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Top Incomes during Wars, Communism and Capitalism: Poland 1892-2015

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Abstract

This study presents the history of top incomes in Poland. We document a U-shaped evolution of top income shares from the end of the 19th century until today. The initial high level, during the period of Partitions, was due to the strong concentration of capital income at the top of the distribution. The long-run downward trend in top incomes was primarily induced by shocks to capital income, from destructions of world wars to changed political and ideological environment. The Great Depression, however, led to a rise in top shares as the richest were less adversely affected than the majority of population consisting of smallholding farmers. The introduction of communism abruptly reduced inequalities by eliminating private capital income and compressing earnings. Top incomes stagnated at low levels during the whole communist period. Yet, after the fall of communism, the Polish top incomes experienced a substantial and steady rise and today are at the level of more unequal European countries. While the initial upward adjustment 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, which make the dominant income source at the top. We relate these developments to processes associated with the new phase in globalisation.

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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 the evolution 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 2001; 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. Moreover, 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.

This paper is a first comprehensive attempt to look at the long-run evolution of inequality in Poland by constructing top income shares from the end of the 19th century until today. Our motivation is to fill the void in the literature and contribute to the understanding of the long-term determinants of inequality. We provide first homogeneous series that offers a possibility to compare the level of income inequality in Poland and its evolution both through time and across countries. As such, we believe it to be the best available indicator of the long-term development of inequality in Poland.

In fact, 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 Waldenstrom 2015). Changes at the top can critically affect the whole distribution. The economic mechanisms at the top may influence the performance of the entire economy, as apparent in the case of Poland, with top incomes assuming the main role, for instance, in driving capital accumulation in the pre-WW1 era or in leading the post-socialist convergence (for technology transfers or by partaking in global value chains). However, along with income, wealthy accumulate command over resources and people. This could

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

adversely impact democracy, as the concentration of economic power increases the political influence of the richest.

Figure 1 presents the long run economic growth in Poland and Western Europe (France, Germany and the UK). Throughout the 20th and 21st centuries the income per adult in Poland is around half of the income in Western Europe (and so the nominal difference has increased). 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.

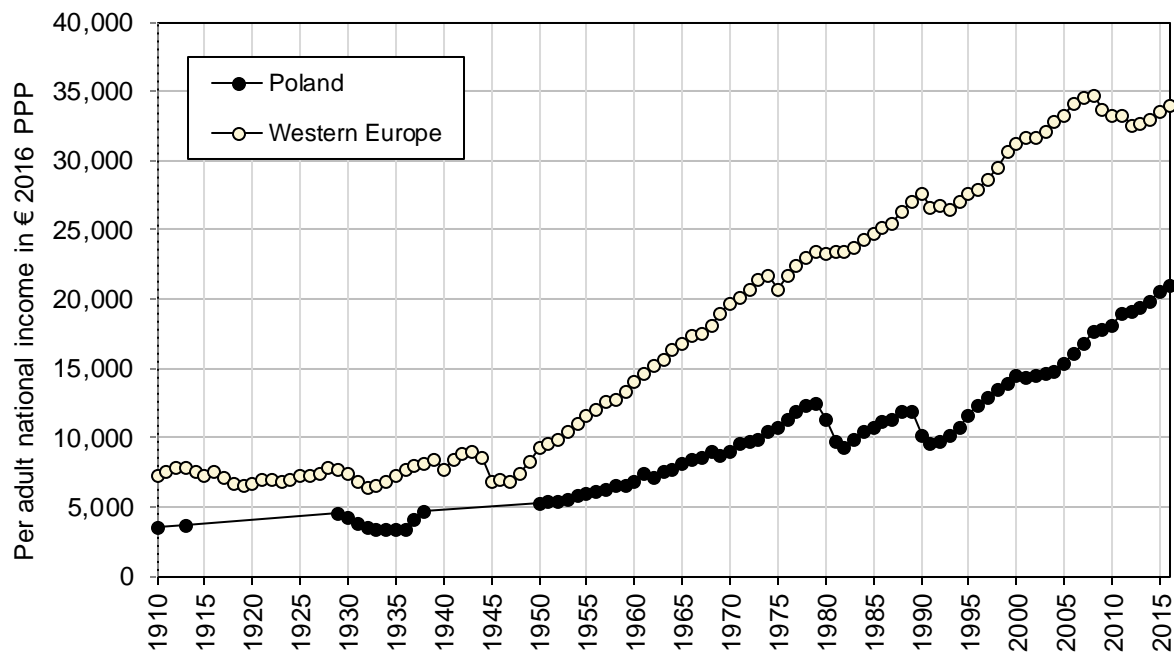
Figure 2 summarizes our main results. Top income shares in Poland followed a U-shaped evolution from 1892 until today. Inequality was high in the first half of the 20th century due to strong concentration of capital income at the top of the distribution. As documented now in many countries, the downward 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, by literally eliminating private capital income with nationalisations and expropriations, while in addition it implied strong reduction of top labour incomes. After the fall of communism the Polish top incomes experienced a substantial and steady rise and today are at the level of more unequal European countries.

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. 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 or the hyperinflation of the early 1920s. This course was reinforced by the introduction of the anti-rich policies such as stronger taxation of the wealthy or the introduction of social legislation. During the interwar period, top income shares *recovered from this low-point*, with the urban-rural gap playing the central role in the evolution of income distribution. 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. The Second World War seemingly had a relatively more modest effect on the top income shares than its predecessor, however the early years of communism significantly impaired income concentration by eliminating private capital income and compressing earnings. During the remaining four decades of the communist rule, top income shares displayed notable stability at these lower levels.

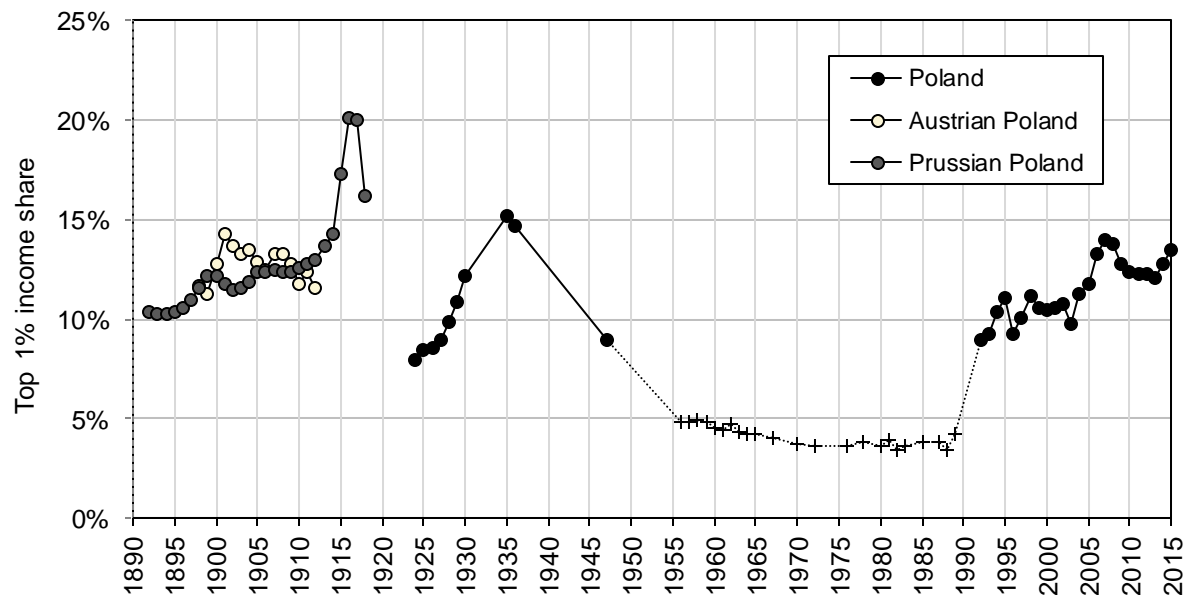
Polish top incomes experienced a substantial and steady rise after the fall of communism and today are at the level of more unequal European countries, most notably Germany and the United Kingdom. It has been found that the post-transformation rise in income inequality has been in general limited to the top and the bottom end of the income distribution.² It was mostly driven by a sharp increase in income shares of the top groups within the top decile. The evolution of the top of income distribution becomes thus an essential ingredient of inequalities in Poland.

The highest increase in top shares took place after Poland joined the EU and top income groups have been main beneficiaries of strong Polish growth in the 2000s. In 2003-2008 almost half of the real income growth was obtained by the top 5%. The beginning of the 2010s marks a stabilisation, yet in the most recent period, we again document a growing trend in top income shares. Income composition has been different for the top percentile and the lower top income groups. The top 1 per cent has been mostly composed of capital income, which shows strong concentration at the top of the distribution. On the other hand, labour income dominates for the groups below the top percentile. While capital income is more pro-cyclical, labour income has been in general more resilient to economic fluctuations.

² For example, Milanović and Ersado (2010) point to a rise of the top decile's income share and a fall in the bottom decile's share, while intermediate deciles were largely unaffected. Similarly, the World Bank estimates show that income dispersion was somewhat more pronounced in Poland than in the other former socialist countries, and it was mostly driven by a surge in income shares of the top groups within the top decile.

Figure 1: 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 2: Top 1 per cent income share in Poland 1892-2015

Source: authors' computation based on income tax statistics; 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).

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

1772 – 1918	The Partitions of Poland - Austria, Prussia and Russia divided Poland and 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	The 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 experienced the biggest relative war losses. Approximately 17% of the 1939 population were killed and 62% of the national wealth was destroyed.
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.

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 byproduct 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.³ 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.

³ In addition to the skill-biased technological change, economists have explored alternative explanations, especially tax policy favouring the richest, changing worker’s bargaining power and increasing wealth inheritance (Alvaredo, Atkinson, Piketty and Saez 2013). This could be partially explained by the institutional change, notably decreasing minimum wage and declining importance of trade unions (Machin and van Reenen 2007).

This study shows that evolution of inequality is shaped by the inextricable workings of economic, social and political factors. Institutions matter. 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. Major political forces, such as wars and occupations, fragile balances of political power and vested interests have differentially affected top shares at various junctures in the Polish history. Equally, economic factors have been significant and often persistent. The history of disparities during the Partitions of Poland shows that industrialisation had different impact on top income shares in the Prussian and Austrian partitions. This study uses the interwar period county-level data to show that these differences persisted even after the unification of the country in 1918. The structural transformation, emigration, or the expansion of general education, all played a role in shaping inequalities throughout the 20th century.

Finally, the recent developments suggest that the future of inequalities in Poland is likely to be linked with the prominent role of capital among the top incomes. Moreover, one should not expect a weakening of this trend, as processes connected with globalisation seem to contribute to the growing dominance of capital in the economy. There is no spontaneous fall in inequality and the future will depend on the institutions and policies taken. We hope that our work, by providing historical perspective, 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 and composition of the top income shares since the end of the 19th century until today. Also, we discuss trends in inequalities for the Prussian and Austrian Partitions of the pre- World War I Poland. Section 4 compares the estimates for Poland with other countries and other measures of inequality. Section 5 outlines areas for further research, namely wealth concentration and privatisation. Finally, Section 6 concludes. The details of the data and estimation are discussed in the appendix.

2. Data and Methodology

The methodology used to estimate top income shares was pioneered by Simon Kuznets (1953) who first combined income tax statistics with accounts for the income and population totals. Since Piketty's (2001, 2003) research on France, this methodological approach has been consistent across studies (for detailed exposition see Atkinson 2007), resulting in homogenous and long-run series for more than thirty countries.⁴ The income

⁴ Which is not true for i.e. the Gini coefficient, see e.g., De Maio (2007).

tax statistics has usually come in the form of tabulations organized by income ranges, containing the number of taxpayers with their corresponding income. To arrive at income shares of specific top groups, income tax data is combined with external control totals for the population and the income. The main advantage is that the tax data aggregate information from the entire population of high-income earners. Moreover, the tax law enforcement ensures that the reported income statements are less prone to measurement error in the form of under coverage of top income groups.

Income Tax Statistics in Poland

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 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 did not exist 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 (gross) income brackets containing the number of income taxpayers in each bracket and their corresponding tax obligation. The total income in brackets is missing, but bracket ranges are quite narrow, and consequently, estimates of total bracket income are robust to the particular distributional assumptions (see Appendix 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 nationalisations 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, which covered almost the entire workforce.⁵ Since the private capital income played a marginal role in the Polish socialist economy,⁶ top earnings provide a reasonably good approximation of top incomes.

⁵ Covering both state and cooperative enterprises (Atkinson and Micklewright 1992, p. 257). Moreover, household budget survey from 1957 until 1972 covered only employees in socialized sector (ibid., p. 258).

⁶ 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.

For the post-communist era, data used to construct top income shares come from the annual reports on the settlement of the personal income tax published by the income tax department of the Polish Ministry of Finance starting from 1992. Tabulations are organised by income ranges that correspond to the 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. However, due to the limited progressivity of the tax system, the number of income brackets presented in the tax statistics has been small (it equals seven from 1992 to 1993, three from 1994 until 2008, and only two afterwards). Hence we focus only on percentiles with thresholds close to those of the given income intervals.

Definition of Income

The use of income tax statistics entails the use of fiscal income. Our preferred income concept is that of 'gross income', which refers to income before all personal deductions and personal income taxes.⁷ Taxable income in Prussia and Imperial Austria, as well as in the interwar period was quite broad and allowed very few exemptions. The post-communism tax data include income from employment, pensions, income from non-agricultural business activity and special agricultural activity, income from self-employment, rental income, capital gains and income from other sources. Capital income, notably interest and dividends, are taxed separately at a source and thus not included in the statistics for the progressive schedule.

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 inter war period. However, the post-communist tax law has been amended several times since 1992. At the beginning of the 2000s, a taxation of capital income (interest and dividends) and capital gains (i.e. from selling company's shares, stocks, derivatives) have been introduced. While the former income is taxed using the presumptive tax and is not reported in the statistics, the latter is taxed using the progressive scale and thus appears in the tabulations. Since 2004 business income from non-agricultural business activity (further referred as business income) can be taxed separately using a newly introduced flat tax (see Appendix for more details).

⁷ Note that gross definition is after subtraction (from revenues) of costs needed to obtain, secure and maintain income.

Control Total for Population and Income

The definition of the control total for a population is based on the definition of the tax unit in the tax code. Tax unit in Prussia and Imperial Austria was household, with the total income of household members ascribed to the head of the household. The tax unit in interwar Poland was both household and individual depending on the income source obtained. Namely, someone earning employment income was individually taxed, while for other sources, incomes of all family members were combined and attributed to the 'head of family' (see Appendix for a detailed exposition). 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 not married,⁸ 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.

For the communist period, we take, following the definition in the employer survey, the individual as the population unit. For the post-communism period, the tax unit has been an individual, and we take as the control total for the population the total number of adults and subtract the number of individual farmers (who pay PIT only if they receive income from a taxable source).

Next, we estimate the total income obtained by all potential tax units. There are two methods, either taking the total reported income of filers and adding the estimated income of non-filers, or starting from some personal income aggregate and excluding items that do not enter into used income concept ('bottom-top' versus 'top-bottom' approach; Atkinson 2007). We follow the latter approach, which is more suitable for the interwar period due to the relatively small proportion of population subject to income tax. For this purpose, we had to rely on historical national accounts. For the recent period, we use official sectoral national accounts published by the Central Statistical Office. The details are outlined in Appendix.

Interpolation

The income tax data are ranged according to income thresholds of the progressive tax schedule. In order to estimate shares for the specific percentiles of interest, such as the

⁸ According to the 1931 census, less than 15 per cent of employed females outside agriculture were married (Maly Rocznik 1939, p. 260, Tab. 5).

top 1 per cent, we interpolate by assuming the Pareto distribution for top incomes. Here we follow the well-established empirical observation that the upper tail of the income distribution is approximately Pareto in form. More specifically, cumulative distribution function $F(y)$ for income y is given by $1 - F(y) = (k/y)^a$, where $1 - F(y)$ is the proportion of individuals with income above y , and with k and a constant. One then finds that the ratio between the average income $y^*(y)$ above the certain threshold y and the threshold y is constant. This constant is often referred as the inverted Pareto coefficient $b = y^*(y)/y$ (equally $b = a/(a - 1)$). It is straightforward to obtain percentile thresholds and average income for the specific top income groups (Piketty 2007, Atkinson 2007a).⁹

3. Trends and composition

Figure 2 shows the top 1 per cent income shares in Poland since 1892 until today (see Table A1 and Table A2).¹⁰ In the Partitioned Poland, the trends in income shares were different for the Prussian and Austrian partitions. In the former, we observe a continuous rise, from slightly below 10% to 15% at the outset of WWI. For Galicia, the initial increase of over 2pp was followed by a decade of continuous fall in top income shares, approaching the starting level in 1913. World War I was characterised by an explosion in top shares in the Prussian partition, the strongest one occurring in Posen, which eventually dropped during the later years of war.

The interwar period saw a continuous rise in the top percentile share. In 1924, which is our first documented point, the share of the top percentile was slightly above 8 per cent. Already in 1930, the top 1 per cent share jumped to levels above 12 per cent. However, when the series re-emerged in 1935, the top percentile is found at 15 per cent, which corresponds to its secular peak in the time of peace. It presents a marked contrast to first transition years in the early 1990s, suggesting a levelling during the communist period, at which we look below.

The Second World War had a relatively modest effect on the top income shares. However, the early years of communism significantly impaired income concentration. Although there is no tax data for the communist period, we document a decline in the concentration of labour income during this time.

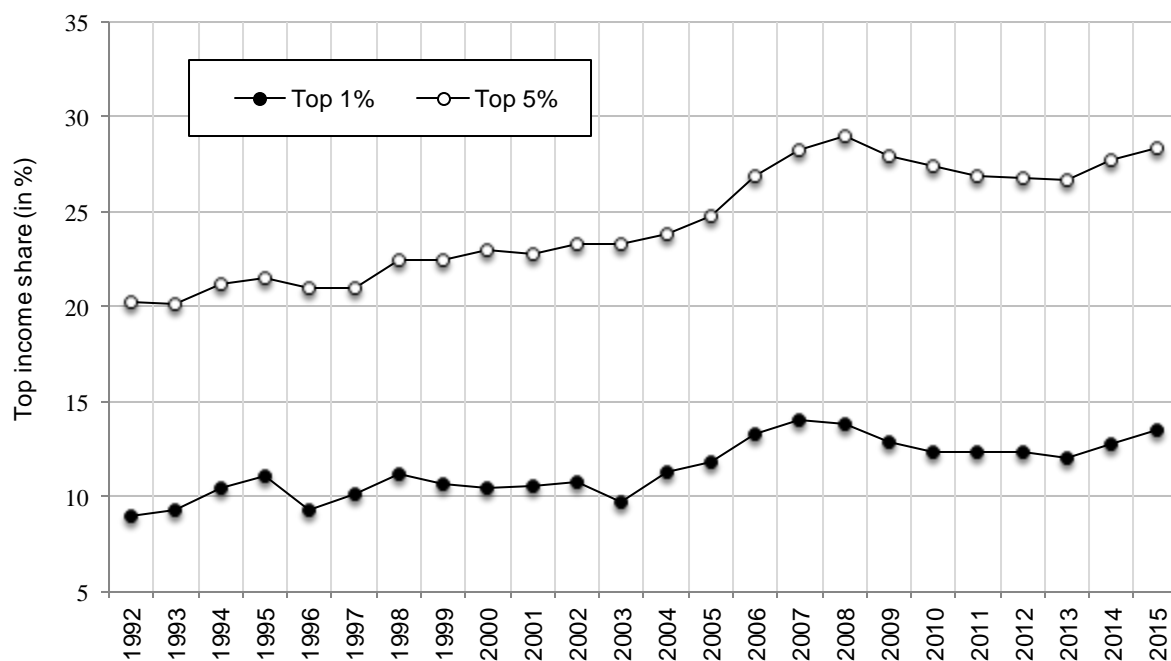
⁹ However, in practice coefficient b can slightly vary with y even for the given year. As the number of brackets in published statistics has been relatively small (generally equal to three for the post-communist period), we restrict our analysis to the top 5 per cent and the top 1 per cent income share, for which thresholds are very close to the reported bracket thresholds and generally restrain from extrapolation into the open interval.

¹⁰ Malinowski and van Zanden (2016) provide the estimates of the distribution of income for the preindustrial Poland (the 16th century).

In the first transition years, the top 1 per cent income share was slightly below 9 per cent. Already by 1995, there was a 2 pp increase in the top percentile share. After a temporary fall in 1996, the top percentile bounced again, and from 1998 it stabilised at slightly above 10% for five years. However, the most dramatic change in the top 1% income share started in 2004 – the year of the EU accession – and lasted until 2008. Throughout this period the proportion of total income attributed to the top percentile increased from 11% to 14%. From 2009 onwards, the estimates dropped slightly and stabilised at around 12%. The most recent period witnessed growth, reaching almost 14% in 2015.

The estimates for the top 5% income share, depicted in Figure 3, evolved similarly as the top percentile, except the changes were more profound. The increase in 1994 is almost of the same magnitude as for the top 1%. However, since then there was a modest but steady increase until 2002. The biggest change took place during the period between 2004 and 2008, where the income share rose by 6pp. It stabilised afterwards at the level of 27% and grew to over 28% in 2015.

Figure 3: Top 1 percent and top 5 per cent in Poland, 1992-2015



Source: authors' computation based on income tax statistics

Partitioned Poland

The Partitions of Poland (1771-1918) between Austria, Prussia, and Russia took place in three stages during the second half of the 18th century and put an end to a two-hundred-year-old Polish-Lithuanian Commonwealth. As a result of Partitions, Poland was removed from the map of Europe for 123 years and came back into existence only after the World War I.

The three Partitions displayed different levels of economic development as well as specific institutions and different social conditions. The best economic situation was in the Prussian part, where the authorities carried out many reforms. The most important of these was the abolition of serfdom, which allowed peasants to become owners of the land after repaying the nobility. Impressive industrialization and urbanization of western Prussia led to a demand stimulus for agricultural products, inducing specialization along these lines in the eastern part of the country (e.g. changes in agricultural technology (crop rotation), fertilizers application, machinery purchases, etc.). Specialization itself was facilitated by the rising integration within Germany due to advances in the transport technology and the institutional structure (e.g. *Zollverein*). As a result, the agriculture, rather than industry, was the main driver of the economic progress. Economies of the other partitions were different. In the Russian partition, it was the industry that developed the most. The clusters of textile industry were created in Łódź and Białystok. Warsaw became a modern city with its sewers, streets, gas lighting, and power plant switchboard. Economic progress, however, did not improve the well-being of workers who had to work long hours (14 hours) for low wages in unsafe conditions. The delayed abolition of serfdom reforms, which were introduced only 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 parcelled. Consequently, people had experienced one of the worst poverty rates in all of the Habsburg Empire, and at the beginning of the 20th century, over two million Galicians emigrated abroad to escape the severe economic conditions.

Another important contrasting point is that inheritance patterns differed in the three partitions, which, in turn, resulted in different wealth distributions, as well as in dissimilar general socio-economic structure (as famously propounded by Tocqueville). The unique inheritance patterns were especially important for the contrasting outcomes in the distribution of land (Mieszczankowski 1960), as the main source of living in pre-industrial societies. The inheritance law in the Prussian partition stipulated strictly impartible inheritance of land holdings, while partible inheritance was practiced in the Austrian and

the Russian part (with the difference that there was a limit to the division in the Russian part which did not exist in Galicia) (Rudolph 1995, p. 12).

Prussian Partition

Prussia assumes a special place in the analysis of historical distributional patterns, primarily due to an 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.¹¹ For the same reason, the Prussian income tax data offer invaluable research opportunities to study the long-term evolution of inequality in Poland. This section focuses on the Prussian partition before 1914, in the next section we analyze the First World War period.

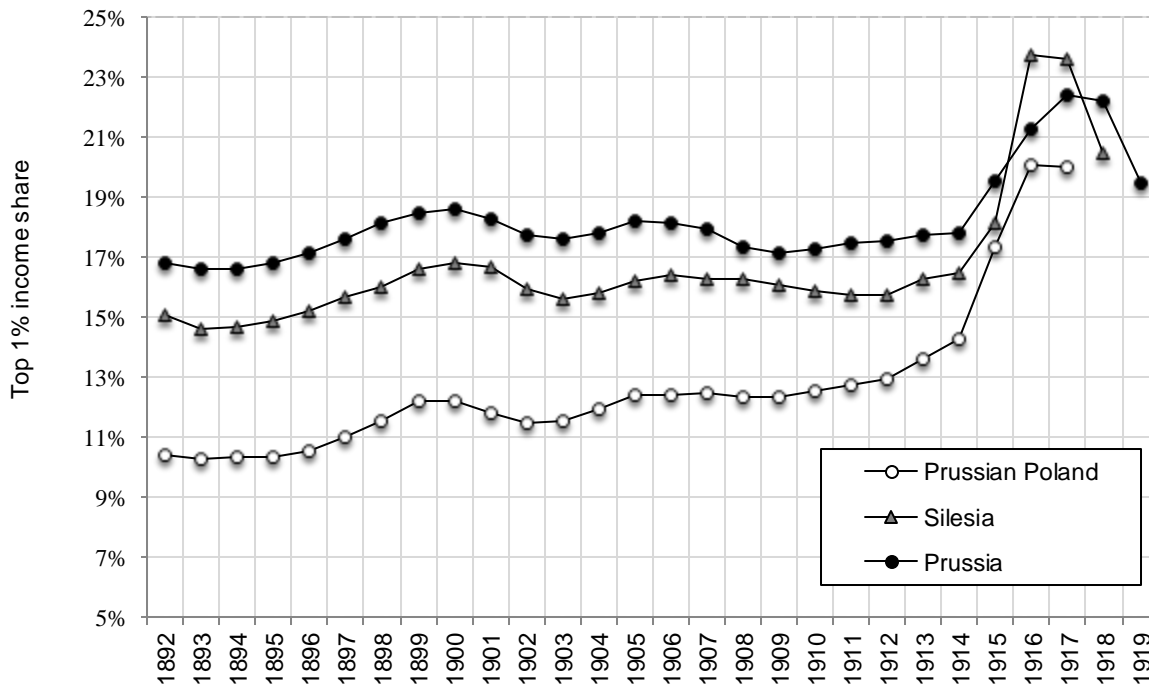
Figure 4 shows the evolution of the top 1 per cent in Prussia, Silesia and jointly the two Prussian provinces with significant Polish population (provinces of Posen (Greater Poland) and West Prussia), and which became an integral part of the Second Polish Republic after WWI.¹² First, it can be seen that following a moderate rise in the 1890s, top inequality stabilized in Prussia after 1900. Silesia, as industrially the most advanced among three provinces, displays the same pattern as Prussia in total, and the top 1 percent remained remarkably stable there from the turn of the century. In contrast, the top percentile in the Province of Posen and West Prussia experienced a strong rise of almost 4pp in the 1890-1913 period and narrowed the 'gap' with the rest of Prussia at the dawn of the Great War.¹³

¹¹ 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, as 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).

¹² Only district Oppeln from Silesia had entered interwar Poland, while the region was predominantly included in Poland only after WWII. Series for Oppeln is currently under construction.

¹³ The evolution of inequality in Prussia was overwhelmingly influenced by the development in richer and more populous regions in western and central Prussia, most notably in the Rhine provinces and above all in Berlin, where resided the greatest number of taxpayers. In general, inequality in towns was greater than in the countryside (Bresicani-Turroni 1915), and observed stabilisation of top income shares in Prussia is equally documented for industrial and urban regions. In agricultural regions, in contrast, inequality was still rising after the turn of the century (Grumbach 1957; Müller and Geisenberger 1972). (a development of inverted Pareto coefficient b ($b=a/(a-1)$) is consistent with the picture presented by top income shares. We observe substantially higher coefficient in industrial and urban regions (in Berlin 3.8, in Rhineland 3.4), which caused very high coefficient above 3 for the whole Prussia.)

Figure 4: Top 1 per cent in Prussia, Silesia and the Polish part of Prussia (Province of Posen and West Prussia).



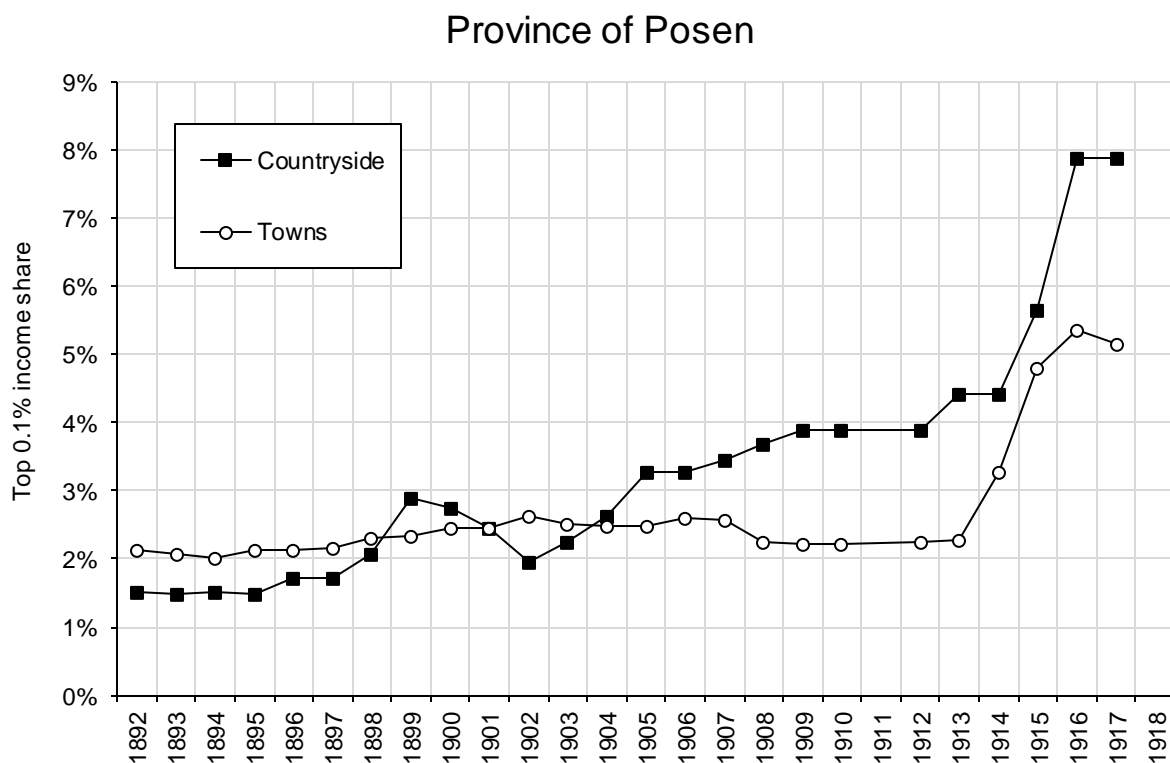
Source: authors' computation based on income tax statistics.

The rise in top income shares in the Polish parts of Prussia was mostly driven by very high-income shares (see Figure A1 and Table A3 in Appendix). In the Province of Posen, it can be seen that a sharp rise of the top 0.1 per cent was 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 5). Top groups below, such as the top 1-0.1 per cent, were on the other hand predominantly composed of urban incomes, accounting for around 80 per cent of the income. The modest rise of these groups (Figure A1) was due to the growth of urban incomes, with the stable share of rural income (see the Appendix Table A3).¹⁴ This is in striking contrast to West Prussia where the rise in the top 0.1% income share until 1910 was mainly driven by urban areas (Figure 6).

¹⁴ However, one should point that the distinction between urban and rural areas presented in the income tax statistics (that is, in towns (*Städte*) and in the countryside (*Land*)) - in particular if one wishes to account for different sources of income and wealth - could have been blurred by the formation of rich residential areas nearby towns, which law treated as rural areas even though its occupants could have dominantly obtained income from economic activities located in towns (Kaeble 1986, pp. 40-1). Moreover, many nouveaux riches coming from the lines of urban industrial and financial bourgeoisie were susceptible to the allure of rural life of aristocracy, and increasingly invested in large landed estates.

How to explain this development? Dumke (1991) singles out a rise of the capital share in agriculture as the leading cause of the rising inequality in Prussia. Likewise, 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 capital-intensive agriculture, which most likely led to the functional shift towards capital income, dominantly captured by the top of the distribution. Wolf (2006) shows that the impressive intensification of agriculture¹⁵ in the two decades preceding WWI led to a spectacular improvement in productivity in the Prussian partition (surpassing that in the rest of Germany). For instance, the yield of potatoes and wheat in quintal per hectare doubled between 1878-1882 and 1909-1913 (Wolf 2006, p.39).

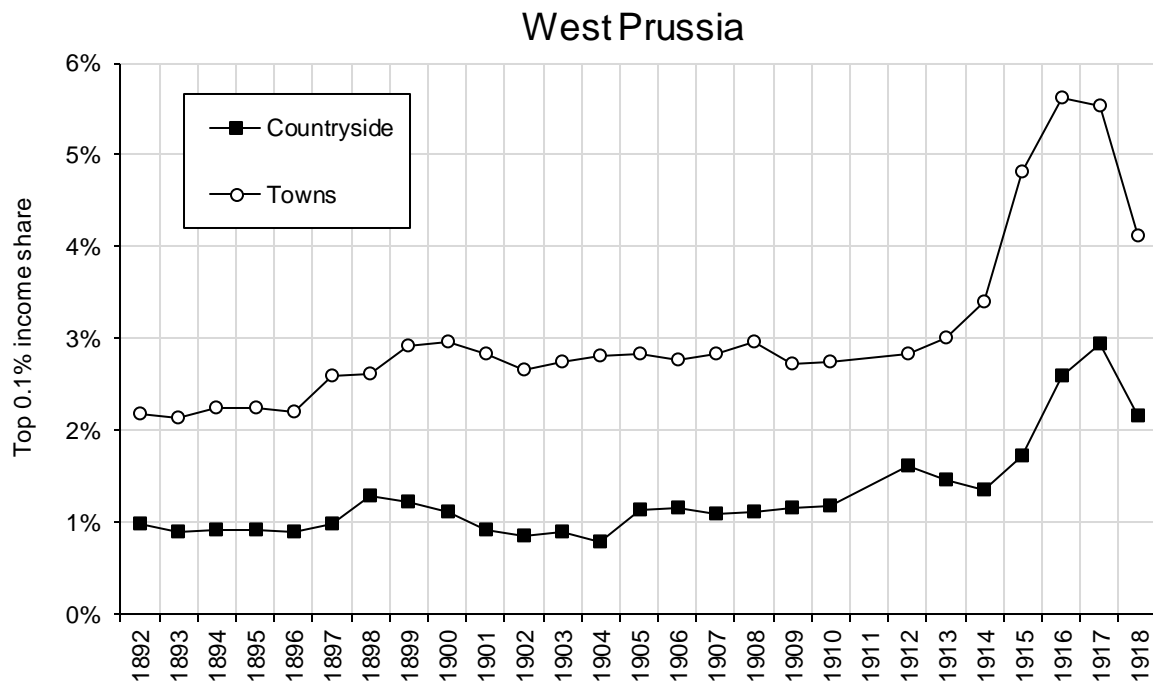
Figure 5: The Province of Posen – decomposition of the top 0.1 percentile



Source: authors' computation based on income tax statistics.

¹⁵ Through mechanization, an increase in the use of chemical fertilizers and generally in the supply of nutrients with the rise in livestock (Grant 2006).

Figure 6: West Prussia – decomposition of the top 0.1 percentile



Source: authors' computation based on income tax statistics.

Distributional repercussions of these developments are, in our opinion, nicely captured by the income tax data. In the Province of Posen, only very high incomes obtained in rural areas induced a rise in top income shares (Figure 5), while for 'lower' top groups (those below the top 0.1 per cent) rural incomes were much less significant and remained quite stable. The importance of agriculture can be related to relatively high land inequality observed in the Prussian partition (Mieszczankowski 1960). Larger estates were more prevalent, and smallholdings to a great extent liquidated during the Prussian land reforms in the nineteenth century, which, by most accounts, benefited mainly noble (Junker) estates¹⁶ and gave rise to a proliferation of rural working class (Perkins 1986; Grant 2005; Eddie 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.¹⁷ Eddie (2008) thus singles out the province of Posen (and

¹⁶ E.g. through enclosure of the public land, rural mortgage banks (*Landschaften*) favoured large estates, while the traditional system of administration in the east (*Gutsherrschaft*) gave nobles a substantial discretion during the land reforms, etc. (Grant 2005, pp. 34-38)

¹⁷ Lenin's (1908) famously defined the 'Prussian' (or Junker) path of the capitalist development, where big landlords acted as the driving force in the transition from feudalism to capitalism (as opposed to the 'American' path driven by peasants). Actually, Lenin's distinction between the 'Prussian' and the 'American' road corresponds better to a divergent experience in eastern and western Prussia, respectively (which is a traditional view in the German agricultural historiography ever since Knapp (Perkins 1986)).

Pomerania) as ‘the real bastion’ of large estates. Nevertheless, this process did not equally affect all ‘Polish’ provinces. The expansion of commercial agriculture in West Prussia seems to lag behind the province of Posen, which might be a result of different (inferior) land quality and different (lower) concentration of land estates in these two provinces (Eddie 2008). Consistent with this, Figure 7 presents the share of agriculture employment and productivity expressed as a percentage of the national average (Tipton 1976, p.106). The agriculture share in all eastern provinces, except Silesia, was higher than the country average, with the Province of Posen having the largest share and the strongest upward trend.¹⁸ Productivity in the Polish provinces was initially below the national average (except Pomerania), but the modernization moved them ahead by 1907. Chlapowski points that marketed surplus more than doubled in Posen in this period (Eddie 2004, p. 83). The additional evidence of rising land income may be surmised from the sharp increase in land prices in Posen,¹⁹ where a remarkable rise in yields and prices made the increase of land prices of 100 per cent quite normal (ibid.).

The emergence of agrarian capitalism in Prussian Poland, with a strong tendency to substitute labour for capital, was spurred by external and internal factors. Changes in terms of trade induced a shift from traditionally dominant grain production to capital-intensive industrial crops,²⁰ such as the sugar beet. Mass migrations from the east to industrial regions in western Germany and across Atlantic (*Ostflucht* or ‘Flight from the East’) 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 partition and Galicia amid fears of ‘Polonisation’ of East Elbia, which reached its height in the Bismarck’s *Kulturkampf* and the mass expulsion of Poles in 1885 (Olsson 1996). 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).

Contrary to the conventional image of East Elbia as being characterized by the extensive agriculture and lacking any industrial base, Eddie (2008) points instead to the non-negligible level of rural industries. An expansion of commercial agriculture in the Prussian

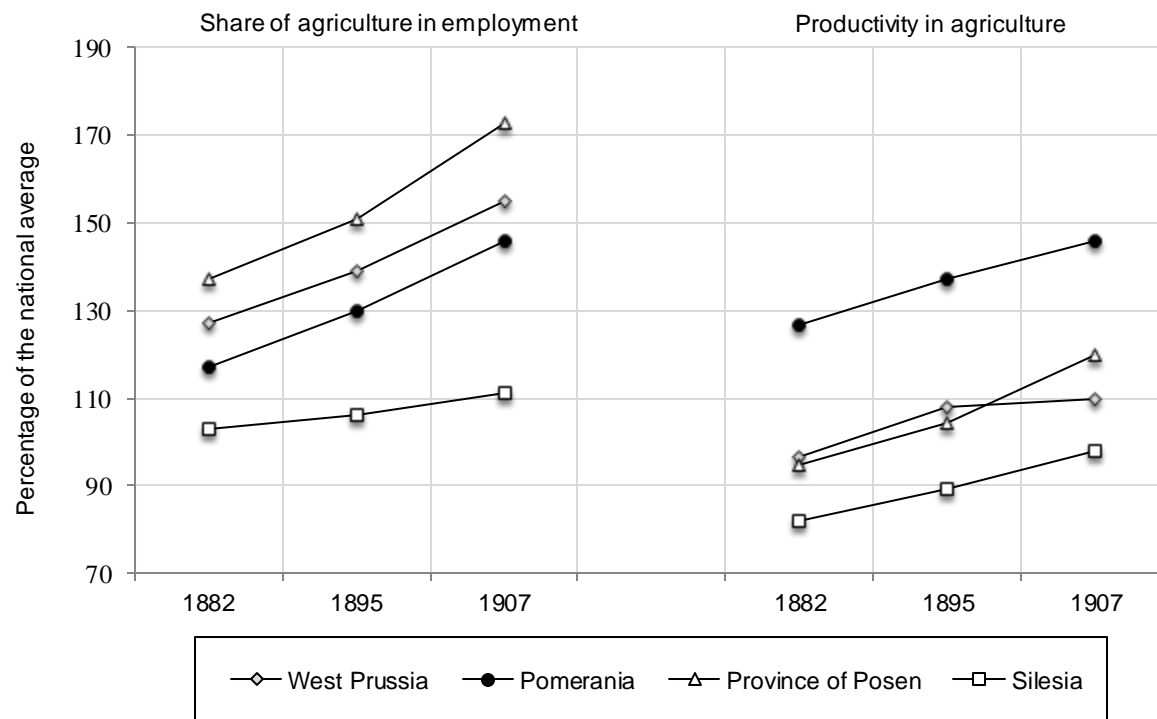
¹⁸ The actual shares for the Province of Posen were 68.2% in 1882 and 61% in 1907. For Pomerania - 57.1% and 51.5% respectively; Silesia - 51% and 39.2%; 63.1% and 54.6% (Tipton 1976, p.171-176).

¹⁹ Based on the market prices paid by the Settlement Commission (()). Eddie (2004) finds that the Settlement Commission did not ‘overpay’ the land it purchased.

²⁰ 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 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.

east stimulated a development of related industries, such as distilleries, grain and sugar mills, sugar factories, breweries, brickworks, industries producing machines for agriculture, etc. Perkins (1986) equally points to a frequent phenomenon of Junkers turning industrialists (see also Grant 2005).²¹

Figure 7: 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).

Austrian Partition

Galicia was economically the least developed of the three 'partitioned' Polish regions. However, since the 1860s it was the only partition with a significant autonomy. The area was fully incorporated into Poland in 1918, but only the western part remained in the country after WWII.

²¹ 'Landed' industrialists were mainly 'enlisted' from the nobility, such as the Henckel von Donnersmarcks in Upper Silesia as the most well-known example (Tomaszewski 1983), but there was also a rising involvement of bourgeoisie as suggested by the case of non-noble Hermann Kennemann, who was the greatest landowner in the province of Posen (also one of the cofounders of *Deutscher Ostmarkenverein* (the German Eastern Marches Society), the radical organization promoting Germanization in East Elbia) (Tims 1941).

A general picture of income distribution in Galicia is best understood by pointing to a contrast between predominant rural population, overwhelmingly living at the bare subsistence level, and less numerous but on average more prosperous urban population. We believe that the situation in Galicia fits well with the basic premises of the classical two-sector model as advanced by Lewis (1954) and Kuznets (1955), or rather its presumption about the initial conditions preceding the structural change.²² In fact, the absence of the more substantial sectoral shift in Galicia could have precluded a significant rise in inequality as postulated by the traditional dualistic model. It was massive emigration that acted as the main safety valve to rural overpopulation.

As noted, the vast majority of the population in Galicia was employed in agriculture (77% in 1900), which in turn was under-invested and parcelled. Smallholdings 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). Coupled with prevailing backward agricultural techniques, such dwarf holdings could not secure even the minimum existential needs. Unlike in the Prussian partition, agrarian capitalism did not develop in Austrian Poland. 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).²³

On the other hand, the young Galician industry, which started to develop only at the end of the 19th century, was not able to offer alternative employment on a grander scale. Consequently, people had experienced one of the worst poverty rates in the Habsburg Empire, and at the beginning of the 20th century, over two million Galicians emigrated abroad. The population in rural areas was growing, the number of people with agriculture income increased from 114 per square km in 1850 to 162 per square km in 1930 (Zubrzycki 1953, p.253). As far as the general situation of peasants is considered, there had been little change from the time of the famous Rousseau's account about three estates in Poland in *Considérations*: "the nobles who are everything, the townsmen who are nothing, and the peasants who are less than nothing".²⁴

Consequently, top incomes in Galicia were dominantly an urban phenomenon. We cannot ascertain income sources of particular top groups, as there is no source breakdown for specific brackets. Figure A3 captures instead income sources of approximately 2-3 per cent of the population subject to the income tax. It might be surmised that besides few

²² Thus, one finds in Galicia, on the one hand, less productive and less unequal agricultural sector, and, on the other, more productive and more unequal urban/modern sector.

²³ Prussia hindered all attempts of Habsburgs to join the *Zollverein*.

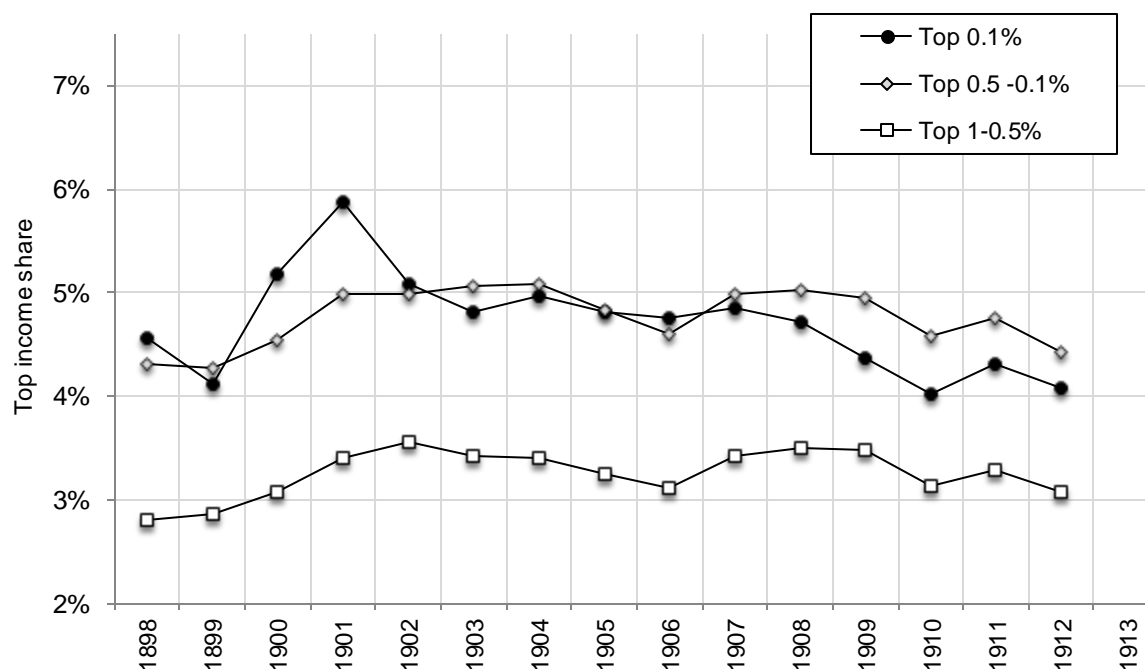
²⁴ *Considérations sur le gouvernement de Pologne* (Ch.6). English translation from Frank (2005, p. 30).

vast estates of grand Polish nobility (such as Potocki or Czartoryski families), most of the *szlachta* in Galicia were relatively poor, which explains the smaller proportion of land incomes in the total income of top groups. In contrast to aristocracy in the Prussian partition or Bohemia, nobles in Galicia rarely engaged in modern industrial enterprises. One could moreover argue that it probably did not take big modern companies to enter top groups such as the top percentile.²⁵

Figure A4 shows that the Galician top 1 per cent were one of the least affluent in Cisleithania (in 1910, a half of average income of the top percentile in Bohemia). The predominance of employment income suggests that employees in towns, such as in banks or imperial administration, lived much better than the surrounding rural population. 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). There were only a few industries of some importance, 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). As we shall see below, the rural/urban contrast figured prominently during the interwar period. Among the Polish counties in 1927, those located in Galicia were characterized by the highest correlation between urbanisation ratio and top 1% income shares (see Table 3).

The top 1 per cent income share in Galicia shows somewhat turbulent evolution in the period from 1898 until 1912 (Figure 1). It increased by almost 3pp in the short period from 1898 until 1901, when it peaked at 14.3 per cent. Afterwards, it was falling until 1906, when it experienced a short-term bounce, but again slightly fell during the years preceding WW1. Figure 8 shows the evolution of the constituent groups of the top percentile. It can be seen that development of the top percentile was largely driven by the top 0.1 per cent share, while lower constituent groups displayed more stable pattern, especially after a moderate rise at the turn of the century. It is interesting to note that the 'boom and bust' development of the top percentile's share corresponds to the business cycle in Imperial Austria (a strong economic growth from 1895 until 1901, followed by the severe recession until 1906; see Good 1978). In this respect, one could speculate that the very top groups in Galicia were immersed in the imperial economy and mainly comprised of capital income, which generally exhibits more pro-cyclical features.

²⁵ For example, Galicia counted proportionally the smallest number of people that exceeded the minimum taxable income threshold in Imperial Austria.

Figure 8: Galicia – decomposition of the top percentile

Source: authors' computation based on income tax statistics.

The expansion of compulsory education at the end of the 19th century preceded the first signs of improvement in the Galician economy. The beginning of the 20th century saw a rapid growth in elementary and secondary education in Galicia, the share of elementary students in population almost tripled between 1880 and 1910 (GUS, 2003) whereas the secondary enrolment ratio increased by 120% - the highest rise in Imperial Austria (Cohen, 1996).²⁶ Notably, there was a strong popular and political pressure to open advanced education to children from poorer strata, possibly increasing social mobility.

Russian Partition

The modern income tax did not exist in the Russian Empire. Consequently, there is no comprehensive information on income distribution for the Russian partition until the unification of the country in 1918.²⁷ Załęski (1901) in his statistical description of the Congress Kingdom attempts to estimate the distribution of non-employees income using

²⁶ The reform of the educational system was modeled on the Prussian solutions. In Prussia, the compulsory education laws were introduced much earlier - already in the 1860s the elementary school enrolment ratio in the Prussian Poland was above 90% (GUS, 2003).

²⁷ Note that the Russian Ministry of Finance estimated top incomes in 50 European provinces of the Empire for 1905 and 1912, in the preparation for the potential introduction of the income tax (Gregory 1982; Lindert and Nafziger 2012), but it did not cover Polish provinces. The income tax was never introduced in pre-revolution Russia.

auxiliary data on the distribution of land (for farmers) and firm size (for entrepreneurs). He defines three ad-hoc income groups based on the land and firm size and calculates corresponding shares of non-employees. In 1901, over 41% of non-employees were classified as “poor”, 57% as “middle”, and 1.5% as “rich”. Importantly, Załęski conducts a similar exercise for Germany and claims that 28% of non-employees were “poor”, 69% were “middle” and 2.8% were “rich”. One can conclude, keeping in mind the simplicity of these estimates, that the income inequalities in the Russian partition were significantly lower than in the whole Prussia. Nevertheless, since the top income shares for the Prussian partition were also lower than in Prussia (Figure 4), it is impossible to evaluate relative inequalities in these two partitions.

One can obtain additional insight about inequalities in the Russian partition from the county-level analysis presented in the Interwar section below. In 1927 the Polish counties located in the former Russian partition displayed, on the average, top income shares in-between those from the former Austrian and Prussian partitions (see Figure 12). The across-county dispersion in inequalities, however, was visibly higher than in the other partitions. The eastern parts stood out in term of high top income shares, which could be linked with a traditional presence of land magnates, a social class of big and wealthy landowners of noble origin. The western counties of the former Russian partition (the central regions of the Interwar Poland), in turn, had relatively modest inequalities, but high mean income (see Figure 13). These were the most developed regions of the Russian Empire, with modern industries and cities. The variation within the Congress Kingdom, could be linked with the Kuznets curve, that is, an inverse U-shaped relationship between development and inequalities. We look at these issues in more detail below.

World War I

In 1914, the Partition Empires turned against each other and consequently placed the Polish lands at the centre of the four years conflict. World War I had tragic consequences for the Polish population and economy, but it also reshaped the political scene in Europe, leading to the unification of the Polish lands in 1918. It has been argued that social inequalities emerging during the war contributed to a growing popular unrest and consequently to revolutions, which brought down the old CEE Empires (Kocka 1973, Baten and Schulz 2005). The effect of World War I on income inequalities is complex – stretching from changing economic environment, trade blockades to direct impact of the military campaign. In this section, we focus on the Prussian partition and provide suggestive evidence for the importance of economic environment, especially armament and the Allied blockade of Germany.

Figure 4 documents the evolution of the top 1 per cent in Prussia, Silesia and “Prussian Poland” during World War I (1914-1919). Figure 5 presents a breakdown by rural and urban areas for the Province of Posen. World War I was characterised by an explosion in top shares, the strongest one occurring in Posen. Interestingly, 1914 and 1915 saw a substantial rise in urban incomes in Posen, which stabilised afterwards. A similar increase, although more profound and delayed, is observed in rural incomes. Remarkably, the surge of 1914-1917 constitutes a secular peak in top income shares in Poland (Figure 2).

The military campaign could directly affect the top income shares if income correlates with a likelihood of fighting or dying during the war. Around 700 000 Poles fought in the German army, which forced them to stop their economic activities. Assuming these were, on average, low or middle-income people, the top income shares will increase even if the earnings of top earners have not changed. Nevertheless, we argue that this scenario is unlikely. Firstly, top 1-0.5% shares were relatively stable, while the top 0.1% surged, suggesting that extraordinary profits of the latter group were the main driver (Figure A1). Secondly, there is a surge in shares of very top groups in the whole Prussia and each eastern province. However, they were not homogeneously exposed to the military campaign. Consequently, it is unlikely that the surge in top income share is solely due to the army conscription or war casualties.

Even though the GDP of Prussia dropped significantly during the war, the fall could be disproportionally distributed across income groups. War does not only favour arm sellers, but producers of goods, which become very scarce during wartime (e.g. food). Entrepreneurs might thus capture huge profits, even though the economy is in decline. Nevertheless, Baten and Schulz (2005) argue that only few German firms profiteered from the war, while majority experienced a decline in their incomes comparable to the reduction of workers’ income. This is consistent with the observation that the increase in top income shares had been due to extraordinary profits of the top groups.

Figure 3 shows that the rise in top income shares during the war was stronger in Eastern provinces. The Allied blockade was the root cause of the German food problem, as this was to the largest extent caused by 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, as we saw, proportionally more concentrated in Prussian Poland.²⁸ It may be thus indicative that the greatest increase in top income shares in

²⁸ The price fixing by districts at the start of the war was found to be quite ineffective as food wholesalers bypassed districts with price controls and virtually forced them to remove the controls (Hardach 1977, pp. 115-6).

Posen 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).²⁹ In the same manner, it is conceivable that the shortage of raw materials, critical for the war economy, brought huge profits to Silesian mining industry and especially its 'coal barons' residing at the top of the income distribution. 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.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. The new country faced a number of immediate burning challenges: the massive destructions and human losses of the Great War paralyzed economic activity and urged huge reconstruction demands, the military fighting continued during the first post-war years³¹, chaotic and radical political scenery, social and ethnic tensions, massive unemployment and big strikes, high inflation, rural poverty, etc. The major task was integrating various regions of notably different economic development with markedly various institutions and legislation (Wolf 2007). All this fuelled political radicalization and made the threat of the communist upheaval imminent. The potential materialisation of revolution pressured the new leadership of Poland into passing the new social legislation (eight-hour working day, trade unions, right to strike, etc.) (Davies 2005). Further, the social equilibrium turned against capital leading to the introduction of various anti-capital policies such as the land reform, sharp increase in tax progressivity, heavier taxation of capital than labour.³² A unique combination of exogenous and endogenous events signified altogether a new page in the distributional history in comparison to the pre-WW1 social setting (e.g. Keynes 1919; Milanović 2016)³³

²⁹ In the same manner, recovery of food imports with the seizure of Romania in 1918 might have alleviated the pressure on food prices (Ritschl 2005).

³⁰ For example, Swedish iron ore exports to Germany from Gällivare mines. See also Fig. 21.

³¹ Poland was engaged in six wars between 1919 and 1921 (Davies 2005, p. 292): the Ukrainian War, the Posnanian War, the Silesian War, the Lithuanian War, the Czechoslovak War, and the Soviet War.

³² The top marginal rate of the income tax had equaled in pre-WW1 Austria 5%, in Prussia 4%, (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 Milanović (2016) has recently 'endogenized' a fall in inequality after WW1 by linking it to the old literature relating theories of imperialism and income distribution (or rather "domestic maldistribution of income"; Hobson 1909). Namely,

Our starting point in the interwar period is 1925, which coincides with the lowest documented point in top income shares during the existence of interwar Poland. 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. Initially proposing it for France, Piketty (2001, 2003) termed this trend ‘capital income phenomenon’. Top incomes stumbled in France and other western countries as capital owners suffered from various shocks such as capital destruction, inflation or stock market crashes. To draw an analogy, it is only France that could match the level of wartime capital destruction experienced by Poland. 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).³⁴ Naturally, the loss of large and protected Russian market signified immense shock for the industry of the Kingdom of Poland (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) and imported coal and raw materials. The Polish-Soviet war of 1919-1920 further disrupted the industrial production and broke the supply chains (Landau and Tomaszewski 1984).

If Poland resembled France in the extensiveness of capital destruction, it was similar to Germany when it comes to the experience of hyperinflation, another great shock of the period that adversely affected top income shares. Its decimating impact on the Prussian top incomes had been documented already by Kuznets (1955), and it is conceivable that the similar fate beset top incomes in parts of Prussia that would eventually become a part of interwar Poland. However, in contrast to the Weimar hyperinflation, there has been surprisingly little research done on the distributional effects of the Polish hyperinflation,³⁵ and its effects remain ambiguous (in particular between the post-war creeping inflation and the hyperinflation of 1923/4).

very high inequality before WWI was the chief cause of the insufficient aggregate demand (oversaving of the top/underconsumption of the bottom), that induced the struggle for external markets/colonies and eventually led to WWI. This way, Milanović directly relates very high pre-war inequality to the war destructions leading to a fall in inequality.

³⁴ For example, German army transferred complete factories from Łódź to Germany (Davies 2005, p. 130).

³⁵ As an exception see Van Thadden 1994. Van Thadden sees Polish inflation as beneficial to the post-war reconstruction via redistribution of wealth towards industrialists (1994 pp. 116-17): “The dynamics of inflation involved a redistribution of wealth first from wage earners to industrialists between 1918 and 1921 and then from agriculture to industrialists between 1921 and 1923. Poland thus achieved a high savings quota which translated into economic growth. Inflation restricted consumption and gave a strong incentive to investment.”

The hyperinflation, wartime destruction and political uncertainty naturally led to a lower credibility of the country and higher credit constraints for the Polish entrepreneurs, who could not obtain foreign currency to finance raw material purchases. Currency stabilization after 1924 alleviated this problem. Nevertheless, the severe depression of 1924-25 probably had more adverse effect on top incomes. In this respect, industrial capital tied in export sectors especially suffered, as the beginning of the Polish-German trade war caused an instant slump in exports, and currency stabilization negatively affected the international competitiveness of Polish products (Landau and Tomaszewski 1985, p. 77).

Further, the cabinet of the prime minister Władysław Grabski launched a whole set of stabilization policies placing the largest burden of their financing on the wealthy (e.g. the introduction of a progressive capital levy, the unification of the income tax, land redistribution, etc.). The 1920s also saw strong wage compression (Sztrum de Sztrém 1922; Derengowski 1930) largely as a result of the introduction of the social legislation.

The economic depression increased the concentration of industrial production. Between 1923 and 1926 the coal production decreased by 1.2%, while the number of collieries dropped by 25% (Landau 1981, p.183). 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 9 shows that the subsequent three years were characterised by the substantial increase in top income shares which outstripped the overall income rise. While economic growth 1926-1929 saw improvement of conditions for all groups, the rich benefited proportionally more (Landau and Tomaszewski 1985, p. 81).

When the tax data become available in the mid-1930s, top income shares re-emerge at substantially higher levels. All 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 between 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. One should be reminded that interwar Poland was still predominantly agricultural, with almost two-thirds of the population made of small farmers and (quite often landless) peasants. Notwithstanding this, the share of rural population in national income was smaller than that of the rest of population (46.7 per cent of national income in 1929; see

³⁶ Consensus of historians has been that the May coup in 1926 (Landau 1977) was not motivated by class struggle, in line with Piłsudski's general disinterest with economic affairs.

Landau 1963, p. 28). And it was agriculture that was most adversely affected by the Depression, in the first place due to a strong fall in agricultural prices (actually, there was no fall in agricultural output during the depression) (Landau 1963). The deflationary trend (aggravated by the adherence to the Gold Standard until 1936) 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). In the midst of the rising unemployment, this led to an increase in wage inequality. 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.³⁷ Rentiers similarly benefited from deflation. In the same manner, (industrial) profits at the top were relatively safeguarded due to rapid cartelization, which prevented a fall in prices of industrial goods. The fall in industrial prices was much less steep than in agriculture. For example, prices of agricultural products in 1935 were only 33 per cent of their 1928 level, while those of industrial goods were 57 per cent. However, prices of cartelized products stood at 82 per cent of its 1928 level (Landau and Tomaszewski 1985, Tab. 2.6).

A proportionally much higher fall in prices of agricultural products ('price scissors') during the Great Depression led to a shift in national income towards the non-agricultural population. Landau (1963, p. 37) thus points that a fall in income of rural population between 1929 and 1934 was proportionally higher (62 per cent; from 46.7 per cent in 1929 to 39.6 per cent in 1934) than a fall in national income (52 per cent).³⁸ Thus, the drop in income of top income groups was smaller relative to a decline in total income caused principally by a plunge in farmers' income.³⁹ It should be noted that this referred predominantly to small farmers on the verge of existence, without any social protection and completely bypassed by the state aid in agriculture (aimed at large landowners; Landau 1963, p. 35-47).⁴⁰

Figure 9 below 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. As can be seen, 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

³⁷ This is obvious if we take those recently unemployed as having zero wages. For those that kept their job, we observe a stability in wage distribution (see Fig 13 below), which is an additional argument for wage rigidity.

³⁸ These estimates are from Klarner (1937).

³⁹ There were of course other afflicted groups beside (small) farmers, such as small handicrafts and other small self-employed, unemployed workers etc.

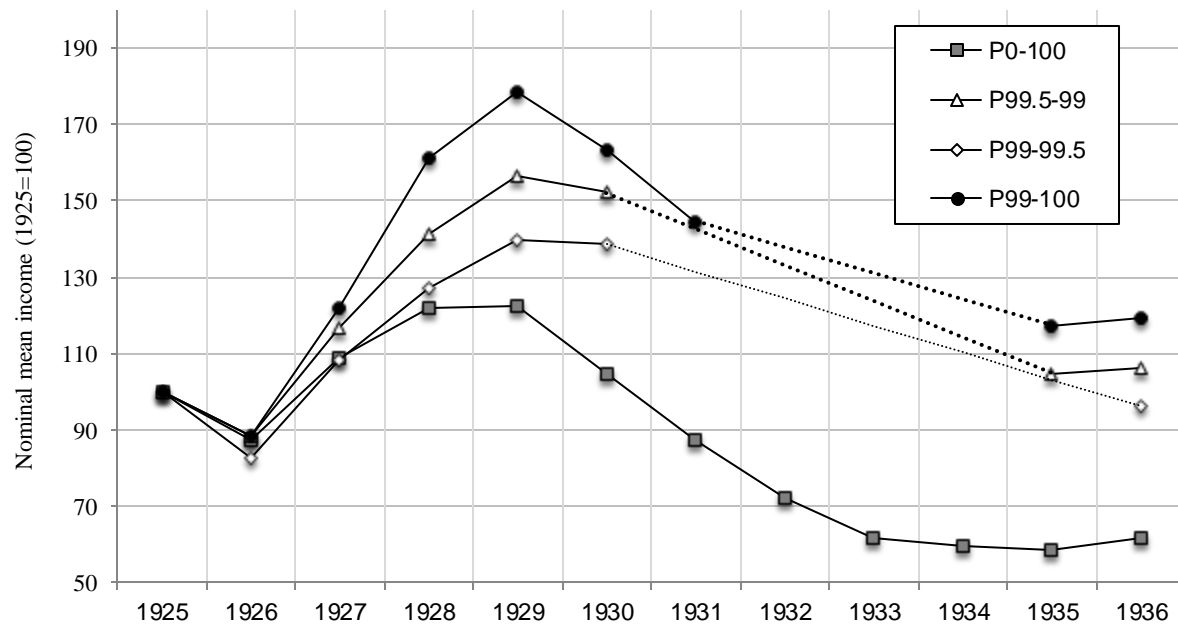
⁴⁰ Even the economic recovery in the late 1930s did not lead to the substantial improvement in the farmers' living standard (Landau and Tomaszewski 1985, p. 136).

three years after 1931) we find that top groups had managed to retain its relative standing, coming out from the crisis unscratched.⁴¹ On the other hand, the average nominal income (P0-100) almost halved in the decade since 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. As noted above, prices of cartelized products fell only moderately, while rough estimates indicate that cartels controlled more than a half of the industrial output in the 1930s (Landau 1978). The chief aim of cartels was to safeguard profits – as Kalecki (1938, p. 111) points out, the cartels are more likely to be formed during slumps⁴² - so the main beneficiaries should be searched among the capital income recipients. As we look next, these predominantly inhabited the very top – the top 0.1 per cent and above.

We can shed additional light on these issues by looking at income composition of top incomes. Figure 10 presents the split between earnings and other sources of income in 1929 and in 1936 (defined in the tax statistics as ‘unearned’ income, roughly corresponding to the broad definition of capital income including income from land, business profits and self-employment income, interests and dividends, rents, etc.). It can be seen that unearned income accounted for almost two-thirds of the top percentile’s total income in 1929 and that its importance increases 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 increased for top groups by 1936 - 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.

⁴¹ There could have been marked V shape of top 0.1% (as in Czechoslovakia), recovery in from mid-1930s.

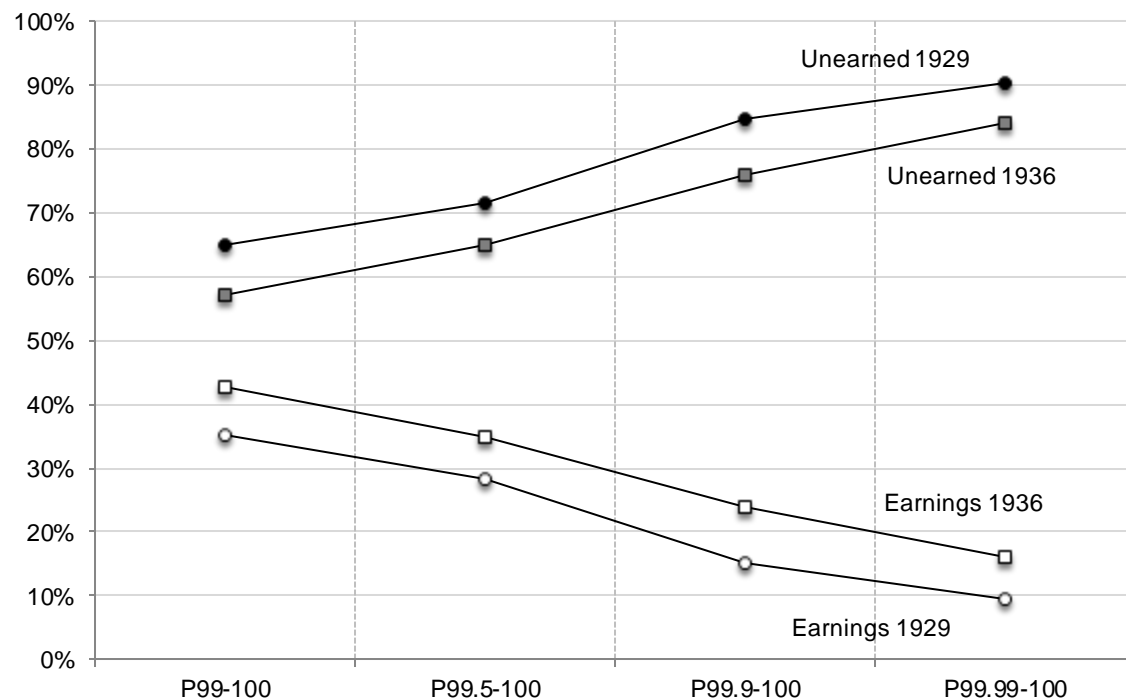
⁴² As has been noted above for the rising industrial concentration during 1923-6 depression.

Figure 9 : Evolution of average income of groups within the top percentile

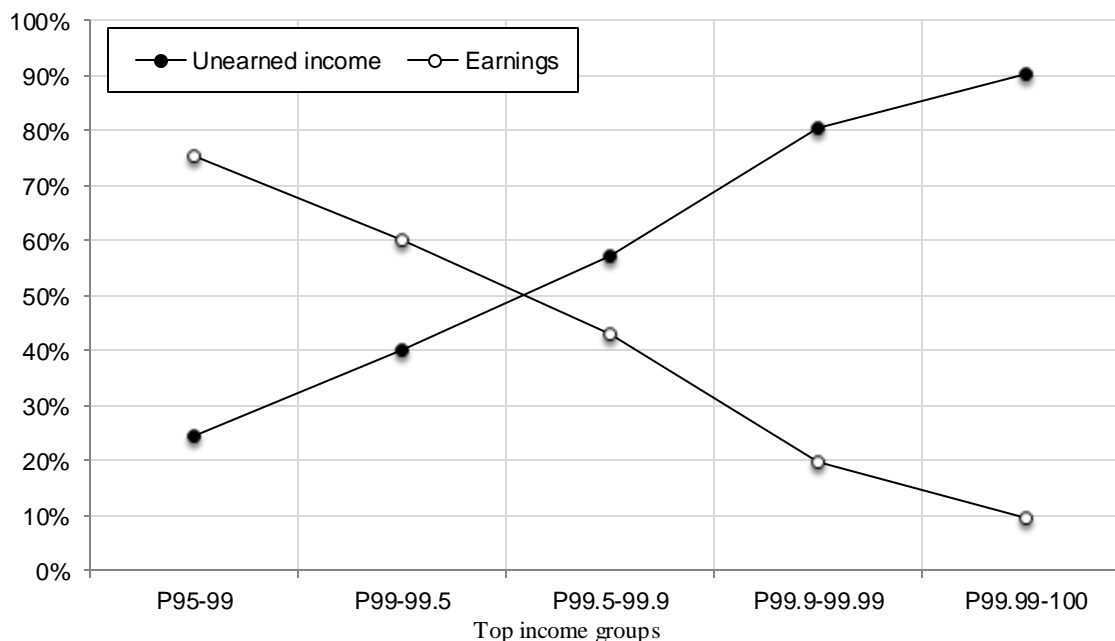
Source: authors' computations based on the income tax data.

In general, this picture is in line with findings for other countries where capital income strongly dominated at the levels of the top percentile and above. Similarly, Leszczyńska and Lisiecka (2008) show that the very top of the income distribution in Poland was dominantly composed of capitalists and big landlords. While the former was found residing at the top in most of the studied countries in the first half of the twentieth century, one should not be surprised by the more extensive presence of the great landlords. It is well known that land ownership was highly concentrated in Poland (and generally in Central Eastern Europe) before the Second World War, especially in the former Prussian partition where commercial agriculture played a substantial role (Jezierski and Leszczynska 2003, Eddie 2008). For example, according to 1921 census, the top 0.5 per cent of all landholdings owned almost a half of the total land (Maly Rocznik 1935, p. 32).

In addition, we were able to merge state employees with income tax statistics in 1929, which allows us an insight into the composition of 'lower' top income groups. Figure 11 thus shows that top income groups below the top percentile, such as the top 5-1 per cent, were dominantly composed of earnings.

Figure 10: The composition of top groups by income source between earned and 'unearned' income

Source: author's computation based on income tax statistics.

Figure 11: The composition of the top 5 per cent, Poland in 1929

Source: authors' computation based on income tax statistics. State employees and pensioners added.

County Analysis

We construct county-level top income shares using the income tax data for the interwar Poland. The details of the data and methodology can be found in the Appendix. Although we argue above that WWI was one of the key junctures in the long-run evolution of inequalities, we believe it could still be of help to understand top income patterns in the former partitions. In addition, we want to shed new light on plausibly the most interesting relationship in development economics, that between the (modern) economic growth and inequality (Kuznets 1955). In this respect, the unique experience of Poland makes almost an ideal research ground, since the economic development (or lack of it) assumed markedly different pace as well as the basic outline in various parts of the country.

Figure 11 presents the map of Polish counties in 1927; the upper panel displays 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 12 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, which might be either because they had already moved beyond the peak of the inverse U-curve, or simply Kuznets' theory does not hold. Institutions could matter as well. The social legislation introduced after World War I markedly improved situation of workers (Sztrum de Sztrém, 1922; Derengowski, 1930), which consisted a major part of the total income in these counties.

What was shaping the spatial distribution of inequalities in the interwar period? 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 (top income were therefore, 'capital income phenomenon'; Atkinson and Piketty 2007, 2010). Presumably, the 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)⁴³ and/or rising concentration of newly accumulated capital (e.g. Allen 2009). However, pre-

⁴³ As we propose above for Prussian Poland.

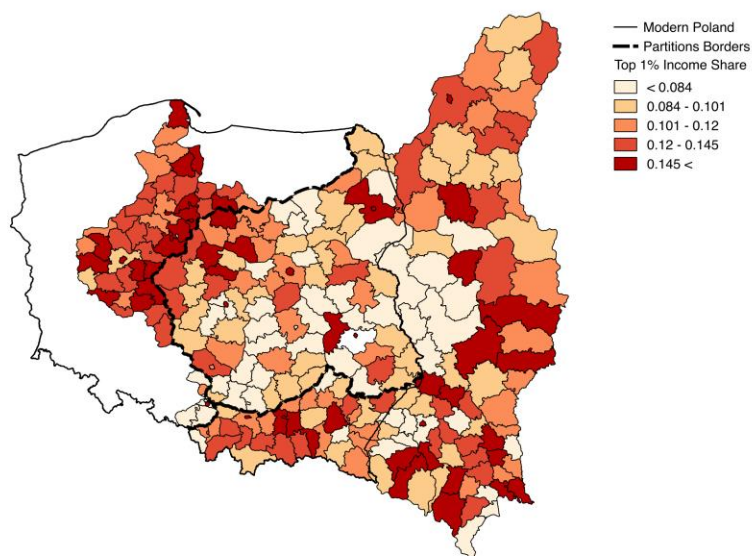
industrial societies had been often characterised by high wealth inequality, especially of land as the main factor of production. Yet, as noted by Milanović et al. (2010), income inequality in low-income pre-industrial societies was always limited by the subsistence level (the ‘inequality possibility 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. First, we look at the relationship between industrialisation and the level of top 1% income shares. We estimate two models,

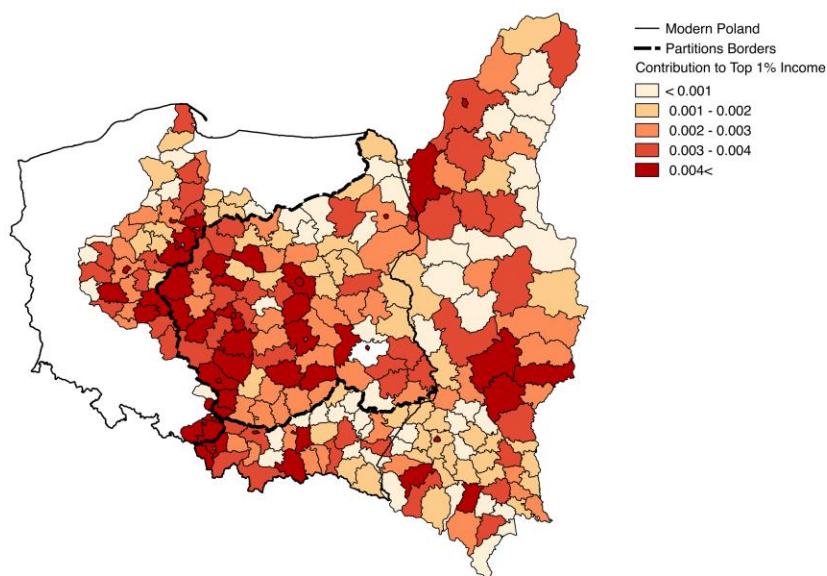
$$(1) \ y_{ip} = \alpha + \beta IND_{ip} + \delta URB_{ip} + \mu_p + \varepsilon_{ip}$$

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

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 industry employees. In the first model, β captures 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 the measure of 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.

Figure 12: County-level top 1% income share

Source: authors' computation (see Appendix).

Figure 13: County-level contribution to the aggregate top 1% income.

Source: authors' computation (see Appendix).

Table 2: The Top 1% Income Share and Agrarian Capitalism*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.

Table 3: The Top 1% Income Share and Urbanisation

	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.

Table 2, Panel A, Columns 1 to 3 shows the estimates for the model without the interaction terms. 10pp increase in the share of industry workers in the total population 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 inclusion of this variable drives β almost to zero (Columns 2 and 3). Columns 4 and 5 explore whether the relationship between industrialisation and inequalities differ across the former partitions. We find a *negative* correlation within the former Prussian partition, 10pp increase in the industry share means 2.3pp drop in the top income share. The correlation in the former Russian partition is also significant and negative, but much smaller in the absolute magnitude. 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. Table 2, Panel B, Column 1, shows that there is a positive but insignificant correlation between the agriculture worker share and inequalities. Column 2 adds the urbanisation ratio and the Gini coefficient for land ownership, the association between the agrarian capitalism and top income shares

increases and becomes significant. 10pp increase in the share of agriculture workers is associated with 2.3pp increase in the dependent variable. Columns 4 and 5 explore the heterogeneity across the former partition. The pattern is opposite as in the case of industrialisation, 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 inequalities across the Polish lands. The role of agriculture in the development of the Prussian partition is underlined by the fact that top income shares are more connected there with agrarian capitalism than with classic industrialisation. Similar, but much smaller, correlations are reported in the Russian partition. We suspect that this might be driven by the eastern-most areas, with the high presence of land-based magnates. On the other hand, in the Austrian partition top income shares are negatively correlated with agrarian capitalism and do not seem to be related to industrialisation.

Finally, we look whether urbanisation is an important predictor of inequalities. Table 3 documents the correlation between county's share of population living in cities and the top 1% income shares. In general, 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. Given the previous discussion on the different roads to industrialisation, it is not surprising to find the strongest association between inequalities and urbanisation in Galicia.

World War II and Early Communism

In order to understand the fall in top shares between 1936 and 1947 (Figure 1), 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).⁴⁴ At the same time, Nazis 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 funds⁴⁵ (a policy later pursued by communists).

The same reasoning - the primacy of accumulation needs in economic policy - implied that Nazis favoured concentration of capital (Sweezy 1939, 1941). As a matter of fact, the tax data for the post-WW2 years 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). However, both physical and legal persons are grouped, without providing separate presentations as before the war. But nationalisation of a large part of big (joint-stock) companies in Poland happened immediately after the war, thus relatively earlier than in other newly turned communist countries in Central Eastern Europe, and it is probable that the presence of the remaining legal forms had not distorted substantially the picture corresponding to physical persons only. Actually, Nazis had already expropriated largest corporations (not owned by Germans), which then the state took over after the war. Landau and Tomaszewski (1985, p. 196) thus note that right after the war state owned “all major enterprises in Poland, as in most cases their legal status had not been settled or they were treated as abandoned property... Sometimes their owners returned but could not afford the capital cost of reconstruction”.⁴⁶

Figure 14 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 Paretian form (inverted Pareto coefficient b). We present roughly 200 thousand top taxpayers⁴⁷ obtaining unearned income in 1936, 1946 and 1947. In addition, we show the ratio both for physical persons only as well as for all taxpayers (including also legal persons) in 1936. It can be seen that while the ratio is notably higher

⁴⁴ 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 notable amelioration of farmers’ living standard in comparison to the 1930s.

⁴⁵ In addition to being an assault on Polish intelligentsia. But both the Nazis and the Soviets more often applied the extermination approach to deal with the Polish elites (e.g. Snyder 2015).

⁴⁶ Note that most of joint-stock companies were before WW2 in foreign ownership (Wellisz 1938, p. 144). The rapid nationalization of largest concerns after the war was in a large part motivated by reducing country’s dependance on foreign capital (Landau and Tomaszewski 1985, p. 198).

⁴⁷ 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).

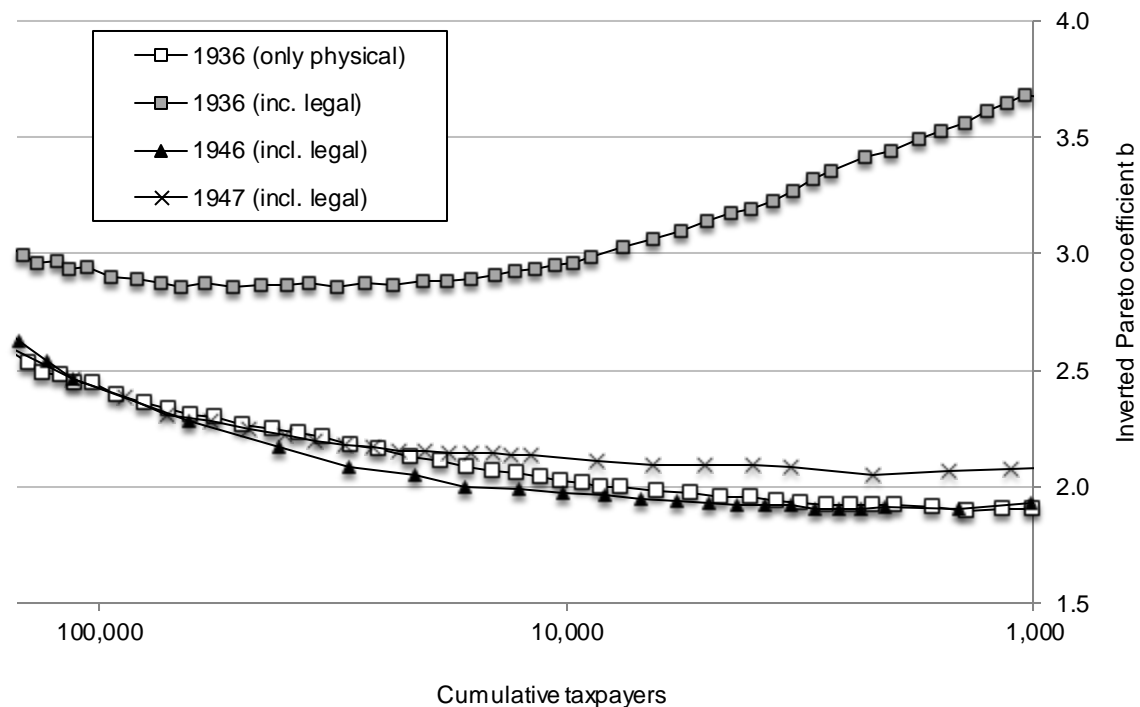
in 1936 when legal persons are included (due to their strong concentration at the very top), top concentration for physical persons before the war is quite similar to that observed immediately after the war. Once again, if the inclusion of legal forms does not critically affect the shape of the upper part of the distribution, 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.⁴⁸

The above results might suggest that the Second and the First World Wars differed in their impact on top income shares. The full explanation is beyond the scope of this paper, but we provide some intuition behind these results. After invading the USSR in 1941, the Nazi Germany considered the annexed Polish lands and the General Government as an important source of agricultural and industrial output for their economy. It was in the best interest of the Germans to take over the industrial establishments and keep them efficient and operational. A common strategy, for instance, was to consolidate industry by moving production from small to large entities. In addition, the resistance of the Polish workers and a fast progress of the Red Army during the final stages of the war limited the German attempts to move or destroy the factories (Landau and Tomaszewski 1985).

The post-war period was favourable for the quick recovery of the industry. The territorial changes brought a new resource base, and workers' almost heroic efforts enabled a fast launch of production. Already in 1946/1947, the industrial output was over 90% of its 1938 level. This is in contrast to the first years after the First World War, as in 1920 the industrial production was only 35% of the level in 1913 (Taylor 1952, p.181).

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 86.8% 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.

⁴⁸ 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.

Figure 14: Inverted Pareto coefficient b for 'unearned' income

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

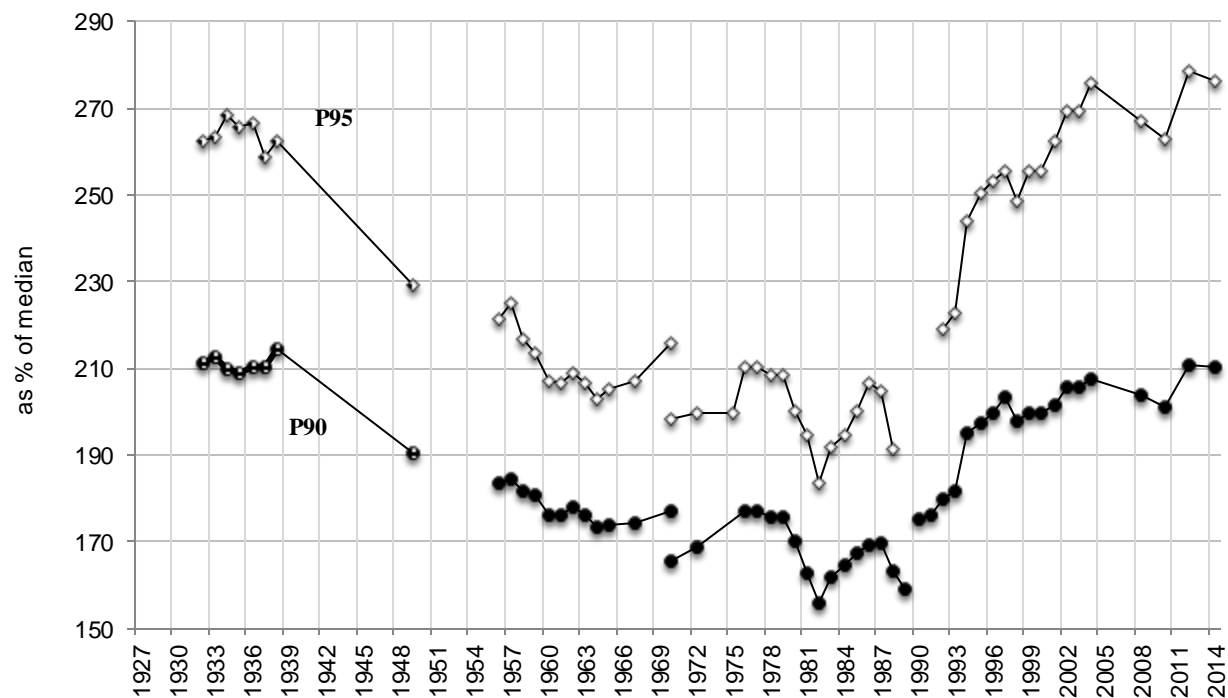
Communism also brought about a fall in earnings dispersion. Figure 15 thus presents the upper part of the earnings distribution, showing the evolution of 90th and 95th percentile (expressed as a proportion to median) from the late 1920s until today. It can be clearly seen that the top earnings concentration was substantially lower in the communism than in the interwar period. Consequently, shares of top income groups such as the top 5-1 per cent, mostly composed of earnings (Figure 11), fell.

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. As mentioned above, 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 (Homze 1967). The end of the German occupation did not reverse the trend in wage compression and moreover led to notable improvement in wages of manual workers in comparison to interwar years. This was an additional factor for the fall in top shares between 1936 and 1947, as Landau and Tomaszewski (1985, p. 211) note that "salaries...were much lower than before 1939, whereas the wages of lowest paid labourers grew considerably." Figure 14 shows a notable fall in top earnings dispersion between 1939 and 1949. The fast industrialisation and urbanisation signifi-

cantly 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.

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.⁴⁹ Ironically, it required radical totalitarian forces in Central Europe to break the fetters of the past.

Figure 15: 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); 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.

⁴⁹ See section on the Prussian partion above for a discussion on the *Sonderweg* and especially about the pervasive influence of the aristocracy(Junkers) in the Prussian East.

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” (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 very concentrated (Piketty 2014), nationalisation of business capital should inevitably lead to a 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 structure in a socialist economy was an outcome of a macro-level centralised policy and micro-level incentive schemes. In general, a socialist economy is based on a plan which sets compensation for major occupation groups/strata of workers, specifies targets and limits for production (Flakierski 1986). The central planner uses the wage structure as a macro policy tool, for instance, to provide incentives for people to invest in particular skills, to stimulate the economy by widening earnings differentials or to cool down social dissatisfaction by narrowing them (Atkinson and Micklewright 1992). At the micro level, the establishment wage bill depends on the fulfilment of the assigned plan.⁵⁰ Given the central wage structure, workers from highly productive companies should enjoy relatively higher compensation, whereas wages of those, which companies fall short of the plan, will be relatively smaller. In practice, the system proved to be highly inefficient as targets were set low and agents had no incentives to increase productivity. Even though the forces shaping earning differences should be theoretically similar as in a capitalist economy, the real determination of wages was often more dependent on the political power of workers, managers and industry groups (Brus 1974).

Figure 2 depicts the top 1% *labour* income shares during the communist period (see Appendix 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.⁵¹ 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. The low level of the top labour income share, and its stability owns to a lesser concentration of labour than capital and

⁵⁰ In a socialist system with market-based mechanisms, the company-level compensation might depend on the after tax profits of a company, rather than realization of the plan. For more details see Flakierski (1986).

⁵¹ 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 real estate.

is consistent with the findings from Hungary (Mavridis and Mosberger 2016) and other capitalist countries (Piketty 2014).

The evolution of wage ratios, depicted in Figure 15, is more volatile than the top labour share, yet the relative levels and trend are similar. To understand better these changes, we now turn to a more detailed description of the events shaping inequalities in the socialist Poland.

The Polish version of the Stalinist economy gave exceptional power to the high-level managers (the “one-man-rule”) and worsened workers’ representation, along with their living standards (Brus 1974). Although the death of Stalin in 1952 opened the communist model for reconstruction, not much had changed. The popular dissatisfaction was growing and culminated in massive and violent protests of workers in Poznan in June 1956.⁵² In October the Party leadership was replaced and a set of reforms improving workers condition, and their representations were initiated. The move towards semi-independent unions is marked by the decline in the wage decile ratios (Figure 15). Interestingly, the P95/P50 ratio falls more abruptly than the P90/P50, possibly owing to the decline of the power of the high-level management.

The “thaw” was short-lived. In the early 1960s, 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 trend accelerated significantly in early 1970 (Figure 15) when the Party announced a new consumption-oriented direction of the economy, financed mostly by foreign loans. At the same time, limited marketization reforms strengthen the connection between worker’s performance and wages. Importantly, the change was due to the growth of within-industry wage dispersion and thus was not a result of a shift in industry composition (Flakierski 1986).

The loan-financed economic growth resulted in a profound economic crisis and substantial fall in real wages. The popular dissatisfaction was further reinforced by the high wage inequalities, leading to massive protests and emergence of the “Solidarność” movement in 1980. The same year is marked with a remarkable fall in the wage ratios, which could be an outcome of the government’s strategic policy to calm down the unrest with lower wage differentials (Flakierski 1986; Atkinson and Micklewright 1992).⁵³ Yet, the communists did not manage to stop the new democratic movement and, in 1989, they

⁵² The violent Budapest anti-communist uprising of October 1956, started as a support movement for the changes in Poland.

⁵³ 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).

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.

Top incomes after communism

The rise of top income shares after the fall of communism has been driven both by earnings dispersion and growing concentration of business income. **Figure 16** and **Figure 17** show that earnings have dominated for lower top groups constituting the top decile, such as the top 5-1 per cent, while higher top income groups were mostly composed of business income.

The rise of earnings dispersion at the top can be in addition clearly seen in Figure 15 above, being especially strong for the higher percentiles such as P95. As pointed by Atkinson (2008), there has been a ‘fanning out’ at the top, with the higher percentiles experiencing relatively larger rise.

In general, rising earnings dispersion has been commonly identified as the main cause of rising income inequality in Central Eastern European countries.⁵⁴ Even though the share of wages in the total income dropped, rising wage concentration has spurred the overall inequality increase (Milanović 1999). Thus, it is not surprising that the evolution of earnings distribution displays the same pattern already documented for the income distribution. As summarised by Rutkowski (2001, p. 11): “In all CE countries the widening of the earnings distribution has taken place at its both ends. The relative position of workers in the bottom of the distribution has deteriorated while the position of those in the top has improved. However, the latter effect was dominant, that is the newly gained affluence of top paid workers was more pronounced than the impoverishment of the low paid workers.”⁵⁵ The rising educational premium has been singled out as the main cause of rising wage inequality in Poland and other Central European countries (e.g. Rutkowski 2001, Brzeziński et al. 2014). Higher returns on education were driven largely by the decentralisation of wage setting process, both in private and public sector (Keane and Prasad 2006), with earnings becoming more indicative of productivity, as well as by the global

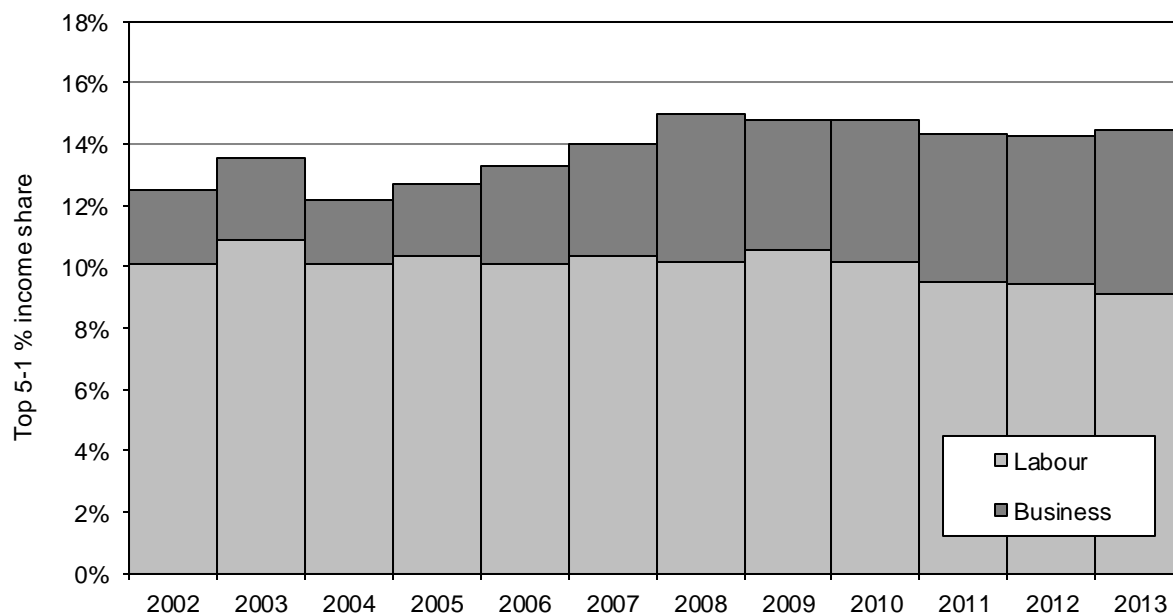
⁵⁴ Mitra and Yemtsov (2006) identify six drivers of inequality in transition: wage decompression and growth of the private sector; restructuring and unemployment, reverting to subsistence economy; fiscal adjustment affecting Government expenditure and taxation, corruption; price liberalization, inflation and arrears; assets transfer, growth of private income; technological change, increased mobility and globalization.

⁵⁵ 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.

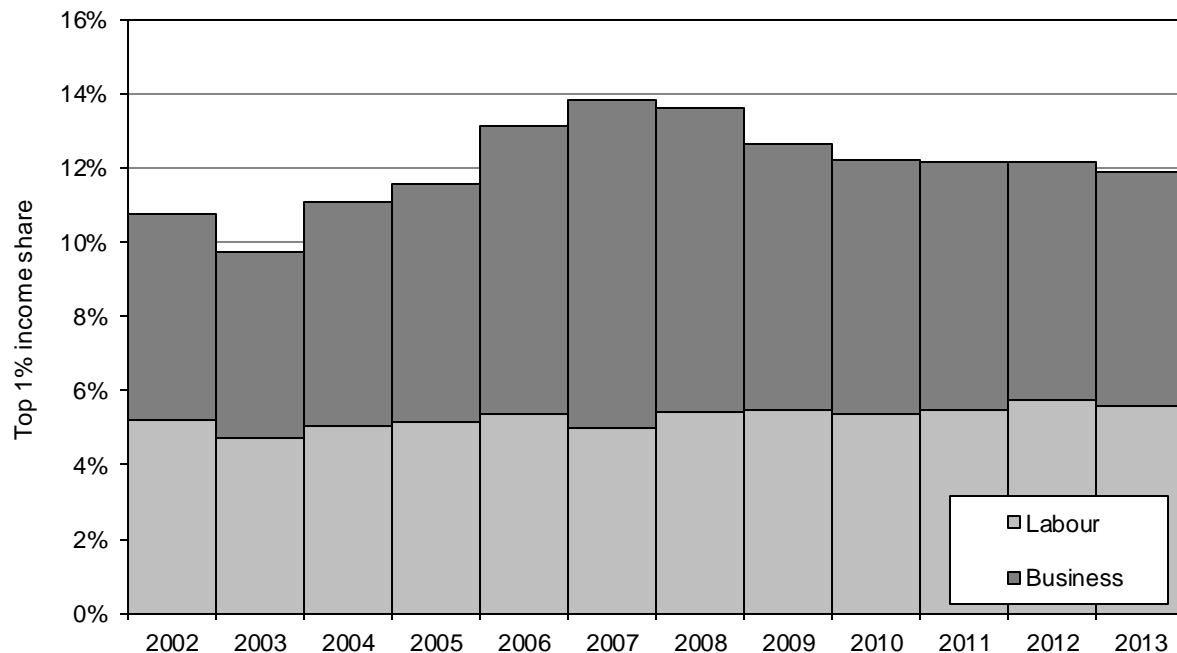
trend of rising complementarity between skills and technology, or the so-called ‘skill-biased technological change’ (Brzeziński et al. 2014).

Next, rising concentration of business income has been especially important in driving an increase in top income shares. One should point to its strong prevalence at the level of the top percentile in Poland. For example, in the majority of countries studied thus far, employment income has been the dominant income source for the top income groups in the recent period. We can also ascertain that business income at the top has been procyclical, and mostly driving the fluctuation of the top percentile. On the other hand, employment income has been more rigid and generally found to be more resilient to economic shocks. Thus, the largest upsurge in top income shares in the second half of the 2000s was exclusively driven by the rise in business income as evidenced by both Figure 8a and 8b. As a robustness check we look at estimates from income tax microdata for Lower Silesian region provided by Kosny (2012) (see Appendix). It should be noted that comparison is not perfect, as one can question the actual representativeness of Lower Silesia for the whole country, as well as the definition of top groups. But, there is a clear predominance of business income at the top percentile level as observed in whole Poland.

Figure 16: Top 5-1 per cent income decomposition between business and labour income



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

Figure 17: Top 1 per cent income decomposition between business and labour income

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

Accounting for the Recent Rise in Top Shares

But first, one should bear in mind that using the tax data for the income distribution analysis includes various interpretational caveats. Most importantly, changes in the tax code could induce individual behavioural responses producing a strong impact on the reported income to tax authorities. Thus, 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? While some part of the drop could be due to real top income phenomena, such as the early 2000s recession, we cannot exclude the possibility that it might be to a greater extent a response to the announced reform of 2004. 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 2003.⁵⁶

⁵⁶As discussed previously, before 2003 taxpayers reporting business income were taxed using either 32% or 40% tax rates. After the reform, they gained an option of reporting business income using the flat rate of 19%.

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).

Similarly, this raises a question whether a robust rise in top incomes in Poland from 2004 onwards was caused by the reform-induced increased reporting of business income to tax administration, for example, due to reduced tax avoidance and/or tax evasion, as proposed by Kopczuk (2012). A decrease in marginal top rates for business income below the top rates applicable to earnings might have induced substantial shifting of high earnings to business income (e.g. Gordon and Slemrod 1998). For example, Jäntti, Riihelä and Sundström (2010) relate a strong (driven by capital income) rise in top income shares in Finland in 1990s directly to the 1993 tax reform, which assumed the same contours as the Polish tax reform.⁵⁷ Yet, as they point (p. 403), “a relevant question to ask is whether this increase in top incomes could have occurred had the income tax system remained the same as before [1993].” Our answer is, although we believe that the reform did have material effects, that it is not the whole story, especially that the strongest rise occurred after 2005 and lasted four years.

A strong rise in business income after 2005 might not only indicate a cyclical fluctuation caused by exceptionally positive business environment leading to higher business profits – as first post-accession years undoubtedly were – but also a structural rise in top incomes driven by concentration of business income. This also calls for a more detailed study of the effect of factor shares (Figure 18). In general, the period after EU accession has been associated with capital deepening (see Gradzewicz et al. 2014) and rising capital share (falling labour share) (Growiec 2012). The most popular explanation has attributed a rising capital share to capital-augmenting technological change.⁵⁸ 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). For example, one potential channel of capital-augmenting technology entering Poland has been strong foreign direct investment (FDI) inflow which accelerated with the EU accession.⁵⁹ This is probably related to processes accompanying the new globalization phase and Poland’s increased participation in global value chains (GVC) (Baldwin 2016). There has been outsourcing of production process, notably from neighbouring Germany as the stronghold of European GVC (Timmer et al. 2012). This is evidenced in the strong rise of

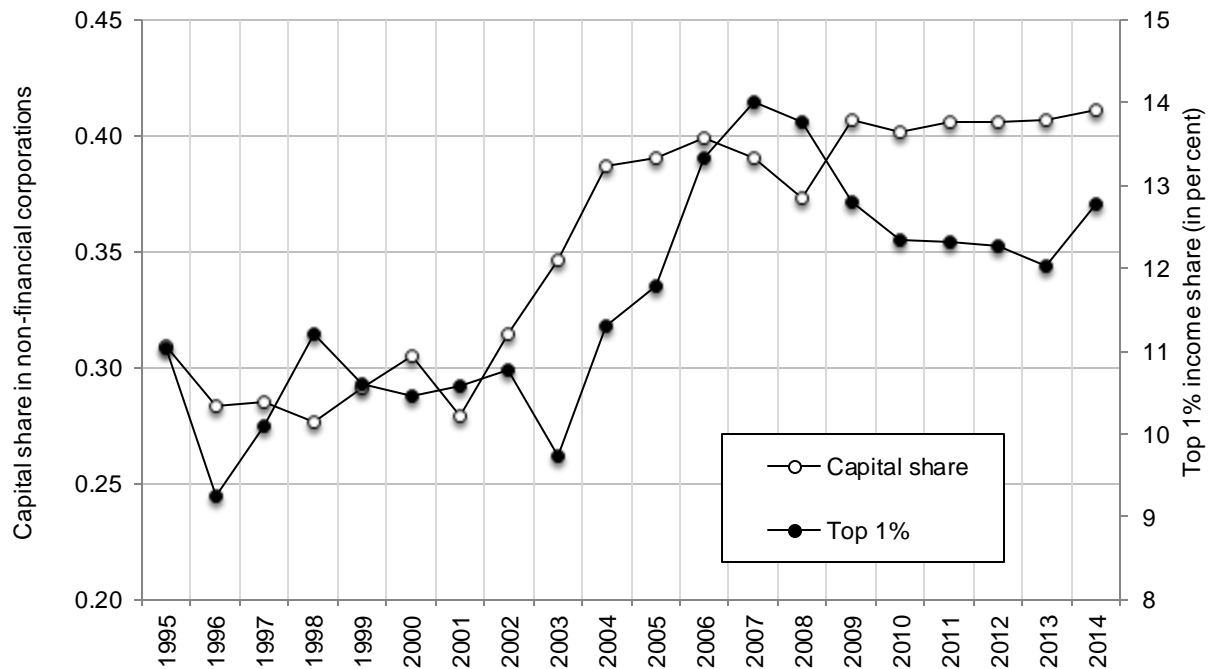
⁵⁷ Jäntti, Riihelä and Sundström (2010) find both the increase in capital income concentration as well as the rise in the aggregate capital share (see more below).

⁵⁸ For an overview of theories aiming to explain the recent global rise (decline) in the capital (labour) see Giovannoni, 2014; Growiec 2009 for the most comprehensive account on Poland; or Rincon-Aznar et al. 2015 generally for CEE Europe.

⁵⁹ FDI is often seen as the principal tool of technological transfer that has been critical for successful restructuring after communism, and the largest part of FDI entered capital-intensive manufacturing industries (Olszewski, 2009).

manufacturing output, so that Baldwin (2016) includes Poland among the constituent member of the 'Industrializing Six' developing countries.⁶⁰

Figure 18: The evolution of capital share in gross value added of non-financial corporations and the top 1 per cent income share, Poland 1995-2013



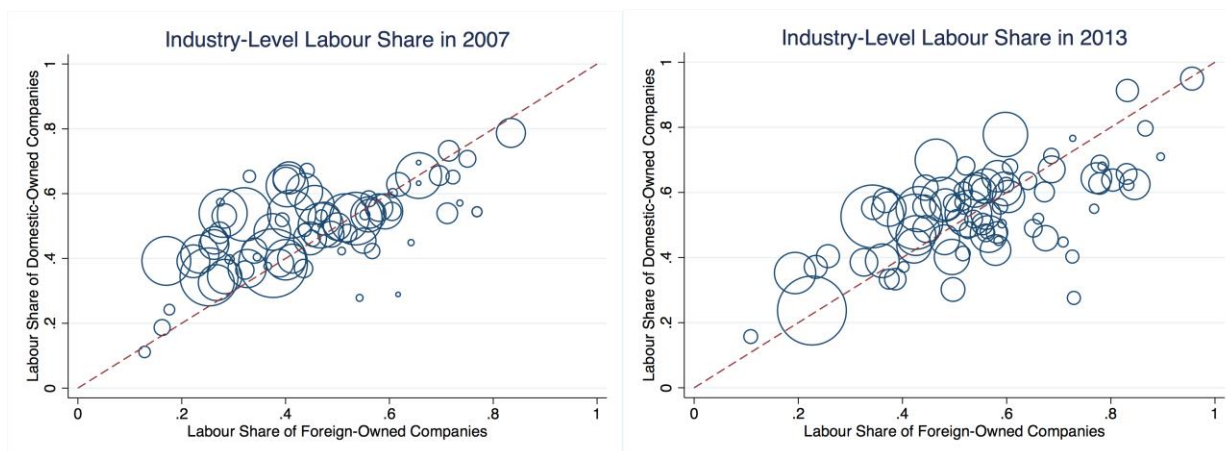
Note: capital income is calculated as 80 per cent of gross operating surplus in non-financial corporations. Capital share is the proportion of thus obtained capital income in factor-cost gross value added of non-financial corporations. We take 80 percent of gross operating surplus since Polish National 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. Source: Polish National Accounts; Eurostat.

Figure 19 displays the industry-level labour share for foreign and domestic owned companies. The circle size denotes the value-added size of an industry. When a circle (industry) is above the 45-degrees line, the labour share of domestic-owned companies is higher than the labour-share of foreign-owned companies from the same industry. All circles located on the diagonal line thus represent industries, in which there is no difference in the labour share between the forms of ownership. The left graph presents the data from 2007; it is clear that the domestic-owned companies were relatively more labour-intensive, which is consistent with FDI favouring capital-intensive enterprises. Interestingly, this pattern is stronger for relatively capital-intensive industries (located closer to the axes origin). Conversely, relatively labour-intensive industries are located on

⁶⁰ Together with China, South Korea, India, Indonesia and Thailand.

the diagonal line. In 2013, the foreign-owned companies are no longer more capital-intensive, as most of the observations are located on the 45-degrees line. This is consistent with the FDI spillovers gradually leading domestic sector of the economy to shift towards the capital.

Figure 19: The Industry-Level Labour Share



Note: The graph presents the industry level ratio of labour compensation and value added, calculated separately for foreign and domestic owned companies. The circle size represents the value-added size of an industry. Source: The author's computation based on the Eurostat data.

Another likely explanation is a trade-induced shift towards capital-intensive sectors. Traditional labour-intensive industries, such as mining or textile manufacturing, have been exposed to the increasing competition from trade, especially after China joined the WTO in 2001. Similarly, the Russian crisis of 1998 might have disproportionately affected labour intensive sectors as there is a negative correlation between firm-level export orientation and capital share in value added (Growiec 2012). In Poland, business income is strongly concentrated at the top of the distribution, with the top 1 percent income group holding almost two-thirds of the total business income reported to the tax administration, and any notable change in the functional distribution (towards capital) could result in rising top concentration.⁶¹

⁶¹ 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. Following Atkinson (2009, p. 10) and Atkinson and Bourguignon (2000, p. 9), we can look at this relation by taking coefficient of variation of income, V^2 , as a measure of income inequality: $V^2 = (1 - \pi)^2 V_w^2 + \pi^2 V_k^2 + 2\rho\pi(1 - \pi)V_k V_w$, where π is capital share, V_k and V_w present the dispersion of capital and labour income respectively, and ρ stands for correlation between capital and labour income. For example, as further pointed by Atkinson (2009, p. 10), in a case of pure ('Ricardian') class system (where ρ is equal to -1), personal distribution of income will become more unequal as a result of rising capital share if $\pi > 1/(1 + \frac{V_k}{V_w})$. And the conventional belief that V_k is greater than V_w probably still corresponds well with reality, even with rapidly rising returns to human capital. Glyn (2009) thus argues: "despite the spread of 'popular capitalism', wealth and especially high-yielding wealth is still extremely unevenly distributed".

It is interesting to note that the most affluent Poles are not top managers in large (commonly multinational and financial) corporations, but 'homebred' business owners and entrepreneurs. What are the implications, for example, for the growth-equity tradeoff? Especially, when this energetic first post-transition generation settles down, could it result in the slow-growth rentier-dominated society (Piketty 2014)? There is a clear need to look together at income and wealth distribution. Unfortunately, we cannot assess the importance of capital income (dividends and interest) for top incomes, but it is plausible that business income at the top also reflects in large part the return to capital. Entrepreneurial income clearly combines both the capital and the labour component.⁶² Namely, the exact definition of business income in the tax code is far from straightforward. For example, the tax statistics mingles here both the owners of large unincorporated businesses and self-employed individuals mostly relying on their human capital.⁶³ However, as typical for tax legislation, this distinction depends on definitions and is somewhat blurred by the prevailing corporate form. Unincorporated enterprises are quite frequent business types in Poland, often including those with substantial capital (Johnson 1994, p. 265).⁶⁴ Kopczuk (2012, p. 6) points in addition that benefits of incorporated organisations such as limited liability can still be in practice combined with personal income taxation under business income (e.g. in the case of *spółka komandytowa*). This option thus equally allows for 'silent partners' (earning 'passive' capital income) to be subject to PIT with business income. On the other hand, corporations distributing profits in the form of dividends are less frequent, predominantly in foreign-owned enterprises. For example, the Polish national accounts point that dividends make less than 10 per cent of distributed profits of corporations received by households, while the rest refers to distributed profits from unincorporated enterprises (Figure 20). This could be attributed to the influence of German corporate law. Dell (2007), for example, points that in Germany top capital incomes generally take the form of business income of unincorporated enterprises⁶⁵ (see also Bach et al. 2009). In Italy, similarly, many large businesses are of unincorporated form.

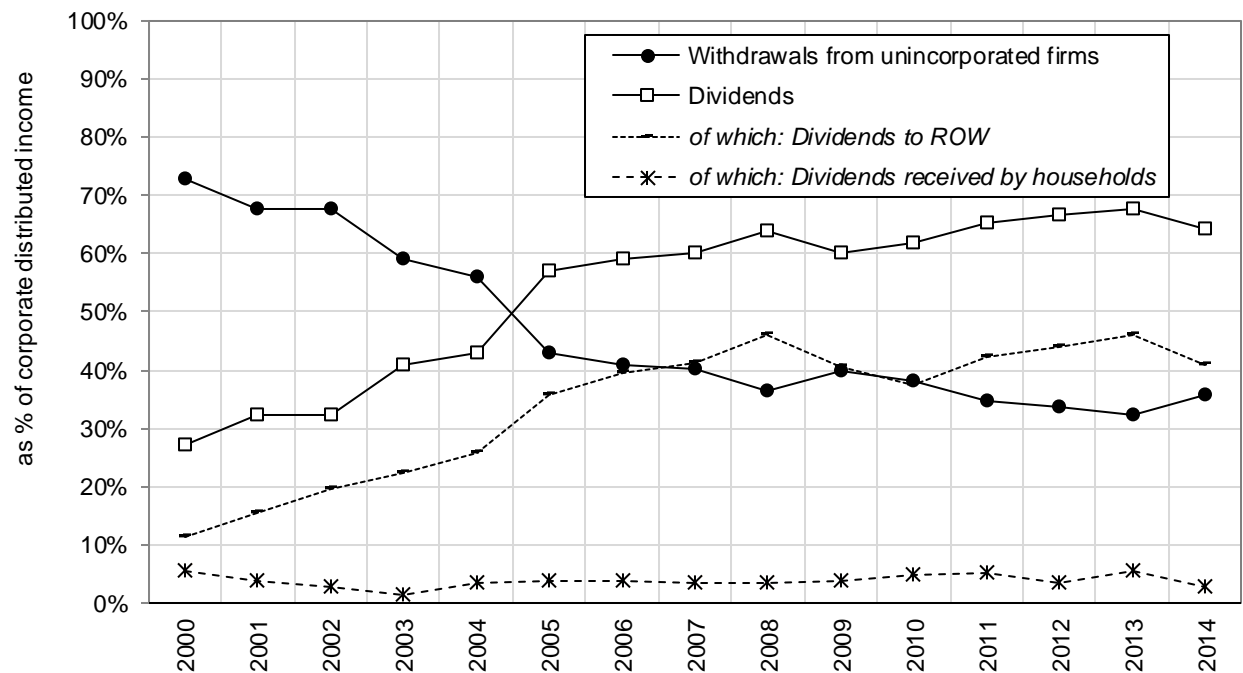
⁶² Meaning that in addition to the pure return on used capital, a part of profits is generated by entrepreneurial talent and skills of business owners which should be characterised as labour income. Business owners moreover have certain discretion in deciding whether to designate income as retained and withdrawn profits or in the form of wage compensation (notably to themselves and their family).

⁶³ In this respect, one faces a similar conceptual problem as when attributing entrepreneurial and self-employed income in determining the factor shares in national income (see in particular Krueger 1999, Elsby et al. 2013). Kosny (2012) wonders whether the importance of business income at the top in Poland is actually exaggerated by actually reporting some earnings income in the form of business income to tax authorities.

⁶⁴ As pointed by Johnson (1994, p. 266), unincorporated form was more preferable at the outset of transition since taxation was heavier for incorporated firms.

⁶⁵ Dell (2007) points that "the German tax law registers as 'business income' (Einkünfte aus dem Gewerbebetrieb) incomes that would, for example in France, be recorded as capital income. This phenomenon still exists today and is

Figure 20: Distributed income from corporations



Source: Central Statistical Office of Poland, National Accounts

Note: 'withdrawals' from unincorporated firms is received in total by households

Figure 20 also indicates that from the total capital income generated in the country, the capital income received by foreigners is almost as important as the capital income received by the Polish households. Moreover, the Financial Balance Sheets of the Bank of Poland show that the rest of the world sector has become the largest ownership sector of the Polish corporations.⁶⁶ This discloses to a large extent the general convergence strategy pursued in CE Europe, relying, as we saw, on foreign technology and know-how transfers. Yet, this has clear effect on inequality by removing a large part of the (high-yielding) property income from interpersonal (resident) income distribution. As capital income has been usually concentrated at the top, foreign-owned countries - such as Poland - display, other things equal, lower inequality than countries with positive foreign capital balance – such as Germany. Importantly, a considerable part of foreign ownership might be actually owned by Poles from tax havens (Zucman 2015).

related to the fact that public corporations (Aktiengesellschaften) which pay dividends which are in turn taxed under the category 'capital income' was until recently quite rare in Germany. Other legal forms for societies (Kommanditengesellschaft or Offene Handelsgesellschaft) seem to have been much more widespread and even encouraged by corporate and business tax law."

Polish equivalents are: spółka jawna for Offene Handelsgesellschaft, spółka komandytowa for Kommanditengesellschaft, and spółka komandytowo-akcyjna for Kommanditengesellschaft auf Aktien.

⁶⁶ Measured by equity holdings (AF.5) of households (S14), general government (S13) and the rest-of-the-world (S2).

Business Income Concentration

The concentration of business income at the top could suggest higher inequality of ownership over productive assets in Poland and calls for studying wealth distribution. Moreover, as suggested by Glyn (2009), this is a part of wealth obtaining higher returns, and potential inequality in its distribution can have a critical impact. The wealth survey conducted by the National Bank of Poland in 2014 (*Zasobność Gospodarstw Domowych w Polsce*)⁶⁷ offers a limited insight into the level and structure of wealth possessed by the richest. Unsurprisingly, there is a positive correlation between wealth and income (0.42). The top 10% richest individuals in the sample has 37% of the total wealth from the sample and earns 23% of total income (NBP 2015). Business wealth accounts for more than a quarter of their wealth, which is the highest among the decile groups and above average for EU countries. This is consistent with our results showing that over 40% of the top 5% income in 2013 originates from business.

In a stylised framework, a high concentration of business assets in the hands of entrepreneurs could be seen as a precondition for entrepreneurial activity. For example, Hubbard (2001) has proposed, building on the important contribution of Fazzari, Hubbard and Petersen (1988), that with costly external financing self-selection into entrepreneurship crucially depends on the disproportionate ownership of wealth.⁶⁸ In the context of a transition country with still underdeveloped capital markets and asymmetric information in the credit market, a reliance on initial wealth and internal funds could indeed present a decisive ingredient for starting a business and securing its perpetuation, especially when it comes to undertaking investment activity. As Kalecki famously noted: “the most important prerequisite for becoming an entrepreneur is the ownership of capital”.

The link between financial market imperfections and the (initial) wealth distribution and growth has been widely studied (for example, the possibility of poverty traps; e.g. Galor and Zeira 1993, Banerjee and Newman 1993). In the development context, which could also be applied for transition countries, the existence of credit constraints could lead to Kuznets’ inverse-U interplay between wealth inequality and growth. In initial stages wealth concentration drives growth through capital accumulation, and in later stages wealth inequality falls, either spontaneously (e.g. Aghion and Bolton 1997) or through redistribution. In Poland specifically, several studies have indicated that borrowing constraints have

⁶⁷ The survey is a part of European Central Bank’s Household Finance and Consumption Network. The sample in 2014 consists of 3500 observations out of 7000 initial sample (52% response rate). By design there is an over-representation of the richest. The main measure of wealth is Private Net Worth (a sum of real estate, cars, items, business wealth, financial assets, minus loans).

⁶⁸ Also on models such as that of Evans and Jovanovic 1989.

been especially pervasive (Błaszczuk and Woodward (1999),⁶⁹ Neneman and Piwowarski (2004, p. 25); or Stiglitz (1999) in general for former socialist countries in CE Europe).

And, as also pointed by Hubbard (2003), the higher saving rate of entrepreneurs coupled with higher available returns on business activity could have led to further concentration of wealth. It has been found that saving rate in transition has been strongly correlated with income level. Denziger, Wolf and Ying (2000) found that saving rate rose strongly with income in Poland, Hungary and Bulgaria.⁷⁰ As they point, it seems that the effect of precautionary savings motive (which declines with income) was greatly reduced since “the transition has pushed a significant fraction of households close to subsistence, reducing their savings capacity”.

In general, one should be reminded that economic theory on wealth accumulation is of little help in explaining how self-made fortunes are created. Here is quite useful to quote Davies and Shorrocks (2000, p. 628) who point: “casual empiricism suggests that [self-fortunes] are linked inextricably with entrepreneurial activity, and that, although ability and ambition play a part, the size of the fortune depends largely on “being in the right place at the right time” – in other words, luck. In effect, social and technological developments create opportunities for fortunes to be made, which specific individuals exploit with varying degrees of success.” Privatization is probably the most straightforward example of these social developments.⁷¹ A certain dose of good luck and knowing the ‘right people’ obviously played a role in more favourable access to public wealth. And here, Poland and other transition countries are no exceptions.⁷² For example, the creation of new enterprises in Poland had been closely linked to the liquidation of state-owned enterprises (SOEs).⁷³

⁶⁹ For example, Błaszczuk and Woodward (1999, p. 42) point: “The analysis of ... enterprises points to striving at self-reliance given the high interest rate on credits.”

⁷⁰ See similar conclusion by Guriev and Rachinsky (2008, p. 138-9) who point to the findings of Foley and Pyle (2005) for Russia.

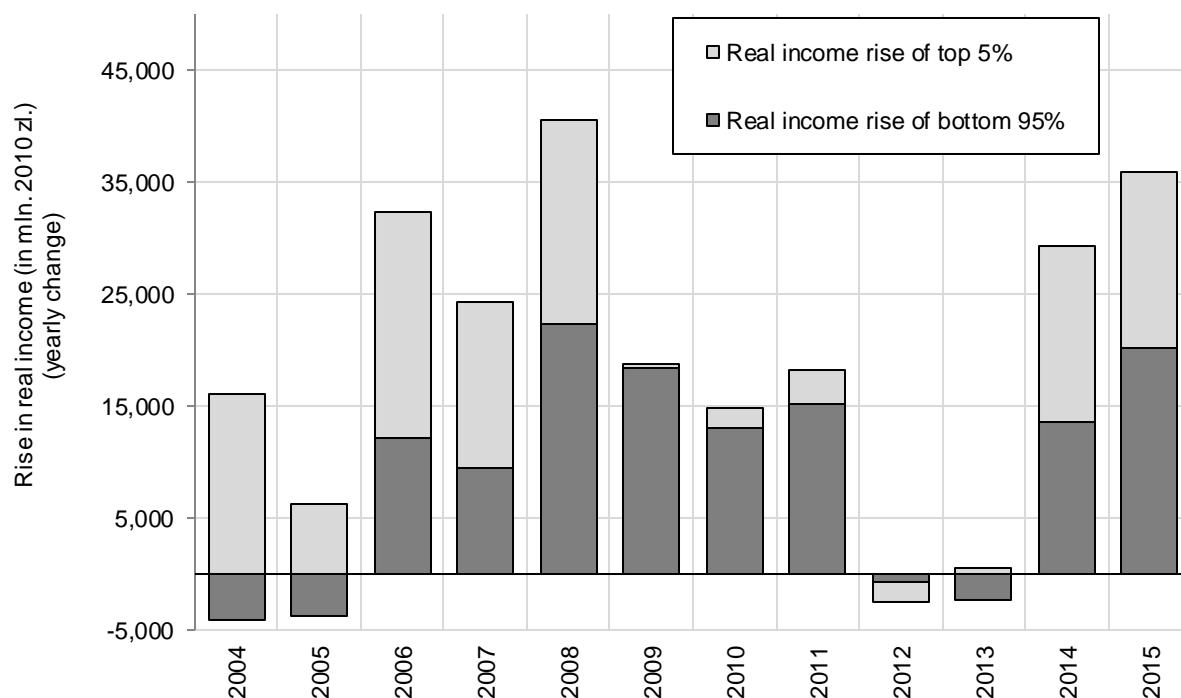
⁷¹ As Davies and Shorrocks (2000, p. 628) further note: “Recently in the UK, for instance, a number of large fortunes can be traced to the privatization of publicly owned enterprises during the 1980s and 1990s.”

⁷² To put it briefly, it is possible that those owners of private enterprises who initially benefited from the privatization, have been responsible for the observed concentration of business income in Poland. As suggested by findings of several studies (e.g. Mitra and Yemtsov 2006; Milanovic 1999), it is exactly this early phase of transition that brought about strongest concentration of business income, being at the same time the principal reason behind the overall rise in inequality in the early 1990s. Besides, the inequality of business income might have been especially exacerbated by the fact that the rest of small enterprises have actually been characterised by low or negligible income generating power, and have served at best as the buffer against unemployment (Surdej 2000, Scafe 2000).

⁷³ Importantly, 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). This practice, made possible by Article 19 of 1981 Law of State Enterprises, was quite widespread and certainly contributed to the establishment of

The evolution of the top 5 per cent in Poland points in addition to the relevance of top incomes for the analysis of distributional effects of growth. For example, it can be clearly seen from Figure 21 that years of Polish 'miracle growth' in 2004-2008 were at the same time years that indicated the largest rise in top income concentration. Top 5 per cent group captured as much as half of the total real income rise during this period, while the bottom 95 per cent captured the other half of the rise. Therefore, by looking at top incomes, we can understand the quite divergent experience of the strong Polish growth among the population.

Figure 21: Rise in real income by income groups



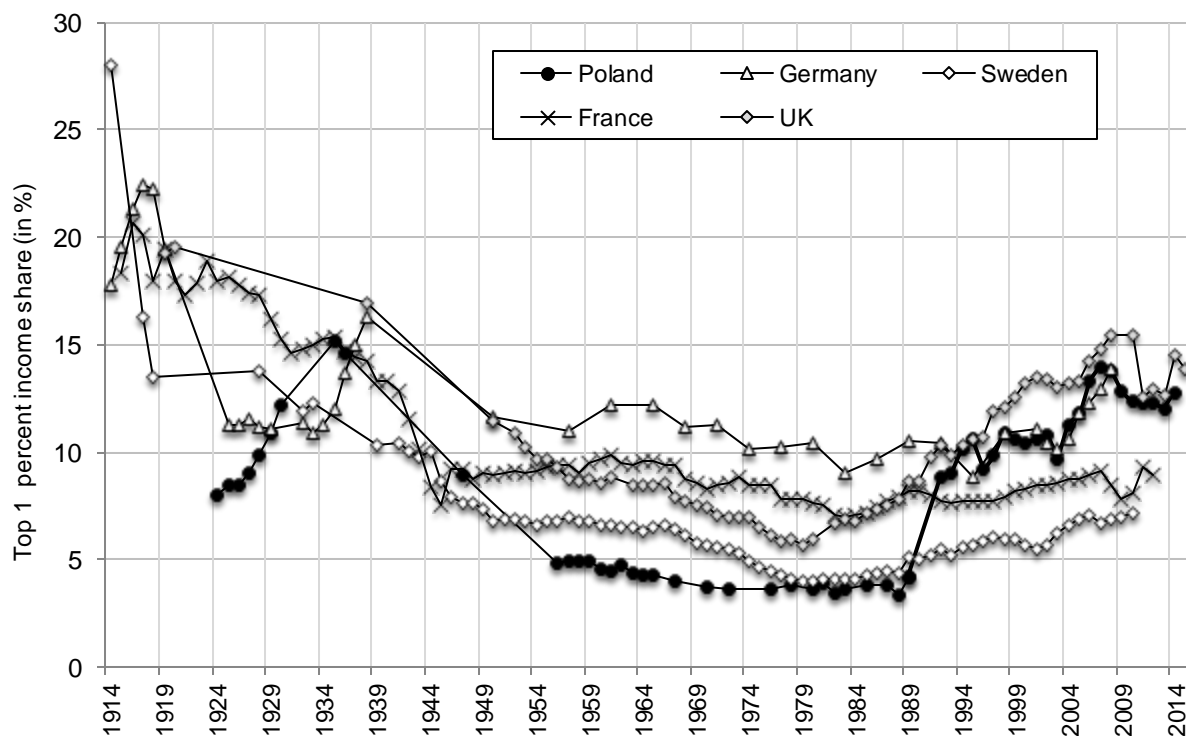
Source: authors' computation based on income tax statistics and the Polish national accounts.

many SMEs in the general condition of private capital scarcity. Moreover, it has been often suggested that this was the principal method how public productive assets were acquired for quite low prices, and that many SOEs were deliberately liquidated exactly for this purpose (Krajewski and Piasecki 1999). Additional privatization channel contributing to the rise of SMEs, facilitated by similar favourable access to capital stock of former SOEs, was the so-called 'leasing' (Article 37 of the 1990 Privatization Law), 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, since private firms with employee ownership had precedence in leasing of SOEs, one should take seriously the possibility that this benefited primarily managers of employee-owned companies as most likely the dominant insider group in the ownership structure of these companies (Belka et al. 1995; Kozarzewski 1999). This could, at least in theory, be a way for the so-called 'enfranchisement of nomenklatura' (Kowalik 2011; Eyal, Szelenyi and Townsley 2000). Kondratowicz and Okolski (1993) thus pointed that 'nomenklatura' primarily targeted the most profitable operations of former SOEs.

4. International comparison

Figure 22 compares top 1 per cent share in Poland together with that in Germany, the UK, France and Sweden. During the interwar period, top percentile share in Poland experienced a strong rise, and in comparison to other presented countries, only Germany saw an increase of a similar magnitude in the 1930s. Top shares in France and Sweden experienced a steady decline between the two wars. It is now well documented that the evolution of the very top shares in developed countries during the interwar period reveals the fate of top capital incomes. Thus, top capital incomes in Germany recovered from Weimar shocks during the Nazi state economy amid growing war preparations, while, for example, in Sweden, they were adversely affected due to the Depression shocks such as the well-known Kreuger crash. However, in still dominantly agricultural Poland, although industry suffered even more in comparison to other countries, the rise of top shares during the Great Depression should be explained by the deterioration of Polish farmers relative to top incomes composed dominantly of non-agricultural groups (or to put it alternatively, income of top groups fell less than for the rest of the population dominantly made of farmers).

Figure 22: Top 1 per cent in Poland, Germany, France and Sweden, 1914-2014



Source: Poland: authors' computation based on income tax statistics, other countries: WID.

While the introduction of communism reduced and kept top incomes in Poland below the levels observed in western European countries, the top percentile strongly increased in Poland from 1992 to 2015, to reach the levels characteristic for more unequal European countries, notably the UK and Germany. The first two years of the transition were characterised by relatively constant share of the top 1% income shares of around 9% - for example, a level slightly above that of France, but significantly larger than Sweden. Already in 1995, there is a 2 pp increase, after which the top share stabilises for several years. However, the most dramatic change in the top 1% income share started in 2004 – the year of the EU accession – and lasted until 2008. Throughout this period the proportion of total income attributed to the top percentile increased from 11% to almost 14% and placed Poland significantly above estimates for the group of continental and southern European countries (e.g. Atkinson, Piketty and Saez 2011), such as France or Spain. From 2009 onwards, similarly as in the other countries, the estimates dropped slightly and stabilised at around 13%.

Furthermore, we can see that countries displaying a higher level of top income shares, such as the UK or Germany, have also exhibited greater fluctuation in the evolution of top shares. On the other hand, countries characterised by a relatively lower top income shares, such as France, have shown a considerable stability of top shares throughout the whole period since the beginning of the 1990s. Moreover, it is interesting to point to the similar evolution of the top percentile income share observed in Poland to that found in Germany and the UK (see Figure 22). In all three countries, the evolution of top incomes has exhibited a strong pro-cyclical character.

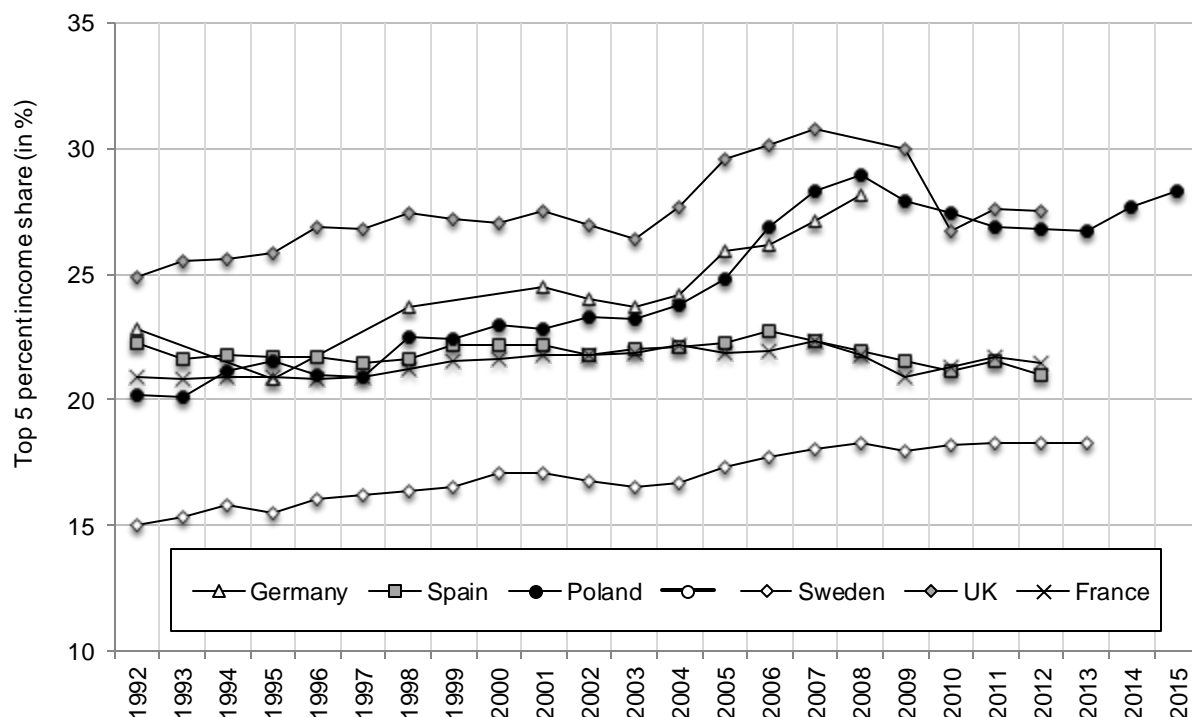
Causes of divergent experience of the two mentioned groups of countries are complex and beyond the scope of this paper (e.g. see Atkinson, Piketty and Saez 2011). As we have examined it in more detail above, it seems that Polish top incomes follow more closely macroeconomic conditions due to the relatively high concentration of business income, which generally displays more pro-cyclical character. In addition, it is well known that economies in Central Europe are especially sensitive to economic developments in Germany, which is their largest trading partner and direct investor. Thus, 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). But in general, it is difficult to say whether this could serve as an indicator that Polish top incomes are more export dependent or that they are in higher degree included in international supply chains.⁷⁴ As

⁷⁴ For example, Saez and Veall (2007) believe that the recent rise in Canadian top incomes is closely connected to the corresponding rise of top incomes in the US.

we noted, an increasing participation of Poland in German-led GVC might have also contributed to the synchronization of top shares in two countries.

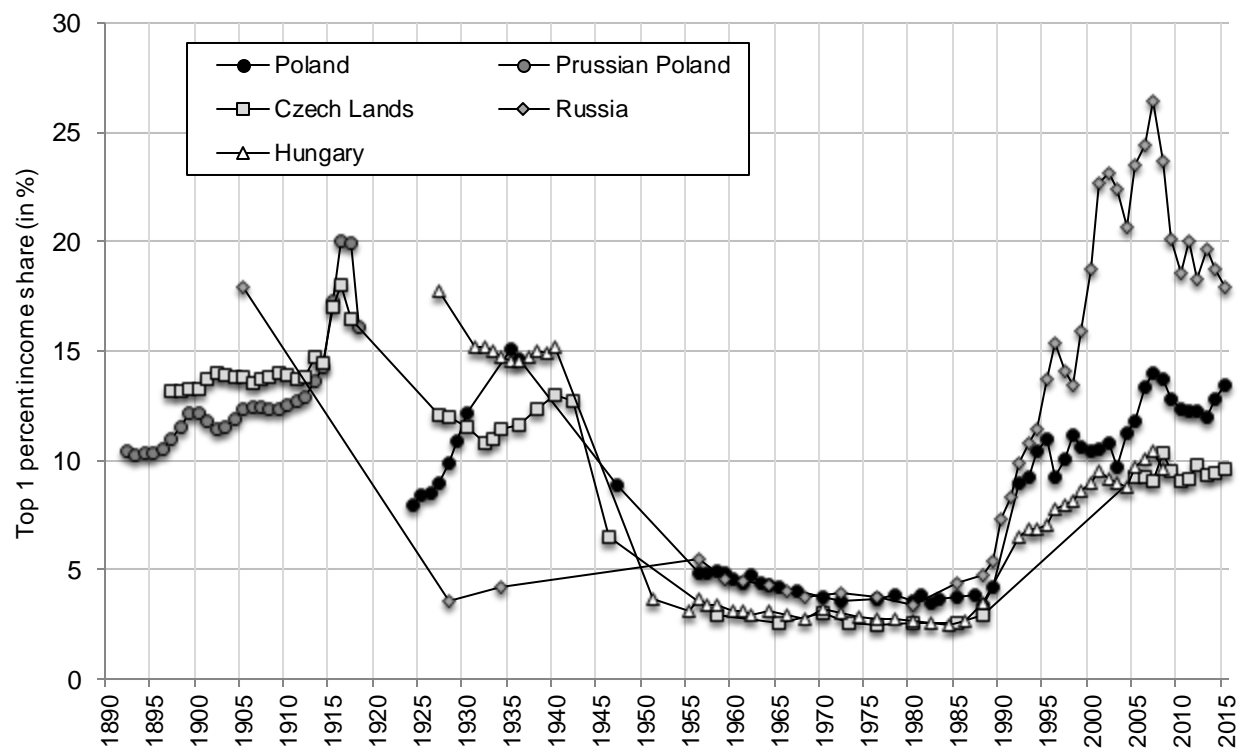
Figure 23 presents estimates of the top 5% income shares. Poland had a lower share of the top 5% income than France or Spain during the period of 1992 – 1997. This changed in the decade after 2004, when the top 5% income share in Poland was 22% higher than in Spain and 55% greater than in Sweden.

Figure 23: Top 5 percent income share in Poland and selected European countries



Source: Poland: authors' computation based on income tax statistics, other countries: WID

Further, it is of particular interest to compare the experience of Poland to that of other ex-communist countries in Easter Europe. Figure 24 shows the evolution of the top 1% from the end of the 19th century until today in Poland, Hungary, the Czech Republic and Russia. 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. Top percentile share in 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.

Figure 24: Top 1 per cent income share in former communist countries (fiscal income)

Source: Poland: authors' computation based on income tax statistics, other countries: WID.

5. Comparison to other studies of Income Inequalities in Poland

This chapter reviews estimates of income inequalities in Poland since the beginning of the transition until the present day. First, we focus on the survey-based estimates of the Gini index, which remains one of the most popular measures of income inequalities. Next, we compare our estimates of the top income shares, with those reported in other studies. We argue that the tax-based top income shares shed new light on the existing findings, which are usually based on data from the Household Budget Survey (HBS), UNICEF TransMONEE, CBOS and EU-SILC.⁷⁵

After the breakdown of the communist rule, all former socialist countries in Central and Eastern Europe experienced a rise in income inequality. Before the transition, as reported by Atkinson and Micklewright (1992), the HBS estimates of income dispersion were

⁷⁵The HBS, CBOS and EU-SILC data are based on a sample of households and individuals, who are asked about their income. UNICEF TransMONEE is conducted on a sample of employers, who provide information about earnings of their employees.

consistently placing Poland in the middle of the Central – Eastern European countries and the last years of the communist period witnessed a decline in the level of inequalities. Nevertheless, during the early 90s' economic transition we observe a significant rise in income dispersion. Milanović (1999) uses the HBS data on gross income to estimate a 5% increase in the Gini index during the early transformation period 1988-1992. Using adjusted HBS data on earnings⁷⁶ Keane and Prasad (2006) show an 18% increase in the Gini index and a 15% increase in the 90th/10th -income decile ratio between 1988 and 1996. On the other hand, using UNICEF TransMONEE employer data on monthly gross wages, Rutkowski (2001) documents a 43% increase in the Gini index for the period 1989-1996. Overall, the presented studies suggest a rapid growth in inequalities before 1996, which slows down after 1996 and peaks around 2004 - the year of EU accession.

A comparison of the Gini index with our measures of income inequalities is far from straightforward. Besides obvious methodological differences, economic changes might have heterogeneous effects for the top 5% and the bottom 95% of the income distribution. A plausible scenario is that, because of the prominent role of business income for top earners, the 'shock therapy' in the early transition period could have been detrimental to them due to worsening of the general economic condition.⁷⁷ At the same time, the rise of the inflation-adjusted wages might drive inequalities in the middle parts of the distribution. In addition, the top of income distributions is very poorly captured by the survey data due to big non-response at the top and missing information of capital gains (Atkinson et al. 2011, Kosny 2012, Burkhauser et al. 2012).⁷⁸ Figure 25 plots the evolution of the tax data estimates of the top income share (black markers) and the survey-based estimates of the Gini index (white markers). Given the methodological differences it might be not surprising that we document a relative stability of the top 1% income share and a decline in the top 5% share between 1992 and 1996, while the Gini indexes calculated by Grosfeld and Senik (2008), Brzeziński et al. (2014) and UNICEF consistently show that this period was characterized by an increase in inequalities. On the other hand, after 2004 the top income shares increase dramatically, while the Gini indexes remain stable or even fall.

Few studies are looking at the top income shares in Poland. Brzeziński (2010), Brzeziński et al. (2014) and the World Bank (only the top 10%) use the HBS, Kosny (2012) uses the individual tax data for the Lower Silesia region in Poland (only the top 1%) and UNU-WIDER reports top income using the EU-SILC. In addition to our estimates using the tax

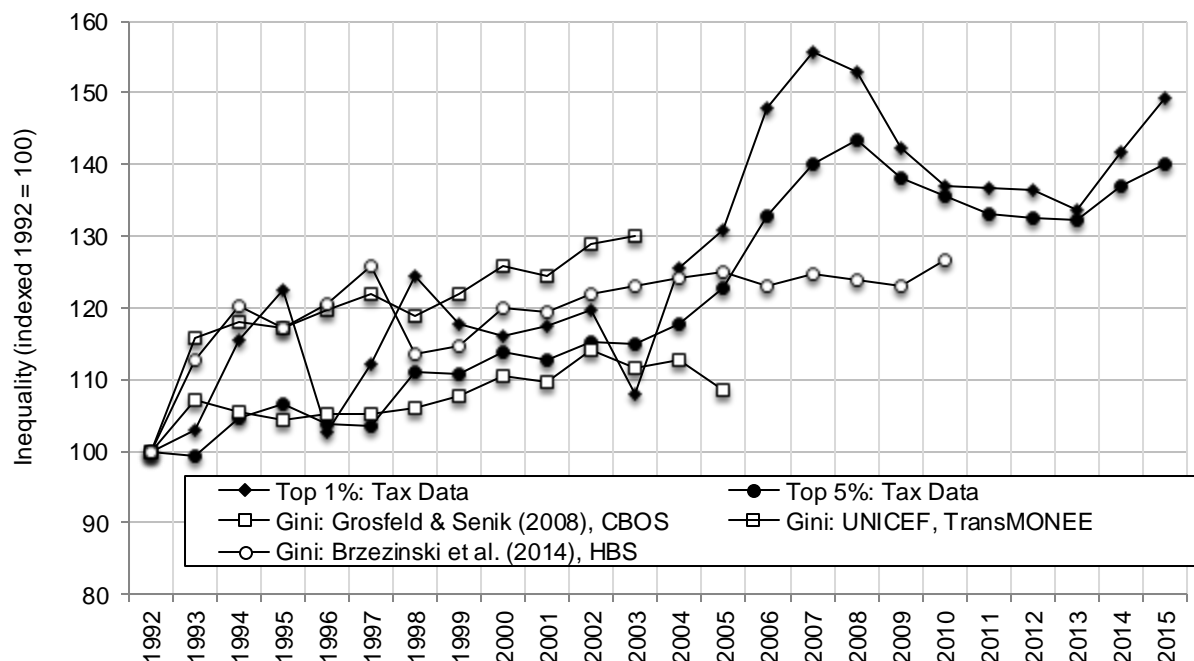
⁷⁶ In 1993 HBS had a major change in its methodology. It became representative for Poland and the frequency of household rotation was modified. Hence, a raw comparison of HBS household income for the expanded time window might be misleading (Brzeziński et al. 2014).

⁷⁷ As Rutkowski (2001) and Keane and Prasad (2006) focus on labor earnings, their estimates might be to a lesser extent affected by pro-cyclicality of business income.

⁷⁸ Additionally, Eurostat (2003) and Szulc (2000) point out to a higher income measurement error in the Polish HBS during the 90s, as the income verification procedure was cancelled in 1993.

data we also use EU-SILC to calculate the top income shares from 2005 until 2013. In these data, incomes from wages, self-employment and pensions are at the individual, while incomes from capital and rentals at the household level. For our upper bound estimates, we assume that adults are the units of observation and we assign all household-level income to the top earner within each household. The lower bound estimates assume the household as a unit of observation and aggregate all income earned by household's members. The appendix section describes our calculations of the EU-SILC top income shares in more detail.

Figure 25: Evolution of the Top Income Shares and Gini index for Poland according to various sources



Source: Gini: Brzezinski et al. (2014) use the Household Budget Survey data published by the CSO of Poland; Grosfeld & Senik (2008) use the CBOS data; UNICEF database use UNICEF TransMONEE data. The top income shares: authors' computation based on income tax statistics.

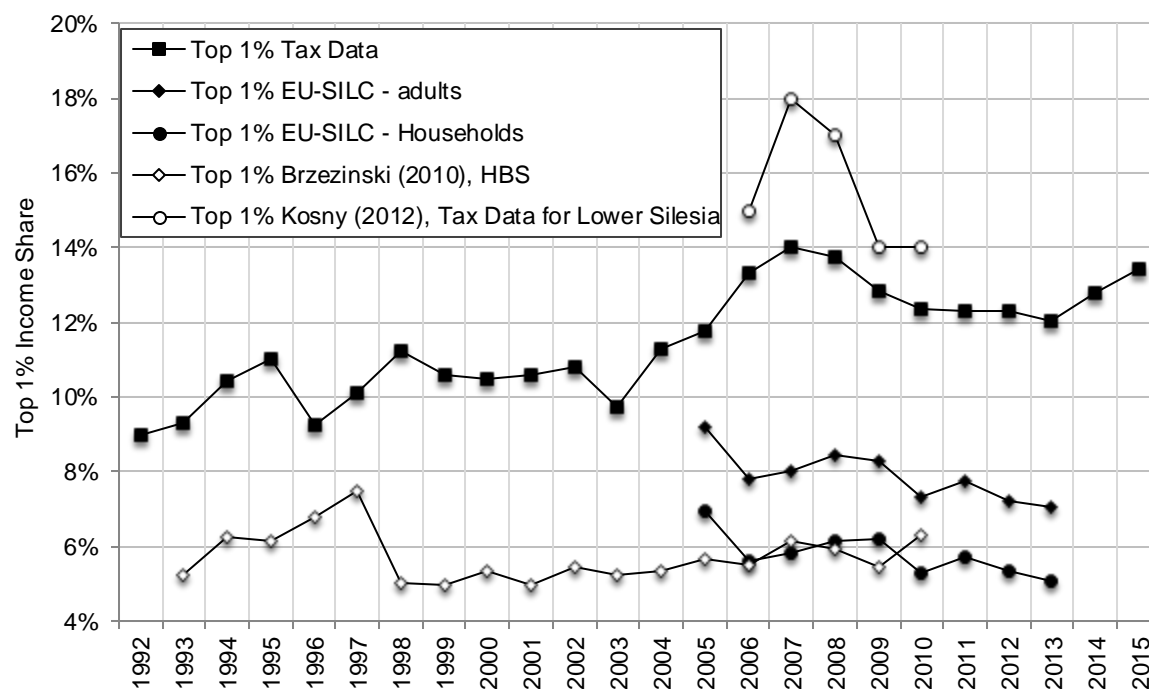
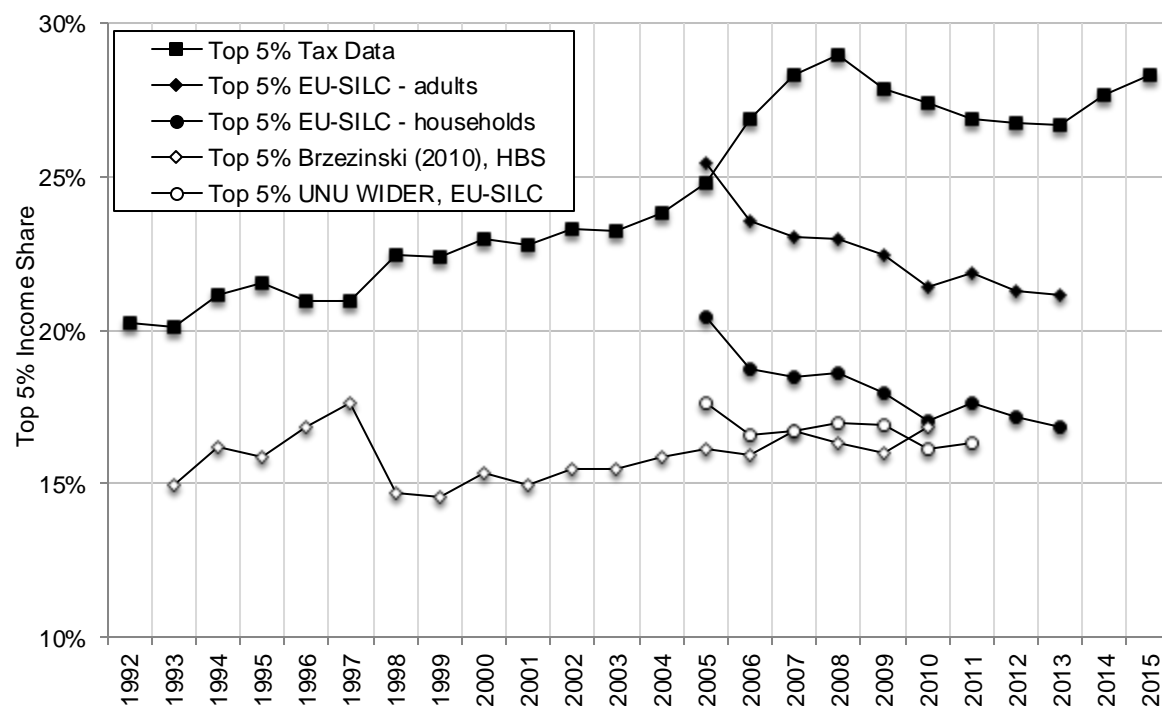
Figure 26 and Figure 27 show the top 1% and 5% income shares as reported by various sources. The black markers represent our estimates of the top income shares based on either the tax data and EU-SILC. The white markers depict other studies. The first important observation is that the survey-based estimates of the top income shares are consistently below the tax-based estimates. This holds both for the HBS and EU-SILC data. The likely reason for the difference in levels is under coverage of the top income in the survey data. Underreporting, right-censoring and sparse observation make the survey data unreliable, and the top earner's participation refusal leads to underrepresentation of

the top parts of the distribution. The second observation is that the evolution of the series differs after 2004. The tax-based estimations, by the authors and Kosny (2012), show an increase, a peak around 2007 and then decline. The survey-based estimates, by the authors, Brzeziński (2010)⁷⁹ and UNU WIDER, suggest that the top income shares were stable or falling after 2004.

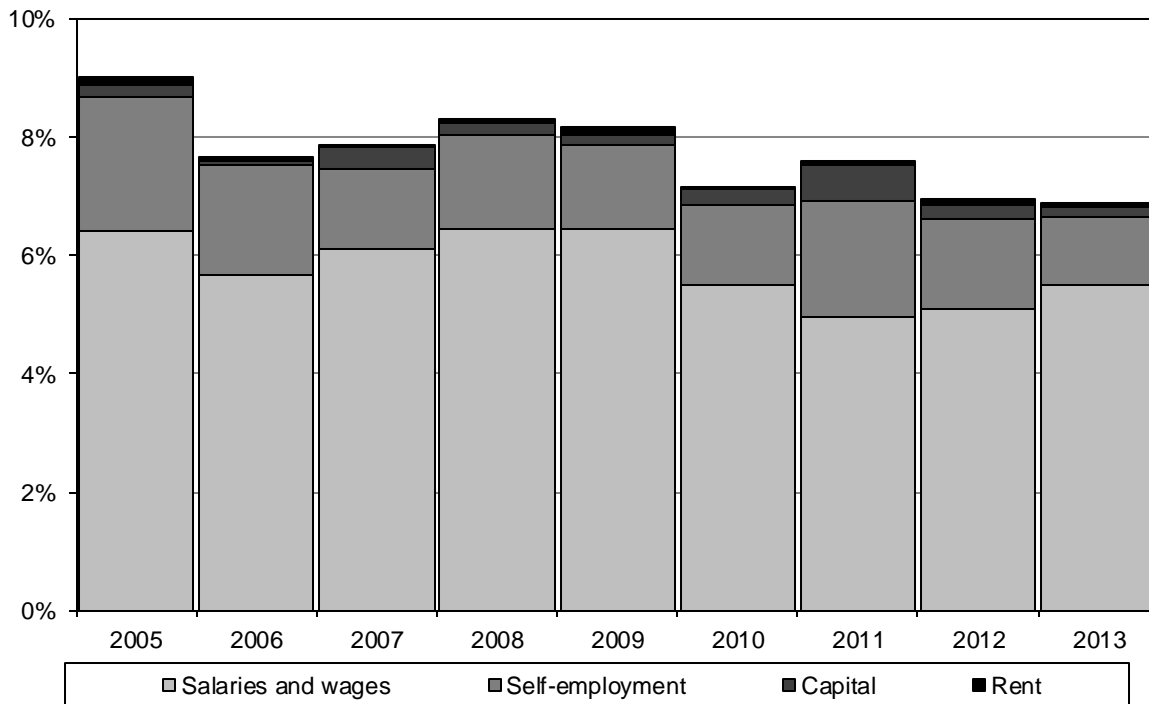
Next, Figure 28 looks at the income composition of the top percentile estimated from EU-SILC (adult based). It can be seen that the markedly lower contribution of self-employment income in the survey is a likely source of the level discrepancy in comparison to the tax data based estimates.

Overall, this section points out to the importance of the top income shares in analysing inequalities. The different evolutions of the tax-based top income shares and the survey-based Gini indexes stress that various methodological approaches are needed to capture the nature of inequalities fully. In particular, the economic transformation of the 1990s and the EU accession in the second half of the 2000s might have heterogeneous effects on the different parts of the income distribution. At the same time, this section testifies for the importance of the tax data. The large differences between the tax and survey data for the top income shares estimates suggest that the latter might significantly undercover the top earners.

⁷⁹ Fall in survey based top incomes in 1998 documented in Brzeziński's series is most likely due to change in HSB methodology in the same year.

Figure 26: Top 1 per cent income share in Poland estimated from different sources, 1992-2014**Figure 27: Top 5 per cent income share in Poland estimated from different sources, 1992-2014**

Source: see the text.

Figure 28: Top 1% composition in EU-SILC (individuals)

Source: authors' computation based on EU-SILC. Note: capital income includes also shares in profit in unincorporated businesses.

6. Conclusions

This paper provides the first estimates of the evolution of top income shares in Poland from the end of the 19th century until today. We find that inequality substantially fell in Poland throughout the 20th century. It was high in the first half of the 20th century due to strong 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, by literally eliminating private capital income with nationalizations and expropriations, while in addition it implied strong reduction of top labour incomes. During the four decades of the communist rule, top income shares displayed notable stability at these lower levels.

After the fall of communism the Polish top incomes experienced a substantial and steady rise and today are at the level of more unequal European countries. The initial upward adjustment during the transition of the 1990s was induced both by the rise of top capital

and labour incomes, which can be explained as decentralization of communist compressed earning structure and the rising concentration of private income with the emergence of the private sector and privatization. The highest increase in top shares took place after Poland joined the EU in 2004 and was driven solely by the rise in top capital incomes, which make the dominant income source at the top. We link this growth with the rise of the capital share in Poland from the 2000s, itself associated with the new globalization-induced phase in the Polish economic development. The beginning of the 2010s marks a stabilisation, yet in the most recent period, we again document a growing trend in top income shares.

The top income groups have been main beneficiaries of strong Polish growth in the 2000s. In 2003-2008 almost half of the real income growth was obtained by the top 5%. Therefore, by looking at top incomes we can understand often quite divergent experience of the strong Polish growth among the population (Grosfeld and Senik 2010). But, clearly, inequality it is not anathema anymore after the bankruptcy of communist egalitarian ideology. Indeed, for this very reason the ideology may have gravitated to the opposite standpoint – with today's "psychological conditions", to paraphrase Keynes (1919) – being more tolerant of higher inequality, seeing it as beneficial to innovation, motivation and economic growth, or (amid binding credit constraints) important for starting and securing entrepreneurial activity. Undoubtedly, a relatively successful economic transition, accompanied by a notable growth and in the absence of major privatization trauma,⁸⁰ has played a role in accepting higher inequality.⁸¹ Yet, whether benefits will spread to the rest of the population (Kuznets 1955), or could it result in the slow-growth rentier-dominated society (Piketty 2014) remains to be seen.

⁸⁰ At least there is no general perception of large-scale plunder (e.g., in contrast to Russia). Moreover, it seems that ownership transfer in Poland largely resulted in 'asset redeployment' rather than in 'asset stripping'.

⁸¹ The more so if this process leads to a creation of a class of domestic capitalists as champions of country's economic strength, that would assumedly be more prone to Polish national interests. Especially in the light of the historical experience, when relating economic weakness was related to the loss of political sovereignty.

Appendix A.1: Income Tax Data – Tables

Table A 1: Top income shares (in %) in the Partitioned Poland 1890s -1917

	Top 1%	Top 0.5%	Top 0.1%	Top 0.01%	Top 1-0.1%	Top 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 Prusia						
1892	10.4		3.5		6.9	
1893	10.3		3.4		6.9	
1894	10.3		3.5		6.9	
1895	10.4		3.5		6.8	
1896	10.5		3.6		6.9	
1897	11.0		3.8		7.1	
1898	11.5		4.2		7.3	
1899	12.2		4.8		7.4	
1900	12.2		4.7		7.5	
1901	11.8		4.5		7.4	
1902	11.5		4.1		7.4	
1903	11.5					
1904	11.9					
1905	12.4		5.0		7.4	
1906	12.4		5.0		7.4	
1907	12.5		5.1		7.3	
1908	12.4		5.1		7.2	
1909	12.3		5.2		7.2	
1910	12.5		5.2		7.4	
1911	12.8		5.4		7.4	
1912	13.0		5.4		7.5	
1913	13.6		5.7		7.9	
1914	14.3		6.4		7.9	
1915	17.3		8.8		8.5	
1916	20.1		11.1		9.0	
1917	20.0		11.2		8.7	

Source: authors' computation based on income tax statistics.

Table A 2: Top income shares (in %) in Poland 1925-2015

	P95-100	P99-100	P99.5-100	P99.9-100	P99.99-100	P95-99	P99-99.5	P99.5-P99.9
1925		10.5	7.2	3.1	0.9		3.3	4.2
1926		10.8	7.6	3.3	0.9		3.1	4.4
1927		11.8	8.4	3.6	1.0		3.5	4.8
1928		11.9	8.6	4.0	1.2		3.3	4.7
1929	27.0	12.0	8.5	3.8	1.2	15.0	3.5	4.7
1930				4.3	1.3			
1931								
1935			11.6	5.3	1.6			6.4
1936		15.6	11.3	5.1	1.5		4.4	6.1
1992	19.7	8.8	6.5	3.1		10.9	2.3	3.3
1993	19.6	9.1	6.8	3.7		10.5	2.2	3.1
1994	20.7	10.2				10.5		
1995	20.7	10.6				10.1		
1996	20.8	9.2				11.6		
1997	20.4	9.8				10.5		
1998	21.8	10.9				10.9		
1999	22.4	10.6				11.8		
2000	23.0	10.5				12.5		
2001	22.8	10.6				12.2		
2002	23.3	10.8				12.5		
2003	23.2	9.7				13.5		
2004	23.8	11.3				12.5		
2005	24.8	11.8				13.0		
2006	26.9	13.3	*			13.5		
2007	28.3	14.0	*			14.3		
2008	29.0	13.8	*			15.2		
2009	27.9	12.8	*			15.1		
2010	27.3	12.3	*			15.0		
2011	27.2	12.5	*			14.8		
2012	27.2	12.5	*			14.7		
2013	27.2	12.1	*			15.1		
2014	27.7	12.8	*			14.9		
2015	28.3	13.4	*			14.9		

Note: * indicates extrapolation into the open interval; Source: authors' computations based on income tax statistics.

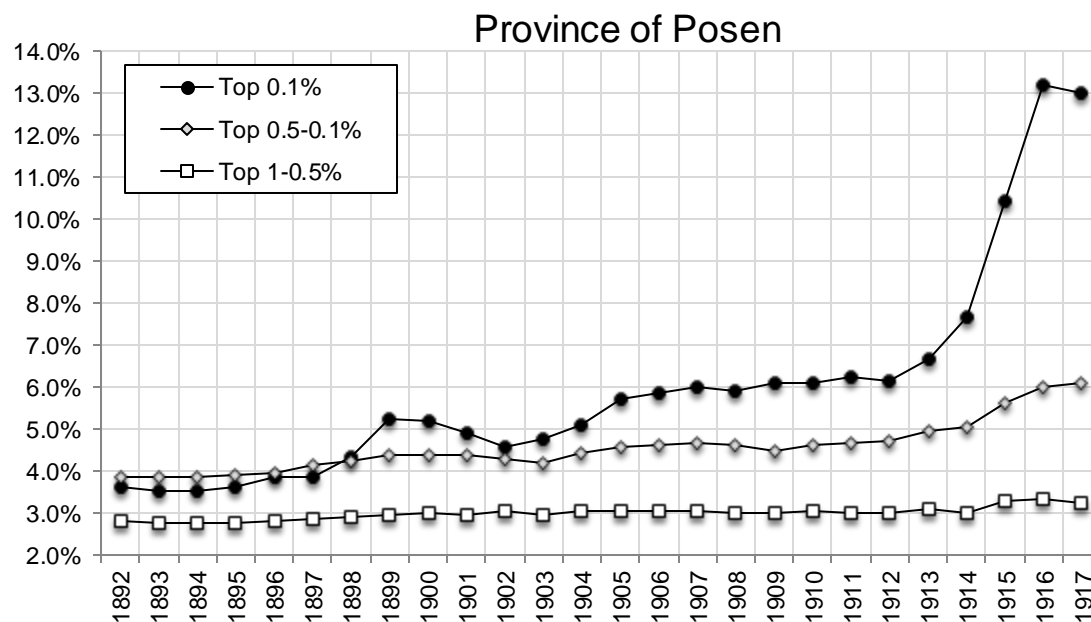
Table A 3: Top income shares (in %) in the Prussian Poland 1892-1918

	West Prus- sia	Province of Po- sen	Silesia	West Prus- sia	Province of Po- sen	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.

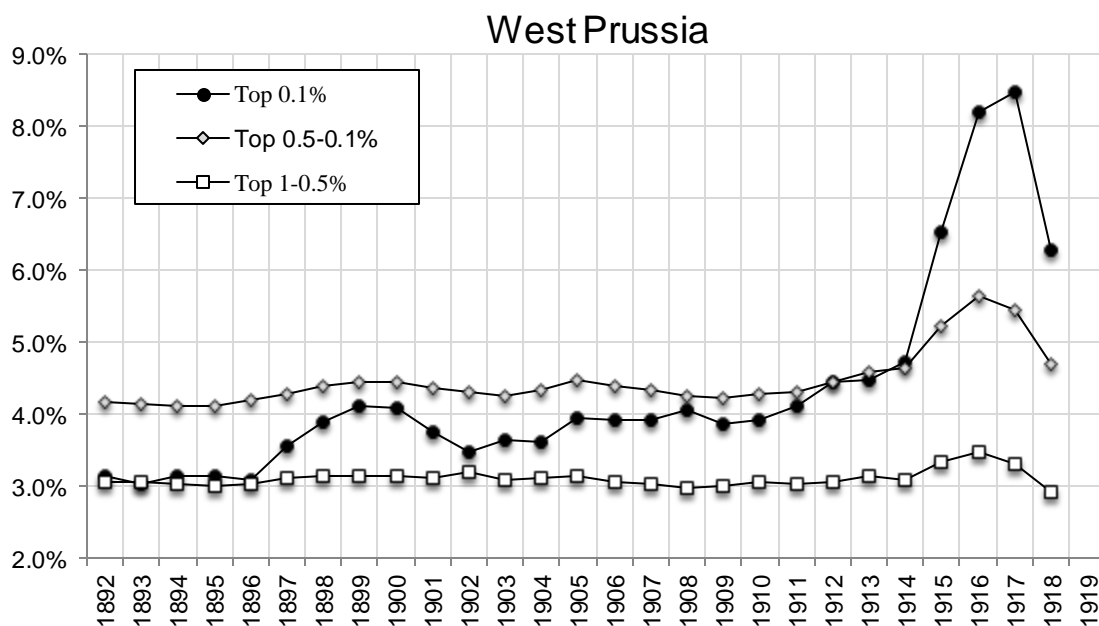
Appendix A.2: Income Tax Data- Figures

Figure A 1: The Province of Posen – decomposition of the top percentile

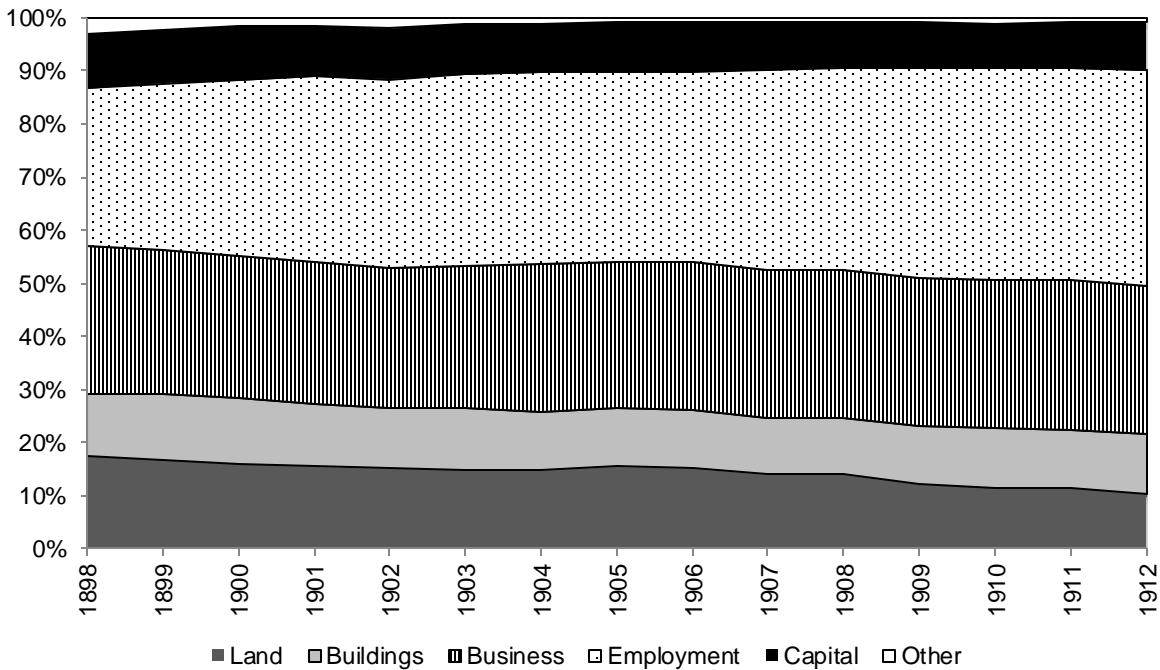


Source: authors' computation based on income tax statistics.

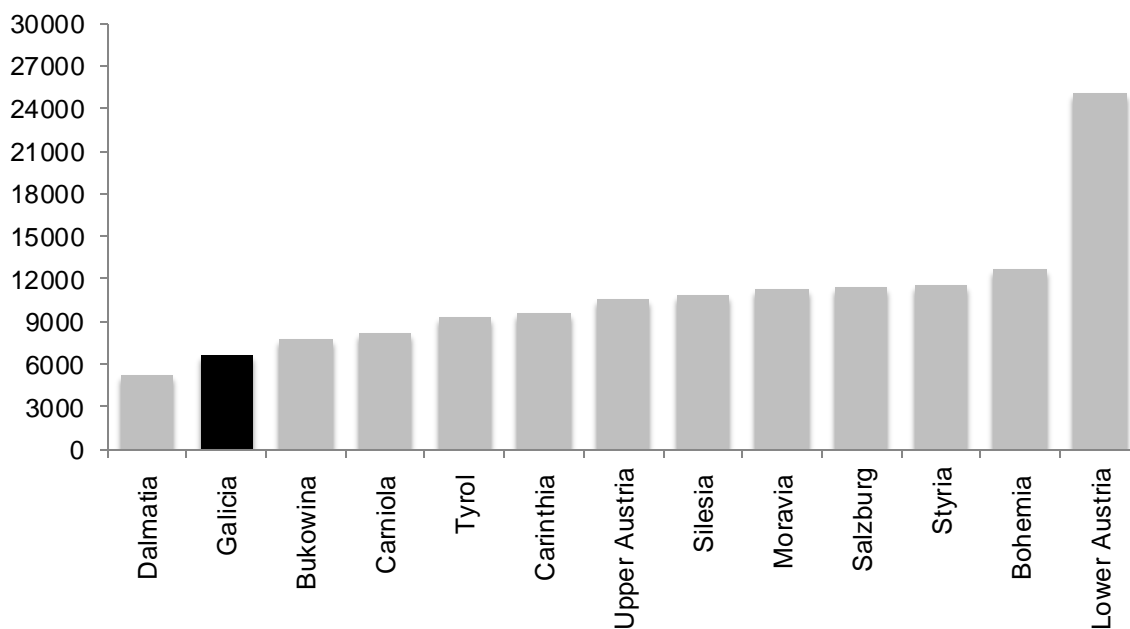
Figure A 2: West Prussia – decomposition of the top percentile



Source: authors' computation based on income tax statistics.

Figure A 3 Galicia – total taxed income by sources.

Source: authors' computation based on income tax statistics.

Figure A 4: Average income (in crowns) of top 1% in provinces of Cisleithania in 1913

Source: authors' computation based on Statistical Yearbooks of Imperial Austria.

Appendix A.3: Data Sources

The Prussian Partition 1890-1918

Data

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-WWI period, and only the district Oppeln 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. As a result, we generally focus our attention on the district Oppeln (Opole). Parts of ancient Prussian provinces of Pomerania and East Prussia are today within the Polish borders (the other parts of the former are in Germany, of the later in Russia and Lithuania), but we do not investigate them separately as these were not generally identified as 'historic Polish lands',⁸² 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 is quite detailed comprising almost seventy brackets, and districts, in turn, could be combined to arrive at 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), which allowed us decomposition of top income shares into the corresponding categories. However, the sources of income are not available at the bracket level, but only in total for all taxpayers.

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*)

⁸² For example, Prussians never included them in widely used term of 'our Polish provinces' Davies (1983, p. 83)

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. Procopovitch 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 assumed 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 in turn had estimated them based on Statistische Reichsamt (1932). The latter also estimated 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.

The Austrian Partition 1890-1914

Data

Top income shares in Galicia are constructed from income tax statistics for Imperial Austria. After the income tax was introduced in 1898, the fiscal administration had been publishing tabulations of income taxpayers in each province of Cisleithania. Income definition was quite broad allowing very few exemptions. Income below 1,200 crowns was tax exempt. It defined income from following sources: from land, from buildings, from business and self-employment, from 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.

Data come from 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).

Population Control

The tax unit in Imperial Austria was household, defined as the married couple with dependants. 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 censuses held in Austria-Hungary in 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 was 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 Austrian-Hungarian crowns, we take the following steps. First, we convert these estimates to 1913 crowns by applying the exchange rate Schulze used (namely 3.36 GK dollars per crown; see Schulze 1997, p. 14). To obtain GDP for other years (for those 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 (2014). Finally, we take 60 per cent of nominal GDP as our total control income.

The Interwar Poland 1918-1939

Tax 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.

Source Name:	Data 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 Państwowymi Podatkami Bezpośrednimi", Kwartalnik Statystyczny VIII (4) 1931, p.901-919	1929	The Central Statistical Office of Poland
Statystyka Skarbow a 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 general types of income: unearned (*fundowany*) and earned (*nie-fundowany*). The unearned category includes income earned by either legal or psychical 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 obtained by employed or retired physical persons. Importantly, state workers and state pensioners do not appear in the tax statistics, even though they were liable to the personal income tax.

For psychical persons only annual income above 1500zł for unearned income and 2500zł for earned income had to be reported. In contrast, all legal persons had to submit the tax report, regardless of their actual income. Legal persons included joint-stock companies and private limited companies.⁸³ Since in this paper we study the distribution of income among psychical persons, we do not analyse the income reported by legal persons.

Unearned and earned incomes were subject to different tax scheme, and thus tax statistics provides separate tabulations for each type. However, this implies that psychical 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 interwar period tax covered a very broad range of economic activities. The only exceptions were incomes coming from inheritance, property selling, an income of non-profit oriented entities, lotteries and others. 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. For unearned income, the reported income could be assumed as more representative for those taxpayers who had accounting books. For others, the administrations simply assumed specific income based on a set of payer's characteristics.

The interwar period tax used both the household and individual level as a definition of the tax unit. An individual reported income if it comes from self-employment, pensions or wages. A household is a tax unit for all other types of income. The problem is that with unearned and earned breakdown, self-employment belongs to the former category, while pensions and wages to the later.

⁸³ Obviously, legal persons could only report unearned income. Wiśniewski (1934) reports that in 1930 there were 12729 legal persons (1784 joint-stock companies).

Hence, the tax unit in the case of unearned income could be either household or individual, whereas in the case of earned income it is always individual.⁸⁴

Tabulations are ranged according to income before tax and personal deductions, containing the number of taxpayers, the assigned fixed amount of tax to each bracket, and the total tax actually paid in a given bracket. Namely, all incomes falling within ranges of the specific bracket paid the fixed tax amount. For example, the tax liability of all individuals that earned any income between 10 thousand and 11 thousand zloty in 1928 was fixed at 605 zloty (the total income within a bracket could be in theory approximated by the following formula: $tax = 0.018 * income^{3/2}$ (Wiśniewski 1934)). But it can be observed that the number of taxpayers in each bracket times the corresponding fixed tax amount does not equal to the total tax paid within each bracket. This is due to available deductions. For instance, someone with ('gross') income in 6.3th zl bracket and with three children might end up paying tax assigned to 3.2th zl bracket, but he/she still will be reported in the 6.3th zl bracket (an example from Wiśniewski 1934). However, for our analysis is central that taxpayers are actually reported in the brackets of their obtained gross income. We then simply estimate the total income in each bracket by assuming Pareto distribution (see below), but brackets' range is quite narrow, and our estimates do not depend on particular distributional assumption.

We should also note that tabulations contain only taxpayers that had eventually paid personal income tax. Therefore, potential taxpayers with income close to the minimum filing threshold using personal and other deductions - which make their taxable income fall below the threshold - are not reported in tabulations. For example, there are around 87 thousand taxpayers in the very bottom brackets (1.5-3.2 thousand zloty) who used deductions, which effectively reduced their taxable income below the 1.5th zl threshold - this is 18 per cent of all taxpayers with income between 1.5th-3.2th zloty (the summary tables, on the other hand, are not conditional on people paying taxes, and they capture all taxpayers with income above 1.5 thousand zloty). However, we look at fractiles whose thresholds are much higher than the minimum filing threshold, and consequently, this does not lead to underestimation of top income shares.

For years 1925 and 1926 both physical and legal persons reporting unearned income (*fundowany*) are presented together, without providing separate reports for each category of taxpayers. We estimated 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 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

⁸⁴ Wiśniewski (1934) unfortunately does not discuss this issue in detail. Using the census data, for *fundowany* income he estimates the control population assuming that the tax unit are: agriculture holdings, for-profit entrepreneurs, self-employed, petty bourgeoisie. For *niefundowany* income he distinguishes between agricultural workers and other workers

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 (*niefundowany*) 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

The definition of the control total for the population is based on the definition of the tax unit in the tax code. 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 (1933) 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 (K&L) estimate is gross of depreciation, roughly corresponding to GDP. K&L used the expenditure approach to estimate GDP. 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)⁸⁵. 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 equaling 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 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, including even sporadic observations in Seym. Those that explicitly refer to 1925⁸⁶ 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.

⁸⁵ 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).

⁸⁶ 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.

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

The Interwar Period – County Analysis

Data

The 1927 Income Tax Statistics published by the Ministry of Finance provides the detailed tables of earned and unearned income for each administrative unit of tax authority in Poland. For the rural areas, the administrative units overlap with counties, for the urban areas, they are usually smaller, in which case we aggregate the units to the county level. In three cases, Gniezno, Inowrocław and Lublin, the tax unit is larger than the corresponding county as it covers the rural and urban counties. We merge these counties to match the tax unit.

Since the data on population and income controls is from the 1931 census, we match the 1927 tax units with the 1931 counties. In the majority of cases, it was straightforward, except counties, which changed the borders or were liquidated between 1927 and 1931. In these cases, we assign a tax unit to a 1931 county, which received the largest portion of a 1927 county. We drop Konstantynów and Królewska Huta counties in which cases 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 to match the reported taxable income from the 1927 Income Tax Statistics published by the Ministry of Finance. We separately estimate the earned

income of agriculture and non-agriculture workers; the exempted unearned income of independent in agriculture and non-agriculture activities. We discuss the details of each part of the control income below.

Earned (niefundowany) Income of Non-Agriculture Workers. The data on the voivodship-level total compensation of industrial workers in nine industries (mineral, metal, electro technical, chemical, textile, paper, tannery, wood and food) comes from the 1931 Industry Statistics (Statystyka Przemysłowa 1931, Główny Urząd Statystyczny). The county-level data on the number of workers in fifteen industries and non-manufacturing sectors comes from the 1931 census of population. To obtain the total earned non-agriculture income for each county, we calculate the average compensation for each voivodship-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. [the 1931 Census]). For the industries not covered by the 1931 Industry Statistics we use the average voivodship-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 each in voivodship-industry earns 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.

Earned (niefundowany) Income of Agriculture Workers. We calculate the average income of agriculture workers and the average income of agriculture 'white collar' workers (dozorca) for each voivodship 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, Główny Urząd Statystyczny) to translate the numbers into the Polish Złoty. 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.

Exempted Unearned (fundowany) Non-Agriculture Income. The 1931 census (Drugi Powszechny Spis Ludności z Dn. 9.XII 1931 r. [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.

Exempted Unearned (fundowany) Agriculture Income. First, based on the estimates from the Puławy Institute and Wisniewski (1931) 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

independent⁸⁷ 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 voivodship-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, 1931)

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.

The Communist Poland 1945-1989

Data

The design of income tax during the first years after the end of WW2 was similar to the Interwar regulations. 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, in turn, separately for technicians and office workers). We merge particular 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 shares. We adjust

⁸⁷ The number of hypothetical exempted agriculture independents is calculated using the 1937 taxdata, 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.

earnings bands in 1949 to the price level of 1947 by using the available retail price index.⁸⁸ 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.6). 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.

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,⁸⁹ 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.

⁸⁸ However, as we are aware, this is available only for Warsaw.

⁸⁹ Accounting system in communist countries was the Material Product System (MPS).

Poland 1992-2015

Tax Data

Data for the 1992-2015 is found in the following publications:

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

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. Here we just describe two major reforms, in 2001 and 2004. From 2001/2002 the tax law introduced taxation of capital revenue (interest and dividends) and capital gains (i.e. from selling company's shares, stocks, derivatives). 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 tax tables. Note that both were absent from the reports before 2001.

The details of the capital income taxation are outlined in Appendix 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.

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.

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.⁹⁰

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.

Each individual, who earned a taxable income (even when it is below the tax exemption threshold), is obliged to submit the tax form individually or ask her employment institution (or social security agency) to do so. An individual submits only one form (PIT 36 or PIT 37, depending on the source of income) if she wants to be taxed on the progressive tax scale. However, since 2004, if she decides to tax her business income (or specialised agriculture) using the flat tax, she needs to submit an additional form (PIT 36L). Also, if her income comes from either the capital gains or the real estate sales, she needs to tax it using the flat rate and submit additional forms for each of the sources (PIT 38 and PIT 39 respectively). Therefore, the same individual might appear several times in the tax reports, but she will only appear once in the progressive tax part.

⁹⁰ This option has been allowed additionally for rental income.

Table A 4: Percentiles and Average Income; Poland 1992-2015

		P95	P99	P95-100	P99-100
1992	*	5,247	9,865	10,041	22,366
1993	*	7,709	13,416	14,095	32,571
1994	*	10,699	21,180	20,973	51,588
1995		14,472	28,567	27,476	70,393
1996		18,297	36,436	31,062	68,571
1997		21,330	42,698	39,918	96,270
1998		24,952	56,939	50,979	127,142
1999		25,740	65,075	55,975	132,475
2000		32,974	75,902	62,949	143,217
2001		34,937	69,634	66,452	154,212
2002		34,977	74,661	67,406	155,967
2003		34,662	72,503	64,111	134,063
2004		37,101	81,568	75,429	179,129
2005		38,753	87,422	80,303	190,793
2006		42,767	99,717	92,061	228,251
2007		46,749	112,818	102,764	254,346
2008		56,983	131,783	118,355	281,276
2009		62,313	139,280	122,555	281,497
2010		65,452	143,479	125,513	282,741
2011		67,524	150,548	132,030	302,500
2012		69,341	154,694	135,560	310,778
2013		71,826	157,471	137,304	309,338
2014		72,812	163,514	143,270	330,627
2015		75,053	173,297	152,809	362,580

Note: In current PLN * amounts should be multiplied by 10000.

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 Figure A5 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.

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, Figure shows 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.

Figure A6 depicts analogous trade-off between the progressive and flat regimes, after the reform of 2009. Note that in this case 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) who used a large sample from the Polish personal income tax returns covering the 2002-2005 period.

First, using descriptive statistics from Kopczuk (2012, Table 1), we estimate that 30% 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 10 percent of the total business income taxed at the flat rate (a proportion that is remarkably constant throughout the years). The remaining 70 percent of flat tax fillers are placed in the top bracket of the progressive schedule with the remaining 90 percent 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%. However, this is likely to be over-estimation as this

drop can be attributed not only to people switching to the new bottom progressive bracket (old medium), but also to the new top progressive bracket (old top) (Figure A5 and Figure A6).

Underlying Assumptions of the Preferred Series

Proportion of Overlapping Individuals

- 80% of the individuals reporting their income in the flat regime report also income in the progressive schedule.

In 2003, 2561 thousand submitted the business income tax forms (PIT 36), among which 344 thousand people reported only business income. It means that around 87% $((2561-344)/2561)$ of the business tax forms were submitted with other forms. Assuming that these were only the progressive schedule (PIT37) forms and that the proportion is the same among the post-2004 flat tax fillers, these would suggest that the proportion of overlapping individuals is 87%. This estimate will be an overestimate if, for instance, those with only business income are on average earning much higher income than those with mixed income and thus are more likely to switch to the flat-rate regime. Since this is a likely scenario, we decide to assume that the overlapping individuals are 80% of the flat tax fillers.

Distribution of tax-fillers income

- 20% of the individuals reporting their income in the flat regime does not appear in the progressive tax reports. We move 70% of these individuals to the top bracket and the remaining 30% to the medium bracket (the bottom after 2009).

Kopczuk (2012, Table 1) reports that in 2005 there were 4138 flat tax fillers who had the total income within the middle bracket thresholds. Similarly, there were 9095 flat tax fillers within the top bracket thresholds. Hence, the share of flat tax fillers, who earn the income within the middle bracket range is 30% and within the top bracket range is 70%.⁹¹ We use this number also for 2004 and the further years. Note that after 2009, the middle bracket was joined with the bottom bracket.

- The income taxed using the progressive schedule of those who use the flat tax (overlapping individuals) is located in the bottom bracket (both before and after 2009). We move 70% of them to top bracket, with 60% of the bracket's average income. Before (after) 2009, we move the remaining 30% of them to the middle bracket (we keep them in the bottom bracket).

Based on data from Kopczuk (2012, Table 2), the average wage of flat tax filers for 2002-2005 makes respectively 67, 58, 50 and 52 percent of the average income of the bottom bracket. This might be because the wage of business owners falls as a part of the wages is turned to business

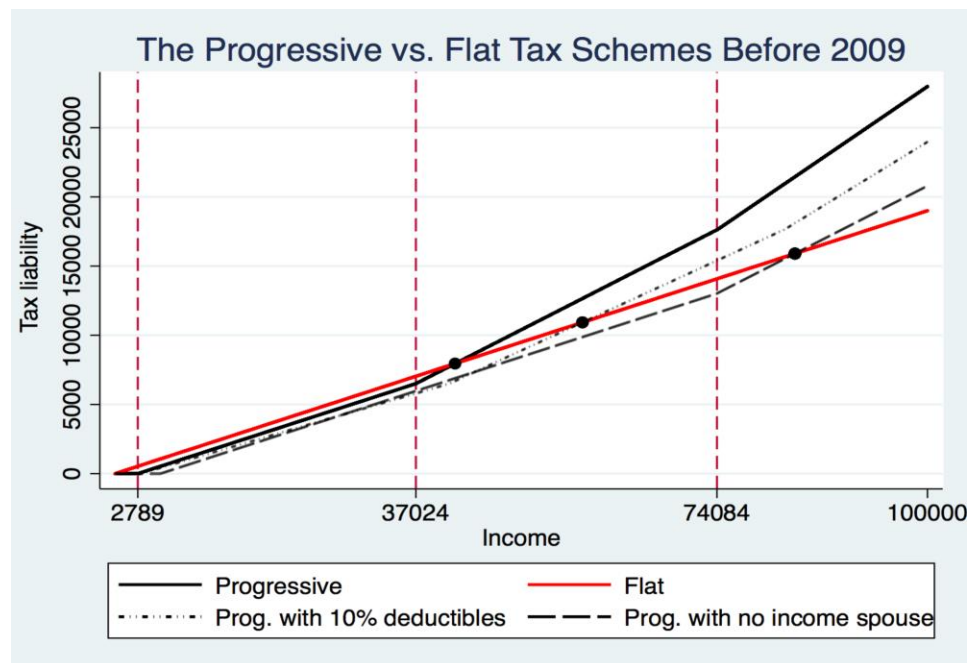
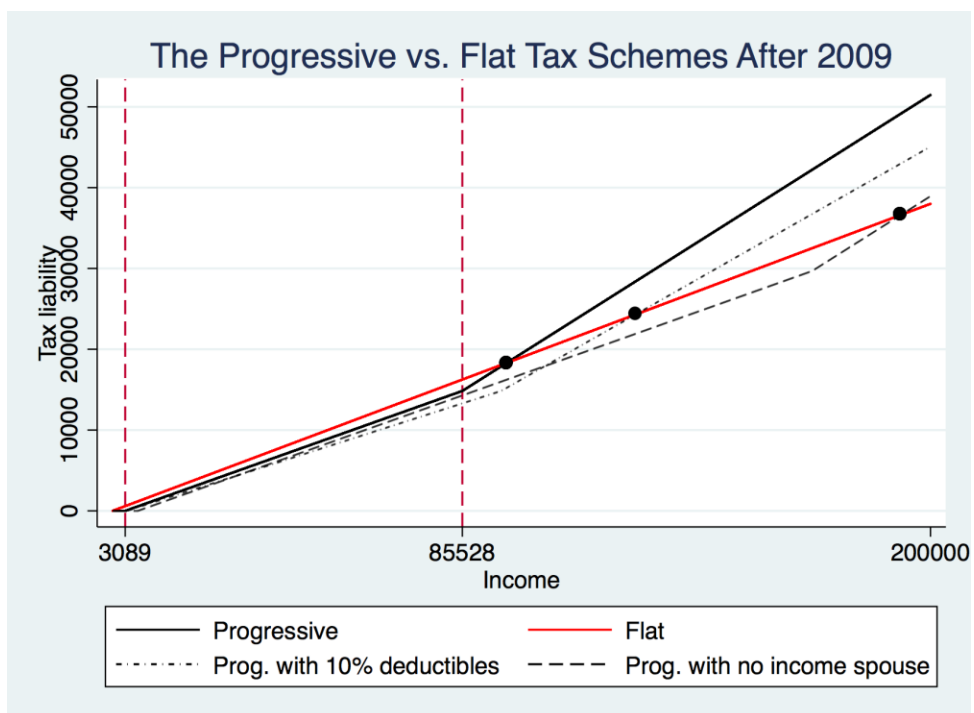
⁹¹ In 2005 there were no flat tax fillers with the total income within the bottom bracket.

income. It seems reasonable to use a proportion of 60%, in order to account for the possibility of other source of income besides wage in the progressive schedule. On the other hand, the average wage of flat tax filers makes 60, 51, 44 and 46 percent of the weighted average income of the bottom and middle bracket for 2002-2005. These suggest that from 2009 onwards a reasonable proportion is 50% of the weighted average income.

Taxation of Capital Income

Income originating from capital is taxed using two exclusive methods, the presumptive tax and the flat tax. The former method is used for capital income, whereas the later for capital gains. Capital income, taxed using the 19% presumptive tax include interest rates from savings accounts, bonds and provided loans, investment funds income and dividends. Capital gains, taxed using the flat 19% tax (PIT 38 form), include gains from selling company's shares and stocks, gains from selling other securities, gains from derivatives.

Some forms of capital income are exempted from the capital income tax, in particular, income from selling government bonds bought before 2003 and local government bonds issued after 1997, gains from selling company's shares, stocks, securities bought before 2004, gains from securities bought before 2004, income from investment funds bought before 2001, income interest rates from savings accounts, bonds and provided loans if the transaction took place before 2001. Copyright income is taxed using either progressive or flat rate (since 2014 only progressive).

Figure A5: Simulated Tax Liabilities in the Progressive and Flat Tax Schemes before 2009**Figure A6: Simulated Tax Liabilities in the Progressive and Flat Tax Schemes after 2009**

In our estimations of the top income shares, we exclude the capital gains. The reasons are twofold. Firstly, these sources of income are negligible. At the same time, merging these sources of income with the progressive schedule, would involve a lot of ad hoc assumption. Secondly, we want to make our estimates consistent across years as much as possible. Since capital gains were not taxed before 2001 their inclusion would distort comparison of the top income shares across the period of interest.

Because the presumptive tax is collected at the source (e.g., bank) capital income is not reported in the tax reports and thus does not appear in the tax reports. Unfortunately, we are not aware of any publication, which would provide comprehensive data on the capital income. The only available data comes from the press publication (Gazeta Wyborcza) and present the tax revenues originating from capital income. Based on these we estimated that capital income between 2007 and 2014 is on average 3.6% of the total progressive income. One solution is to exclude this income from the control income when capital income based on revenues is distributed similarly to the observed income, this strategy should not seriously bias the top income share estimates.

Joint taxation

Married couples and single parents have a right to submit a joint tax form under the standard set of conditions. From the calculation of the control income, 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).

Population Control

From 1992, the tax unit has been individual. However, when an individual uses both types of tax regime (the progressive or the flat) or her income comes from specified sources, she has to submit multiple tax forms.⁹² We describe the multiple reporting problem and the way to deal with it in the special section. Regardless of the method of merging income across the tax regimes, a good candidate for the relevant control total for the population is the total number of individuals, adjusted for the following tax reporting eligibility criteria:

⁹² For instance, when the individual uses either the progressive or flat tax regime she submits only one tax form and she appears only once in the statistics. When she uses both regimes, she needs to submit a multiple tax forms and thus will be reported two times. In theory one could submit up to four tax reports.

- People younger than 18 years old submit a tax form only when their income comes from an employment contract, scholarships, internships or a sale of items. In all other cases their income is reported through their parent's form.
- People older than 18 years old, who do not earn any taxable income, are not obliged to submit any tax form. The most important group which falls into this category are individual farmers (unless they receive income from a taxable source).

Income Control

In order to approach the total income denominator for the 1992-2015 period, we use National Accounts figures. 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' and employees' 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).

Table A5: Population and Income Control Total, Poland 1992-2015

		Total tax units (in thd.)	Total population (in thd.)	(1)/(2) %	Total income (mill. PLN)	Total income (2010 mill. PLN)	Average in- come (2010 PLN) (5)/(1)	CPI 2010=100
1992	*	26,139	38,203	68%	66,462	373,384	14,284	18
1993	*	26,349	38,239	69%	94,674	388,010	14,726	24
1994	*	26,523	38,265	69%	134,547	413,991	15,609	33
1995		26,699	38,284	70%	173,282	415,544	15,564	42
1996		26,864	38,294	70%	204,866	410,554	15,283	50
1997		27,023	38,290	71%	262,782	457,808	16,942	57
1998		27,178	38,277	71%	315,471	491,387	18,081	64
1999		27,202	38,263	71%	337,896	491,128	18,055	69
2000		27,474	38,254	72%	371,729	490,408	17,850	76
2001		27,793	38,242	73%	404,779	506,607	18,228	80
2002		28,178	38,219	74%	406,035	498,814	17,702	81
2003		28,336	38,191	74%	416,707	507,560	17,912	82
2004		28,577	38,174	75%	441,645	519,582	18,182	85
2005		28,782	38,157	75%	453,337	522,277	18,146	87
2006		29,244	38,126	77%	486,912	554,570	18,964	88
2007		29,419	38,116	77%	520,345	578,804	19,674	90
2008		29,545	38,136	77%	580,996	619,399	20,965	94
2009		29,679	38,167	78%	621,502	638,092	21,500	97
2010		30,035	38,530	78%	652,950	652,950	21,740	100
2011		30,251	38,538	78%	699,969	671,112	22,185	104
2012		30,222	38,533	78%	722,072	668,586	22,122	108
2013		30,230	38,496	79%	727,425	666,751	22,056	109
2014		31,399	38,479	82%	760,176	696,132	22,171	109
2015		31,365	38,437	82%	791,372	732,074	23,341	108

Taken these together, the reasonable strategy for the control population is to use the size of population who are older than 18 years old and subtract the number of individual farmers.⁹³ The current levels of population (with a breakdown by age) are reported annually by *GUS*. The share of people working in agriculture is available from the censuses conducted in 2002 and 2011 and these are extrapolated for the remaining years.

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). Moreover, using the firm-level micro data from the Bureau van Dijk Amadeus database, we estimate that only between 2% to 13% of profits earned by companies larger than ten employees can be attributed to unincorporated enterprises.

It is interesting to note that distributed income from unincorporated enterprises accounts for the predominant form of distributed income received by Polish households, far surpassing dividends in magnitude. In fact, income from unincorporated enterprises ('business income') accounts for the largest part of the property income of households. This could be related to the relatively more frequent use of non-corporate business forms in comparison to companies that pay dividends (probably the business form used more by foreign investments). We should probably trace this practice to the influence of the German commercial law.

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.

⁹³Analyze of micro-data on source of incomes, might provide insights on the share of individual farmers who are receiving income also from taxable sources. This information can be used to adjust the number of subtracted individual farmers.

Appendix 4: 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 ($a > 1$) (Feenberg and Poterba 1993, p. 172).

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 :

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

We allow for variation of coefficients through the distribution, and accordingly 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.

Appendix 5: Interpolation

Up to 2006, the top bracket contains approximately 1 percent of the control population, making accordingly estimates constructed using this information quite robust to distributional form assumptions. However, the number of taxpayers in the top bracket rises steadily afterwards,

containing more than 2 per cent of the population from 2008 and reaching 3 per cent in the recent years.

Therefore, we had to extrapolate using the specific distribution form in order to estimate the top 1 per cent income share for these years. As discussed in Section 2.5., the upper tail of income distribution is quite well approximated by Pareto distribution, whose basic feature is that the ratio of average income above the certain threshold y and the threshold y is constant. This ratio is often termed as the inverted Pareto coefficient b . Thus, by assuming the constant Pareto b , it is straightforward to estimate top shares of specific fractiles.

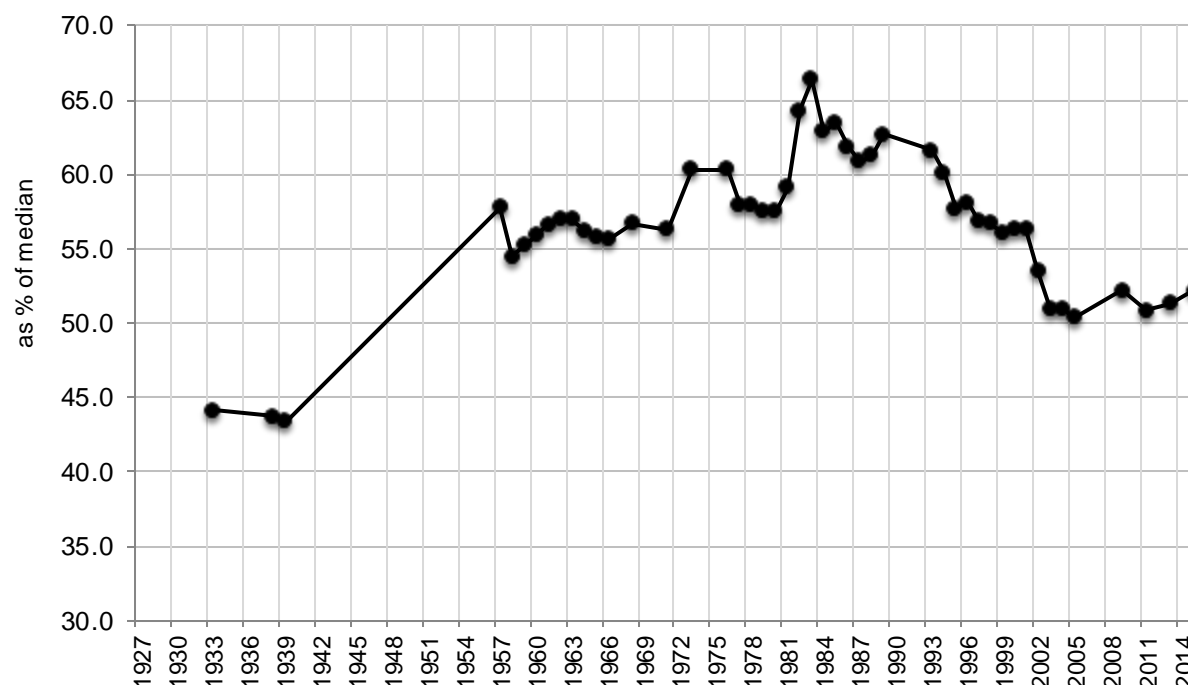
However, in practice coefficient b can slightly vary with income even for the top of distribution in a given year, making the extrapolation into the open interval sensitive to the extent of this variation. Because we observe for preceding years (1992-2005) that Pareto coefficient b rises slightly with income as we move from the middle bracket to the top bracket threshold, extrapolation in order to obtain the top 1 percent income share would quite likely result in the underestimation of the top percentile. But since there is a fairly similar year-to-year change of Pareto b both for the middle and the top bracket observed in the preceding years, we obtain instead Pareto b coefficient for the top percentile in the 2009-2013 (when we have only two brackets) period by taking the Pareto b for the top percentile in 2008 as the starting point to which we apply the growth rate of Pareto b for the upper bracket from 2008 to 2013.⁹⁴

Appendix 6: 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.

⁹⁴ The same procedure when applied for 2006-2008 taking 2005 as the start year results in very close values of Pareto b as those observed in the data, so we do not make corresponding adjustments.

Figure A7: P10 of the earning distribution in Poland

Source: own construction: 1929-1949; 2008-2014; other years: Atkinson and Micklewright 1992; Rutkowski 2001; Atkinson 2008; (see Appendix); 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.

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 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 10: Top shares from EU-SILC

The EU statistics on income and living conditions (EU-SILC) is survey data on income distribution collected by Eurostat. The reference population is all private households and their members aged above sixteen. For Poland, the sample consists of 6000 households and 15000 individuals every

year and the available data spans from 2005 until 2013. For our analysis, we only look at people older than twenty years old. The income from capital and rental is defined at the household level, whereas income from employment, self-employment and pension benefits is collected for each individual separately.

In order to make the definition of income comparable to the tax data, we include income from employment, self-employment, pension, capital (interests, dividends, profit from capital investments in unincorporated business) and rental of a property or land. Employment income consists of employee cash or near cash income and non-cash employee income. Self-employment is defined as cash benefits or losses from self-employment (including royalties).

Since the tax data is at the individual level, our preferable unit of analysis is also an individual. We decided to assign the household-level income (capital and rental) to a household member who has the highest income from employment and self-employment. This way we obtain upper bound estimates of the top income shares. Alternatively, we also assume the household level as the unit of analysis, and we sum up all the income sources across the household members.

Table A 6: Top income shares estimated from EU-SILC (unit of analysis are adults)

	10%	5%	1%	0.5%	0.1%	10-5%	5-1%	1-.5%	.5-.1%	0.1%
2005	38.90	25.42	9.21	5.97	2.10	13.47	16.21	3.24	3.87	2.10
2006	36.46	23.55	7.82	4.66	1.21	12.91	15.73	3.16	3.45	1.21
2007	35.50	23.04	8.03	5.04	1.65	12.46	15.01	3.00	3.39	1.65
2008	35.12	22.96	8.43	5.45	1.80	12.16	14.53	2.98	3.65	1.80
2009	34.51	22.48	8.27	5.51	1.87	12.03	14.21	2.76	3.64	1.87
2010	33.83	21.43	7.32	4.61	1.30	12.40	14.11	2.71	3.31	1.30
2011	33.99	21.86	7.75	4.98	1.75	12.13	14.10	2.77	3.23	1.75
2012	33.47	21.25	7.20	4.55	1.40	12.22	14.05	2.66	3.14	1.40
2013	33.28	21.17	7.06	4.38	1.19	12.10	14.11	2.68	3.19	1.19

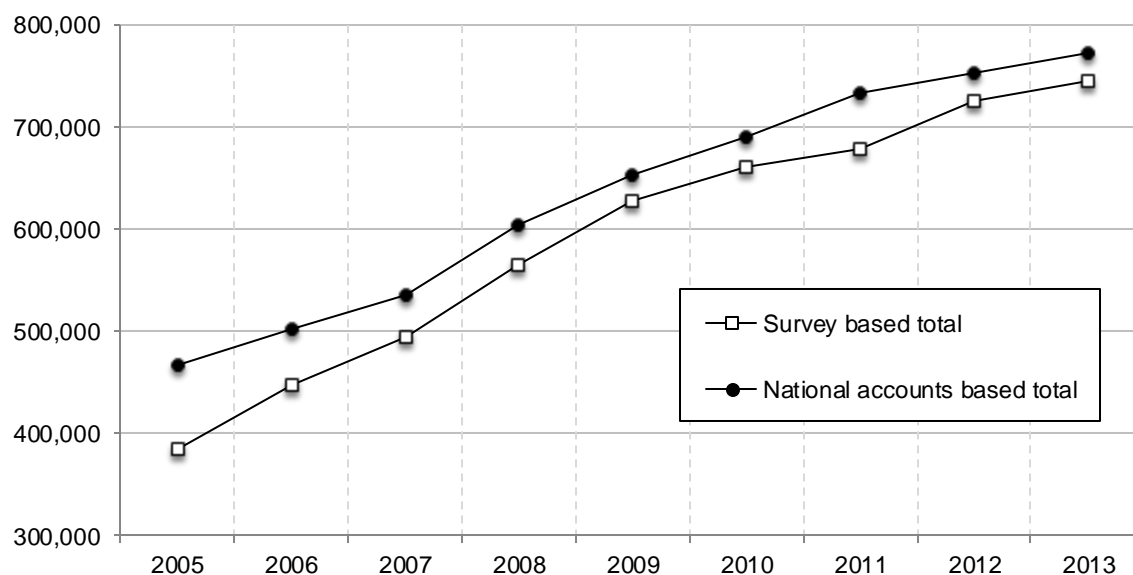
Table A 7: Top income shares estimated from EU-SILC (unit of analysis are households)

	10%	5%	1%	0.5%	0.1%	10-5%	5-1%	1-.5%	.5-.1%	0.1%
2005	32.5	20.5	6.9	4.4	1.4	12.0	13.5	2.5	3.1	1.4
2006	30.5	18.7	5.6	3.3	0.9	11.8	13.1	2.3	2.4	0.9
2007	30.0	18.5	5.8	3.6	1.2	11.5	12.7	2.3	2.4	1.2
2008	29.9	18.6	6.2	3.8	1.3	11.3	12.5	2.3	2.5	1.3
2009	29.0	18.0	6.2	3.9	1.3	11.0	11.8	2.3	2.6	1.3
2010	28.0	17.0	5.3	3.3	0.8	11.0	11.7	2.0	2.4	0.8
2011	28.7	17.6	5.7	3.6	1.1	11.1	11.9	2.1	2.5	1.1
2012	28.3	17.2	5.3	3.3	1.0	11.1	11.8	2.0	2.3	1.0
2013	28.1	16.8	5.1	3.0	0.7	11.2	11.7	2.1	2.3	0.7

Table A 8: Average income and percentiles estimated from EU-SILC (unit of analysis are adults)

	Average income						Threshold				
	All	10%	5%	1%	0.5%	0.1%	10%	5%	1%	0.5%	0.1%
2005	13,394	52,084	68,094	123,302	159,991	322,273	31,442	42,221	78,000	100,826	230,400
2006	15,477	56,425	72,896	120,732	143,515	205,465	34,716	46,708	87,520	111,540	173,302
2007	17,012	60,391	78,390	136,461	170,696	362,170	37,334	49,605	90,798	118,885	244,490
2008	19,388	68,060	88,955	163,088	208,834	389,945	41,429	55,026	103,270	136,853	276,339
2009	21,501	74,185	96,600	177,744	236,669	558,282	45,312	60,000	107,592	137,017	408,675
2010	22,554	76,283	96,657	164,800	206,128	419,332	49,393	64,661	112,305	134,765	314,062
2011	23,069	78,397	100,808	178,474	229,593	479,823	49,695	64,580	115,997	145,226	308,256
2012	24,288	81,287	103,237	174,805	219,374	460,996	52,030	68,489	118,990	148,081	271,404
2013	24,932	82,964	105,552	175,022	217,319	379,163	52,961	70,188	120,706	152,174	286,428

Note: amounts in zloty; average income for all taxpayers in million zloty.

Figure A7: Total controls as estimated from national accounts and surveys

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