of around 15%.

Second, the reports of Ministry of Finance in 2017 estimate that around 65% of the individuals reporting their income in the flat regime report also income in the progressive schedule. Before 2009, we assume that 60% of these individuals are reported in the bottom bracket of the progressive schedule, and 40% in the middle bracket. Based on numbers from Kopczuk (2012, Table 1 and Table 2), we move 60% of individuals from the bottom bracket to the top bracket and the remaining 40% to the medium bracket. Similarly, we move 60% of individuals from the middle bracket to the top bracket, and leave remaining in the middle bracket. After 2009, we move 80%

to the top bracket (with 20% of the bottom bracket's average income) and keep 20% in the bottom. In all cases, we assume that the progressively-taxed income of overlapping individuals is 60% of the bracket's average income

Joint taxation. Married couples and single parents have a right to submit a joint tax form. An important condition is that neither of spouses (or a single parent) taxes his/her income using the flat rate or the presumptive tax. Since the joint report yields tax benefits, married individuals (and single parents) might be thus more reluctant to use the flat regime or the presumptive tax, than unmarried people (without kids). In the case of married couples, the reported joint taxable income is a sum of each spouse's income divided by two. A similar construction is used for the single parents, with an exception that the sum consists of parent's and child's income (if any). The tax publications report the number of taxpayers in each bracket after the couple split.

Population and Income Control. See Appendix 2.

In our benchmark series, total income is estimated directly by combining survey and tax data. However, as a robustness check, we estimate top income shares for the 1992-2015 period using personal income tax tabulations and independently estimated total income denominator. We add the following items to approach the aggregate that corresponds as closely to the concept of income reported in the tax statistics:

(i) wages and salaries received by households, net of employers' social security contributions, plus (ii) social security benefits in cash, plus (iii) 50% of profits of household unincorporated enterprises (taken as household operating surplus net of depreciation, net of primary income in agriculture and net of imputed rents of owners' occupiers), plus (iv) withdrawals from income of quasi-corporations received by households plus 30% of retained earnings of non-financial corporations.

Income denominator obtained this way results on average in 80 per cent of households' primary incomes. We take only half of the income of household's unincorporated enterprises because the Central Statistical Office publishes the national accounts figures corrected for the concealed activity, which is in the same manner concealed from the tax authorities. Moreover, the scope of the non-observed economy was especially worrisome for the transition economies. According to official estimates, concealed activity in Poland has been the most prevalent in the household sector, for example accounting for as much as 7 per cent of GDP in 1998 (United Nations 2003, p. 188).

It should be noted that in Polish national accounts enterprises smaller than ten employees are included in the household sector, while those with ten and above employees in the non-financial corporate sector. We take 'withdrawals from income of quasi-corporations' as a measure of distributed income of unincorporated enterprises in the corporate sector, as the CSO only estimates 'withdrawals' paid by non-financial corporations, and add 30 per cent of retained earnings of non-financial corporations (as unincorporated firms are as 'pass-through' entities taxed with their whole profits under PIT).

For years 1992-1994 we lack comparable external controls for total income to use the method described above. Instead, we use an alternative method to obtain total income control, which starts from the total income of taxpayers reported in tax statistics and add to it the total income of 'non-filers' (Atkinson 2007). Using this approach depends on the proportion of the population that files income tax returns. Today in Poland the majority of the population actually files personal income tax (either by themselves or by tax remitters such as employers or social insurance institutions), in average 85 per cent of our reference for the total population, which makes, in theory, this method a reliable alternative. For years 1992-4 we estimate total control for income by assuming that the total reported income of filers makes 85 per cent of the total income and consequently the total income of non-filers 15 per cent of the total income. This proportion is chosen based on the proportion of the income of filers in the total income in the late 1990s. The data on sectoral national accounts is available from the CSO of Poland and Eurostat.

Appendix 2: The Full Distribution of Income, 1983-2015: Methodology and Data Sources

A.2.1. Survey Data

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) (*Badanie Budżetów Gospodarstw 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.⁷⁷ For the 1992-2004 period, we use harmonised HBS microdata from the Luxembourg Income Study (LIS). The data are available for 1992, 1995, 1999, 2002 and 2004, (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. For the period 2005-2015 we use the EU Statistics on Income and Living Conditions (EU-SILC) collected by Eurostat.

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

⁷⁷ 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).

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.

The LIS data on household income for Poland is net of labour and pension income tax withheld at source. We impute pre-tax labour income by grossing the net income using the official tax rates. Business and capital income for, which tax is paid directly by individuals, is recorded as gross. The EU-SILC data is reported gross of taxes and social security contributions.

A.2.2. Definition of Income

When joining the survey and tax data, we produce the distribution of the fiscal income. This is the same income concept used to construct top income shares series. Several caveats, however, must be mentioned. 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.⁷⁸

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). 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.

⁷⁸ Milanović (1999, pp. 322-3), for example, points out that the difference between pre- and post-tax income was less than 1%.

Table: Population, Average National Income and Inflation; Poland 1992-2015

	Adults (20+) population (in thd.)	Total population (in thd.)	(1)/(2) %	Average nat. income (PLN)	Average nat. income (2010 PLN)	CPI 2010=100
1992	25,900	38,203	68%	3,839	21,567	18
1993	26,073	38,239	68%	5,273	21,611	24
1994	26,254	38,265	69%	8,000	24,615	33
1995	26,463	38,284	69%	10,910	26,163	42
1996	26,695	38,294	70%	13,763	27,581	50
1997	26,948	38,290	70%	16,627	28,967	57
1998	27,198	38,277	71%	19,199	29,905	64
1999	27,463	38,263	72%	21,075	30,632	69
2000	27,348	38,254	71%	23,448	30,934	76
2001	27,617	38,242	72%	24,157	30,234	80
2002	27,886	38,219	73%	24,687	30,328	81
2003	28,183	38,191	74%	25,067	30,532	82
2004	28,505	38,174	75%	25,610	30,129	85
2005	28,816	38,157	76%	27,743	31,962	87
2006	29,099	38,126	76%	29,437	33,527	88
2007	29,315	38,116	77%	31,752	35,319	90
2008	29,506	38,136	77%	35,192	37,518	94
2009	29,686	38,167	78%	35,962	36,922	97
2010	29,684	38,530	77%	37,450	37,450	100
2011	29,847	38,538	77%	40,448	38,780	104
2012	29,999	38,533	78%	41,734	38,643	108
2013	30,114	38,496	78%	42,403	38,866	109
2014	30,189	38,479	78%	43,597	39,924	109
2015	30,266	38,437	79%	45,177	41,792	108

Table: Percentiles and Average National Income; Poland 1983-2015

	Average	P50	P90	P99	P90-100	P99-100
1983	23	21	36	69	50	97
1984	28	26	44	89	63	132
1985	34	30	54	104	75	141
1986	42	38	67	129	94	174
1987	54	49	85	158	117	232
1988	95	85	151	268	203	393
1989	382	340	619	1,183	862	1,682
1992	3,839	3,141	6,060	13,624	10,154	29,774
1993	5,273	4,311	8,353	18,405	14,341	44,568
1994	8,000	6,387	12,551	32,840	23,717	80,195
1995	10,910	8,517	17,019	54,138	34,958	122,201
1996	13,763	10,805	22,463	65,986	43,234	127,753
1997	16,627	13,139	26,707	73,140	51,481	166,322
1998	19,199	14,940	30,317	92,176	61,313	205,896
1999	21,075	16,615	33,016	104,300	65,414	212,856
2000	23,448	18,055	37,750	123,902	76,087	233,221
2001	24,157	18,667	39,553	110,585	77,655	248,314
2002	24,687	18,787	40,528	123,623	81,709	260,302
2003	25,067	18,942	42,202	134,893	83,802	240,909
2004	25,610	19,203	41,658	129,810	87,167	303,435
2005	27,743	20,264	47,024	139,639	96,335	338,032
2006	29,437	21,270	47,907	153,508	104,488	380,540
2007	31,752	22,891	50,481	166,033	114,147	450,430
2008	35,192	25,135	56,527	187,752	126,619	482,907
2009	35,962	26,024	58,636	193,547	125,439	434,418
2010	37,450	27,502	61,078	203,396	130,074	447,597
2011	40,448	29,670	65,223	218,643	141,364	490,169
2012	41,734	30,628	67,303	224,714	145,986	504,183
2013	42,403	31,167	70,031	226,775	146,963	506,030
2014	43,597	32,142	70,231	241,881	151,719	537,755
2015	45,177	33,414	71,919	248,180	156,405	563,009

Note: current PLN

Appendix 3: Interwar Counties

This section analyzes the spatial distribution of income inequality in interwar Poland. We construct county-level top income shares using the income tax data for interwar Poland. The details of the data and methodology can be found in Appendix 1.4.

One robust finding in the literature has been that top income shares were at the very high levels in the first half of the 20th century due to the strong concentration of capital income at the top of the distribution (Atkinson and Piketty 2007; 2010). Presumably, industrialisation and the advancement of capitalism were accompanied by the rising concentration of capital income. This could have resulted both from technological progress (Kaeble and Thoma 1991, p. 11), as we propose for Prussian Poland, and/or rising concentration of newly accumulated capital (e.g. Allen 2009). Yet, as noted by Milanović et al. (2010), income inequality in low-income pre-industrial societies was always limited by the subsistence level (the ‘inequality possibility frontier’). It is only with the technological progress and hitherto unimaginable expansion of the production capacities that mean income and inequality entered into the positive relationship (Milanović 2016). Accordingly, we need to pay attention both to the rising importance of capital as the factor of production (functional distribution) and to its distribution.

We provide suggestive evidence for the proposed explanations using the cross-section of counties from Interwar Poland. First, we look at the relationship between our measure of industrialisation and the top 1% income shares. We estimate two models:

$$(1) y_{ip} = \alpha + \beta IND_{ip} + \delta URB_{ip} + \mu_p + \varepsilon_{ip}$$

$$(2) y_{ip} = \alpha + \beta_{PRU} PRU \times IND_{ip} + \beta_{RUS} RUS \times IND_{ip} + \beta_{AUS} AUS \times IND_{ip} + \delta URB_{ip} + \mu_p + \varepsilon_{ip}$$

where y_{ip} is the top 1% income share in county i from partition p . We define our measure of industrialisation IND as the share of population working in industry. In the first model, β describes the correlation for the whole country. In the second model, we allow it to vary across the partition by the inclusion of three interaction terms between industrialisation and the Russian, Austrian and Prussian partitions dummies. URB is the share of people living in urban areas, μ_p are the partition fixed effects, and ε_{ip} denotes the error term. The model is estimated using a standard OLS with heteroscedasticity-robust standard errors.

Panel A of the table below, Columns 1 to 3 show the estimates for the model without the interaction terms. A 10pp increase in the share of population working in industry is associated with 1.5pp increase in the top 1% income shares. However, this relationship is likely to be driven by the urbanisation rate, as its inclusion leads to β falling almost to zero (Columns 2 and 3). Columns 4 and 5 explore whether the relationship between industrialisation and inequality differs

across the former partitions. We find a *negative* correlation within the former Prussian partition, 10pp increase in the share of population working in industry means 2.3pp drop in the top income share. The correlation in the former Russian partition is also significant and negative, but smaller in the absolute terms. In the former Austrian partition, the correlation is small and not statistically different from zero.

Next, we regress the top 1% income share on the share of agriculture workers in the total population, which is a measure of agrarian capitalism. Panel B, Column 1, shows a positive, but insignificant, correlation between agrarian capitalism and inequalities. Column 2 adds the urbanisation ratio and the Gini coefficient for land ownership, the association between agrarian capitalism and top income shares increases and becomes significant. A 10pp increase in the share of agriculture workers is associated with 2.3pp increase in the top 1% income share. Columns 4 and 5 explore the heterogeneity across the former partition. The pattern is opposite as in the case of industrialisation, a 10pp increase in the share of agriculture workers is associated with almost 5pp increase in the top income share in the former Prussian partition, 1.65pp increase in the former Kingdom of Poland and 2.77pp drop in Galicia (not significant).

Although these results are not causal, they provide suggestive evidence for the heterogeneous relationship between modernization and inequality across the Polish lands. The role of agriculture in the development of the Prussian partition is consistent with the fact that top income shares are more connected there with agrarian capitalism than with classic industrialisation. Similar, but smaller correlations are reported in the Russian partition. We suspect that this might be driven by the eastern-most areas, were traditionally the land-based magnates lived. On the other hand, in the Austrian partition the top income shares are negatively correlated with agrarian capitalism and do not seem to be related to industrialisation.

Finally, Panel C documents the correlation between the urbanization rate and inequality. A 1pp increase in the urbanisation rates is associated with 0.06-0.08pp increase in the top income shares (Columns 1-3). The effect is heterogeneous across the former partitions (Columns 4-5). In the former Austrian lands, the coefficient is the highest at 0.13pp, while in the former Russian the magnitude is one-third of the Austrian effect. Consistent with the discussion on the different roads to industrialisation, it is not surprising to find the strongest association between inequalities and urbanisation in Galicia.

Table: Results of county-level regressions for 1927.

Panel A: Industrialisation

	Top 1% Income Share				
	(1)	(2)	(3)	(4)	(5)
Emp. Ind. Share	0,146 (0,039)***	-0,029 (0,049)	-0,132 (0,046)**		
Emp. Ind. Share				-0,066 (0,075)	-0,225 (0,06)***
X Prussian Partition					
Emp. Ind. Share				0,132 (0,046)***	-0,123 (0,05)**
X Russian Partition					
Emp. Ind. Share				0,315 (0,121)**	0,01 (0,091)
X Austrian Partition					
Urbanisation		0,072 (0,017)***	0,087 (0,016)***		0,082 (0,015)***
Counties	256	256	256	256	256
Partition FE	No	No	Yes	Yes	Yes

Panel B: Agriculture Workers

	Top 1% Income Share				
	(1)	(2)	(3)	(4)	(5)
Emp. Share in Agr.	0,230 (0,065)***	0,311 (0,056)***	0,329 (0,065)***		
Emp. Share in Agr.				0,229 (0,107)*	0,498 (0,079)***
X Prussian Partition					
Emp. Share in Agr.				-0,073 (0,121)	0,165 (0,086)*
X Russian Partition					
Emp. Share in Agr.				-0,713 (0,421)	-0,277 (0,344)
X Austrian Partition					
Urbanisation		0,066 (0,018)***	0,067 (0,017)***		0,057 (0,015)***
Land Gini		0,042 (0,015)**	0,039 (0,015)**		0,035 (0,015)*
Counties	256	245	245	256	245
Partition FE	No	No	Yes	Yes	Yes

Note: robust standard errors in the parentheses. *** denotes significance at the 0.1% level, ** at the 1% level and * at the 5% level.

Panel C: Urbanization

	Top 1% Income Share				
	(1)	(2)	(3)	(4)	(5)
Urbanisation	0.065 (0.011***)	0.082 (0.020)***	0.080 (0.018)***		
Urbanisation				0.047 (0.015)**	0.087 (0.025)***
X Prussian Partition					
Urbanisation				0.049 (0.015)**	0.041 (0.018)*
X Russian Partition					
Urbanisation				0.108 (0.022)***	0.132 (0.026)***
X Austrian Partition					
Land Gini		0.047 (0.014)**	0.040 (0.015)***		0.036 (0.015)*
Emp. Ind. Share		-0.070 (0.033)*	-0.067 (0.032*)		-0.043 (0.037)
Emp. Share in Agr.		0.306 (0.054)***	0.296 (0.062)***		0.328 (0.064)***
Counties	256	245	245	256	245
Partition FE	No	No	Yes	Yes	Yes

Note: robust standard errors in the parentheses. *** denotes significance at the 0.1% level, ** at the 1% level and * at the 5% level.

Appendix 4: Distribution of Earnings

For the interwar period, estimates of the upper part of distribution are based on annual enterprise surveys of workers in medium-sized and large enterprises in processing and energy industries (those with more than 20 employees, divided into three groups: enterprises up to 49 employees, enterprises with 50 to 199 employees, and enterprises above 200 employees). The Central Statistical Office and the Ministry of Industry and Trade conducted the survey quarterly in the months of February, May, August and November. Results were published in the form of tabulations ranged by the weekly wage. Published tabulations also provide earning bands by gender, by the size of the enterprise, by employees covered by collective agreements, by specific industry and by regions.

It should be noted that indicated dispersion in the upper part of the distribution should be seen as a lower bound since small enterprises not covered by the survey generally paid much smaller wages (Landau 1933, p. 118). Czajkowski (1934) thus estimated earnings distribution for all workers in 1934. Dispersion at the top is higher than in the case where only industrial workers in middle and large enterprises are covered, in the first place because of the now lower median wage. This corresponds to the Landau's observation mentioned above.

In socialist Poland the enterprise survey was conducted annually in the period from 1949 until 1989. The survey assessed earnings of full-time employees in September in socialized sector covering state-owned and cooperative enterprises. This covered around two-thirds of the total workforce, while excluded were self-employed and those working in the private sector. The predominant part of self-employed and employees in private sector was found in agriculture (Atkinson and Micklewright 1992, p. 257). The survey only included full-time workers in the month of September. Definition of earnings referred to gross monthly earnings (inclusive of bonuses and allowances) in the period from 1955 until 1970, while from 1970 the concept of net earnings was used instead (Atkinson and Micklewright (1992, p. 257). However, Figure 8 above shows that in 1970, for which both concepts were published, upper percentiles show markedly higher level (as proportion to median) when using gross concept (Atkinson 2008, p. 320). From 1991 the private sector is covered as well (firms with more than six employees; Atkinson 2008, p. 320), and the gross concept of earnings is used.

Appendix A.5: Tables

Table A1: Top income shares (in %) in the Partitioned Poland 1890s -1917

Top:	1%	0.5%	0.1%	0.01%	1-0.1%	0.1-0.01%
Galicia						
1898	11.7	8.9	4.6	1.6	7.1	2.9
1899	11.3	8.4	4.1	1.5	7.1	2.7
1900	12.8	9.7	5.2	2.3	7.6	2.8
1901	14.3	10.9	5.9	2.7	8.4	3.2
1902	13.6	10.1	5.1	2.0	8.5	3.1
1903	13.3	9.9	4.8	1.8	8.5	3.0
1904	13.4	10.0	5.0	1.8	8.5	3.1
1905	12.9	9.6	4.8	1.8	8.1	3.0
1906	12.5	9.4	4.8		7.7	
1907	13.3	9.8	4.9	1.8	8.4	3.0
1908	13.3	9.8	4.7	1.1	8.5	3.6
1909	12.8	9.3	4.4	1.5	8.4	2.9
1910	11.7	8.6	4.0	1.3	7.7	2.7
1911	12.4	9.1	4.3	1.5	8.1	2.8
1912	11.6	8.5	4.1	1.4	7.5	2.7
Province of Posen and Western Prussia						
1892	10.4	7.4	3.5		6.9	
1893	10.3	7.3	3.4		6.9	
1894	10.3	7.3	3.5		6.9	
1895	10.4	7.4	3.5		6.8	
1896	10.5	7.6	3.6		6.9	
1897	11.0	7.9	3.8		7.1	
1898	11.5	8.5	4.2		7.3	
1899	12.2	9.1	4.8		7.4	
1900	12.2	9.1	4.7		7.5	
1901	11.8	8.7	4.5		7.4	
1902	11.5	8.4	4.1		7.4	
1903	11.5	8.5	4.3			
1904	11.9	8.8	4.5			
1905	12.4	9.5	5.0		7.4	
1906	12.4	9.5	5.0		7.4	
1907	12.5	9.6	5.1		7.3	
1908	12.4	9.5	5.1		7.2	
1909	12.3	9.5	5.2		7.2	
1910	12.5	9.6	5.2		7.4	
1911	12.8	9.8	5.4		7.4	
1912	13.0	10.0	5.4		7.5	
1913	13.6	10.5	5.7		7.9	
1914	14.3	11.3	6.4		7.9	
1915	17.3	14.2	8.8		8.5	
1916	20.1	17.0	11.1		9.0	
1917	20.0	17.0	11.2		8.7	

Source: authors' computation based on income tax statistics. Distribution of fiscal income among tax units.

Table A2: Top income shares (in %) in Poland 1925-2015

	Top 5%	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%
1925		10.5	7.2	3.1	0.9
1926		10.8	7.6	3.3	0.9
1927		11.8	8.4	3.6	1
1928		11.9	8.6	4	1.2
1929	25.3	12.0	8.5	3.8	1.2
1930				4.3	1.3
1931					
1935			11.6	5.3	1.6
1936		15.6	11.3	5.1	1.5
1992	18.7	7.8			
1993	19.4	8.4			
1994	22.0	9.9			
1995	24.4	11.0			
1996	22.9	9.4			
1997	22.8	10.3			
1998	24.0	11.0			
1999	23.3	10.4			
2000	24.2	10.5			
2001	23.7	10.9			
2002	24.6	11.2			
2003	24.5	10.3			
2004	25.9	12.0			
2005	26.7	12.9			
2006	27.9	14.0			
2007	27.2	14.5			
2008	26.0	14.4			
2009	25.9	12.8			
2010	26.0	12.4			
2011	25.5	12.5			
2012	25.6	12.2			
2013	26.0	12.3			
2014	26.0	12.6			
2015	25.9	12.9			

Source: authors' computation based on income tax statistics. Distribution of fiscal income among tax units.

Table A3: Income shares (in %) in Poland 1983-2015

	Bottom 50%	Middle 40%	Top 10%	Top 5%	Top 1%	Top 0.1%
1983	31.3	46.8	21.8	13.3	4.2	0.8
1984	30.5	46.9	22.6	14.1	4.7	1.0
1985	31.4	46.5	22.2	13.4	4.2	0.8
1986	31.2	46.6	22.3	13.5	4.2	0.7
1987	31.1	47.2	21.8	13.2	4.3	0.9
1988	32.2	46.4	21.4	12.8	4.1	0.9
1989	30.9	46.6	22.6	13.8	4.4	0.9
1992	29.3	44.3	26.4	17.7	7.8	2.9
1993	28.7	44.2	27.2	18.4	8.5	3.7
1994	27.3	43.0	29.6	20.8	10.0	4.0
1995	25.9	42.0	32.0	23.1	11.2	4.1
1996	26.2	42.4	31.4	21.7	9.3	2.9
1997	26.5	42.6	31.0	21.6	10.0	3.7
1998	26.2	41.9	31.9	22.7	10.7	3.9
1999	26.6	42.3	31.0	22.1	10.1	3.3
2000	25.8	41.8	32.4	22.9	9.9	3.0
2001	25.7	42.2	32.1	22.4	10.3	3.7
2002	25.1	41.8	33.1	23.3	10.5	3.6
2003	24.7	41.9	33.4	23.2	9.6	2.7
2004	24.3	41.7	34.0	24.5	11.8	4.5
2005	22.8	42.5	34.7	25.1	12.2	4.9
2006	23.2	41.3	35.5	26.0	12.9	5.3
2007	23.3	40.8	35.9	26.8	14.2	6.2
2008	23.4	40.6	36.0	26.5	13.7	5.8
2009	23.8	41.3	34.9	25.3	12.1	4.5
2010	24.0	41.2	34.7	25.1	12.0	4.3
2011	23.9	41.2	34.9	25.5	12.1	4.5
2012	24.0	41.0	35.0	25.5	12.1	4.5
2013	23.9	41.4	34.7	25.1	11.9	4.4
2014	24.0	41.2	34.8	25.5	12.3	4.5
2015	24.3	41.1	34.6	25.4	12.5	4.4

Source: authors' computation based on combined household surveys and income tax statistics. Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults

Table A4: Top income shares (in %) in the Prussian Poland 1892-1918

Province:	Top 1%			Top 0.1%		
	West Prussia	Province of Posen	Silesia	West Prussia	Province of Posen	Silesia
1892	10.4	10.3	15.0	3.15	3.63	6.95
1893	10.2	10.2	14.6	3.03	3.54	6.68
1894	10.3	10.2	14.7	3.15	3.52	6.70
1895	10.3	10.3	14.9	3.14	3.62	6.76
1896	10.3	10.6	15.2	3.08	3.85	6.91
1897	11.0	10.9	15.7	3.57	3.87	7.16
1898	11.4	11.6	16.0	3.89	4.37	7.35
1899	11.7	12.6	16.6	4.13	5.24	7.88
1900	11.7	12.6	16.8	4.08	5.20	8.04
1901	11.2	12.3	16.7	3.75	4.92	8.08
1902	11.0	12.0	15.9	3.49	4.60	7.25
1903		12.0			4.78	
1904		12.6			5.11	
1905	11.6	13.4	16.2	3.96	5.74	7.52
1906	11.4	13.6	16.4	3.91	5.88	7.71
1907	11.3	13.8	16.3	3.92	6.02	7.77
1908	11.3	13.6	16.3	4.06	5.93	7.85
1909	11.1	13.6	16.1	3.88	6.11	7.90
1910	11.3	13.8	15.9	3.93	6.12	7.54
1911						
1912						
1913	12.2	14.8	16.3	4.48	6.70	7.75
1914	12.5	15.8	16.5	4.73	7.70	8.05
1915	15.1	19.4	18.1		10.46	9.11
1916	17.4	22.6	23.8		13.23	14.09
1917	17.2	22.4	23.6		13.02	13.52
1918	13.9		20.5			11.22

Source: authors' computation based on income tax statistics.

Appendix A.6: Figures

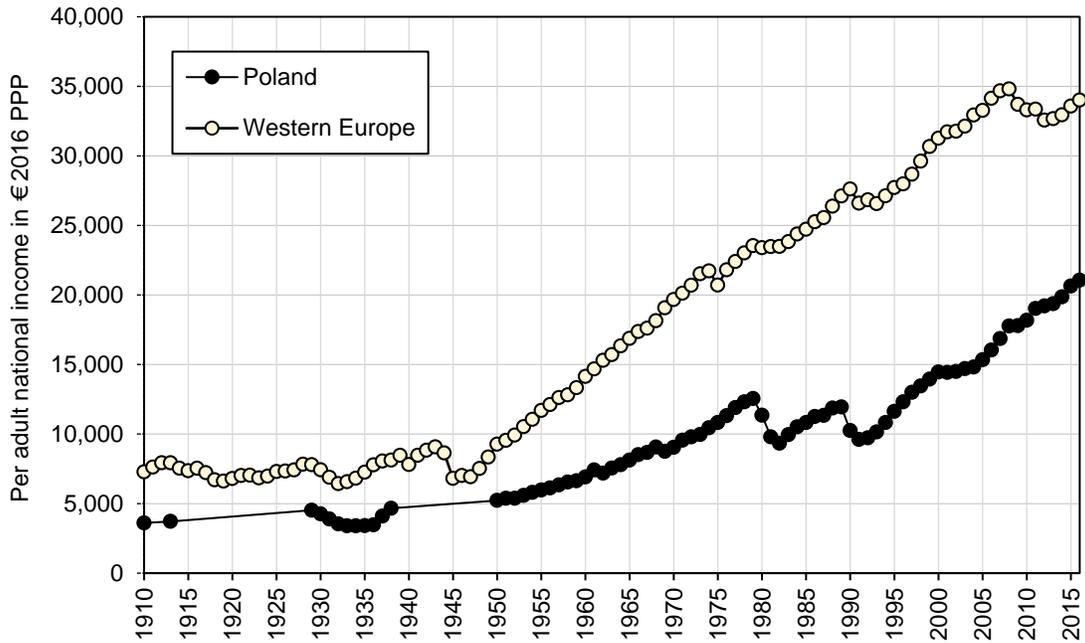


Figure A1: Real income per adult in Poland and Western Europe 1910-2015
 Source: authors' computation based on WID and Maddison (2013). Western Europe is the unweighted average of Germany, France and UK.

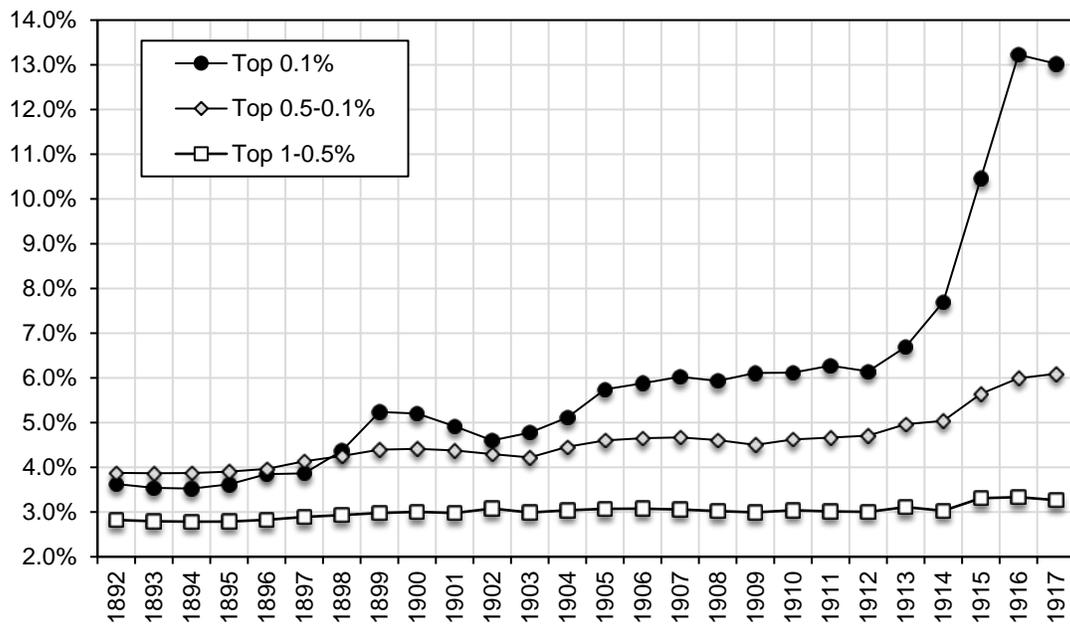


Figure A2: The Province of Posen – decomposition of the top percentile
 Source: authors' computation based on income tax statistics.

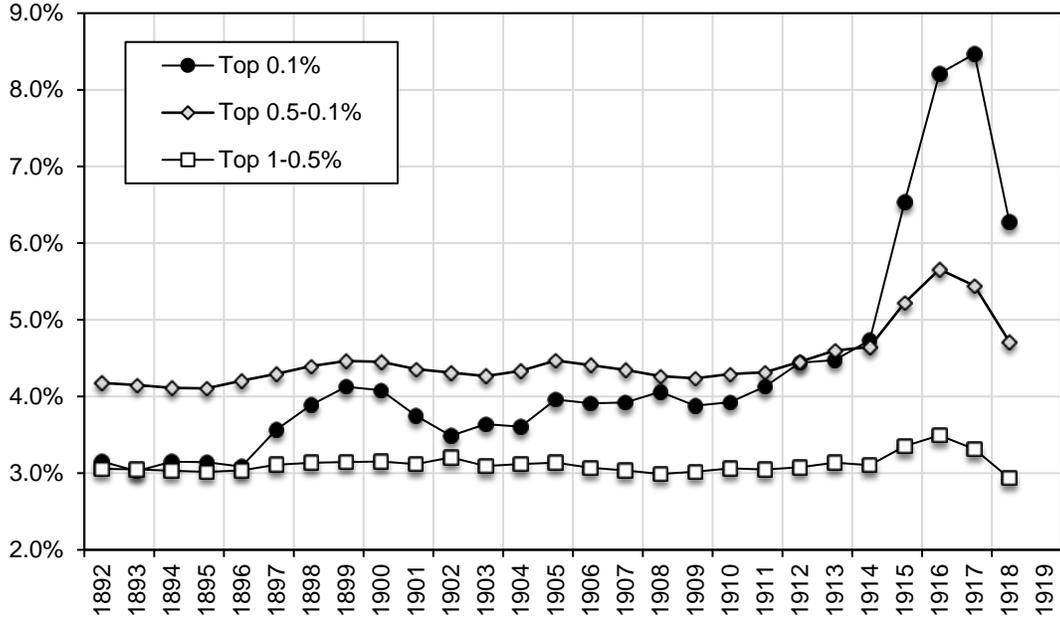


Figure A3: West Prussia – decomposition of the top percentile
 Source: authors' computation based on income tax statistics.

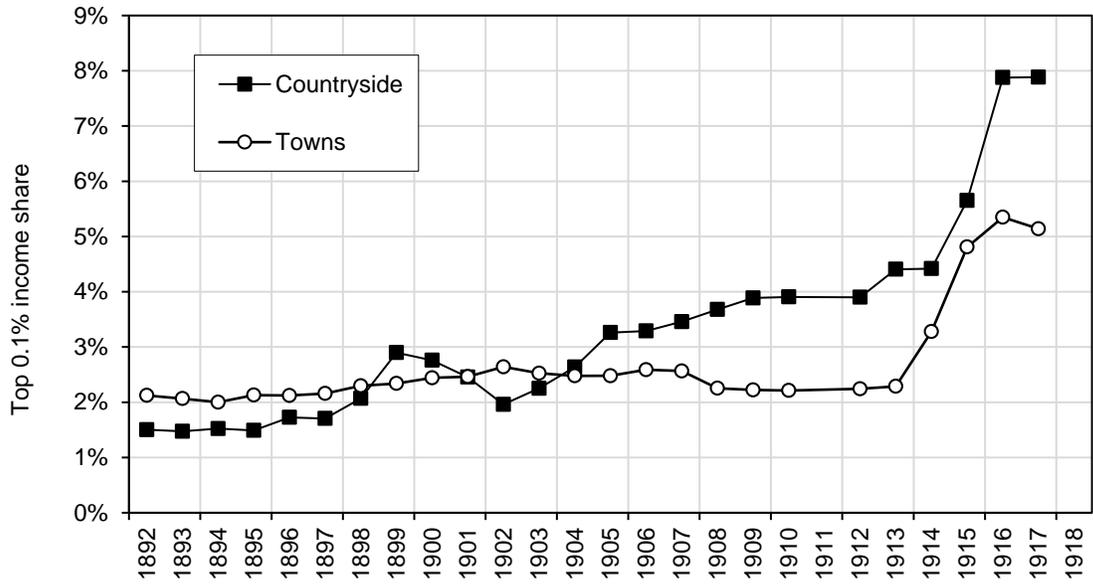


Figure A4: The Province of Posen – decomposition of the top 0.1 percentile.
 Source: authors' computation based on income tax statistics.

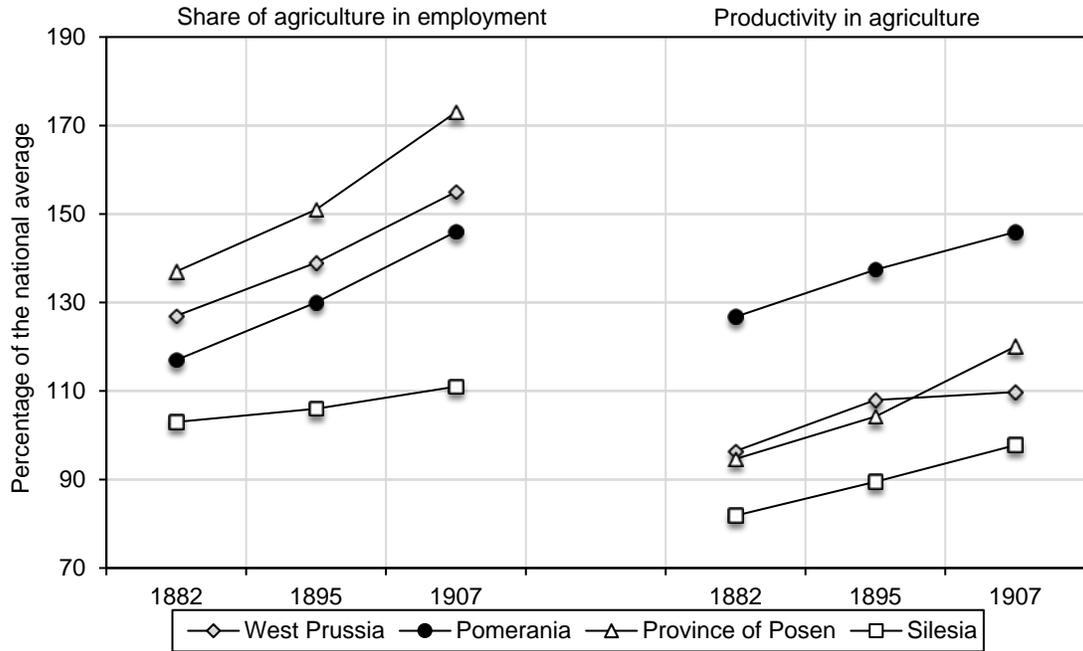


Figure A5: Shares of agriculture in employment and productivity in agriculture, as a percentage of the national average
 Source: the data from Tipton 1976, Table 6.2 (p.106); Grant 2002, Tab. 2 (net value added per full-time labour unit).

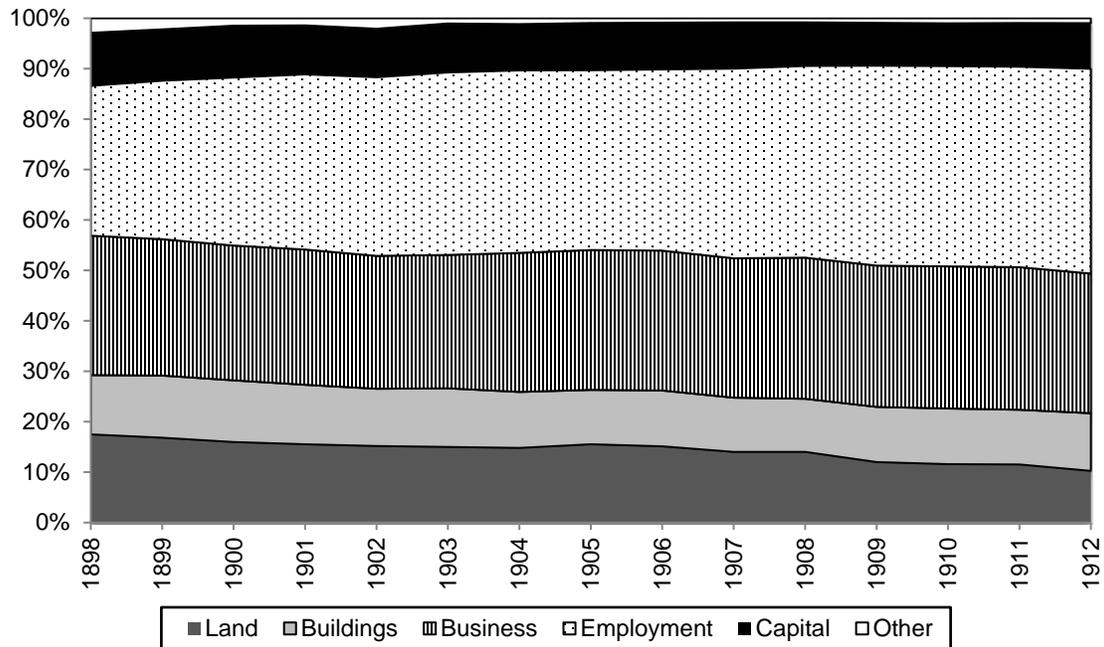


Figure A6: Galicia: total taxed income by sources.
 Source: authors' computation based on income tax statistics.

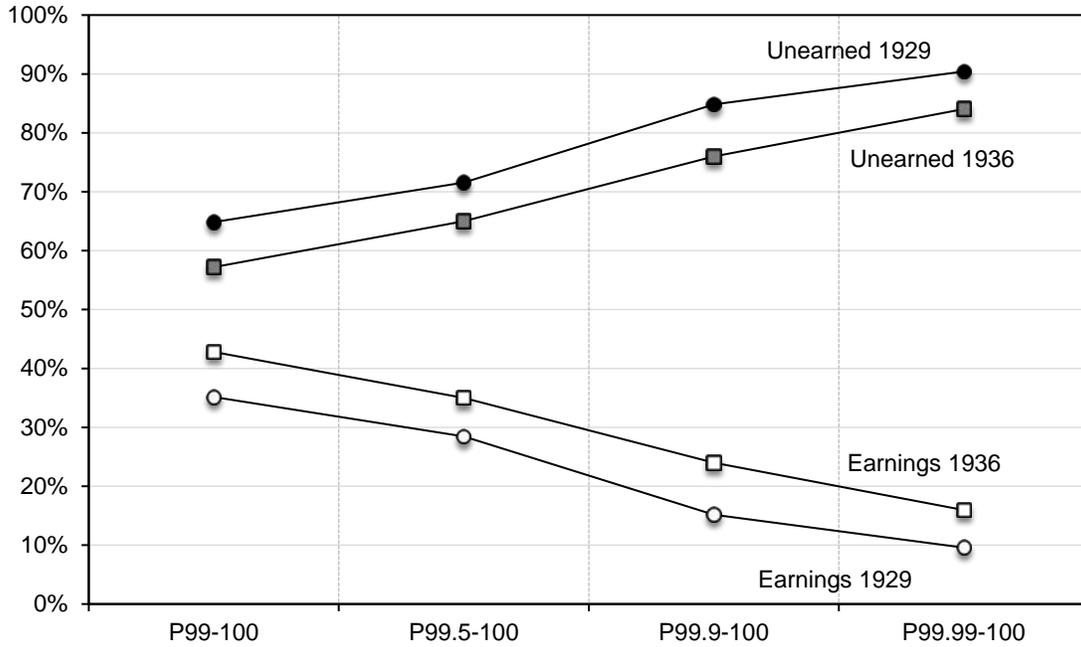


Figure A7: The composition of top groups by income source
 Source: author's computation based on income tax statistics.

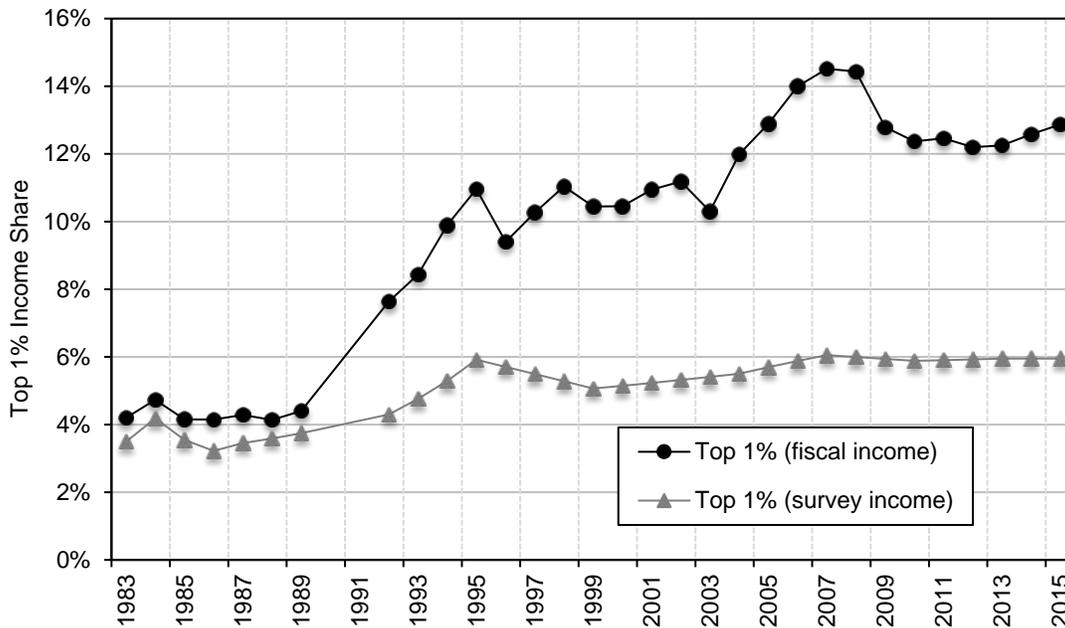


Figure A8: Top 1 Incomes Share in Poland, 1983-2015
 Source: Authors' computation (see Section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment. insurance) among equal-split adults

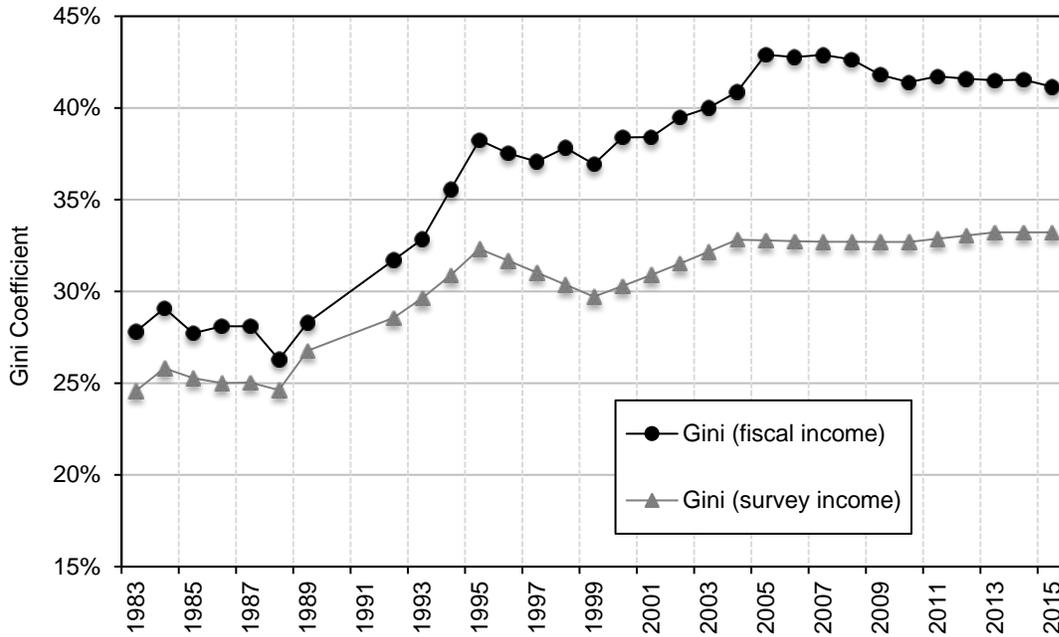


Figure A9: Gini coefficient in Poland, 1983-2015

Source: Authors' computation (see Section 2). Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance) among equal-split adults

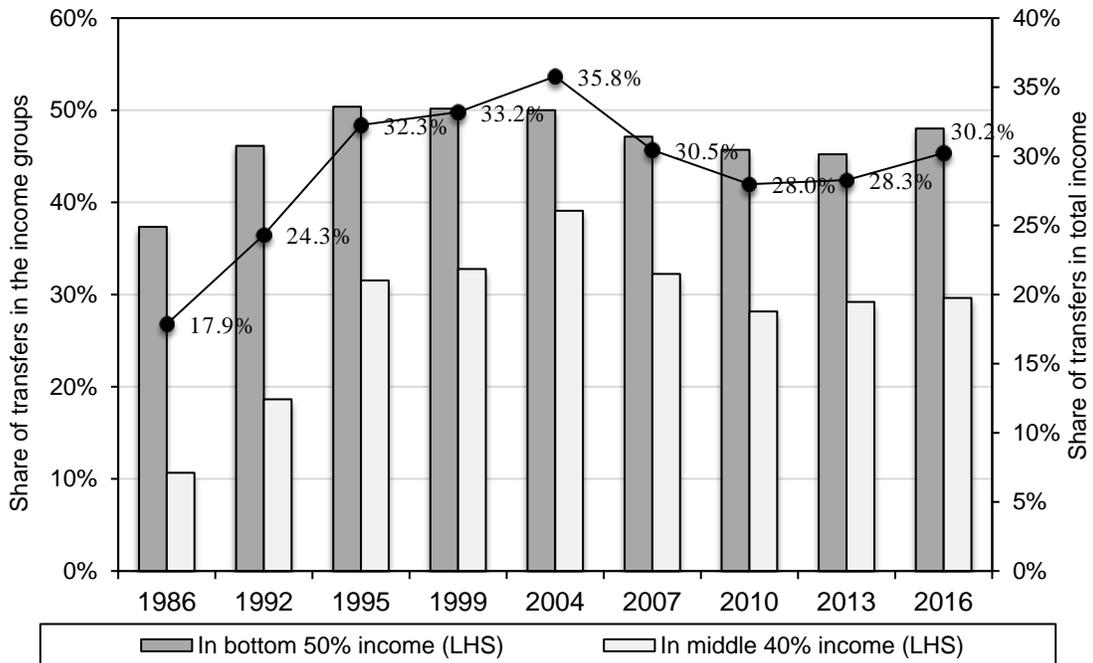


Figure A10: Share of transfers in the bottom 50 and middle 40 income groups.

Source: Authors' computation (see Section 2). Distribution of income reported in HBS among equal-split adults

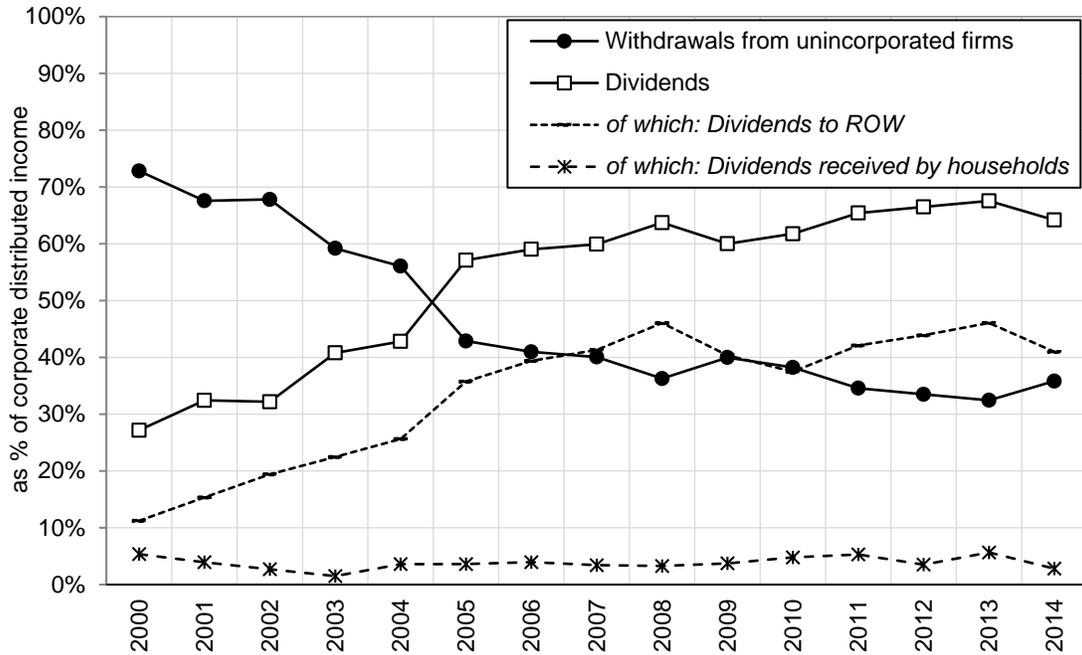


Figure A11: Distributed income from corporations, 2000-2014

Source: Central Statistical Office of Poland, National Accounts. 'Withdrawals' from unincorporated firms is received in total by households

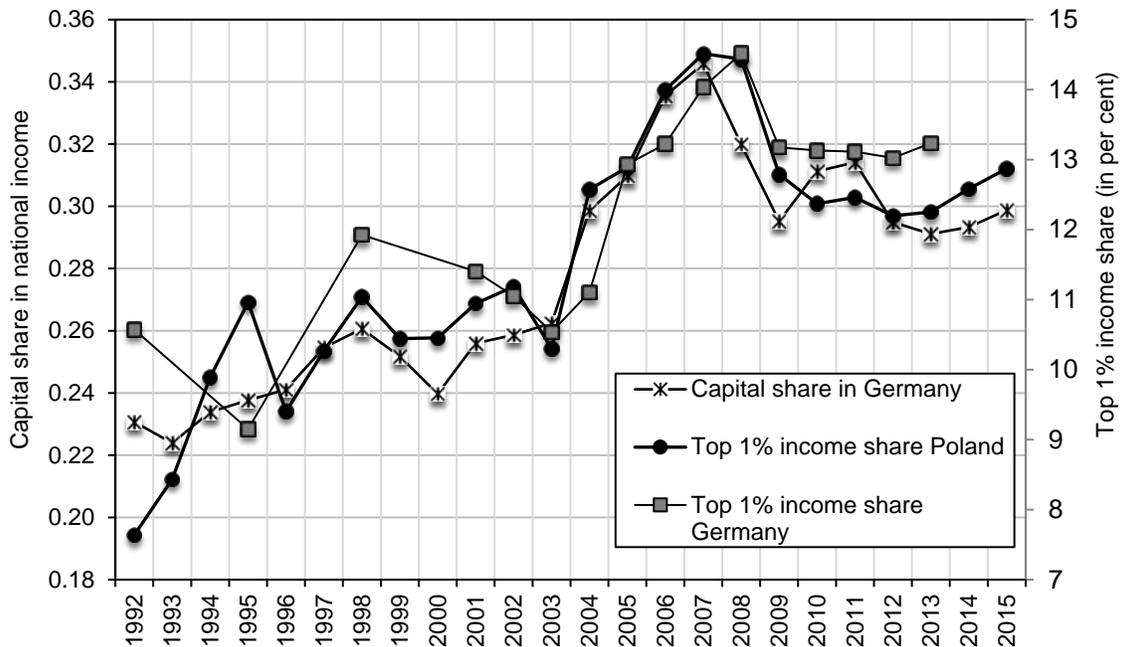


Figure A12: Capital share in national income in Germany; top 1 income share in Germany and Poland (distribution of fiscal income among tax units).

Source: WID

References

Acemoglu, D. (2002). "Technical change, inequality, and the labor market." *Journal of Economic Literature*, 40(1), 7-72.

Allen, R. C. (2009). "Engels' pause: Technical change, capital accumulation, and inequality in the British industrial revolution", *Explorations in Economic History* 46(4), 418-435.

Alstadsæter, A., Jacob, M., Kopczuk, W., and Telle, K. (2017). Accounting for Business Income in Measuring Top Income Shares: Integrated Accrual Approach Using Individual and Firm Data from Norway, mimeo.

Alvaredo, F., Atkinson, A. B., Piketty, T., & Saez, E. (2013). "The top 1 percent in international and historical perspective." *The Journal of Economic Perspectives*, 27(3), 3-20.

Alvaredo, F., Atkinson, A., Chancel, L., Piketty, T., Saez, E. and Zucman, G. (2016). "Distributional National Accounts (DINA) Guidelines: Concepts and Methods used in WID.world", WID.world Working Paper 2016/02.

Atkinson, A. B. (2007). "Measuring Top Incomes: Methodological Issues." In A. B. Atkinson and T. Piketty (Eds.), *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries* (pp. 18–42), Oxford: Oxford University Press.

Atkinson, A. B. (2008). *The changing distribution of earnings in OECD countries*. Oxford: Oxford University Press.

Atkinson, A. B. (2009). "Factor shares: the principal problem of political economy?". *Oxford Review of Economic Policy*, 25(1), 3-16.

Atkinson, A. B. (2015). *Inequality*. Cambridge: Harvard University Press.

Atkinson, A. B., & Bourguignon, F. (2000). Introduction: Income distribution and economics. *Handbook of Income Distribution*, 1, 1-58.

Atkinson, A. B., and Micklewright, J. (1992). *Economic Transformation in Eastern Europe and the Distribution of Income*. Cambridge: Cambridge University Press.

Atkinson, A. B., and Piketty, T. (2007). *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries* (Eds.), Oxford: Oxford University Press.

Atkinson, A. B., and Piketty, T. (2010). *Top Incomes: A Global Perspective* (Eds.), Oxford: Oxford University Press.

- Atkinson, A. B., Piketty, T., and Saez, E. (2011). "Top Incomes in the Long Run of History". *Journal of Economic Literature*, 49(1), 3-71.
- Autor, D., Katz, L. F., and Kearney, M. S. (2006). "The polarization of the US labor market." *American Economic Review*, 96(2), 189-194.
- Autor, D., Dorn, D., and Hanson, G. (2016). "The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade". *Annual Review of Economics*, 8, 205-240.
- Autor, D., Dorn, D., Hanson, G., and Song, J. (2014). "Trade Adjustment: Worker-Level Evidence". *The Quarterly Journal of Economics*, 129(4), 1799-1860.
- Azar, J., Marinescu, I., and Steinbaum, M. (2017). "Labor Market Concentration." NBER Working Paper Series, No w24147.
- Baldwin, R. E. (2016). *The great convergence: information technology and the new globalization*, Cambridge: The Belknap Press of Harvard University Press.
- Banerjee, A., and Duflo, V. (2003). "Inequality and Growth: What Can the Data Say?" *Journal of Economic Growth*, 8(3), 267-299.
- Balsvik R., Jensen, S. and Salvanes, K. G. (2015). "Made in China, sold in Norway: Local labor market effects of an import shock". *Journal of Public Economics*, 127, 137-144.
- Bell, B., Bukowski, P. and Machin, S. (2018). "Rent Sharing and Inclusive Growth". CEP Discussion Paper No.1584.
- Bengtsson, E., and Waldenström, D. (2018). "Capital Shares and Income Inequality: Evidence from the Long Run". *The Journal of Economic History* 78(3), 712-743.
- Benmelech, E., Bergman, N., and Kim, H. (2018). "Strong Employers and Weak Employees: How Does Employer Concentration Affect Wages?" NBER Working Paper Series, No w24307.
- Berglof, E., and Bolton, P. (2002). "The great divide and beyond: Financial architecture in transition." *Journal of Economic Perspectives*, 16(1), 77-100.
- Beskid, L. (1963). "Poziom realny dochodów ludności pracowniczej w Polsce w roku 1960 w porównaniu z rokiem 1937." *Przegląd Statystyczny* vol. 10/3.
- Beskid, L. (1964). "Płace realne na jednego zatrudnionego pracownika w 1960 r. w porównaniu z 1937 r." *Przegląd Statystyczny* vol. 11/3.
- Blanchet, T., Fournier, J., and Piketty, T. (2017). "Generalized Pareto Curves: Theory and Applications ", WID.world Working Paper 2017/03.

Bolt, J., R. Inklaar, H. de Jong and J. L. van Zanden (2018), "Rebasing 'Maddison': new income comparisons and the shape of long-run economic development", Maddison Project Working paper 10.

Brus, W. (1974). "Income Distribution and Economic Reforms in Poland". *Il Politico*, 39(1), 5-28.

Brzezinski, M. (2017). "Is High Inequality an Issue in Poland?," IBS Policy Papers 01/2017.

Brzezinski, M., Jancewicz, B. and Letki, N. (2013). "Growing Inequalities and their Impact in Poland", Gini Country Report for Poland, AIAS, Amsterdam Institute for Advanced Labour Studies.

Bujak, F. (1908). *Galicja, t. I.—II*. Lviv, H. Altenberg.

Bukowski, P. and Novokmet, F. (2017). "Top Incomes during Wars, Communism and Capitalism: Poland 1892-2015." LSE International Inequalities Institute Working Paper 17.

Bukowski, P., Chrostek, P., Novokmet, F. and Skawinski, M. (2019). "The Distributional National Accounts in Poland: 2004-2017", forthcoming manuscript.

Burkhauser, R. V., Héroult, N., Jenkins, S. P., & Wilkins, R. (2016). "What has been happening to UK income inequality since the mid-1990s? Answers from reconciled and combined household survey and tax return data" NBER Working Paper No. w21991.

Card, D., & DiNardo, J. E. (2002). "Skill-biased technological change and rising wage inequality: Some problems and puzzles." *Journal of Labor Economics*, 20(4), 733-783.

Checchi, D., and García-Peñalosa, C. (2010). "Labour Market Institutions and the Personal Distribution of Income in the OECD". *Economica*, 77(307), 413-450.

Cvrcek, T. (2013). Wages, prices, and living standards in the Habsburg empire, 1827–1910. *The Journal of Economic History*, 73(1), 1-37.

Czajkowski, T. (1934), "Proba szacunkowego obliczenia zarobkow robotniczych w Polsce", *Statystyka Pracy*, (4), 225-236.

Dahrendorf, R. (1968). *Society and democracy in Germany*, London: Weidenfeld and Nicolson.

Davies, J. B. and Shorrocks, A. F. (2000). The distribution of wealth. In A. B. Atkinson and F. Bourguignon (Eds.), *Handbook of income distribution*, Volume 16 of *Handbooks in economics*, pp. 605–675. Amsterdam, New York: Elsevier.

Davies, N. (2005). *God's Playground A History of Poland: Volume II: 1795 to the Present (Vol. 2)*. Oxford: Oxford University Press.

Dell, F. (2007). "Top Income in Germany throughout the Twentieth Century: 1891–1998". In A. B. Atkinson and T. Piketty (eds.), *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, (pp. 365-425), Oxford: Oxford University Press.

Dell, F. (2008). *L'Allemagne inégale: inégalités de revenus et de patrimoine en Allemagne, dynamique d'accumulation du capital et taxation de Bismarck à Schröder 1870-2005*, Doctoral dissertation, Paris, EHESS.

Derengowski, J. (1930). „Płace robotników przemysłowych w Polsce w latach 1924-1929.” *Statystyka Pracy*, (1), 118-122.

Diamond, P., and Saez, E. (2011). "The Case for a Progressive Tax: From Basic Research to Policy Recommendations". *Journal of Economic Perspectives*, 25(4), 165-190.

Dumke, R. (1991). "Income Inequality and Industrialisation: the Kuznets curve reexamined" in Brenner, Y., Kaelbe, H. and Thomas M. eds., *Income Distribution in Historical Perspective*, Cambridge: Cambridge University Press.

Eichengreen, B. (2018). *The populist temptation: Economic grievance and political reaction in the modern era*. Oxford: Oxford University Press.

Eddie, S. A. (2008). *Landownership in Eastern Germany before the Great War: a quantitative analysis*. Oxford: Oxford University Press.

Eddie, S. A. (2013). *Freedom's price: serfdom, subjection, and reform in Prussia, 1648-1848*. Oxford: Oxford University Press.

Fisher, J., Johnson, D., Smeeding, T. M. and Thompson, J. P. (2018). "Inequality in 3-D: Income, Consumption, and Wealth". *FEDS Working Paper No.*

Frank, A. F. (2005). *Oil Empire: Visions of Prosperity in Austrian Galicia*. Cambridge: Harvard University Press.

Flakierski, H. (1986). *Economic Reform & Income Distribution: A Case Study of Hungary and Poland*. Armonk, New York/London: M.E Sharpe.

Flemming, J. S., and Micklewright, J. (2000). *Income distribution, economic systems and transition*. In *Handbook of Income Distribution* (Vol. 1, pp. 843-918). New York: Elsevier.

Fukuyama, F. (2018). *Identity: The demand for dignity and the politics of resentment*. Farrar, Straus and Giroux.

Gerlicz R. (1929). *Praca Najemna na Roli w Większej Własności Ziemskiej*, Warszawa: Wydawnictwo Rady Naczelnej Organizacji Ziemiańskich.

Glyn, A. (2009). "Functional Distribution and Inequality", In W. Salverda, B. Nolan, and T.M. Smeeding (eds), *Oxford Handbook of Economic Inequality*, Oxford: Oxford University Press.

Goldin, C., and Katz, L. (2008). *The race between technology and education*. Cambridge: Harvard University Press.

Gordon, R. H., & Slemrod, J. B. (2000). *Are "Real" Responses to Taxes Simply Income Shifting Between Corporate and Personal Tax Bases?. Does Atlas Shrug?:* in: *The Economic Consequences of Taxing the Rich*, Cambridge: Harvard University Press.

Gradzewicz, M., Growiec, J., Kolasa, M., Postek, Ł., and Strzelecki P. (2014). "Poland's exceptional performance during the world economic crisis: New growth accounting evidence". *NBP Working Paper No. 186*.

Grant, O. (2002). "Productivity in German agriculture: estimates of agricultural productivity from regional accounts for 21 German regions: 1880/4, 1893/7 and 1905/9", *University of Oxford Discussion Papers in Economic and Social History*, 47.

Grant, O. (2005). *Migration and inequality in Germany, 1870-1913*. Oxford: Oxford University Press.

Grosfeld, I., and Senik, C. (2010). "The Emerging Aversion to Inequality". *Economics of Transition*, 18(1), pp. 1–26.

Growiec, J. (2012). "Determinants of the labor share: evidence from a panel of firms". *Eastern European Economics*, 50(5), 23-65.

Gruber, J., and Saez, E. (2002). "The elasticity of taxable income: evidence and implications", *Journal of Public Economics*, 84(1), 1-32.

Guriev, S., and Rachinsky, A. (2008). "The Evolution of Personal Wealth in the Former Soviet Union and Central and Eastern Europe", In J.B. Davies ed., *Personal Wealth from a Global Perspective*, pp. 134-149, Oxford: Oxford University Press.

GUS. (1949). *Dochód Narodowy Polski 1947*, Główny Urząd Statystyczny. Statystyka Polski ; seria D, Warszawa.

GUS. (2017). *Rocznik Demograficzny*. Główny Urząd Statystyczny, Warszawa.

Hardach, G. (1977). *The First World War: 1914-1918*. London: Allen Lane.

Johnson, S. (1994). "Private Business in Eastern Europe". In Blanchard, O., Froot, K., and Sachs, J. (Eds.), *Transition in Eastern Europe, Volume 2*, Chicago: University of Chicago Press.

Kalecki, M. (1964). "A Comparison of Manual and White-Collar Worker Incomes with the Pre-War Period." in: *Collected Works of Michal Kalecki: Volume IV: Socialism: Economic Growth and Efficiency of Investment (Vol. 4)*. 1993. Oxford: Oxford University Press.

Kalecki M., and Landau, L. (1934). *Szacunek dochodu społecznego w r. 1929*, Instytut Badania Koniunktur Gospodarczych i Cen, Badania nad dochodem społecznym w Polsce, t. 1. Warszawa.

Kalecki M., and Landau, L. (1935). "Social income in 1933 and the foundations of periodic studies on changes of income". In J. Osiatyński (Ed.), *Collected works of Michał Kalecki, Vol. VI, Studies in Applied Economics*, Oxford: Clarendon press, 1996, 436-483.

Karabarbounis, L., and Neiman, B. (2014). The global decline of the labor share. *The Quarterly Journal of Economics*, 129(1), 61-103.

Keane, M. P., and Prasad, E. S. (2000). "Inequality, Transfers and Growth: New Evidence from the Economic Transition in Poland". IMF Working Paper No 00/17.

Keane, M. P., and Prasad, E. S. (2002). "Inequality, transfers, and growth: New evidence from the economic transition in Poland." *The Review of Economics and Statistics*, 84, pp. 324–341.

Keane, M. P. and Prasad, E. S. (2006), "Changes in the structure of earnings during the Polish transition," *Journal of Development Economics*, vol. 80(2), pp. 389-427.

Klarnier, C. (1937), *Dochód społeczny wsi i miast w Polsce w okresie prze silenia gospodarczego 1929—1936*, Lwów.

Kolodko, G. W., and Nuti, M. (1997). "The Polish Alternative. Old Myths, Hard Facts and New Strategies in the Successful Transformation of the Polish Economy", *UNU/Wider Research for Action* No. 33.

Kopczuk, W. (2012). "The Polish business "flat" tax and its effect on reported incomes: a Pareto improving tax reform?", *mimeo*.

Kordos, J., Lednicki, B., and Zyra, M. (2002). "The household sample surveys in Poland." *Statistics in Transition*, 5(4), 555-589.

Kośny, M. (2012). "Upper Tail of the Income Distribution in Tax Records and Survey Data: Evidence from Poland", *Paper Prepared for the 32nd General Conference of the International Association for Research in Income and Wealth*.

- Krusell, P., Ohanian, L. Rios-Rull, J.V., and Violante, G., (2000), "Capital–Skill Complementarity and Inequality: A Macroeconomic Analysis", *Econometrica* 68(5), 1029–1053.
- Kuhn, M., Schularick, M., and Steins, U. (2018). „Income and Wealth Inequality in America, 1949-2016”, *CEPR Discussion Paper 12218*.
- Kuznets, S. (1953). *Shares of upper income groups in income and savings*. New York: National Bureau of Economic Research.
- Kuznets, S. (1955). "Economic growth and income inequality". *American Economic Review* 45, 1-28.
- Landau, L. (1933). *Płace w Polsce w związku z rozwojem gospodarczym*. Instytut Spraw Społecznych, Warszawa.
- Landau, Z. (1963). "Polish Countryside in the Years 1929-1935", *Acta Poloniae Historica* 9.
- Landau, Z. (1968). "The reconstruction of Polish industry after World War I", *Acta Poloniae Historica* 18
- Landau, Z. (1976). "National income in historical research (On material from the period of interwar Poland)", *Acta Poloniae Historica* 33.
- Landau, Z. (1978). "The extent of cartelization of industries in Poland, 1918-1939", *Acta Poloniae Historica* 38.
- Landau, Z. and Tomaszewski, J. (1984). "Spory o ocenę tendencji rozwoju gospodarki polskiej w latach 1918-1939", *Przegląd Historyczny: dwumiesięcznik naukowy*, 75(4), 723-746.
- Landau, Z., and Tomaszewski, J. (1985). *The Polish economy in the twentieth century*, London: Croom Helm.
- La Porta, R., Lopez-de-Silanes F., Shleifer A., and Vishny R. W. (1997). "Legal Determinants of External Finance". *Journal of Finance*, pp. 1131–1150.
- Łaski, K. (1956). *Akumulacja i spożycie w procesie uprzemysłowienia Polski Ludowej*. Książka i Wiedza.
- Lenin, V. I. (1908). *The Agrarian Programme of Social Democracy in the First Russian Revolution, 1905-1907*. Foreign Languages Publishing House.
- Letki N., Brzezinski M. and Jancewicz B. (2014), "The rise of inequalities in Poland and their impacts: When politicians don't care but citizens do", in B. Nolan, W. Salverda, D.

Checchi, I. Marx, A. McKnight, I. G. Tóth, and H. G. van de Werfhorst (eds.), *Changing Inequalities and Societal Impacts in Rich Countries: Thirty Countries' Experiences*, Oxford, Oxford University Press, pp. 488-513.

Lindert, P. H. (2004). *Growing public: social spending and economic growth since the eighteenth century*. Cambridge: Cambridge University Press.

Luxembourg Income Study (LIS) Database, <http://www.lisdatacenter.org> (Poland; 1992-2013; access 9/11/2017) Luxembourg: LIS.

Machin, S., and Van Reenen, J. (2007). "Changes in wage inequality". Centre for Economic Performance LSE Special Report No.8.

Maddison, A. (2001). "The World Economy: A Millennial Perspective, Development Centre of the Organization for Economic Cooperation and Development". OECD, Paris, 3, 162-193.

Marx, K. (1875). "Critique of the Gotha program". *Œuvres: Économie*, 1.

McCagg, W. O. (1989). *A History of Habsburg Jews, 1670-1918*. Bloomington: Indiana University Press.

Malinowski, M., and van Zanden, J. L. (2017). „Income and its distribution in preindustrial Poland.” *Cliometrica*, 11(3), 375-404.

Mavridis, D., and Mosberger, P. (2017). "Income inequality and incentives the quasi-natural experiment of Hungary, 1914-2008." WID. world Working Paper series, (2017/17).

Mieszczankowski, M. (1960). *Struktura agrarna Polski międzywojennej*. Warszawa: Państwowe Wydawnictwo Naukowe.

Milanovic, B. (1999). "Explaining the increase in inequality during Transition". *Economics of Transition*, 7(2), 299-341.

Milanovic, B. (2015). "Increasing capital income share and its effect on personal income inequality". *MPRA Paper No. 67661*.

Milanovic, B. (2016). *Global Inequality. A New Approach for the Age of Globalization*. Cambridge: The Belknap Press of Harvard University Press.

Milanovic, B., and Ersado, L. (2012). "Reform and inequality during the transition: an analysis using panel household survey data, 1990–2005." *Economies in Transition*. pp. 84-108.

Milanovic, B., Lindert, P. H., and Williamson, J. G. (2010). "Pre-industrial inequality." *The Economic Journal*, 121(551), 255-272.

Mitra, P., and Yemtsov, R. (2006). "Increasing inequality in transition economies: Is there more to come?", *The World Bank. Policy Research Working Paper Series 4007*.

Müller, J. H., and Geisenberger, S. (1972). *Die Einkommensstruktur in verschiedenen deutschen Ländern: 1874-1913 unter Berücksichtigung regionaler Verschiedenheiten* (Vol. 10). Duncker & Humblot.

Nikolic, S. and Novokmet, F. (2018). "Inequality in Eastern Europe, 1890-1950: Evidence from Dynamic Social Tables", *mimeo*.

Novokmet, F. (2018). "The long-run evolution of inequality in the Czech Lands, 1898-2015". WID.world Working Paper Series No 2018/06.

Novokmet, F., Piketty, T., and Zucman, G. (2018a). "From Soviets to oligarchs: Inequality and property in Russia 1905-2016." *The Journal of Economic Inequality*, 16(2), 189-223.

Novokmet, F., Piketty, T., Yang, L., and Zucman, G. (2018b). "From Communism to Capitalism: Private versus Public Property and Inequality in China and Russia". *American Economic Review: Papers and Proceedings*, Vol. 108, pp. 109-13.

Olszewski, K. (2009). *Essays on the effect of foreign direct investment on Central and Eastern European transition economies*. Università Ca'Foscari Venezia.

Pareto, V. (1896). *Course of political economy*. Lausanne.

Perkins, J. (1984). "The German agricultural worker, 1815–1914." *The Journal of Peasant Studies*, 11(3), 3-27.

Petyniak-Sanecki, K. (1939), *Współczesne zagadnienia gospodarcze*, Part II, Lwów.

Piatkowski, M. (2018). *Europe's growth champion: Insights from the economic rise of Poland*, Oxford University Press.

Piketty, T. (2001). *Les hauts revenus en France au XXe siècle*. Hachette.

Piketty, T. (2003). "Income inequality in France, 1901–1998." *Journal of Political Economy*, 111(5), 1004-1042.

Piketty, T. (2014). *Capital in the 21st century*, Cambridge: The Belknap Press of Harvard University Press.

Piketty, T. (2018). "Brahmin Left Vs Merchant Right: Rising Inequality & the Changing Structure of Political Conflict (Evidence from France, Britain and the US, 1948–2017)". World Inequality Lab WP No 2018/7.

Piketty, T., and Saez, E. (2003). "Income inequality in the United States, 1913–1998." *The Quarterly Journal of Economics*, 118(1), 1-41.

Piketty, T., Saez, E. and Stantcheva, S. (2014). "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities," *American Economic Journal: Economic Policy* 2014, 6(1), 230-271.

Piketty, T., Saez, E., and Zucman, G. (2018). "Distributional national accounts: Methods and estimates for the United States". *Quarterly Journal of Economics*, 133(2), 553-609.

Piketty, T., Yang L. and Zucman, G. (2019). "Capital Accumulation, Private Property and Rising Inequality in China, 1978-2015", *American Economic Review*, Forthcoming.

Prokopovitch, S. (1926), "The Distribution of National Income", *Economic Journal*, 36, 69–82.

Ritschl, A. (2005). "The pity of peace: Germany's economy at war, 1914-1918 and beyond". In S. Broadberry and M. Harrison (Eds.), *The Economics of World War I*, Cambridge: Cambridge University Press.

Rodrik, D. (1997). "Has Globalization Gone Too Far?" Washington DC: Institute for International Economics.

Rodrik, D. (2018). "Populism and the economics of globalization." *Journal of International Business Policy*.

Roine, J., and Waldenström, D. (2010). Top incomes in Sweden over the twentieth century. *Top Incomes: A Global Perspective*, 2.

Roine, J., and Waldenström, D. (2015). "Long-Run Trends in the Distribution of Income and Wealth", In A.B. Atkinson and F. Bourguignon, eds., *Handbook of Income Distribution*, Vol. 2, Amsterdam: North-Holland.

Rutkowski, J. (2001). "Earnings inequality in transition economies of Central Europe: Trends and patterns during the 1990s." World Bank Social Protection Discussion Paper No. 0117.

Ryan, P. (1996). "Factor Shares and Inequality in the U.K." *Oxford Review of Economic Policy* 12(1): 106–26.

Saez, E. (2004) "Reported Incomes and Marginal Tax Rates, 1960-2000: Evidence and Policy Implications." In J. Poterba, ed., *Tax Policy and the Economy*, 18, 117-74. Cambridge and London: MIT Press.

Scheidel, W. (2017). *The Great Leveller: Violence and the Global History of Inequality from the Stone Age to the Present*. Oxford: Oxford University Press.

Scheve, K., and Stasavage, D. (2016). *Taxing the rich: A history of fiscal fairness in the United States and Europe*. Princeton: Princeton University Press.

Schlenker, E., and Schmid, K. (2013). "Capital Income Shares and Income Inequality in the European Union." FZID Discussion Paper 80–2013, Stuttgart, Germany.

Smith, M., Yagan, D., Zidar, O. M., and Zwick, E. (2019). "Capitalists in the Twenty-First Century." NBER Working Paper 25442.

Stiglitz, J., Sen, A., and Fitoussi, J. P. (2009). "The measurement of economic performance and social progress revisited. Reflections and overview." *Commission on the Measurement of Economic Performance and Social Progress*, Paris.

Sukiassyan, G. (2007). "Inequality and Growth: What Does the Transition Economy Data Say?". *Journal of Comparative Economics*, 35 (1), pp. 35-56.

Timmer, M. P., Erumban, A. A., Los, B., Stehrer, R., and de Vries, G. J. (2014). "Slicing up global value chains." *Journal of Economic Perspectives*, 28(2), 99-118.

Tinbergen, J. (1974). "Substitution of Graduate by Other Labour." *Kyklos* 27 (2): 217–26.

Tipton, F. B. (1976). *Regional variations in the economic development of Germany during the nineteenth century*. Wesleyan University Press.

von Thadden, G. H. (1995). *Inflation in the reconstruction of Poland 1918-1927*. PhD thesis, London School of Economics and Political Science.

Wiśniewski, J. (1934). *Rozkład dochodów według wysokości w r. 1929*, Instytut Badań Koniunktur Gospodarczych i Cen, Badania nad dochodem społecznym w Polsce. t. III. Warszawa.

Wolf, N. (2006). "Local Comparative Advantage: Agriculture and Economic Development in Poland, 1870-1970", *Diskussionsbeiträge des Fachbereichs Wirtschaftswissenschaft der Freien Universität Berlin 2006/15*.

Wolf, N. (2007). "Endowments vs. market potential: What explains the relocation of industry after the Polish reunification in 1918?", *Explorations in Economic history*, 44(1), 22-42.