INCOME INEQUALITY IN EASTERN EUROPE:

BULGARIA AND CZECHOSLOVAKIA IN THE TWENTIETH CENTURY

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Income Inequality in Eastern Europe:
Bulgaria and Czechoslovakia in the Twentieth Century[†]

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Abstract

This article provides novel estimates of long-term income inequality in Bulgaria and Czech Lands/Czechoslovakia in the twentieth century. Relying on newly-constructed datasets and the social tables approach, we measure inequality between salient social strata. We find that Czechoslovakia was significantly more unequal than Bulgaria before 1945. Inequality converged to similarly low levels under socialism. Decomposition analysis by social classes reveals that different levels of inequality in the first half of the century were principally driven by higher within social-class inequality in Czechoslovakia, owing to a more stratified industrial society; whereas a low dispersion within the dominant agricultural sector held down the within social-class component in Bulgaria. A dramatic fall in total inequality after 1945 was a result of the social revolution that encompassed the virtual disappearance of between social-class inequality and a marked reduction in within social-class inequality. Our findings point to the critical role of institutional and political factors in driving inequality in Eastern Europe throughout the twentieth century.

Keywords: Income inequality; social tables; Bulgaria; Czechoslovakia
JEL codes: D31, E24, E25, J31, N33, N34

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1 Introduction

Little is known on the historical evolution of income inequality in Eastern Europe. This is unfortunate given the dramatic socio-economic and political changes that singularly marked the twentieth century in Eastern Europe, and could serve as a historical laboratory to investigate central developmental questions: how does inequality evolve during economic development and which structural forces shape it; how development impacts social structure; which social groups benefit or lose from modern economic growth.

Long-run data with detailed information on the socio-economic attributes of a society are needed to answer these questions. Promising work on historical inequality in Eastern Europe has been done, but available series either focus on the development at the top of the income distribution (Novokmet, 2017, 2023; Novokmet et al., 2018; Bukowski and Novokmet, 2021), are confined to a specific point in time (Lindert and Nafziger, 2014; Vinski, 1967), or start relatively late (e.g. in the 1960s, Atkinson and Micklewright (1992)).[1] As a result, the "holistic" dataset is still missing for Eastern Europe, and many pressing questions remain without an answer.

This paper aims to come one step closer to this ideal by constructing a comprehensive dataset on long-run income inequality in Bulgaria and Czechoslovakia during the twentieth century. Our country choice is motivated by comparing inequality levels and trends in the most and the least developed parts of Eastern Europe, which makes them particularly suitable case studies from the comparative development perspective.[2] We estimate inequality using the social tables approach. For this purpose, we constructed a new dataset on socio-economic structure and income based on a plethora of historical sources. We track inequality during a tumultuous period that included World Wars, state formation, the Great Depression, German occupation, and Communism. We find that Czechoslovakia was significantly more unequal than Bulgaria before 1945. By contrast, inequality in the two countries converged to similarly low levels under socialism. Moreover, the

[1] Studies of the long-run aiming at global coverage approximate inequality in the whole of Eastern Europe based on sporadic estimates available for certain countries and years (Bourguignon and Morrisson, 2002; Van Zanden et al., 2014).

[2] Around 1930, Czechoslovakia had the highest and Bulgaria the lowest share of industrial employment in Eastern Europe (ca. 40 and 8 per cent, respectively, cf. Figure 2).

Great Depression in Bulgaria and the German occupation of Czechoslovakia stand out as significant short-term shocks to inequality. Social tables enable us to examine how changes in the size and incomes of social groups affected inequality. We are thus able to consistently track, for the first time, the secular developments in social stratification in the studied countries, as well as to ascertain how social changes impacted long-run inequality trajectories. Structural change, compression or expansion of worker's wages, a growing public sector, collectivization of agriculture and nationalization of industry all mattered in both countries at certain periods.

We construct social tables to study the income distribution. Social tables are data tabulations enumerating salient socio-economic groups with their average incomes (Milanovic et al., 2011, p. 256). Social tables have a long tradition in economic history. In modern literature, pioneering social tables were created by Lindert and Williamson (1982), and to date no less than 41 social tables have been produced (Milanovic, 2018).[3] While most social tables are constructed for benchmark years, following Rodriguez Weber (2015), scholars have recently started to construct annual social tables. Gómez León and De Jong (2019) estimated income inequality in Britain and Germany from 1900 to 1950 based on social tables, and Gómez León and Gabbuti (2024) have done the same for Italy. Social tables are the main tool for estimating inequality in periods for which tax data or household surveys are lacking. Moreover, social tables aim to draw a full picture of a society's income distribution.

We muster a comprehensive new dataset on employment structure and incomes to construct annual social tables. For both studied countries we start on the eve of the First World War, cover the interwar period, the Second World War, and most of the socialist period. In total, we cover 53 years in Bulgaria, and 57 years in Czech Lands/Czechoslovakia. Based on population censuses, we track the labor force by consistent social groups over time. Workers, employees, and self-employed are joined by members of cooperatives under socialism.[4] We distinguish social groups within more than twenty economic branches

[3]For example, social tables have recently been constructed for the USA (for 1774, 1850, 1860, and 1870) by Lindert and Williamson (2013, 2016), and revised for England (for 1688, 1759, 1798, 1846, and 1867) by Allen (2019).

[4]Population censuses clearly distinguish various social categories. We group certain social categories

spanning all three major economic sectors. We draw on a multitude of historical sources for average incomes of salient social groups. Sources include statistical yearbooks, labor statistics, health and accident insurance reports, tax statistics, household budget surveys, microcensuses, and national income studies.

Compared to the existing literature, we go a step further to capture inequality within social groups. We apply the most granular social and economic differentiation possible to minimize income differences within social groups. Further, we innovatively use additional data for social groups with potentially large within-group income differences. For example, we use land surveys to estimate the income distribution of farmers. We draw on personal income tax data for income differences among self-employed. We apply income distributions of employees from employer surveys. And we distribute members of cooperatives by income based on household budget surveys. Lastly, for social groups where only average incomes are available, we employ the log-normal distribution to estimate within-group inequality.

We single out two main findings on long-run inequality. First, income inequality was significantly higher in Czechoslovakia than in Bulgaria in the first half of the twentieth century (the Gini coefficient was between 40-45 in Czechoslovakia and around 30 in Bulgaria). Second, income inequality sharply declined in both countries with the introduction of the communist system after the Second World War, converging to record low levels under socialism (the Gini coefficient reached levels slightly below 20).

We apply the social class analysis to explain both the documented inequality levels and trends. We formally assess the role of social structures for inequality by conducting a standard inequality decomposition into constituent within and between inequality. We find that the different inequality levels in Czechoslovakia and Bulgaria in the first half of the 20th century were the result of a more "developed" social structure in the former. This entailed a relatively larger contribution of within inequality in Czechoslovakia due to the more sizeable shares of modern (industrial) classes that were also characterized by higher within inequality. On the other hand, the importance of the between component − reflecting differences in the mean income between classes − was roughly similar in the two

to ensure consistency across censuses in the long run.

countries. Concretely, in pre-industrial Bulgaria, the relatively egalitarian distribution among the most populous group of independent farmers attenuated the sizeable income distances between groups (i.e. within inequality was constrained).[5] In Czechoslovakia, different social classes were more sizeable (more evenly represented in the population) and at the same time all exhibited relatively higher within inequality, hence the contribution of within component was more pronounced.[6] The social revolution that occurred during communism had a first-order impact on income inequality. The total income inequality came to be almost exclusively determined by the within-inequality component, itself reduced to low levels (especially in Czechoslovakia). Inequality in mean income between social groups practically vanished, partly in an attempt to reach a classless society.

We confront our results with existing theoretical frameworks of the inequality evolution during the development process, in particular in relation to mechanisms underlying the influential Kuznets' hypothesis − that of sectoral reallocation of labor and cumulative effects of concentration of saving. For this purpose, we extend the analysis by comparing patterns of top income shares in Bulgaria and Czechoslovakia.[7] We explain observed inconsistencies with the predicted dynamics of the paradigmatic model in its overly deterministic emphasis on economics forces as determinants of inequality. We suggest instead the critical role of institutional and political factors in shaping long-run income inequality in Eastern Europe during the twentieth century.

The next section discusses the historical and conceptual background. Section 3 explains the social tables approach to estimating income inequality. Section 4 describes our data on socio-economic structure and incomes. Section 5 presents estimates of income inequality in Bulgaria and Czechoslovakia in the twentieth century. Section 6 compares our results with the international literature. The last section offers our conclusions.

[5]However, it should be emphasized that land inequality was not necessarily low in pre-industrial societies, and correspondingly the contribution of within inequality to overall inequality was not relatively egalitarian. We discuss the critical role of land inequality for pre-industrial inequality.

[6]For example, the inequality among workers, as the largest social class in pre-communist Czechoslovakia, was high due to pronounced gender wage inequality or marked wage dispersion between industrial branches; inequality among independent outside agriculture was markedly right-skewed due to a large income gap between capitalists and the rest of self-employed; inequality among independent in agriculture was high due to very high land concentration, etc.

[7]Our other data contribution is to construct the first historical series of top income shares in Bulgaria for the 1921-1946 period.

2 Historical and conceptual background

The economic development in Eastern Europe in the "long" twentieth century was turbulent. The two countries studied, Czechia and Bulgaria, both passed through critical historical junctures of the two world wars, the rise and fall of communism, globalizations and disintegrations, among others, which all entailed dramatic socioeconomic and political transformations. At the beginning of the studied period, at the turn of the twentieth century, the two countries belonged to markedly different political, socioeconomic and cultural spheres, being for centuries a part of large multinational empires−the Czech Lands developing in the Habsburg Empire (since the 16th century), Bulgaria in the Ottoman Empire (since the late 14th century). Countries' economies accordingly assumed distinctive features, for example, visible in different institutions, administrative capacities, land tenure arrangements, the nature of the proto-industrialization, etc.

In the period up to the First World War, the Czech Lands had undergone a critical economic transformation and largely industrialized in a "natural" (capitalistic) way. These lands were the stronghold of Habsburg industry, containing almost two-thirds of the monarchy's industrial capacity and also stood at the forefront of commercial agriculture (Klein et al., 2017). Moreover, the crown lands had one of the most educated workforce in Europe (Cvrček, 2020). Bulgaria was, in contrast, among the poorest countries in Europe. The prevailing historical narrative characterizes the country's experience in the first half of the 20th century as that of failed economic modernization (Gerschenkron, 1962; Lampe and Jackson, 1982; Lampe, 1986; Palairet, 1997).[8] The subsistence agriculture with the gravest rural overpopulation, and the small and sluggish industry, kept Bulgaria in the low-growth equilibrium.

The aftermath of the First World War brought the dissolution of the Habsburg Empire and the establishment of the First Czechoslovak Republic. Bulgaria, de facto independent from the Ottoman Empire from 1878, came out of the Great War (and previous Balkan

[8]"Revisionist" views attenuate these harsh assessments stating that important preconditions were made before the Second World War for the eventual communist industrialization of Bulgaria (Ivanov and Tooze, 2007; Ivanov and Kopsidis, 2023). Recent research on neighboring Serbia found that both real wages (Milanović and Mijatović, 2021) and GDP per capita (Mijatović and Zavadjil, 2023) were stagnant between 1860 and 1910, thus supporting the traditional underdevelopment thesis.

Wars) burdened with war reparations and high debt. Both countries grappled with a difficult political situation coupled with ethnic tensions between natives and minorities. Czechoslovakia further faced the challenge of nation building. The Great Depression hit these Eastern European countries hard compared to the rest of Europe (Marcus et al., 2021). Overall, the growth experience of the interwar period was relatively poor (Roses and Wolf, 2010).

The aftermath of World War 2 signified communist accession to power in both countries and falling into the Soviet influence zone ("Iron Curtain"). Accordingly, it entailed a full-scale transformation of the economy and a rigid adoption of the Soviet economic model. Both countries came to be known as bastions of the orthodox communist model (ensured with direct Soviet military intervention in Czechoslovakia in 1968). This primarily meant the implementation of central planning, nationalization of industries, collectivization of agriculture. Nationalizations occurred very quickly in both countries (by 1950 the whole industry was nationalized).

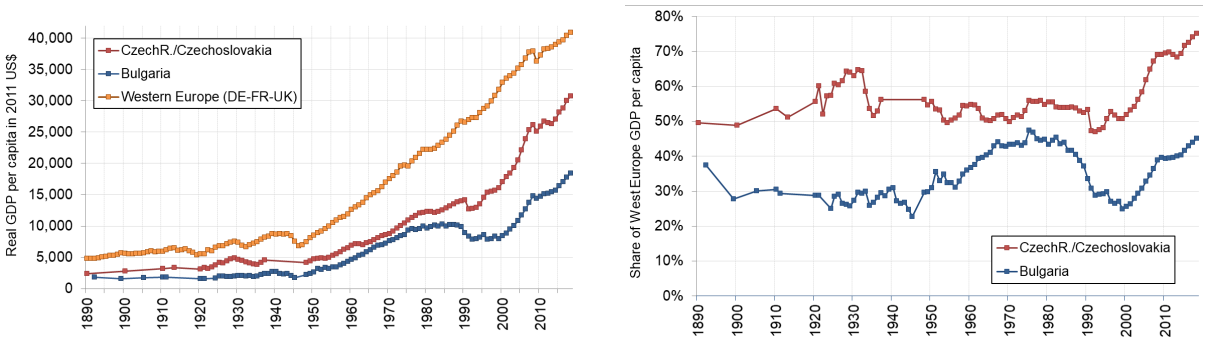


Figure 1: *Long-term GDP per capita in Czechoslovakia and Bulgaria, 1890-2018*

Notes: Up to 1990 Czech Lands/Czechoslovakia; since 1990 the Czech Republic. Western Europe is the unweighted average of France, Germany and the United Kingdom.
Sources: Own construction from Bolt and Van Zanden (2020).

Inequality and development. Modern economic growth was set off by the Industrial Revolution, which is seen as a critical historical juncture that ushered in sustained economic growth amid permanent technological and organizational innovations (hence the period thenceforth is simply equated with the process of economic development (Kuznets, 1966, 1973)). The structural change from agriculture to industry (i.e. industrialization) may be taken as the most robust indicator of initiated economic development. Figure 2

suggests this in a rather unambiguous way. The figure shows the employment shares in industry and levels of GDP per capita in Europe in the interwar period. It can be seen that the European countries with higher shares of the workforce employed in the industry were unmistakably more prosperous.[9]

This simple observation of structural asymmetry between sectors lies at the heart of the famous dual-economy model (Nurkse, 1953; Lewis, 1954; Ranis and Fei, 1961). The model builds on a notion that high-income countries underwent a structural change, with the massive reallocation of labor (and other resources) from the traditional, low-productivity (technologically backward) agricultural sector to modern (urban and industrial), high-productivity (technologically advanced) sectors. Most importantly, the assumed structural heterogeneity amid differential sectoral productivities postulates aggregate growth-enhancing effects of sectoral labor reallocation.[10]

The stylized dual-economy model provided an operating framework for Kuznets' model of inequality evolution during the development path. Kuznets (1955) famously hypothesized an inverse-U evolution of inequality, according to which inequality first increases and then declines as the country develops. He proposed a mechanism of structural reallocation of the population from the traditional, less productive agricultural sector to the modern, more productive sectors that drives the upward swing of the inverse-U trajectory. Kuznets postulated different inequality levels in the two sectors (thus extending the paradigmatic dual-economy model, e.g. as conceived by Lewis (1954)), with lower inequality in agriculture and higher in industry − hence, a reallocation of the population during industrialization leads both to an increase in the aggregate output and of inequality (Anand and Kanbur, 1993). In the later stages of development, inequality falls once the surplus labour is fully absorbed and wages increase in the rural sector (the

[9]Although there was some variation in the level of industrialization between high-income countries at the time, it is clear that achieving higher living standards was accompanied by significant structural change. In the words of Kocka (2016): "as a rule, the only way to have made up in prosperity is some form of industrialization".

[10]It has been often assumed that developing countries are featured by surplus labor in agriculture (i.e. marginal product of labor is close to zero), which attracts workers to modern, technologically superior sectors (without a loss of agricultural output). This inflow of workers keeps wages in the industry at low levels, allowing in turn rapid capital accumulation there (which contributes further to rising labor productivity).

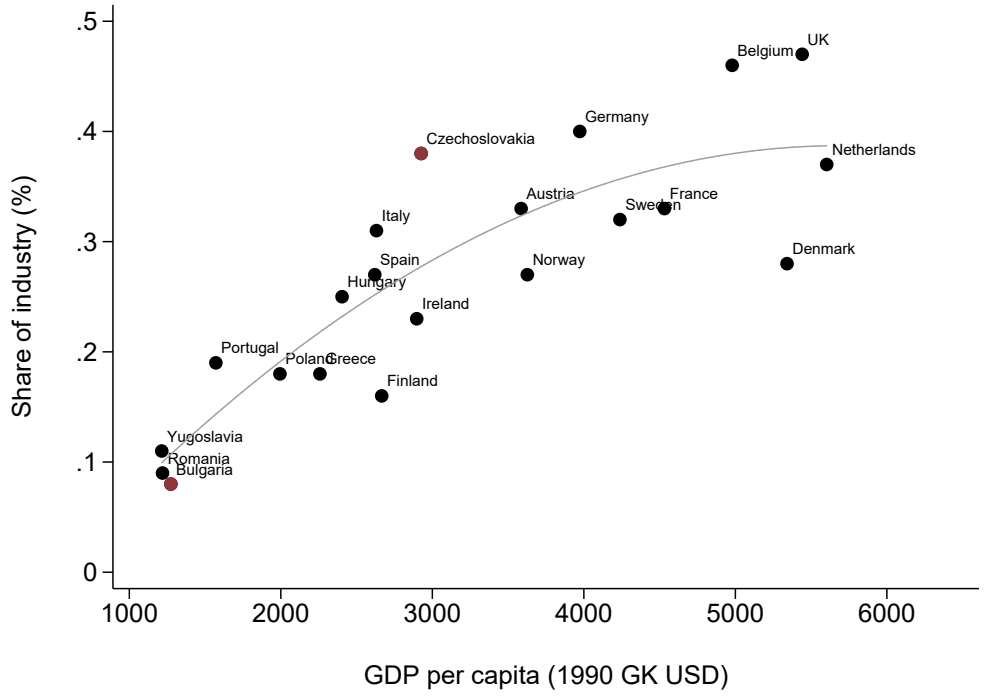


Figure 2: *Share of employment in industry and GDP per capita in Europe in the interwar period*

Notes: Shares of employment in industry are for 1930; GDP per capita for 1930 (in 1990 international Geary-Khamis dollars).
Sources: Share of employment in industry: Buyst and Franaszek (2010, Table 9.1, p.210). GDP per capita: Bolt and Van Zanden (2020).

so-called Lewis' turning point (Ravallion, 2016)), as well as inequality declines within the modern sector (see generally Milanovic (2023)). An inverse-U trajectory thus connoted an optimistic message about the distributional implications of economic development, stating that an initial rise in inequality is only a temporary price to pay for embarking on the development path, but is automatically reversed as growth advances. And as the expounded description reveals that the inverse-U inequality dynamics is fundamentally determined by economic forces, there is no need for policy interference.

The comparative experience of Bulgaria and the Czech Lands provides a particularly useful setting to investigate the validity of Kuznets' propositions. Both the timing and nature of industrialization were markedly different in the two countries. Different development levels during the study period imply that each country may be seen at different positions on the hypothesized Kuznets' curve. Recorded inequality patterns may be thus indicative of

the assumed evolution and mechanisms operating during different phases of development − i.e., the documented inequality experience of Bulgaria for the growth take-off and the rising part of the curve; of the Czech Lands for the more mature stages of development presumably accompanied by the decline in inequality.

At the turn of the twentieth century, when our analysis starts, we can look at them as being representative of a European core and a periphery. Figure 2 shows that Bulgaria was among the poorest and the least industrialized European countries during the interwar period. In the first half of the twentieth century, Bulgaria (and South-Eastern Europe in general) could be seen as a prototypical development country, which did not still commence its economic "take-off" (to use Rostow's terminology).[11] The exigency of economic modernization engrossed Bulgaria's collective strivings in the first half of the twentieth century. But as already mentioned, the efforts did not materialize and the shadow of Gerschenkronian "failed modernization" still presents the dominant historical narrative of Bulgaria's pre-communist development. After their accession to power, communists forced industrialization and structural change following the Soviet example of the 1930s, which, in its essence, was a variant of the dual-economy model. The industrialization process was forced in the sense that independent peasants were expropriated and quickly turned into wage earners, either compelled to join the collective farms or absorbed by the expanding state-owned industry.[12]

We examine the inequality dynamics during Bulgaria's industrialization, but find no evidence that the take-off was accompanied by rising inequality. Although Bulgaria displayed some typical features of an initially less developed country in a stylized dual-economy model − notably, characterized by low-income, egalitarian and surplus rural sector − a structural absorption of the rural labor surplus by industry did not lead to

[11]Lampe and Jackson (1982) thus point out that South-Eastern European "periphery" represented the original development countries. In fact, the earliest contributions to the dual-economy model were to a considerable extent inspired by the development predicaments of South-Eastern Europe (Rosenstein-Rodan, 1943). Surplus labor was perceived as characteristic of South-Eastern Europe in the first half of the twentieth century due to rural overpopulation. Rosenstein-Rodan (1943) assumed the surplus to be around 25% of the population in South-Eastern Europe (as "disguised unemployment"; see footnote 8)

[12]The income of collective farms was squeezed to provide funds for the capital accumulation in the industry (Nove, 1961) in the logic of "primitive socialist accumulation", as Preobrazhensky famously postulated (on the Soviet industrialization debate, see Dobb (2012); Erlich (1960); Allen (2003)).

an overall increase in inequality. As we show, structural transformation was actually accompanied by a dramatic decline in inequality.

Reasons for this inconsistency with the predicted dynamics of the paradigmatic model lie in its overly deterministic interpretation of forces driving inequality, in particular, its sole focus on the impact of a sectoral reallocation of workers on the labor market outcomes. The Kuznets process thus neglects the critical role that institutional and political factors play in shaping inequality in the long run, both of labor income and other income sources (Lindert, 2000; Piketty, 2006). Their decisive role for inequality is clearly manifested in the communist (almost complete) bureaucratic control of employment and the wage setting, which allowed them considerable discretion in determining wage differentials (both within and between different sectors, skill and occupational groups). Similarly, "institutional" investment in the massive expansion of education increased the supply of skilled workers (that was plausibly rising in tandem or faster than the industrialization-induced demand for skill). Importantly, the predominantly state ownership of the means of production entailed that the growing importance of capital income during industrialization appertained fully to the state, thus removing this inegalitarian pressure from interpersonal inequality (see below about the role of capital income).

In contrast, Czechoslovakia − and the Czech Lands in particular − had already achieved relatively high living standards by the interwar period (e.g. similar to Austria, Italy, or Norway) and undergone considerable structural change with one of the highest levels of industrial employment in Europe (Figure 2).[13] Accordingly, we can analyze documented inequality patterns in the industrialized Czech Lands in a setting of the peak (or the turning point) and the downward part of the inverse-curve. Our series starts at the beginning of the twentieth century, during a period which historical research has often associated with the peak of the Kuznets' curve, notably in the development context of Central Europe.[14] The remaining period may be seen as that of a secular decline in

[13]For example, Aldcroft (2016) analyses the European "periphery" in the interwar years. Czechoslovakia is the only country in Eastern Europe that is not included in the periphery, but treated as a part of Europe's core.

[14]Especially of Germany, for which there is a large body of historical research pinpointing the turn of the century as the peak of the Kuznets' curve during the industrialization of Germany (Dumke, 1991;

inequality, in line with the Kuznets' prediction.

However, as in the case of Bulgaria's take-off, the secular decline of inequality in the industrialized Czech lands had little to do with the dual-economy processes, as postulated by Kuznets. Wage inequality declined primarily because of comprehensive institutional reforms of the labor market and pronouncedly egalitarian wage policy, which sharply reduced premiums between sectors, different skills and occupations (Adam, 1984; Maňák, 1967; Večerník, 1991). More fundamentally, income inequality declined due to the dramatic deconcentration of capital income. An outstanding institutional rearrangement of property relations amid communist nationalizations and expropriations completely eliminated private ownership of wealth (Novokmet, 2023), which was the most important contributor to the secular fall in inequality. As first shown by Piketty (2001, 2003), a decline in inequality in Western countries was almost exclusively a result of the major shocks to high capital incomes which critically reduced top income shares (Atkinson and Piketty, 2007, 2010; Atkinson et al., 2011). That is, the turning point of inequality and its fall were not caused by the Kuznets' mechanism. In this respect, the Czechoslovak downward trajectory may be simply seen as the extreme version of inequality development in Western developed countries.

Finally, it should be mentioned that Kuznets (1955) identified two major sources of inequality during the development process. In addition to the process of sectoral reallocation of population discussed thus far, he also mentions the concentration of saving among high-income groups. Given that top incomes have a higher marginal propensity to save, there is a tendency towards higher wealth concentration, which leads in turn to higher capital income concentration − thus unleashing a spiral of further increases in income and wealth concentration (in a snowball effect, as Saez and Zucman (2016) point out). Correspondingly, an ongoing development should lead to a rising concentration of capital income and rising top income shares (the more so as development in a dual-economy

Grant, 2005; Tilly and Kopsidis, 2020). The Czech Lands are frequently seen as developing in tandem with neighboring German and Austrian Lands, and their economies consequently assuming broader common features. Structural similarities between Central European economies can be also seen in Figure 2, which suggests that the Czech Lands and Germany were "exceedingly" industrialized for their level of development.

model is supposed to be accompanied by the rising share of capital income in national income).[15]

We investigate this mechanism by comparing top income shares in Bulgaria and Czechoslovakia before communism. In line with the presented logic, we find indeed notably higher top income shares in industrialized Czechoslovakia, which were largely composed of property income (business profits, land income, interests, rents). As a result, shocks to top capital incomes in the form of communist nationalization of private wealth, entailed a considerably larger fall in top income shares in Czechoslovakia than Bulgaria after the Second World War.

3 Methods

Social tables establish the number of individuals in salient social classes and estimate their average incomes. Social tables are a powerful tool for analyzing historical inequality before the widespread introduction of individual taxation or household surveying. Indeed, before the 1950s, there were relatively few household surveys, and the ones existing for the countries we study cannot be taken as representative of the total population. At the same time, tax records focused on top income earners, leaving out a considerable portion of population at lower income levels. Social tables, by contrast, aim to capture a more comprehensive picture of a country's socio-economic structure.

We follow the approach of Milanovic et al. (2011) and other scholars, to construct our social tables for the gainfully occupied population. Thus, we measure inequality of individual incomes per economically active person.[16]This includes between 50 and

[15]To fix ideas, it is useful to look at the following formula $sh^p_Y = (1-\alpha) \cdot sh^p_{YL} + \alpha \cdot sh^p_{YK}$, which approximates the income share of a percentile p (e.g. of the top-1%), sh^p_Y, as depending on the size of the labor and capital share, $1-\alpha$ and α, and the share that the percentile p has in the total labor and capital income, sh^p_{YL} and sh^p_{YK} (for the sake of simplicity, we ignore the so-called "alignment" coefficients). Note that the "capital channel" driving an increase in sh^p_Y during industrialization would both connote a rising concentration of capital income, sh^p_{YK}, and a rising capital share in total income, α (see Atkinson and Piketty (2007); Atkinson et al. (2011); Roine and Waldenström (2015).

[16]It is hence the data availability that dictates the choice of our benchmark unit of observation as (economically active) individual adult. We correspondingly analyze the distribution of individual incomes for social categories of workers and employees (i.e., we assume that there is no income sharing within households of workers or employees). However, several adjustment were required due to data constraints. First, income data for independents in agriculture before WW2 is estimated at the household level from land censuses, and we needed to split income between adults within a households. We have applied

60 percent of the total population earning a market income. We draw on occupational censuses to categorize active population by social groups, economic sectors, and gender. Building social tables for the twentieth century provides for a relatively large number of observations compared to pre-modern societies. This is both because of the higher economic specialization and social stratification in modern societies, and the more detailed recording of data in official statistical sources. For example, each major economic sector consists of multiple branches within which we are able to distinguish several social groups, such as workers, employees, or entrepreneurs. Social tables, thus, truly provide a most detailed look into the socio-economic fabric of a country and inequality of income thereof.

Social tables, however, have their limitations. The most pertinent limitation concerns inequality within social groups. Although social tables enumerate individuals in each social group, individual incomes remain unobserved. Instead, average incomes are imputed to each social group. This may downward bias inequality if income variation within a social group is high. We adopted several strategies to mitigate this issue.

First, based on population censuses, we apply the largest possible level of social and economic disaggregation for a given historical context. In the first half of the twentieth century, censuses would typically differentiate between "blue-collar" workers, "white-collar" employees, and self-employed (called "independents" by the census), who depending on the economic sector, were farmers, industrialists, business owners, free professionals, or other entrepreneurs.[17] During socialism, with the nationalization of industry and collectivization of agriculture, independents all but disappeared, while cooperative members emerged as a new social category.[18] Importantly, we not only account for differences in incomes between

'equal-split adult' unit for independent in agriculture, according to which household income is equally distributed within households (Alvaredo et al., 2016). An equivalent approach is assumed for cooperative farmers and independent farmers during socialism, whose income is obtained from Household Budget Surveys (HBS); i.e., we equally distribute household income from HBS to adult individuals. Second, the tax data used to estimate income of inependent outside agriculture in pre-communist Czechoslovakia was reported for tax units. However, the tax statistics only reports income of the household head (e.g., classified as independent in different non-agricultural branches), without including earnings of spouse or other household members; see details in Novokmet, 2023, Appendix 1). Hence, we can generally assume that this taxable income was obtained by individuals.

[17]Censuses clearly distinguished workers from employees. Workers included laborers, apprentices, and others who performed manual work in agriculture or industry, or entry-level jobs in services. Employees included officials, clerks, and others tasked with administrative and management jobs spanning all major economic sectors.

[18]To be clear, the population census first introduced cooperative members as a social category in 1956

social groups, but also across economic sectors. For example, workers in agriculture or traditional industries (e.g. textiles) would typically earn considerably less than those in modern industries (e.g. chemicals). Detailed, branch-level statistics allow us to account for these income differences.

Next, we innovatively combine land distributions and tax records to estimate incomes within social groups where within-variation is expected to be large.[19] In Bulgaria, for example, farmers were the largest social group. Assigning the same average income to all farmers would mask potentially large income differences between farmers with land plots of different size. We take into account how land was distributed among farmers to capture inequality within this social group. Another example are entrepreneurs in industrial Czechoslovakia. Average incomes would hide differences in earnings between small business owners and large industrialists. To remedy this issue, we employ tax data to separate entrepreneurs in each sector into income classes. This way we account for inequality of income among the top income earners.

Lastly, we do not generally have information on the within-group income dispersion of workers and employees. Modalsli (2015) offers an important discussion of the issue specifically related to the social table method. He applies the log-normal distribution to the existing estimates of social tables and obtains significantly higher estimates of inequality as compared to those before the correction. We similarly deal with this issue by assuming that incomes within a particular social group (for which we only know mean income) follow the log-normal distribution. This is a standard assumption given the well-known empirical regularity that the size distribution of income is well described by the log-normal distribution (specifically, since it is positive and right-skewed). Hence, its frequent application to model the income distribution. Log-normality of income is explained in relation to the Gibrat's law of proportionate growth, according to which income of a given group is determined by series of random multiplicative shocks giving rise to a log-normal form (Gibrat, 1931; Kalecki, 1945; Aitchison and Brown, 1957).

in Bulgaria and in 1961 in Czechoslovakia.

[19]It should be noted that Lindert and Nafziger (2014) used tax and land inequality data to generate their estimate of Russian inequality. Our innovation is in using these data in a new way.

Parametrizing the log-normal form to our data is straightforward as this distribution is described by two parameters, the mean (μ) and the standard deviation (σ) of the log income. As we know the mean income of each social group, the standard deviation is assumed based on a conventional value for the coefficient of variation (CV); i.e. standard deviation equals the mean times the coefficient of variation. We opt for the relatively lower values of the coefficient of variation, of 0.5 (e.g. relative to values used by Modalsli (2015)), since we model the within-variation for smaller groups, that is, we have much more detailed distinction of occupational groups than is usually the case in the literature. Finally, from thus simulated log-normal distribution for a given occupational group (e.g. for workers in metallurgy), we create five composite observations based on the number of standard deviations from the mean (Figure 3).[20]

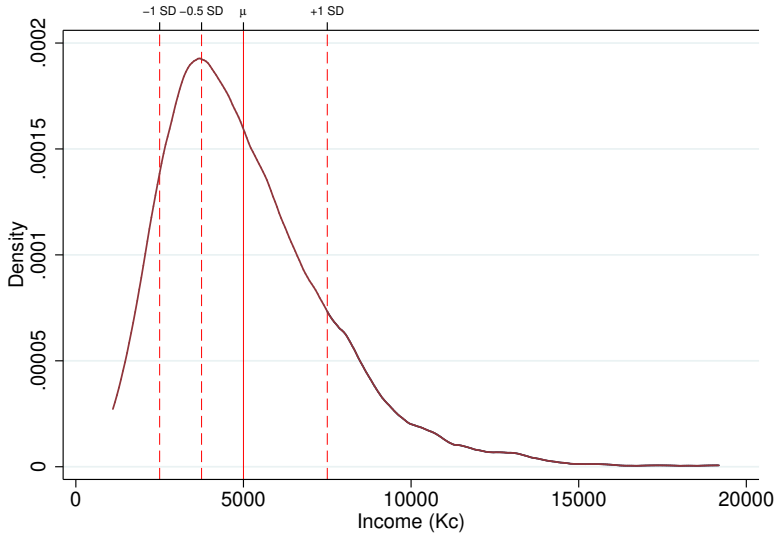


Figure 3: *Simulated lognormal distribution with CV =0.5 (μ=5000 and σ=2500)*
Sources: Own illustration.

[20]From the lowest to highest income observation: i) less than 1σ below the mean $[0, \mu - 1\sigma]$; ii) from 1σ below the mean to 0.5σ below the mean $[\mu - 1\sigma, \mu - 0.5\sigma]$; iii) from 0.5σ below the mean to the mean $[\mu - 0.5\sigma, \mu + 0.5]$; iv) from the mean to 1σ above the mean $[\mu, \mu + 1\sigma]$; v) more than 1σ above the mean $[\mu + 1\sigma, +\infty]$. We call these composite observations (rather than quintiles) since they are not necessarily of the same size.

4 Data

To construct social tables and estimate long-term income inequality, we muster a comprehensive new dataset on the socio-economic structure and incomes in Bulgaria and Czech Lands/Czechoslovakia spanning the period from 1911 to 1980. In this section, we describe the main sources and illustrate key data features, while the full list of sources and details on data building are documented in the Appendix.

Table 1 summarizes our dataset. In both countries we consistently track five social groups. As explained in Section 3, we divide each social group into a number of sub-groups to capture within-group variation. Social groups are further distinguished by more than twenty economic branches spanning all three major sectors, and by gender. The data cover a benchmark year before the First World War, most of the interwar, Second World War, and the socialist period. In total, we have 31,906 observations for Bulgaria and 41,732 observations for Czech Lands / Czechoslovakia.

Table 1: *Dataset summary*

Social groups	Within groups (no. of groups)	Sectors (no. of branches)	Period (no. of years)	N
	Bulgaria			
Workers	log-normal (5)			10,600
Employees	employer census (5)	Agriculture,	1911, 1921-1946,	10,600
Independents in agriculture	land size (8)	Industry (15),	1955-1980 (53)	636
Independents outside agriculture*	log-normal (5)	Services (4)		5,130
Members of cooperatives**	HBS (5)			4,940
				31,906
	Czech Lands / Czechoslovakia			
Workers	log-normal (5)			13,110
Employees	microcensus (5)	Agriculture,	1913, 1921-1945,	13,110
Independents in agriculture	land size (6)	Industry (15),	1950-1980 (57)	684
Independents outside agriculture*	tax income (7)	Services (7)		8,008
Members of cooperatives**	HBS (5)			6,820
				41,732

Notes: *Independents outside agriculture disappear after 1945. **Members of cooperatives appear after 1945. N is the number of observations calculated as the sum product of each social group and the corresponding number of within groups, economic branches, gender, and years. Before 1945, we estimate within inequality of employees applying the log-normal. After WWII, we rely on results of Bulgarian employer censuses (reported in Statistical Yearbooks) and the 1955 and 1970 Czechoslovak microcensus. HBS stands for household budget surveys.

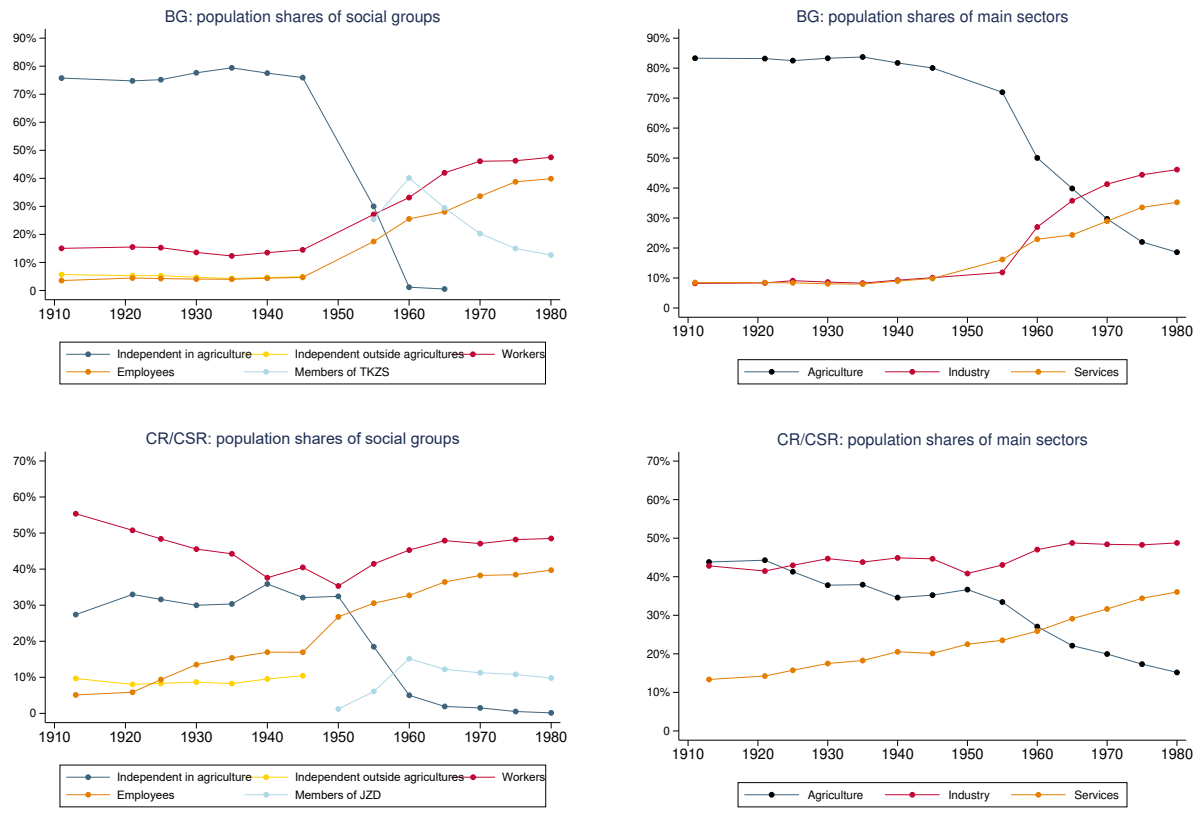
4.1 Socio-economic structure

Population censuses reveal a country's socio-economic structure. We collected labour force data from population censuses of Bulgaria in 1910, 1920, 1926, 1934, 1946, and 1956, as well as censuses of Czech Lands in 1910, and Czechoslovakia in 1921, 1930, 1950, and 1961. While earlier censuses are available, it proved difficult to find all the necessary accompanying incomes to reconstruct social tables for the preceding period. We, therefore, settled on constructing social tables starting from the eve of the First World War.

We consistently track socio-economic groups throughout most of the twentieth century. This allows us to estimate inequality before and after the First World War, during the tumultuous interwar, and uniquely both for Bulgaria and for the Protectorate of Bohemia and Moravia (that is the Czech Lands under German occupation) during the Second World War. Furthermore, our analysis covers the socialist period. To the best of our knowledge, we construct the first social tables for socialist countries. We can, thus, evaluate how inequality changed in the transition from a capitalist to a communist mode of production. For the socialist period, the first socialist census serves as the benchmark from which we reconstruct annual labor force movements with data from statistical yearbooks.

Figure 4 presents labor force shares by social groups and by sectors for our studied period. Bulgaria had a predominantly agricultural economy as late as the 1950s. Accordingly, independent farmers were by far the most numerous social group, comprising between 70% and 80% of the labor force before 1946. Workers consisted around 15% of the labor force, and were the only social category relatively evenly represented in all three major economic sectors. Independents in industry and services (e.g. artisans, business owners, or free professionals) and employees, practically all of which were occupied in the tertiary sector, jointly comprised the remaining 10% of the labour force.

Czechoslovakia had a significantly different socio-economic structure. Industry occupied as much as 40% of the labour force already before the First World War and its share grew over time. The share of services in the labour force also steadily increased. Naturally, the share of agriculture diminished. Workers were the largest social group throughout the studied period. They accounted for approximately half of the labor force. At the



Notes: Figures illustrate labor force shares by social groups (left) and economic sectors (right) for Bulgaria (top) and Czech Lands/Czechoslovakia (bottom). The latter series are for Czech Lands before the First World War, the Protectorate of Bohemia and Moravia during the Second World War, and Czechoslovakia for all the remaining years. Independent in agriculture include farmers and helping family members. TKSZ and JZD are agricultural cooperatives in Bulgaria and Czechoslovakia, respectively.
Sources: Own calculation based on sources detailed in the Appendix.

Figure 4: *Labor force shares by social groups and economic sectors*

same time, the share of employees increased reaching approximately a quarter of the labor force by 1950. Most workers were engaged in industry, whereas most employees were occupied in services. Independents comprised a stable share of the labor force: 30% were independents in agriculture and 10% independents outside of agriculture.

Communism brought major changes in the socio-economic structure of the labor force in both countries. In Bulgaria, from the 1950s, the share of both industry and services started to increase at the expense of agriculture. Independent farmers, who had previously been the dominant social group, shrank to about a quarter of the labor force in 1956, and due to the progressing collectivization of agriculture soon thereafter all but disappeared. Meanwhile, a new social category, formed in large part from previously independent

farmers, appeared: cooperated farmers.[21] In 1960, they accounted for as much as 40% of the labor force, but their share steadily decreased thereafter. The shares of workers and employees, by contrast, steadily increased during communism.

In Czechoslovakia, workers remained by far the most numerous social category, followed by a large share of state officials and employees. During socialism the share of employees increased to around 40%. As in Bulgaria, independent farmers were by and large collectivized, which produced a large group of cooperated farmers.[22] Collectivization of agriculture and nationalization of industry meant that in 1961, a meager 1% of the labor force earned a living independent of the state. Among them, remaining independent farmers were the most numerous. Thus, communism made the previously vastly different socio-economic structures in Bulgaria and Czechoslovakia more alike.

4.2 Incomes

We consulted a plethora of official statistical sources to gather information on incomes of different social groups. We managed to ascertain how incomes of social groups varied across economic sectors and over time. For workers, we were able to estimate pay-gaps by gender. Whenever possible we collected data on average annual earnings, instead of wage rates, to account for other types of income, such as payments in kind or overtime work. Where necessary, we annualized incomes relying on information on working time from national income studies. Before communism, we estimate inequality of pre-tax income, defined as income before personal income taxes and government transfers. The income concept under communism refers to post-tax income, that is, after direct taxes withdrawn at source (notably payroll taxes). However, given the generally linear schedule of direct taxes under communism, the difference between pre-tax and post-tax income inequality was minimal.

For the pre-socialist period, we compiled income data mainly from statistical yearbooks and national income studies. Bulgarian statistical yearbooks detail wages of industrial workers across many branches around 1911, in 1921, and from 1924 to 1945. Chakalov

[21] Members of labor-cooperative agricultural holdings, in Bulgarian abbreviated as *TKZS*.
[22] Unified agricultural cooperatives, in Czech abbreviated as *JZD*.

(1946) and Ivanov (2012) provide wages of workers in agriculture and services for the same years. We estimate incomes of other social groups in industry and services by applying premia relative to the worker wage. For these premia, we rely on Chakalov (1946) and Ivanov (2012) who estimated incomes of different social groups across economic sectors.

We innovatively estimate incomes of independent farmers. Simply assigning an average income to a social group that accounts for the majority of the labor force would grossly underestimate inequality. We therefore combine information from national income studies and land surveys to distribute independent farmers and their incomes into multiple income groups classified by land size. In Bulgaria, for example, starting from national income from agriculture, we deduct estimated labor income and distribute the remaining land income by income classes. To do so, we employ land distributions for multiple benchmark years. To each income class we impute a labor income so that farmers in the lowest category of land ownership earn little beyond their imputed labour income, while farmers in higher land categories earn more, depending on the size of their plot.

Czechoslovak statistical yearbooks document wages of workers within branches of agriculture and industry, in 1913 and during the interwar period. Statistical yearbooks of the Protectorate of Bohemia and Moravia cover the period from 1939 to 1945. We estimate incomes of employees in industry and agriculture by multiplying branch-level worker wages with employee premia that we calculate based on Stádník (1946). The employee premia is the ratio between the average remuneration of white- and blue-collars. We take salaries of public employees from statistical yearbooks. We rely on Stádník (1946) for total income of independent farmers and distribute their income following the same procedure as for Bulgaria. In the same spirit, we distributed independents in industry and services into multiple income groups based on tax statistics that reported their income from business and self-employment. Thus, we estimate the number of independents and their incomes in agriculture based on land statistics while we do the same for industry and services using tax statistics.

For the socialist period, we draw most information from statistical yearbooks, which also reported results of land and household budget surveys. Bulgarian statistical yearbooks

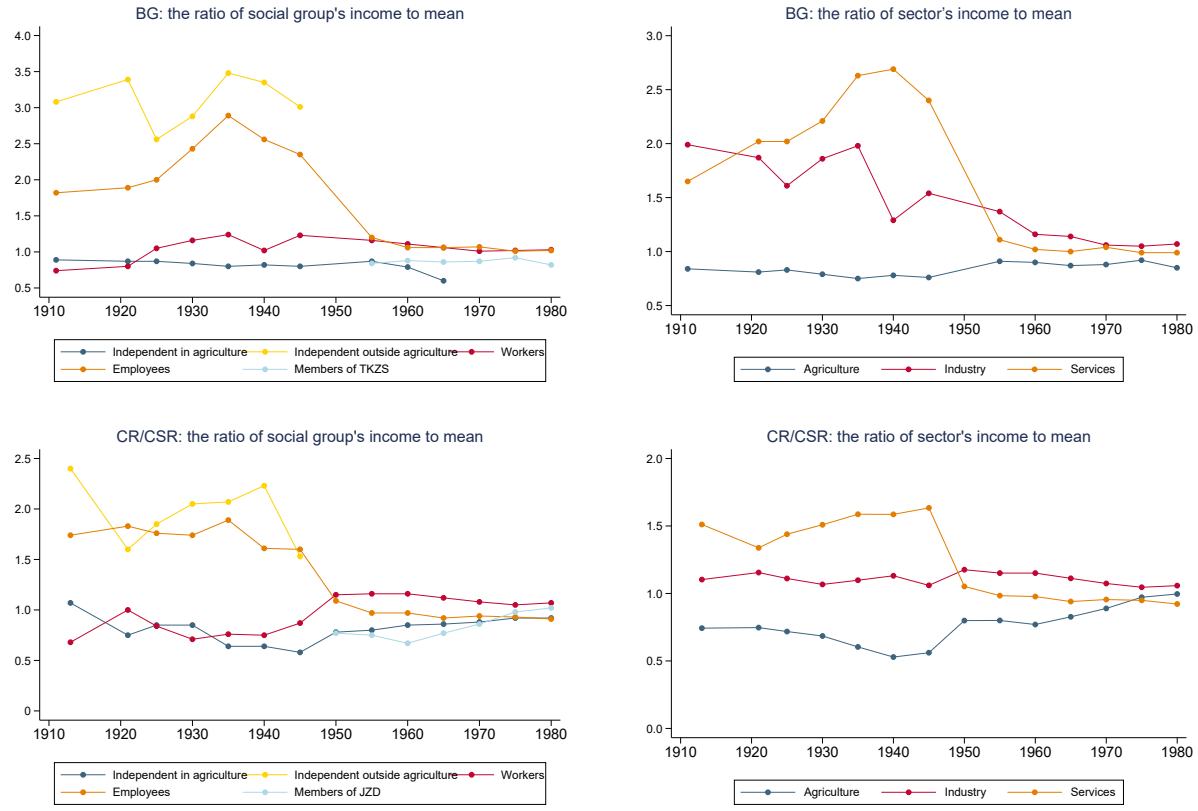
provide detailed information on average wages and wage distributions in the state sector (wage distributions were based on the enterprise censuses). These include state enterprises and cooperatives, but exclude cooperated farmers (TKZS). We collect the reported branch-level wages of workers, assistants, and employees occupied in industry. For cooperated farmers, construction, and the service sector we combine branch-level average wages and wage distributions to differentiate wages across multiple income classes. We do this to account for income variation within branches for which we only observe average wages. Starting from the average wage in each branch, we estimate the ratio to the mean for five income classes: P0-30, P30-50, P50-70, P70-90, P90-100.[23] Average wages are available annually from 1955, while we observe wage distributions once every couple of years starting from 1960. We estimate incomes of any remaining independent farmers following the same procedure as for the pre-socialist period, taking the land distribution and the total value of agricultural production from statistical yearbooks.

In socialist Czechoslovakia, statistical yearbooks document wages of workers in agriculture and industry. We estimate the incomes of other social groups employed in the material sector, by applying premia relative to worker wages. The exception are independent and cooperated farmers. We distribute independent farmers as we did for the pre-socialist period, relying on annual land distributions and total value of private agricultural production from statistical yearbooks. For cooperated farmers and service branches within the non-material sector, as for Bulgaria, we combine branch-level average incomes and wage distributions to differentiate wages across the same five income classes.

Figure 5 presents incomes relative to the mean by social groups and by economic sectors for our studied period. The most striking finding revealed by the figure is the compression of relative incomes in both Bulgaria and Czechoslovakia during socialism. Before 1945 there was a clear differentiation of relative incomes by social groups. On average, employees earned more than workers and independent farmers, and self-employed in industry and services by and large earned the most. Correspondingly, incomes were the

[23]The respective distributions in HBS reports and Enterprise censuses were reported in a tabulated form, classifying individuals into discrete income bands. We apply these tabulations in the G-pinter tool to summarize the entire distribution by g-percentiles (using generalized Pareto interpolation; https://wid.world/gpinter/).

highest in services, followed by industry, and lowest in agriculture. After 1945, relative income differences between social groups diminished. The employee premia disappeared. Workers even became slightly better paid than employees. This shift was also reflected in sectoral incomes. Incomes in the material, industrial sector surpassed those in the non-material, service sector. Members of agricultural cooperatives earned similar to or even more than any remaining independent farmers.



Notes: Figures illustrate income relative to mean by social groups (left) and economic sectors (right) for Bulgaria (top) and Czech Lands/Czechoslovakia (bottom). The latter series are for Czech Lands before the First World War, the Protectorate of Bohemia and Moravia during the Second World War, and Czechoslovakia for all the remaining years. Independent in agriculture include farmers and helping family members. TKSZ and JZD are agricultural cooperatives in Bulgaria and Czechoslovakia, respectively.
Sources: Own calculation based on sources detailed in the Appendix.

Figure 5: *Income to mean, by social groups and economic sectors*

There were other significant changes in relative income trends prior to 1945. For example, during the Great Depression, the relative income gap between farmers and other social groups widened. Farmer's incomes fell while incomes of other social groups rose. The relative gap between farmers and the rest was larger and grew faster in Bulgaria than in Czechoslovakia. This suggests increasing inequality in Bulgaria during the depression

period. By the same token, falling incomes of employees and independents outside of agriculture from the mid-1930s would suggest that the depression period was followed by falling inequality.

5 Results

5.1 Long-term income inequality from social tables

Figure 6 presents the results on the evolution of inequality expressed by the Gini coefficient in Bulgaria and Czechoslovakia over the course of the twentieth century. The figure shows that inequality was markedly higher in Czechoslovakia than in Bulgaria in the first half of the century, with on average around 10 percentage points difference in the Gini coefficient. Inequality dramatically declined in both countries after the Second World War and the communist accession to power. The Gini coefficient fell in Bulgaria by almost 15 percentage points relative to its average pre-war levels, while it more than halved in Czechoslovakia, decreasing by more than 20 Gini points. The post-war compression was practically immediate, leading to a synchronization of inequality in the two countries by the early 1950s, with the Gini coefficient broadly converging at levels around 20 in the post-war decades. Thus, our main long-term results reveal that the two studied countries previously displaying markedly different inequality levels suddenly became characterized by the most egalitarian distribution of income in the post-WW2 era.[24]

Considering the inequality evolution of each country, inequality in Bulgaria declined more noticeably in the early 1920s, when the Gini fell from levels around 35-36 in

[24]It is sometimes argued that income inequality during communism was actually (significantly) higher because statistical sources (such as household surveys) did not usually include the communist elites, the so-called *nomenklatura*. However, it is not likely that the inclusion of *nomenklatura* would overturn the general picture of marked equality of income during the socialist period. First, the communist *nomenklatura* was by definition a rather small (exclusive) group, which implies that its impact on overall inequality was limited (i.e. when measuring inequality among all individuals in the country), and this holds, in particular, for measures as the Gini coefficient which are less sensitive to changes at the distributional tails. Second, direct evidence from personal income tax data on high-income individuals during communism suggest relatively low top concentration (for example, lower than in contemporary western countries; see Novokmet (2017) for socialist Yugoslavia, Bukowski and Novokmet (2021) for socialist Poland). Furthermore, even the "corrections" for the non-monetary privileges of the communist elites (Morrisson, 1984; Atkinson and Micklewright, 1992) did not alter the general finding of very low income inequality during socialism.

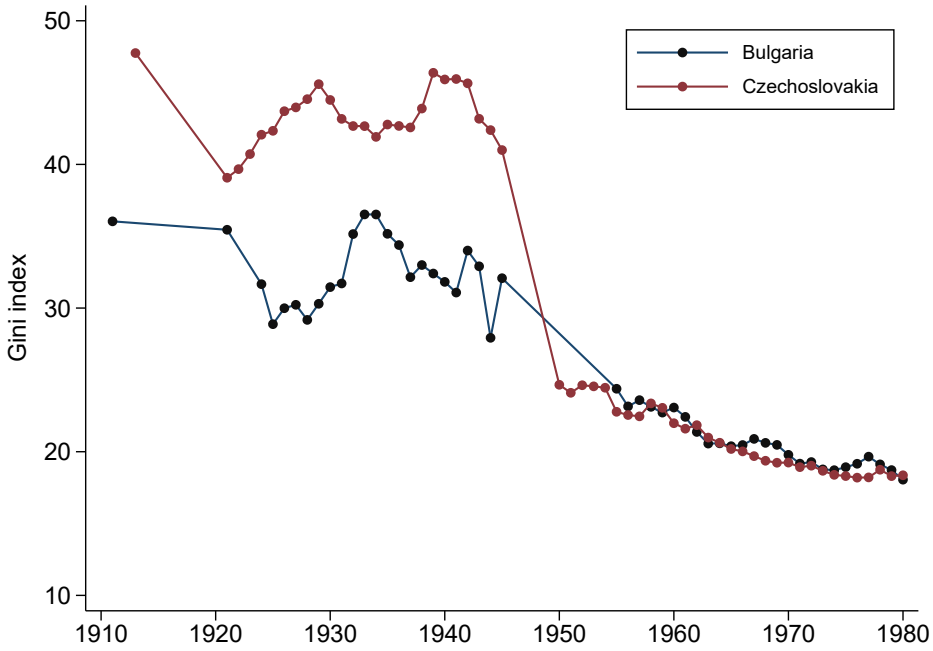


Figure 6: *Gini coefficient in Bulgaria and Czechoslovakia, 1910-1980*

Notes: The Gini series is for Czech Lands before the First World War, the Protectorate of Bohemia and Moravia during the Second World War, and Czechoslovakia for all the remaining years.
Sources: Own construction based on sources detailed in the Appendix.

1911/1921 to 29 by 1925. There was, however, a sharp increase in inequality during the Great Depression, which signified a peak of inequality in Bulgaria (with Gini reaching 37 in 1933/4). Inequality then declined in the late 1930s, but again increased during the Second World War (seeing a sharp drop in 1944). Income inequality was dramatically reduced by the time our series reemerges in 1955, with the recorded Gini index at 23. The remaining period up to 1980 saw a further steady decline in inequality.

In Czechoslovakia, we observe a more marked decline in inequality after the First World War. Gini fell from levels around 46 in 1913 (in the Czech Lands) to 40 in 1921 (in Czechoslovakia). Inequality gradually increased by the end of the 1920s, when Gini reached 45 in 1929. The Great Depression in Czechoslovakia was featured by a decline in inequality (the Gini decreased to 41 by 1934), and it was followed by a moderate increase in the late 1930s. The Gini coefficient assumed higher levels in the newly established Protectorate of Bohemia and Moravia, but decreased during its existence from 46 in 1939 to 41 in 1945. By 1950, the Gini dramatically decreased by 15 Gini points, and the decline

continued during the whole next decade when it stabilized at low levels slightly below 20. Figure 7 shows that the presented secular dynamics of inequality principally connoted the opposite level shifts in the shares of the top 10% (left panel) and the bottom 50% (right panel) groups.

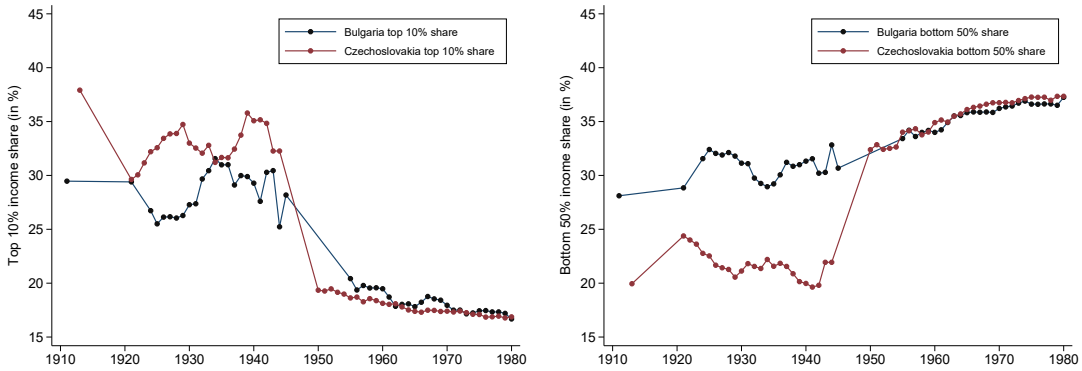


Figure 7: *Top 10% income share (left panel) and the bottom 50% income share (right panel) in Bulgaria and Czechoslovakia, 1910-1980*

Notes: The series is for the Czech Lands before the First World War, the Protectorate of Bohemia and Moravia during the Second World War, and Czechoslovakia for all the remaining years
Sources: Own construction based on sources detailed in the Appendix.

5.1.1 Social transformations

We investigate in more detail documented inequality trends in the two countries by applying the social class analysis. As already mentioned, our dataset is unique given the level of detail about social classes in terms of their relative size and income, but also about their inner stratification. Hence, it is possible to consistently track the secular developments in society's social stratification and to ascertain how social changes impacted inequality patterns. We proceed in this direction by presenting stacked kernel densities by social classes at different time snapshots throughout the twentieth century (Jenkins, 1995; Lakner and Milanovic, 2016).

Bulgaria. We first look at the development of kernel densities by social groups in Bulgaria at four snapshots at similar time intervals − specifically in 1911, 1930, 1955, and 1970 (Figure 8)[25]. It can be seen that the income distribution in Bulgaria in the first half of the

[25]We look at 1955, which is the first year after the Second World War in our dataset for Bulgaria.

twentieth century (in 1911 and 1930) was characterized by the overwhelming concentration of the population around its (unique) mode in the middle of the distribution. In addition, the kernel density is slightly positively skewed with a relatively smaller concentration of individuals in the upper-middle income levels. The figure further reveals that sectoral development played a key role in shaping inequality in the first half of the twentieth century. Namely, density plots for 1911 and 1930 show that the independent farmers made up the bulk of the population (almost three-fourths of the population; the blue area), which coupled with the markedly egalitarian distribution of land ownership entailed rather moderate dispersion of income in the agricultural sector. The two top panels of the figure show that the size of this group remained relatively constant in the first half of the century (thus suggesting the absence of structural change), while the concentration within this subgroup saw moderate changes. The most material change in the density curve for the independent in agriculture between 1911 and 1930 consisted in their virtual disappearance from the right tail and a marked shift towards the middle of the distribution. This was likely the outcome of the land reform under the agrarian government of Alexander Stamboliyski in the early 1920s, which targeted the few large estates in the country (Bell, 1977).

Turning to other groups, the mass of workers, as the second largest social group in pre-communist Bulgaria (accounting, however, for less than 15% of the labor force; compare with Figure 4) resided in the (lower-) middle parts of the distribution, while the densities of employees and independents outside of agriculture were largely concentrated in the right-hand part of the distribution. Moreover, the figure reveals that the relative distance between these groups and independents in agriculture was the chief determinant of inequality. Put differently, given the distinct character of these groups, we can say that the urban-rural gap was the main source of inequality. Thus, when the densities of the groups shifted apart more substantially by 1930 − and the right tail elongated − income inequality expressed by the Gini coefficient increased (Figure 6). This conforms with the peak of inequality during the Great Depression when the urban-rural gap surged as a

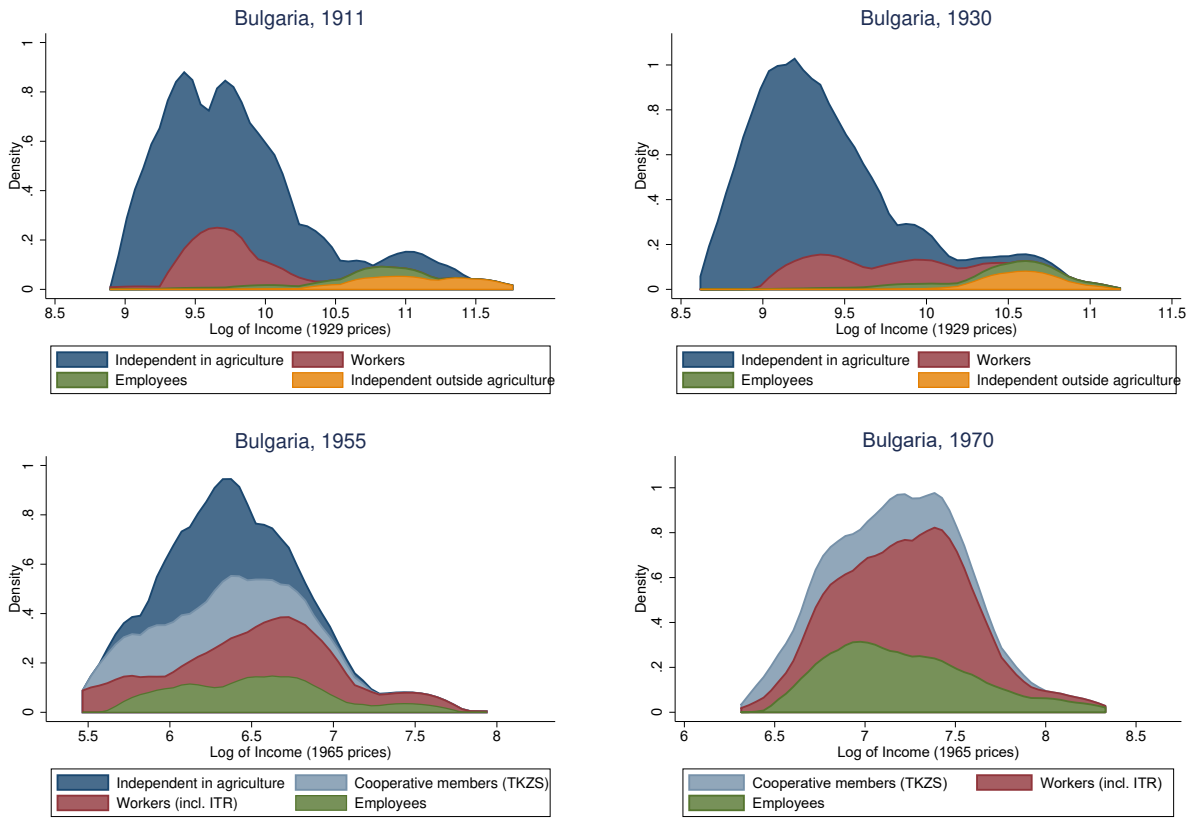


Figure 8: *Size and relative income of social groups in Bulgaria in 1911, 1930, 1955, and 1970*

Notes: Independent in agriculture include farmers and helping family members. TKSZ are agricultural cooperatives in Bulgaria. ITR stands for engineering and technical workers. Kernel densities are estimated before imputing within-inequality based on the log-normal distribution (see Table 1).
Sources: Own calculation based on sources detailed in the Appendix.

result of the so-called "price scissors".[26] [27]

The two bottom panels of Figure 8 suggest that a transition to the communist system in Bulgaria after the Second World War was truly a radical social revolution. As already mentioned, the communist government forced the "big-push" industrialization by adopting a strategy that internalized basic tenets of the dual economy model, relying on the massive labor reallocation from agriculture to industry. This development entailed profound social transformation, which primarily and fundamentally affected independent farmers, who were either compelled to join the collective farms (TKZS in Bulgaria; modeled after the

[26]The episode of "price scissors" is visible from the evolution of terms of trade and the ratio of industrial to agricultural prices. A sharp drop in international agricultural prices during the Great Depression hit especially hard the net exporters of agricultural products (importers of industrial products), in the first place the countries in South Eastern Europe. The overreliance on agricultural exports (imports of industrial goods) made these countries excessively vulnerable to shocks in international prices.

[27]Even an increase in dispersion among workers between 1911 and 1930 was primarily due to an enlarged income gap between agricultural workers and other (non-agricultural) workers by 1930.

Soviet kolkhozes) or migrate to urban areas with rapidly expanding industry (thus also alleviating hidden unemployment in agriculture, which had assumed endemic levels in the interwar era). As the bottom left panel of Figure 8 suggests, the share of TKZS members in the labor force reached around 30% by 1955 already (see also Figure 4).[28] Forced collectivization of agriculture allowed communists to squeeze resources from agriculture and use them for investment in industry (Nove, 1961; Lampe, 1986).

At the same time, the groups of workers and employees expanded with the rapidly growing secondary and tertiary sectors. Workers became the most numerous social group in Bulgaria by the mid-1960s. Interestingly, the kernel densisty plot for 1955 in Figure 8 suggests a still relatively dispersed within-distribution of workers (relative to 1930).[29] It may be conjectured that this was due to a still more considerable inequality between industrial branches in the early socialist period (e.g., due to more marked wage discrimination between the so-called "producer" and "consumer" goods industries),[30] as well as indicative of the more pronounced skill-premium commanded by engineers and technical personnel (ITR in Bulgaria) in the early phases of the industrialization with the large supply of labor migrating from the rural sector. But as industrialization advanced and the share of workers continued to expand, their within-distribution became more compressed (especially once labor shortages kicked in). The density plot for 1970 reveals that an enlarging mass of workers heaped in the middle parts of the distribution, while both tails shortened (the bottom right panel in Figure 8).

Finally, the long-run trends for the two top classes in the pre-communist income hierarchy − independents outside agriculture and employees − further corroborate that the introduction of communism thoroughly transformed patterns of social stratification in Bulgaria. The independents outside agriculture were liquidated as a distinct social class, while the nature of the white-collar occupations, together with their social standing

[28]Collectivization of agriculture was the most expedient in Bulgaria as compared to other socialist countries in Eastern Europe.

[29]Measures of within-inequality among workers, such as the Gini index or the mean log deviation, display a relatively modest decline of inequality. For example, the Gini index for workers was 31.2 in 1930, while 27.6 in 1955.

[30]Also reflected in a higher wage gap between workers in heavy industry or construction, on the one hand, and workers in state-owned agriculture, on the other.

and relative income, was fundamentally transformed. Given that in terms of relative incomes these two groups exhibited the largest distance to the rest of the population (or "premium") in pre-communist Bulgaria (see also Figure 5), their disproportionate material depletion after the Second World War critically impacted overall income inequality (by reducing the between component of inequality; see below). And since both groups were in the aggregate more important in Czechoslovakia before communism, we appraise their fortune in more detail when we next analyze the density plots for Czechoslovakia.

Czechoslovakia. Figure 9 reports the kernel densities for Czechoslovakia by taking the same twenty-year snapshots − namely in 1913, 1930, 1955 and 1970. The upper two panels of the figure show that the social structure in Czechoslovakia in the first half of the twentieth century differed markedly from that in contemporary Bulgaria. Correspondingly, the density curve for pre-war Czechoslovakia was more dispersed, with a fatter right tail.

Pre-communist Czechoslovakia presented a clearly demarcated class society broadly comparable to the industrial societies of contemporary Western countries. In a country that was already considerably industrialized by the early twentieth century (Figure 2), workers accounted for the largest social group. They were largely concentrated in the lower-middle and middle parts of the income distribution. The critical factors for the dispersion of workers was the sector of occupation (concretely, agriculture versus the rest) and gender (see below).

Next, the social standing of employees was notably advantageous in Czechoslovakia before the Second World War. This was a broader Central European phenomenon, where the privileged status of salaried employees was institutionalized (such as in the separate insurance scheme and various legal provisions from job security to benefit schemes; originating from Germany and Austria-Hungary (Kocka, 1981)). The considerable income premium earned by employees (e.g. relative to workers; Figure 5) reflected to an important extent the "status" premium (Kalecki, 1993; Scitovsky, 1966).[31] A material basis of this social differentiation was further strengthened during the First Republic, as evidenced,

[31]Kocka (1981) suggests a sharp (and "socially relevant") delineation of salaried employees and wage earners (*Angesttellte* and *Arbeiter*) in Germany or Austria in the late nineteenth and early twentieth centuries. Moreover, he suggests an antagonistic stance of employees towards workers.

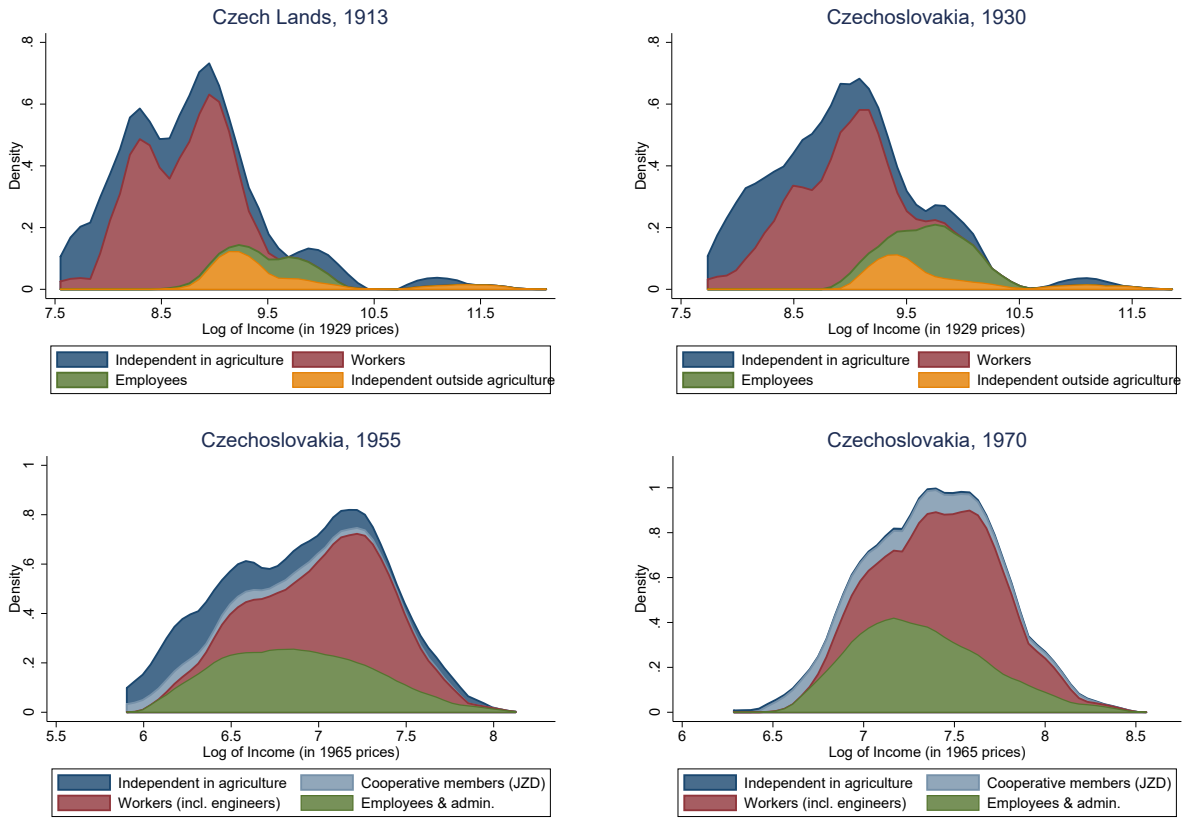


Figure 9: *Size and relative income of social groups in Czech Lands/Czechoslovakia in 1913, 1930, 1950, and 1970*

Notes: Independent in agriculture include farmers and helping family members. JZD are agricultural cooperatives in Czechoslovakia. Kernel densities are estimated before imputing within-inequality based on the log-normal distribution (see Table 1).
Sources: Own calculation based on sources detailed in the Appendix.

for example, by an increase in the employee premium (e.g., due to the introduction of new salary scales in 1926 particularly favoring civil servants (Teichova, 1988)).

An important dimension that underlay the earning distribution of both workers and employees was gender. Pre-communist Czechoslovakia was characterized by high gender inequality in earnings.[32] The bottom left panel of Figure 10 shows clear-cut segregation by gender of workers and employees in Czechoslovakia in 1930. Densities of both female workers and employees were concentrated at the lower income levels, noticeably left of the

[32]We analyze gender inequality among workers and employees only, because the statistical sources only allow us to distinguish industry (branch) specific earnings by gender. Although dictated by the data, this focus is conceptually sensible – and hence assumed in the literature – as male and female workers/employees have generally been engaged as independent individuals in the labor market. On the other hand, other social groups, such as independent or cooperated farmers, have generally generated income together as a household; accordingly, we have equally split income of a household between constituent adults (see Section 3 for details about the population units of analysis).

main mass of their fellow male workers and employees. High gender inequality in earnings was due to several factors. First, female workers were disproportionally employed in a handful of industries − notably in agriculture, textiles, clothing or food processing − which paid below average wages (agriculture in particular, as mentioned above; according to the 1930 census, almost 40% of female workers were employed in agriculture). However, industrial segregation by gender seems to be only a (smaller) part of the explanation, as we observe the pronounced within-industry gender gap in earnings. Explaining this is beyond the scope of this paper, but it is plausible to attribute it to differences in skill requirements of jobs assumed by males and females (i.e., females generally had low-skilled jobs within a specific industry/sector due to shorter job experience, limited access to apprenticeship, fewer working hours, etc. (Mesch, 1984)).[33]

Lastly, independents outside of agriculture made a heterogeneous group. As the kernel density plots for 1913 and 1930 reveal, a greater mass of them was concentrated in the mid-income ranges, and could be treated as a part of the middle classes − probably largely comprised of self-employed such as artisans, craftsmen, shopkeepers, or small entrepreneurs (Teichova, 1988). This group, however, also comprised true capitalists, such as large industrialists or financiers, who populated the long right tail of the distribution. One could count among this income super-elite the richest landlords who were predominantly engaged in commercial agriculture (included in the category of independent in agriculture). We look below in more detail at this upper crust of the pre-communist Czechoslovak society (Section 5.2).

Communist Czechoslovakia was in the true sense of the word the laboratory of social change (Krejčí, 1972; Krejcí and Machonin, 1998). The introduction of communism was accompanied by profound social transformation, which involved a gigantic equalization between social classes. The bottom left panel of Figure 9 shows that the elongated right

[33]Mesch (1984) provides a comprehensive overview of gender inequality in earnings among workers in Imperial Austria before the First World War. He explains the concentration of women in low-skilled jobs by the fact that female industrial workers faced challenges such as limited education, societal devaluation of formal training, and employer reluctance to invest in female education due to short job tenures. Furthermore, institutional barriers confined women to less physically demanding but monotonous tasks. Short job durations, influenced by age and marital status, hindered career growth, perpetuating wage disparities and underrepresentation in unions.

tail, that defined the pre-1945 distribution of income, was thoroughly chopped off by the 1950s. Both large capitalists immediately after WW2,[34] and of all other independents outside agriculture soon thereafter, were expropriated by communist nationalizations and expropriations. Large (and medium-large) landholders were deprived of their landholdings with the big land reform, while the remaining independent in agriculture were gradually pressured to join agricultural cooperatives (JZD) as the process of land collectivization progressed.

Next, the material, and consequently social, standing of employees was considerably devalued relative to the pre-WW2 period (Maňák, 1967). The separate insurance scheme was abolished and all other legal privileges enjoyed before the war removed (Krejčí, 1972). It should be mentioned that the process of relative deterioration of the employees' position was already initiated during the German occupation (both to target national intelligentsia and stimulate workers for the war effort; Krejcí and Machonin (1998)). During the socialist period, the income difference between workers and employees was relatively more pronounced in Czechoslovakia (as conveyed by the lower two panels of Figure 9). Formal remuneration structure rewarded more physically intensive jobs, such as in heavy industry or construction, relative to intellectual jobs, largely concentrated in the tertiary sectors with employees (Večerník, 1991; Flemming and Micklewright, 2000).

Communism also brought about a reduction in gender inequality in earnings (the bottom right panel of Figure 10). Equality between sexes was one of the basic tenets of communist ideology (it was formally incorporated in the 1960 Constitution and in the labor legislation).[35] Improvements in the relative standing of women were additionally driven by significant advancements in their educational attainments and the secular shift of female employment from low-wage sectors (especially working in agriculture and as domestic servants). Notwithstanding these advancements, Figure 10 shows that the actual gender earnings gap in communist Czechoslovakia was far from the proclaimed ideal. Moreover, it was often argued that gender was the most important dimension

[34]Note that considerable nationalization of industry had occurred even before communists' accession to power (e.g. with Beneš decrees).

[35]For example, according to the Law (No. 65/1965), women were given equal rights with men in the workplace, as well as guaranteed equality in the area of wages (Havelková, 2009, p. 192).

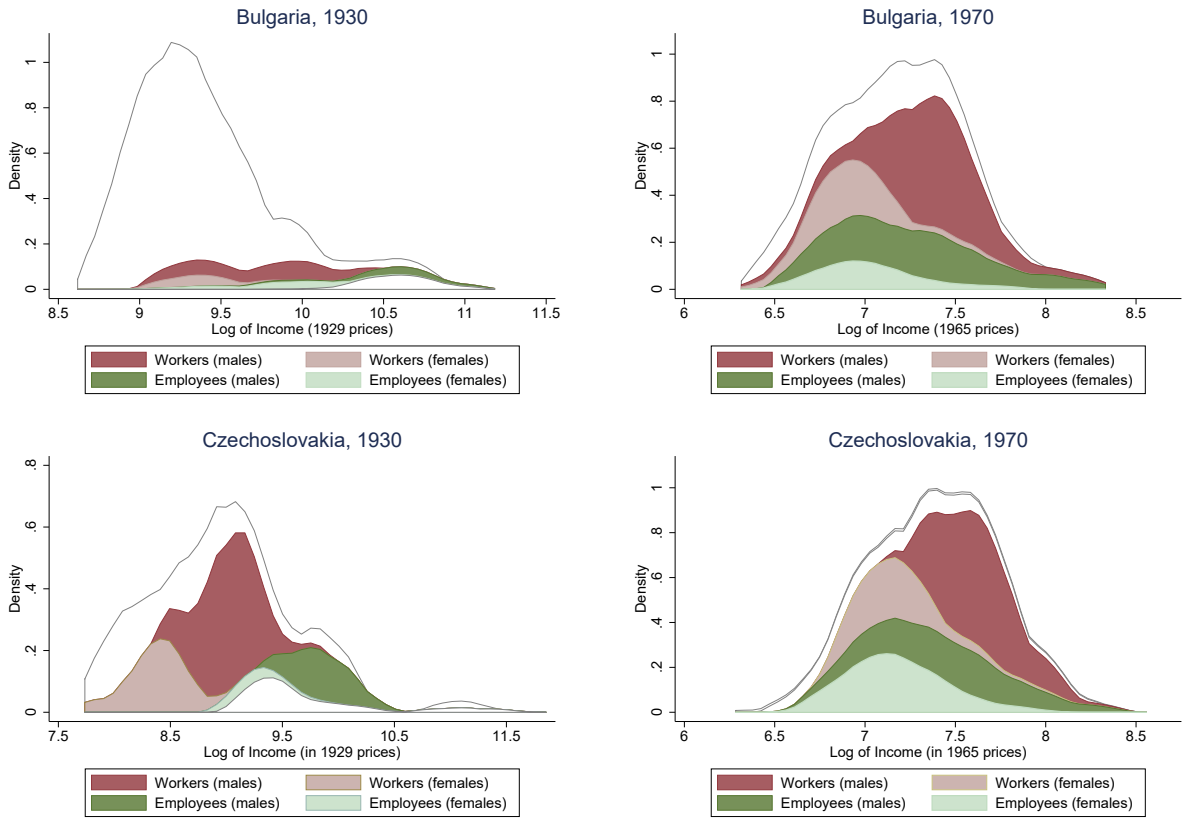


Figure 10: *Size and relative income of workers and employees by gender*

Notes: Kernel densities are estimated before imputing within-inequality based on the log-normal distribution (see Table 1).
Sources: Own calculation based on sources detailed in the Appendix.

for overall income inequality in the otherwise distinctly egalitarian society (Večerník, 1991; Atkinson and Micklewright, 1992). We have already indicated some of the factors contributing to tangible gender differences in earnings. The gender gap between workers was to an important degree a result of industrial segregation of employment, where women were heavily underrepresented in the highest-paying sectors, such as in heavy industry or construction (overrepresented in the low-paying, such as trade and catering, or textiles; (Michal, 1973)). As the overall placement of the density plot for male workers in the bottom right panel of Figure 10 shows, this new "labor aristocracy" of industrial working men was among the highest-paid groups in Czechoslovakia. Furthermore, women were disproportionately employed in the tertiary sectors generally paying below average earnings. The density plots for 1970 also reveals the existence of the non-negligible gender gap among employees, which can be reconciled with historical accounts pointing to a

marked male dominance in high-paying administrative jobs.

Finally, it may be pointed to the primacy of ideological considerations in driving the social transformation in Czechoslovakia. Namely, practical concerns, notably industrialization demands were less pressing in industrialized Czechoslovakia.[36]

5.1.2 Between and within decomposition

Density plots have provided broad intuition of how developments in the relative size and incomes of social groups impacted trends in income inequality during the twentieth century. Equipped with these insights, we proceed by considering a formal decomposition of inequality into inequality between and within social groups (and sectors). For this purpose, we decompose Mean Log Deviation (MLD), which in contrast to the Gini index, is exactly additively decomposable measure of inequality by population subgroups. That is, the total inequality measured by MLD may be expressed as the (population-weighted) sum of inequality between the subgroup mean income and inequality within subgroups.

Figure 11 presents the results of the MLD decomposition in Bulgaria and Czechoslovakia over the study period. First, it can be seen that the development of overall inequality as measured by MLD indicates the same trends in inequality as suggested by the Gini index above (Figure 6). Notably, both measures suggest a secular decrease in inequality occurring with the communist accession to power after WW2.

Looking at the contribution of the within and between components to the overall income inequality, it can be seen that the within-inequality component was a relatively more important source of inequality in both countries at the beginning of the twentieth century. This was particularly the case in the Czech Lands before WW1, where the within component accounted for almost 80% of inequality in 1913. Accordingly, a reduction in the importance of the within component after the war was the main factor behind a noticeable decrease in overall inequality in the Czech Lands between 1913 and 1921. As

[36]This was embedded in the very nature of the new state. Teichova (1988, p.157) refers to the 1960 constitution (according to which Czechoslovakia was officially declared a socialist state): "It was laid down that this state was based 'on the firm alliance of workers, peasants and the intelligentsia [...] led by the working class."

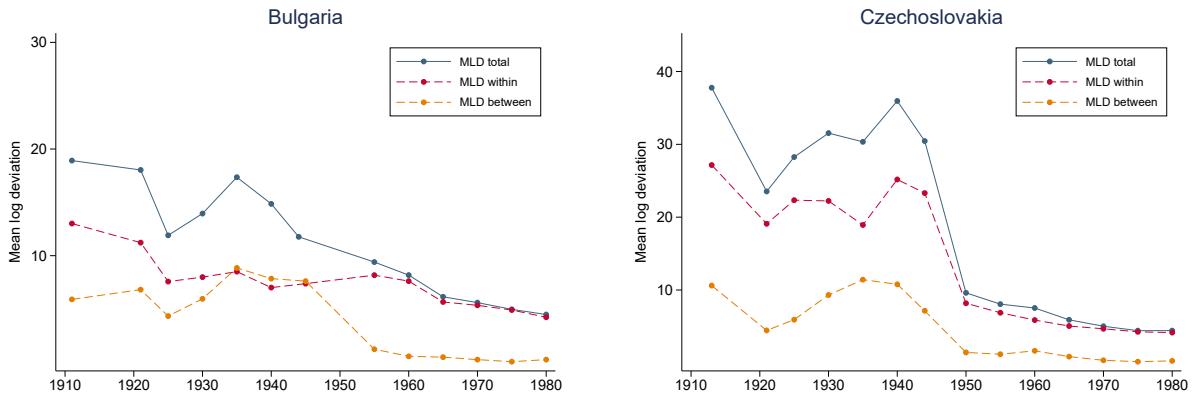


Figure 11: *Mean log deviation (MLD) of income: overall, between and within social groups*
Sources: Own calculation based on sources detailed in the Appendix.

mentioned above, inequality among independents in agriculture decreased after WW1 in both Bulgaria and especially Czechoslovakia due in part to the major land reforms.[37] More importantly, a decline in income inequality among independents in agriculture also reflected the 'return' component, that is, a decline in agricultural prices in the early 1920s relative to the pre-WW1 period disproportionally hurt incomes of larger landholders.[38]

Plausibly, the most important reason for a decline in the between component in Czechoslovakia after WW1 was a marked increase in the relative incomes of workers (Figure 5), who were the most numerous group in the country. The reasons for this noticeable improvement in workers' standing should be sought in the immediate post-WW1 development that armed workers with higher bargaining power, who in turn pushed for wage increases.[39] At the same time, the relative income of employers (independents outside agriculture) was considerably reduced and reached in the early 1920s its interwar low (Figure 5).

[37]In Czechoslovakia, the pre-war land inequality was very high, and the extent of the redistribution more extensive as a result. Bulgaria was, by contrast, already characterized by the relatively egalitarian land distribution before WW1, and the extent of the land redistribution − and a resulting decrease in the within component − was less pronounced (as mentioned above, and can be seen in Figure 11 (left panel), the strongest decline in within inequality of independents in agriculture occurred in the early 1920s).

[38]More generally, we see that the periods of agricultural booms (busts) were accompanied by the rise (fall) in inequality among independent in agriculture. In Czechoslovakia, the agricultural boom of the late 1920s disproportionally benefited middle and large landholders specialized in commercial crops (inequality among independents increased), while the Great Depression had an opposite effect (inequality among independents decreased).

[39]Sometimes claimed as excessive, for example as discussed for Germany under the so-called Borchardt controversy.

Both countries saw an increase in the between component during the Great Depression, but its impact on the overall inequality differed. In Bulgaria, the between component drove the overall increase in inequality, which is consistent with the above-expounded upsurge in the urban-rural income gap in this period (also suggested above by the development in mean incomes in Figure 5). In Czechoslovakia, in contrast, a decline in the within component (among independents inside and outside agriculture) outweighed a rise in the between component, with the net effect of the decline in overall inequality during the Great Depression.

The secular compression after WW2 was driven by a decreasing contribution of both components. However, the importance of the within component decreased only modestly in Bulgaria, primarily because the dominant group of independents in agriculture had already displayed relatively low within inequality before the war. Specifically, the social transformation in the post-WW2 decades in Bulgaria entailed rising population shares of workers and employees which displayed similar within inequality as independents in agriculture before the war. On the other hand, the importance of the within component fell more significantly in Czechoslovakia after WW2, induced by a decrease in inequality among all social groups.[40]

During the socialist era, inequality became almost exclusively determined by the within component, itself reduced to quite moderate levels. As Figure 11 shows for both countries, the importance of the between component for inequality practically vanished, which, at least in terms of income hierarchies between social classes, came closest to the communist ideal of a classless society.

5.2 Top income shares

We mentioned above that Kuznets (1955) also proposed the alternative mechanism of concentration of saving among high-income groups as inducing an increase in inequality along the development path (see Section 2). The evidence on top income shares could be informative to ascertain this mechanism.

[40]This is consistent with trends documented in Novokmet (2023), Figure 10, which show a strong decline in inequality for both wage earners and salaried in Czechoslovakia after WW2.

The historical accounts suggest that the industrialization of today's developed countries led to the growing concentration of capital income and rising top income shares. Allen (2009), for example, argues that the British Industrial Revolution was initially accompanied by rising profits amid stagnant wages (the so-called "Engels" pause'); i.e. there was a rise in the share of capital income (a decline in the share of labor income) in national income, which ensured necessary capital accumulation to sustain industrialization (Dumke (1991) suggests the same pattern for the industrialization of Germany). In addition, it was mentioned above that the dual-economy model also postulates a rising capital share as the modern capitalist sector expands amid the structural change (e.g., Ravallion (2016)). This development implied − with capital income being strongly concentrated − that the gains from the growth take-off largely went to high incomes. And given that high incomes have a higher marginal propensity to save,[41] there was a tendency of further wealth and capital income concentration.[42]

Kuznets' conjecture of cumulative effects of concentration of saving on top income shares provides a useful framework to compare top income shares in Bulgaria and Czechoslovakia from a development perspective. Figure 12 shows the development of the top-0.1% share in the two countries in the first half of the twentieth century. It can be seen that the very top income shares were markedly higher in Czechoslovakia and experienced notable volatility relative to their Bulgarian counterpart.

Both phenomena may be explained by the strong concentration of capital income at the top of the income distribution in industrialized Czechoslovakia. The left panel of Figure 13 clearly shows that the top-0.1% in interwar Czechoslovakia was predominantly composed of capital income − in particular, of business profits − whose dominant industrial character has been documented by Novokmet (2023). Similarly, it can be seen that shifts in business profits were the main reason behind more pronounced volatility in Czechoslovak top income shares. This is consistent with findings in the literature that explain high levels of

[41] Plus that there is a higher marginal propensity to save out of profits than out of labor income.

[42] This logic led to the formulation of the "classical" channel positing positive effects of inequality on economic growth via capital accumulation (Keynes (1920); Kaldor (1957); Galor and Moav (2004); Itskhoki and Moll (2019) have recently argued that the optimal policy along the development path is to initially stimulate the rise in business profits (by suppression of wages) to allow higher capital accumulation).

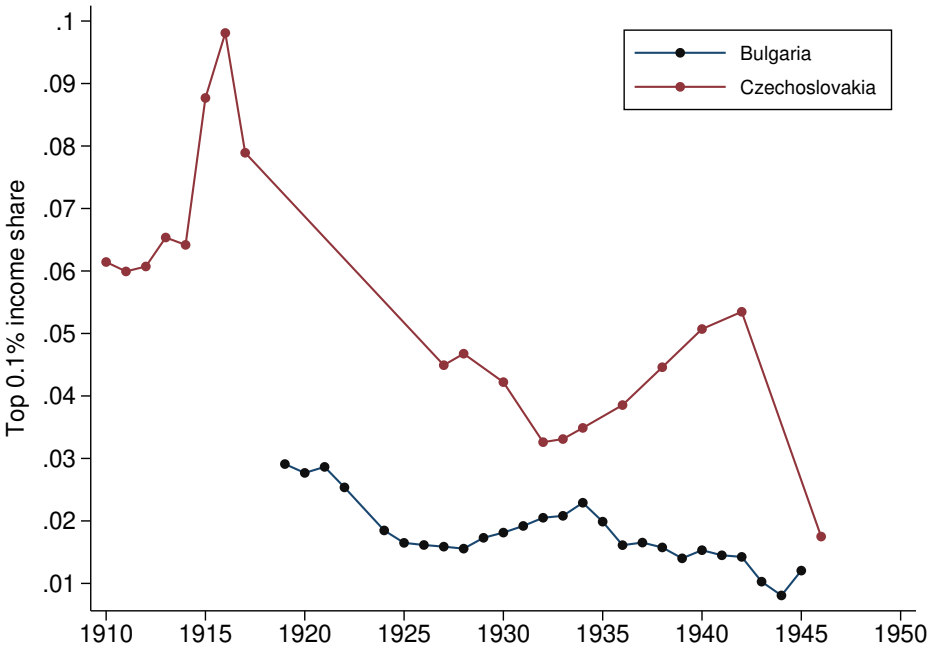
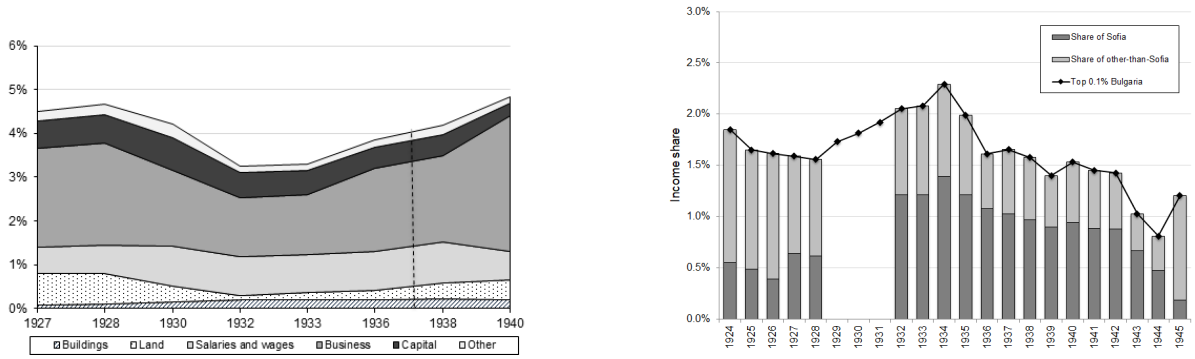


Figure 12: *Top 0.1% income share in Bulgaria and Czech Lands/Czechoslovakia, 1910-1946*
Sources: The series for Czechoslovakia are from Novokmet (2023); Bulgaria: own construction.

top income shares in advanced countries in the first half of the twentieth century by the strong concentration of capital income (Atkinson and Piketty, 2007, 2010).



Notes: Left panel: Decomposition of the top-0.1% in Czechoslovakia by income sources. Right panel: Decomposition of the top-0.1% in Bulgaria between the share of Sofia and other-than Sofia.
Sources: Left panel replicated Novokmet (2023), Figure 4b. Right panel: own construction.

Figure 13: *Top-0.1% share decompositions in Czechoslovakia (left) and Bulgaria (right).*

There is unfortunately no data on income sources of top incomes in Bulgaria, but it is tempting to attribute both substantially lower top income shares levels and their stability to the pre-industrial character of interwar Bulgaria. To put it simply, the great industrial or financial fortunes associated with the advancement of capitalism were generally lacking

in Bulgaria. The available geographical distribution of the top-0.1% share on the right panel of Figure 12 may help us to illuminate the character of Bulgaria's rich in the interwar period. In particular, a noticeable geographical rebalancing of top-0.1% during the Great Depression from traditional commercial centers in agricultural goods (such as Plovdiv, Ruse, Varna or Burgas) in favor of the country's capital, Sofia (whose share of the top-0.1% income almost doubles in the 1930s) may suggest a shift in the dominant outlook of the rich − specifically, the replacement of "merchant" with "state" capitalists.[43] Both types may be seen as more pertinent to pre-industrial stages of capitalism (e.g. Braudel (1979)), and the historical evidence consistently point to the lack of the (western-style) industrial and financial *haute* bourgeoisie in pre-communist Bulgaria.

Finally, although we believe that the industrialization axis proved to be a useful comparison framework to understand top incomes trajectories in pre-communist Czechoslovakia and Bulgaria, it is important to stress that the top inequality dynamics is critically determined in the broader institutional setting. Notably, industrialization is not necessarily accompanied by the rising wealth and capital income concentration (Roine and Waldenström, 2015), which especially hinged on historical institutions governing the land distribution.[44] Also in this respect, Bulgaria and Czechoslovakia provide a revealing contrast, with markedly different land inequality − unusually low in the former and strikingly high in the latter − and (resultingly) different social relations in agriculture, which in part implied a distinctive industrialization path and inequality development in the Czech Lands (and more generally in Central Europe) or its absence in Bulgaria (Gerschenkron, 1962; Palairet, 1997).[45] Finally, we should underline the critical role of

[43]With the end of the agricultural export boom of the 1920s, Sofia assumed an excessively large role in Bulgaria's economy in the 1930s, when the traditionally large role of the state in the economy was taken one step further. Lampe and Jackson (1982, p.240) thus assert that "previous economic centres suffered [...] for being far from the seat of political power". Ivanov and Ganev (2014) argue that the geographical rebalancing of top incomes was the result of industry moving from the countryside to the capital.

[44]High levels of wealth inequality in the pre-industrial period were typically the function of high land inequality; in these scenarios, the falling importance of agricultural land in the total wealth could have entailed a stagnation or decrease of wealth inequality during the industrialization (Piketty and Zucman, 2014; Waldenström, 2023).

[45]An interesting debate considered to what extent the so-called *chiflik* estates of the late Ottoman period (see generally İnalcık (1983)) were similar to commercial demesnes in Central Europe (such as the Prussian *Gutscherrschaft*) in their assumed export orientation, bonded labor or capital accumulation. Correspondingly, it was discussed whether *chifliks* could have altered class and property relations in agriculture and stimulated industrial development (e.g., as Brenner (1982) proposed for England). See

institutional arrangements of property relations for the inequality dynamics (Piketty, 2020; Novokmet, 2023). Concretely, a sweeping transformation from private to public capital amid communist nationalizations of private capital and the fact that capital accumulation during communism was altogether assumed by the public sector had a decisive impact on private capital income concentration in both countries.

6 International comparisons

We next turn to international comparisons. Historical social tables provide a natural starting point for comparison, specifically for Eastern European countries during the first half of the twentieth century. As already mentioned, Lindert and Nafzinger's (2014) study of income inequality in Russia in 1904 is closest to ours in terms of data and methodology used to construct social tables, in particular in their pioneering combination of different data sources to estimate inequality within social classes, such as using information on the distribution of land to estimate inequality between independent in agriculture or using fiscal data to estimate high business and professional incomes of self-employed.[46] Their study suggests moderately high levels of inequality (by standards of the time) in Russia at the beginning of the twentieth century. Income inequality expressed by the Gini coefficient was 36.2, which is remarkably similar to our estimates for pre-WW1 Bulgaria (with Gini equal to 36 in 1911). Relatively lower inequality levels can be explained by shared structural features of the two countries before WW1: i) both Bulgaria and Russia were predominately agricultural countries, with more than two-thirds of population employed in agriculture; ii) the predominantly peasant population was characterized in both countries by the relatively egalitarian distribution of income.[47]

More generally, the same logic may be extended to explain inequality dynamics in other countries in Eastern Europe in the first half of the twentieth century, all broadly similar in

Lampe and Jackson (1982) on a negative consensual assessment.

[46]Specifically, fiscal data used by Lindert and Nafziger (2014) refer to the investigation of high incomes during the 1900-4 period (the so-called *Opyt* study) in preparation for the introduction of the personal income tax (which, however, was never implemented in Tsarist Russia).

[47]It should be noted that relatively lower income inequality among peasants in Tsarist Russia was primarily a consequence of relatively egalitarian access to communal land, rather than a result of the relatively egalitarian distribution of private ownership of land (Lindert and Nafziger, 2014).

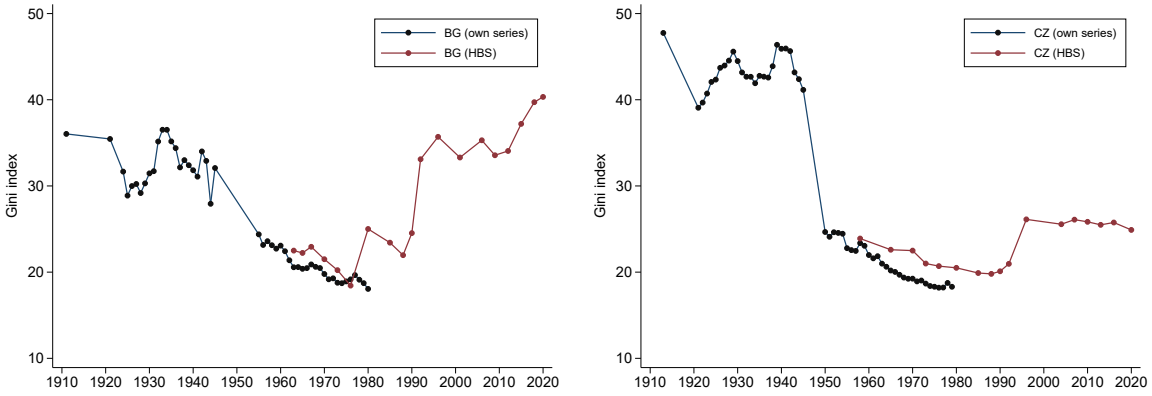
terms of sectoral development and land ownership patterns (i.e., generally corresponding to Kuznets' conception of the initial conditions characterizing developing countries in the dual-economy framework; see Section 2). For example, a study of interwar Yugoslavia by Vinski (1967) corroborates these conclusions.[48] Vinski's estimates of income inequality in Yugoslavia in 1938 are quite close to levels we obtain in Bulgaria (Gini in Yugoslavia was 37 vs. 34 in Bulgaria). Importantly, he argues that income inequality in Yugoslavia was critically held down by the relatively egalitarian agricultural sector (Gini for independent farmers is 19 in Yugoslavia vs. 18 in Bulgaria). Another example is the seminal study by Wiśniewski (1934) for Poland that also explains relatively moderate inequality levels in 1929 (the Gini index equal to 34) by the relatively equal distribution of the peasant population (see also Bukowski and Novokmet (2021)).

We can also compare our series to inequality developments in industrial countries based on the annual ("dynamic") social tables recently constructed for Germany and the United Kingdom (Gómez León and De Jong, 2019). According to this study, at the beginning of the twentieth century the Gini coefficient was 43 in Germany and 45 in the U.K. These levels are very close to our estimates for the Czech Lands before WW1.[49] Equally, the whole interwar period and WW2 were featured by high income inequality in both Czechoslovakia and other industrial countries. We believe that these comparisons also corroborate the importance of the level of development of social structures for inequality. We saw that pre-communist Czechoslovakia was a stratified class society very much alike the industrial societies of contemporary Western countries. The shared inequality experience of industrialized Czechoslovakia with Western developed countries in the first half of the twentieth century is also confirmed by the development of top income shares (Novokmet, 2023).

[48]Interwar Yugoslavia is a particularly interesting comparative case study given its quite similar sectoral structure to that of Bulgaria at the time (see Figure 2). Vinski's study also used social tables approach to estimate income inequality. It provides a detailed overview of social groups in interwar Yugoslavia, importantly also allowing for within inequality among independent farmers based on the size of landholdings.

[49]But one should keep in mind that inequality estimates for Germany and the U.K. from Gómez León and De Jong (2019) should be seen as conservative, as they generally do not account for inequality within a social class. For this reason, total inequality was probably higher in both countries than in pre-WW1 Czech Lands. For example, Lindert and Williamson (1983) suggest the U.K. Gini to be 50.2 in 1913.

It was only after WW2 and the institution of the communist system in the country that Czechoslovak inequality diverged fundamentally from the Western European patterns. The secular decline of inequality occurred everywhere in the post-WW2 decades (e.g. Piketty, 2001; Atkinson and Piketty, 2007; Atkinson et al., 2011), but it was especially pronounced in the newly turned communist countries. This was principally due to more extreme and sweeping institutional and political changes that accompanied the introduction of communism. Accordingly, and as already mentioned, the Czechoslovak inequality trajectory might be seen as an extreme version of the inequality development in Western countries. At the same time, the transition to communism led to the synchronization of inequality in Bulgaria and Czechoslovakia, which converged to almost identical inequality levels (Figure 6). The social structure of the two countries, and its (political-institutional) determinants, became practically indistinguishable (Figures 7 and 8).



Notes: The Gini coefficient for income inequality in Bulgaria (left panel) and in Czechoslovakia/Czech Republic (right panel). Blue lines: our estimates; Red lines: official estimates based on Household Budget Survey (HBS). The HBS series refers to the distribution of the net income per capita.
Sources: Own series: see text; HBS series: Milanović, B: All the Ginis (ALG) Dataset at https://stonecenter.gc.cuny.edu/research/all-the-ginis-alg-dataset-version-february-2019/; UNU-WIDER, World Income Inequality Database (WIID) Companion dataset (wiidcountry and/or wiidglobal). Version 20 November 2023. https://doi.org/10.35188/UNU-WIDER/WIIDcomp-281123

Figure 14: *Long-run evolution of income inequality in Bulgaria and Czechoslovakia/Czech Republic*

Finally, it is interesting to consider how income inequality evolved after the fall of communism in the two analyzed countries. For this, we rely on the official measures of inequality based on the household budget surveys (HBS), instated in Bulgaria and Czechoslovakia in the late 1950s/early 1960s and conducted (more or less) regularly since

then. In Figure 13 we plot them together with our benchmark estimates to draw more than a century-long picture of the income distribution in Bulgaria and Czechoslovakia/Czech Republic. There are several points worth noting. First, it is reassuring that our estimates based on the social table approach are remarkably close to HBS estimates in the overlapping years (i.e. in the 1960s and 1970s). Next, it can be seen that income inequality increased in both countries after the fall of communism in Eastern Europe, suggesting an overall U-shape pattern of inequality development from the beginning of the twentieth century until today. Lastly, and quite interestingly, the post-communist increase in inequality was much more pronounced in Bulgaria than in the Czech Republic (or for that matter in Slovakia). Today Bulgaria exhibits one of the highest inequality levels in Europe, the Czech Republic one of the lowest. We thus document a striking 'reversal of fortune' in inequality dynamics, as Bulgaria used to be much more equal than the Czech Republic, while the opposite is the case today.[50]

7 Conclusion

This paper fills a gap in the literature by providing new long-term estimates on the historical evolution of income inequality in Eastern Europe. We examine inequality during dramatic socio-economic and political changes in the twentieth century, focusing on Bulgaria and Czechoslovakia. These two countries, representing the least and the most developed parts of Eastern Europe at the time, allow us to investigate questions central to inequality and economic development. How does inequality evolve during the process of economic development and which structural forces shape it? How does development impact social structure? And which social groups benefit or lose from economic growth?

Our inequality estimates, based on a newly-constructed dataset and the social tables approach, reveal several important findings. We find that Czechoslovakia had significantly higher inequality than Bulgaria before 1945. Inequality substantially increased during the Great Depression in Bulgaria and fell in Czechoslovakia under German occupation. After

[50]Similarly, Russia used to be more equal than Western European countries at the beginning of the twentieth century (Lindert and Nafziger, 2014), while today it is more unequal (Novokmet et al., 2018).

the communist revolution, inequality in the two countries quickly converged to similarly low levels. The initial difference in inequality reflected large differences in socio-economic structure. Czechoslovakia had a more industrialized economy and a more stratified society. Our decomposition analysis reveals that inequality within the dominant agricultural sector was key in Bulgaria, whereas inequality both between and within social groups and economic sectors mattered in Czechoslovakia. The swift fall in inequality after the communist ascension to power was driven by collectivization of agriculture, nationalization of industry, and an unprecedented equalization of incomes between social groups.

The experience of Bulgaria and Czechoslovakia suggests that economic forces significantly affected short-run inequality, but institutional and political factors had the largest impact on long-term inequality in the studied Eastern European countries during the twentieth century.

Appendix A: data construction

A.1. Socio-economic structure in Bulgaria

A.1.1. 1910-1946

Based on Bulgarian population census results for 1910, 1920, 1926, 1934, and 1946, we can consistently track the labor force in three social groups: workers, employees, and independents. The independents category include self-employed and their assistants (helping family members). Each social category is further divided according to economic branches and gender. When necessary we aggregate economic branches to ensure comparability across census years. Table A1 lists the resulting economic branches, spanning all three economic sectors.

Independents and assistants were the most numerous social groups. Together they accounted for around 80% of the labor force (ca. 30% independents and 50% assistants). Most independents were male farmers. Almost all assistants, both men and women, were occupied in agriculture. By and large, they were spouses and children of independent farmers. Other independents were occupied outside of agriculture, for example, as artisans, business owners, or free professionals.

Workers comprised around 15% of the labor force. They were the only social category relatively evenly represented in all three major economic sectors, for both genders. Men were slightly more represented in industry than in other sectors, while women worked marginally more in agriculture. Overall, most workers were men: for each female worker, there were around four male workers.

Employees were the smallest social group. Although their relative size somewhat increased over time, they accounted for at most 5% of the labor force. The tertiary sector occupied practically all employees, both male and female, with few men being employed also in industry. Women were primarily employed in education, whereas men were spread across trade and finance, education, and public administration. As with workers, there were around four times more male than female employees.

To be able to interpolate between census years, we made two additional steps. First,

the 1910 and 1920 census report assistants and employees jointly, while subsequent censuses separate these categories. For 1910 and 1920 we disaggregate the "assistants and employees" into two separate categories applying 1926 weights. Second, the 1946 census provides information on the four social groups for the entire economy, but not separately by economic branches. Census data confirm that the overall distribution of the labor force by social groups in 1934 and 1946 was practically the same at the economy level. We therefore keep the branch-level distribution observed in 1934 also for the next census year.

Table A1: *Economic sectors and branches in Bulgaria*

No.	Sector	Branch
1	Primary	Agriculture, horticulture and animal husbandry
2	Secondary	Mining
3	Secondary	Quarrying
4	Secondary	Saltworks
5	Secondary	Metal industry
6	Secondary	Ceramics
7	Secondary	Furniture industry
8	Secondary	Textiles
9	Secondary	Hides, skins and other hard materials derived from animals
10	Secondary	Food and beverages
11	Secondary	Chemicals and related products
12	Secondary	Luxury goods, science, art and letters industry
13	Secondary	Construction industry
14	Secondary	Production and distribution of physical forces
15	Secondary	Construction of transport equipment
16	Secondary	Clothing, footwear and dressing industry
17	Tertiary	Transport and Communication
18	Tertiary	Commerce, credit, insurance
19	Tertiary	Free professions
20	Tertiary	Public administration

A.1.2. Communist period

The population census of 1956 (Population census, 1956, volume III, pp. 282-318) breaks down the labor force by economic sectors, social classes, and gender. While it is

possible to match economic sectors with those reported in previous population censuses, matching social groups is difficult. This is because of both the removal of old and the introduction of new social groups under communism. For this reason, we use the 1956 population census to benchmark total labor force figures by economic sectors, but for the social categories within these sectors as well as for variation over time we utilize information from statistical yearbooks, which correspond well with pre-communist social categories.

Communism brought major changes in the social structure of the labor force. In 1956, members of labor-cooperative agricultural holdings (*TKZS*) represented the largest communist social category numbering 1.7 million people and accounting for 42% of the labor force. This was a new social category formed in large part from previously independent farmers and assistants. Accordingly, the share of independent farmers in the labor force shrank to 20% and that of assistants to 13%. Meanwhile, workers became the second largest social category increasing their relative share in the labor force to 23%. Employees were not anymore distinguished from other social categories, but probably bundled together with workers. The remaining 3% of the labor force mainly consisted of artisans in cooperatives and independent artisans. The last two social categories, private traders and free professions, were tiny (0.14% and 0.17% of the labor force).

We combine employment data from the 1956 census and post-war statistical yearbooks in four steps. First, we collect census data on the labor force by economic sectors, social groups, and gender. We match economic sectors with those reported in previous population censuses. Second, we use the totals reported by statistical yearbooks to project backwards and forwards from 1956 the absolute figures in each economic sector. Third, for each year, we distribute the active population in each economic sector into social categories by applying the relative shares for workers, industrial-technical workers, and employees observed in statistical yearbooks. Fourth, we include independent farmers, which are reported in the census. We decrease their number over time according to their share in total agricultural production, reported in statistical yearbooks.

A.2.1. Incomes in Bulgaria

A.2.1.1. 1911-1945

Incomes in agriculture. We estimate incomes in agriculture in two steps. We first assign income from labour to each social category. We then estimate income from land and add it to the labour income of independent farmers. Using data on land distribution from agricultural surveys, we differentiate independents and their incomes by land size into eight categories. We reason that independent farmers in the lowest category of land ownership earn little beyond their imputed labour income. Farmers in higher land categories earn more, depending on the size of their plot.

Labour income. Annual incomes of workers in agriculture, from 1924 to 1945, are available from Chakalov (1946, p. 124, table 110). We project annual incomes of agricultural workers backwards, with the annual series of day labourer's wage reported in the Statistical Yearbook (1945, p. 215). We assume that independents and an equivalent number of assistants earned 90% of the income of workers. We consider these assistants to be the spouses of the independents. Remaining assistants, that is other helping family members such as children, earned 70% of the income of workers. To employees, the number of which was negligible, we assign the same income as workers.

Land income. We distribute independents and their assistants to eight social classes and impute land income to each class. We do this in three steps: 1) Distribute the number of independents and their assistants using the distribution of number of farms. We multiply the number of independents and their assistants by the share of farms in each land size class. 2) Distribute income from land using the distribution of farm area. We first subtract our estimated total income from labour from the national income in agriculture reported by Chakalov (1946). We then distribute the income residual to independents and their assistants. To do so, we multiply the total number of independents and their assistants by the share of farm area in each land size class. 3) Calculate income from land per landowner in each land size class. We divide the number of independents and their assistants in each class with the income from land in each class.

Land distribution. Statistical yearbooks report the number of farms and their total

area by farm size classes for benchmark years before the First World War, during the interwar, and after the Second World War. Table A2 reports these data for 1908, 1926, 1934, and 1956 by six farm classes. In 1908, 57% of farms were smaller than 5 hectares. The share of farms below 5 hectares increased to 62% by 1926, and to 68% by 1934. Under communism, 92% of private farms were smaller than 5 hectares. These agricultural small holdings captured respectively 17%, 24%, and 30% of the total privately owned arable land in 1908, 1926, and 1934. By 1956, as much as 81% of private arable land was owned by smallholders. Redistribution of land after the First World War and especially after the Second World War is evident in the statistics. In 1908, largest plots (over 20 hectares) captured 26% of all arable land. In 1926 and 1934, this share fell to 13% and 9%, respectively. By 1956, the few large plots remaining in private ownership held a meager 1% of arable land. We make use of such information on land distribution to account for inequality in agricultural incomes.

Table A2: *Land distribution in Bulgaria*

	No. of farms (%)				Arable land (%)			
Hectares	1908	1926	1934	1956	1908	1926	1934	1956
0 to 3	41.2	41.2	45.2	69.2	7.5	9.3	11.9	45
3 to 5	15.5	20.1	22.3	23.6	9.4	14.3	18.1	36
5 to 10	24.4	25.7	23.7	7	26.8	34.5	36.8	17.8
10 to 15	10.3	8.1	6	0.1	19	19.8	17.1	1.1
15 to 20	4.2	2.6	1.7	0	10.9	9.5	7.3	0
over 20	4.4	1.8	1.1	0	26.4	12.6	8.8	0

Sources: Statistical yearbook 1913-1922, B10, table 7. Statistical yearbook 1941, p. 203, table I. Statistical yearbook 1956 (1957), p. 45, table 5

Incomes of industrial workers. Our starting point are detailed statistics on daily wages of workers in industry, which come from Statistical Yearbooks. Data are available for 1909, 1911, 1912, 1921, and 1924-1945. Until 1921, an average wage is reported for industry sectors and sub-sectors. From 1924, wages are reported for occupational groups within each industrial sector, separately for male and female workers. Over time, wage statistics expand to include more occupational groups as well as differentiation by age, qualification, or wage type (time or piece wage). By aggregating several sectors, we can consistently track wages across 10 industrial sectors. We take the reported average wage

per industrial sector, and average across occupational groups where necessary. We average male wages, which are available for all occupational groups. Female wages, unfortunately, are reported only for certain occupations. We estimate workers' annual incomes by multiplying reported daily wages by 240 days of work, which Chakalov (1946, table 60) uses to annualize daily wages of workers in small-scale industry.

Incomes of other social groups in industry and services. For all social groups in industry and services, except the already discussed industrial workers, we rely on data provided by Chakalov (1946) and Ivanov (2012). We estimate incomes of assistants, employees, and independents in both industry and services, by multiplying the wages of workers in a given branch by the relevant skill premia.

In the secondary sector, the skill premium of assistants relates incomes of journeymen with workers in arts and crafts. The skill premium of employees, on the other hand, relates incomes of employees and personnel with workers in big industry. Lastly, the skill premium of employers relates incomes of employers with workers in small-scale industry. These skill premia vary over time, but are constant across industrial branches.

In the tertiary sector, skill premia vary across four branches: transport and communications; commerce, credit, and insurance; liberal professions; and public administration. In commerce, credit, and insurance, we assign the same income to workers and assistants. The available data do not allow separating the incomes of workers and assistants. We calculate the income of employees as the average income of white collars (office personnel; managers and directors) engaged in commerce. To employers we assign an average merchant's income. We calculate the merchant premium as the ratio of employer and worker income in commerce, credit, and insurance.

For social groups in transport and communications, we combine information on income of relevant social categories in automobile and other transport services. We estimate the income of employers by multiplying the income of workers with the merchant premium.

We differentiate incomes of workers and employees in public administration. For workers we apply incomes of municipal servants, while for employees we use income of better-paid, state servants. We do not include assistants and independents in public

administration since their number was negligible and because we do not have information on their incomes.

For liberal professions it is not possible to make a distinction of incomes by social classes. Both Chakalov (1946) and Ivanov (2012) only provide the average income for liberal professions. We therefore apply the available average income in each social class.

Gender pay-gap. In both industry and services, we estimate income differences across gender by applying an industry average gender premium. We calculate the gender premium from workers' wages for males and females reported in Statistical Yearbooks. In agriculture, we do not differentiate incomes by gender since we do not have any information on the gender pay gap.

A.2.1.2. Post-1945

Incomes of workers and employees. Statistical yearbooks provide detailed information on average wages and wage distributions in the state sector. These include state enterprises and cooperatives, but exclude cooperated farmers (TKZS). For mining and industry, we apply the reported branch-level wages of workers (distinguishing industrial-technical workers), and employees. These wage series start in 1955. We match the reported wages with 10 industrial branches in our social table, including mining. To be consistent with our industry classification, we average wages in metallurgy and metal processing as well as in paper and printing, weighting by the labor force shares of these industries.

For workers in state agriculture, construction, and the service sector we combine branch-level average wages and wage distributions to differentiate wages across five income classes. We do this to account for income variation within branches for which we only observe average wages. Starting from the average wage in each branch, we estimate the ratio to the mean for five income classes: bottom 30%, 30-50%, 50-70%, 70-90%, and top 10%. To be precise, we use average wages and corresponding wage distributions for agriculture, forestry, construction, transport, communications, trade, science, education, health, finance, and public administration. To fit our industry classification, we then calculate labor force weighted wages for transport and communication; trade and finance;

and science and education. We apply the within inequality estimates for agriculture, forestry, construction, and all five service branches in our social table (see Table A1). The average wage is available annually from 1955. We observe wage distributions in 1960, 1962, 1965, 1967, 1971, 1974, 1977, and 1980. We hold the wage distribution constant before 1960 and interpolate for missing years within the observed period.

Incomes of farmers in state cooperatives (TKZS). We first estimate the average income of cooperated farmers by multiplying the average wage of workers in agriculture (reported in Statistical Yearbooks) with the income of cooperated farmers relative to the income of workers reported in household budget surveys.

We then estimate income differences between collectivized farmers, as we did for workers in state agricultre. Starting from the average income, we estimate the ratio to the mean for five income classes: bottom 30%, 30-50%, 50-70%, 70-90%, and top 10%. The average income and wage distributions are available in 1963, 1965, 1967, 1969, 1970, 1972, and 1974. We hold the income distribution constant before 1963 and after 1974, and interpolate for missing years within the observed period.

Incomes of independent farmers. We estimate the income of independent farmers using the same approach as for the pre-communist period. In short, independent farmers earn a fixed labor income and a land income that varies with the size of their farms. We combine information from statistical yearbooks on land distribution and production to classify independent farmers and their land income into five categories. To farmers in each land size category, we impute labor income equal to 90% of a workers wage. We take wages of agricultural workers reported in Statistical Yearbooks. We estimate incomes of independent farmers from 1955 until 1967, after which they do not appear anymore in land statistics. But, because of land collectivization, the number of independent farmers became minuscule already from 1959.

Land income. We distribute independent farmers to five social classes and impute land income to each class. As before, we do this in three steps: 1) Distribute the number of independent farmers using the distribution of number of farms. We multiply the number of independent farmers by the share of farms in each land size class. Farm distributions

are available for each year in the period from 1953 to 1956. We take the number of independent farmers reported in the census of 1956. For other years, we estimate the number of independent farmers based on the development of their share in total arable land. 2) Distribute income from land using the distribution of farm area. Statistical yearbooks report the value of agricultural production by social categories. We distribute the total value produced by independent farmers across land size classes. 3) Calculate income from land per landowner in each land size class. We divide the number of independent farmers in each class with the income from land in each class.

Land distribution. Communist collectivization of agriculture, including redistribution of land, was unprecedented. Recall that, in 1934, 68% of farms were smaller than 5 hectares and they accounted for 30% of total privately owned arable land (Table A2). By 1956, as much as 93% of farms were smaller than 5 hectares and they captured 81% of land owned by independent farmers. This means that the majority of farms owned by independent farmers under communism were small. Moreover, the share of arable land held by independent farmers decreased with collectivization of agriculture. Whereas in 1952 independent farmers owned 40% of arable land, already in 1956 their share fell to 18%. By 1959 independent farmers owned 1% or less of arable land.

A.2.1.3. Top incomes

Data used to estimate top income shares for Bulgaria come from the statistics of the *Supplementary Tax over Total Income*. These data were reported annually from 1925 to 1946 in the Statistical Yearbook of the Kingdom of Bulgaria. The high exemption level limits our analysis to 0.2 per cent of control population (minimum proportion covered through all years). The statistics comes in the tabulation form, with taxpayers ranged by income brackets according to specific tax rate of the progressive schedule. The tabulations are ranged by the gross income concept (income before personal deductions and income taxes), which is the income concept of our interest. The number of brackets varies over the period from ten to twelve. Each income bracket contains number of tax units and the corresponding tax obligation. The information on total income by bracket was not

reported for most of the years. For the period from 1942 to 1945, we have information both on the number of tax units and on the corresponding total income, and, fortunately, Nedkov (1938) reports assessed incomes for 1927 and 1929-1934 (provided by the Ministry of Finance). For years where there is reported only the number of taxpayers, we estimated the corresponding incomes in brackets by assuming Pareto distribution for high incomes.

Top income shares series are constructed by taking the following steps. First, we estimate total income in each bracket of income tax tabulations for years where the number of tax units is reported only and information on the associated income are missing, by assuming that top incomes follow the Pareto distribution. Second, we estimate the control total for population following definitions of tax units specified by tax law and reported in tabulations. The tax unit was defined as household and the total number of households is estimated as the number of adults minus the number of married females. The data are found in population censuses. Third, we estimate the total income denominator. This is based on historical national accounts (Chakalov, 1946; Ivanov, 2012). Finally, we use Pareto interpolation to arrive at income shares of the specific percentages of population.

A.3.1. Socio-economic structure in Czech Lands/Czechoslovakia

A.3.1.1. 1910-1950

We consistently track three social groups – workers, employees, and independents – between 1910 and 1950. We collected data from population censuses surveying Czech Lands in 1910, and Czechoslovakia in 1921, 1930, and 1950. We aggregated certain social categories and economic branches to ensure consistency over time. Independents include self-employed and their helping family members. Employees consist of officials and clerks. Workers, laborers, apprentices, and servants comprise the third social group. We distinguish the labor force in these social groups by gender and 23 economic branches listed in Table A3.

Workers were the largest social group throughout the studied period. They accounted for over half of the labor force until 1920. Their share in the labor force decreased between 1920 and 1950 by 14 percentage points. Most workers were engaged in industry, and the share captured by the secondary sector increased over time. By 1950, three-quarters of

Table A3: *Economic sectors and branches in Czech lands and Czechoslovakia*

No.	Sector	Branch
1	Primary	Agriculture, horticulture and animal husbandry
2	Secondary	Mining and metallurgy
3	Secondary	Metal processing
4	Secondary	Industrial machinery, tools, and equipment
5	Secondary	Stone and earth industry
6	Secondary	Glass industry
7	Secondary	Chemical industry
8	Secondary	Gasworks, waterworks, power plants
9	Secondary	Wood industry
10	Secondary	Paper industry
11	Secondary	Printing industry
12	Secondary	Textile industry
13	Secondary	Leather industry
14	Secondary	Clothing industry
15	Secondary	Food industry
16	Secondary	Construction
17	Tertiary	Trade
18	Tertiary	Banking
19	Tertiary	Post, telegraph and telephone
20	Tertiary	Railways and other tracks
21	Tertiary	Other transport
22	Tertiary	Judicial and public administration
23	Tertiary	Education and training

male workers and two-thirds of female workers were engaged in industry. The gender balance remained fairly stable over time with at most a third of workers being women.

Between the 1910 and 1921 censuses, there was a notable decline in female employment in agriculture, horticulture, and animal husbandry. The Population census of 1930 recognized prior errors, particularly in the classification of women's occupations. In particular, many wives and daughters of farmers were wrongly classified as "family members without their own occupation" in the 1921 census, despite their active involvement in agriculture, leading to substantial discrepancies in female employment across the years 1910, 1921, and 1930. In light of this, we attributed 32.6% of female dependents in

agriculture to female independents, effectively recalibrating the gender balance among independent agricultural workers in 1921.

The share of employees in the labor force increased significantly over time. Consisting of only 5% of the labor force in 1910, the share of employees started to increase in 1920 and by 1950 reached around 25% of the labor force. The share of officials and clerks increased rapidly after the First World War, with a more pronounced effect on men. This change was especially significant in Trade, Banking and Public Enterprises, likely driven by the introduction of the legal definition of employees. A similar trend was observed in Austria, where the number of employees and civil servants almost tripled from 1910 to 1951, primarily due to the Employees Act of 1921 and civil servant appointments in public companies after 1945 (Mesch and Weigl, 2012). The share of employees in industry increased over time, but the tertiary sector remained the biggest employer of this social group. There were hardly any employees in agriculture. The gender ratio of employees was skewed heavily in favor of men. Although the gender balance somewhat improved over time, even in 1950 there were four male employees for each employed woman.

Independents comprised a stable share of the labor force, between 35% and 40%. Most independents were occupied in agriculture (around two-thirds, even in 1950). The social group was relatively equality split between men and women. However, men were by and large self-employed, whereas women were primarily helping family members. The share of self-employed within the group decreased over time, from around two-thirds before the First World War to one-half in 1950.

A.3.1.2. Post-1950

The first census taken after the Second World War (1950) in Czechoslovakia is consistent with the pre-war censuses, but not with subsequent ones. Whereas it is possible to match the economic sectors across time, social groups underwent a large change in 1961. For this reason, it is not possible to interpolate population by social groups between 1950 and 1961. Hence, we benchmark our post-1945 estimates on social groups reported in the 1961 census and rely on annual information from statistical yearbooks for variation in the

number of people within social groups over time.[51]

The population census of 1961 (Population census, 1961, volume II, pp. 52-69) distinguishes the labor force by economic sectors, social classes, and gender. The labor force counted 6,4 million people. There were seven social classes. Workers (3,3m) were by far the most numerous. They were followed by 1.8 million "other employees", 930 thousand farmers in cooperatives, and 95 thousand producers working in non-agricultural cooperatives. Only 1% of the labor force earned a living independent of the state. Among them independent farmers were the most numerous (166k), while self-employed in industry and people with free professions in services were tiny (respectively, 4k and 6k). The low number of independent farmers relative to those in cooperatives suggests that collectivization of agriculture was widespread by 1961.

To be as consistent as possible with pre-war social categories, and in line with the available post-war information on incomes, we define the following social groups after 1950: workers, employees, independents, and members of cooperatives.

To better capture variation within "other employees", we distinguish officials from engineering-technical employees. Engineers and technicians accounted for a quarter of all employees in the labour force. Their share was especially high in industry, in which they constitute almost a half of all employees. The way we differentiate officials from engineers and technicians is straightforward. We take the reported number of engineering-technical employees and apply the branch-specific employee gender ratios to estimate the number of male and female engineers and technicians. We then subtract the number of engineers and technicians from the reported number of employees to calculate the number of officials by gender in each economic branch.

[51] Federalni statisticky urad (1960, 1965, 1967, 1968, 1970, 1971, 1973, 1975, 1977, 1978, 1980, 1982, 1984, 1985, 1986, 1988, 1989).

A.4.1. Incomes in Czech Lands/Czechoslovakia

A.4.1.1. 1913-1945

Workers (industry and agriculture). Our starting point are detailed statistics on wages of workers in agriculture and industry, which come from Statistical Yearbooks.[52] In 1913 and 1918-1935, the data cover 15 sectors and 55 sub-sectors. Wages are differentiated by three macro regions: Bohemia; Moravia and Silesia; and Slovakia and Subcarpathian Ruthenia. For the latter, data become available in 1921. We calculate wages for the whole of Czechoslovakia as a population weighted average of regional wages. We estimate annual incomes by multiplying reported daily wages by 300 days of work.

From 1939 to 1945, for the Protectorate of Bohemia and Moravia, we collected hourly wages of workers across 15 industrial sectors from Statistical Yearbooks. We assume an eight-hour workday and then annualize wages as before. For wages in agriculture during the Protectorate, we rely on Stádník (1946).

Employees (industry and agriculture). We estimate the incomes of employees in agriculture and industry by multiplying the wages of workers in a given branch by a skill premium between white-collar and blue-collar workers. The skill premium varies over time, but is constant across sectors.

Our starting point are detailed statistics on salaries of employees in agriculture, industry, commercial trade and banking reported for the period 1929-1936 in Statistical Yearbooks.[53] For these four sectors, we compute a gender-specific skill premia by dividing the reported salaries of employees by the average income of workers weighted by population. Moreover, we compute skill premium that covers all insured workers and employees, across all sectors, between 1913 to 1945. This cross-sector skill premium serves as a basis for interpolating sector- and gender-specific skill premiums for the years with missing data.

To compute the cross-sector skill premia we rely on several sources. For 1913, we use health insurance data reported by the Imperial and Royal Ministry of the Interior

[52] L'Office de Statistique de la République Tchécoslovaque (1928, 1932); Statní úřad statistický (1924, 1932, 1936, 1946, 1948).

[53] Statistisches Staatsamt (1937, 1938).

of Austria-Hungary.[54] It provides daily wages of different types of workers, in all Crown lands, disaggregated at the level of political and judicial districts. For political districts, where wages are disaggregated in court districts and/or different groups of workers, we draw an average for each of the groups defined above. We then assign these wages to the respective number of workers in each group within political districts. We do so in order to calculate aggregated average daily wages of each group in Bohemia, Moravia and Silesia, as well as gender and wage premia.

The skill premia for the period 1929-1943 comes from insurance data reported by Stádník (1946). Stádník reports the total wages and number of manual workers insured at the Central Insurance Company. He also reports the total salaries and number of white-collar workers insured by the General Pension Institute. Based on these data, we calculate the average wage per manual worker and the average salary per white-collar worker. We estimate the skill premium as the ratio between the white- and blue-collar average remuneration.

Before 1929, direct wage estimates for white-collar workers in Czechoslovakia are lacking. To estimate skill premium trends, we link them to wage data for building workers in Germany as reported by Bry (1960). An exception is 1926, where we calculate skill premiums using the average salary for employees from Hotowetz (1927), divided by the weighted average annual wage for all sectors.

Employees (services). For our pre-WWI benchmark, we use Zemská statistická kancelář království Českého (1913), which reports data on the number and salaries of state employees in four social categories, equivalent to those in the social tables.

We use detailed data on state officials and their salaries provided in statistical yearbooks for the years 1924 – 1947.[55] It includes information on the salaries of state officials and their number, divided by departments of state administration and specific occupations. We were able to match these numbers with our social categories and thereby compute average monthly salaries of independents, officials and clerks, and domestic servants. We

[54] k.k. Ministerium des Innern (1914).

[55] L'Office de Statistique de la Republique Tchecoslovaque (1935); Statistisches Zentralamt (1941, 1942); Statní úřad statistický (1925, 1948); Statistisches Staatsamt (1928, 1934, 1936, 1938).

approximated the wages of public sector workers based on skill premia estimated on the basis of data reported by Stádník (1946). We complement the missing information on remuneration schemes in education, army and judiciary with data from Landau (1927, 1931). For years where the tax data is missing, we interpolate the wages using the overall wage development reported in statistical yearbooks and other sectors, or employ a linear approximation.

Gender premia. We estimate the incomes of males and females by multiplying the incomes of different social categories by a gender premium. The premium is based on wages of male and female workers. Before the First World War, the premium is calculated from the health insurance data reported by the Imperial and Royal Ministry of the Interior of Austria-Hungary. Statistical yearbooks cover the period from 1928 to 1948.[56] We apply the same district-level population weighting as we did for skill premia, to calculate the average gender premia for Czech lands in 1913. For the post-war period, we rely on gender differences in workers' pay reported at the regional or national level. As before, when necessary, we weight regional premia by population. For missing years we use linear approximation.

Independent farmers. Tax statistics classified independent farmer households into six income classes. Tax statistics are available for 1928, 1930, 1932, 1933, 1934, 1936, 1938, and 1940. Many households that earned much below the threshold were not included in the tax statistics. Households are further classified by the type of their income. As a rule, by far the largest number of households had income from land as compared to other income categories (e.g. buildings, capital, other employment). Accordingly, income from land accounts for the lion's share of total household income.

We estimate the number of independent farmers and impute their income in two steps. First, we estimate the number of tax-paying individuals in each tax bracket. We assume that in most, but not all, agricultural households two adults and some children contribute to household income earned from land. For this reason, we multiply the number of households with 1.8 to arrive at the number of tax-paying individuals per income

[56]Statistisches Staatsamt (1936); Statistisches Zentralamt (1941, 1944); Statní úřad statistický (1948a).

bracket. We then apply a gender ratio to differentiate the number of males and females. The gender ratio is based on reported census figures on independent males and females in agriculture. We calculate individual income of independent farmers by dividing the total household income from land with the estimated number of tax-paying individuals. We subsequently apply the calculated gender premia to estimate incomes of male and female independent farmers.

The next step is to transfer the estimated number of independent farmers and their income to the social tables. Each of the six income brackets forms a sub-category of independent farmers in the social table. To each of these, we add the number of independent farmers and assign the estimated income which, as explained, we calculated based on tax statistics. The seventh category are non-fillers. To be consistent with the census figures, we deduct the total number of estimated, tax-paying individuals from the total number of independent farmers reported in the census. This difference gives us an estimate of the number of non-fillers not reported in tax statistics. We impute the income of agricultural workers to non-fillers. We take this assumption to be sensible on the grounds that non-fillers, owning tiny plots of land, had a marginal return that was probably similar to that of agricultural wage earners.

Independents in industry and services. We follow a similar procedure for independents in industry and most services. Based on the same tax sources, we are able to differentiate the number of households and their incomes, by the same income sources and tax brackets as for agriculture, for two other sectors: industry and crafts; trade, finance, and transport. Most households in these sectors earned their income from business and self-employment. This income category, accordingly, captures the largest share of total household income.

We estimate the number of independents in industry and services, and impute their income in two steps. First, we estimate the number of tax-paying individuals in each tax bracket, separately for industry and crafts; and trade, finance, and transport. We assume that in both sectors households earning an income from business and/or self-employment had a single adult breadwinner, whereas other family members only occasionally con-

tributed to household income. For this reason, we multiply the number of households with 1.3 to arrive at the number of tax-paying individuals per income bracket. We then apply gender ratios to differentiate the number of males and females. The gender ratio is based on reported census figures on independents in industry or independents in trade, finance, and transport. We calculate individual income of independents by dividing the total household income from business and self-employment with the estimated number of tax-paying individuals. We subsequently apply the calculated gender premia to estimate incomes of male and female independents in industry and services.

Second, we estimate the number of independents and their incomes in the social tables. We distribute the number of independents observed in the census according to the estimated distribution of tax-paying individual independents by income class. We apply the estimated distribution for industry and crafts to all 16 industrial branches in our social table, and the distribution for trade, finance, and transport to four service branches (trade; hostelry; banking; other transport).

We take the estimated income of tax-paying individuals in industry and crafts and multiply it by a wage premium for each industry branch in our social table. Similarly, we multiply the estimated income of tax-paying individuals in trade, finance, and transport, with an income premium for the seven branches in services. The income premia estimate relative differences in workers' income levels between branches in industry or services.

A.4.1.2. Post-1945

Workers (industry and agriculture). We collected wages of workers in industry and agriculture from Statistical Yearbooks.[57] Average wages are available for workers in 15 industrial branches, from 1949. Wages in agriculture start in 1953. We extrapolate agricultural wages from 1950 to 1952 with the overall wage index.

Employees (industry and agriculture). We estimate incomes of employees in industry and agriculture by multiplying the wages of workers in a given branch by a skill premium. We observe the premium of engineering and technical personnel, and of

[57]Federalni statisticky urad (1960, 1965, 1967, 1968, 1970, 1971, 1973, 1975, 1977, 1978, 1980, 1982, 1984, 1985, 1986, 1988, 1989).

administrative and clerical personnel, relative to manual workers. The skill premium varies over time and is reported separately for construction and all remaining sectors in the Statistical Yearbooks.[58] We complement several missing years using data from Adam (1984) and Myant (1989), or employ linear approximation.

Independent and cooperated farmers. Statistical yearbooks report the average wage of cooperated farmers and the average wage in agriculture. We estimate the average wage of independent farmers by multiplying the average agricultural wage with the ratio of farmer to worker income reported in budget surveys of agricultural households. We then distribute the average income of independent and of cooperated farmers into five income classes: bottom 30%, 30-50%, 50-70%, 70-90%, and top 10%. We observe wage distributions from household budget surveys taken in 1956, 1958, 1960 1965, 1970, 1973, 1976 and 1980.

Services. For the service sector we combine branch-level average wages and wage distributions to differentiate wages across five income classes. We do this to account for income variation within branches for which we only observe average wages. We utilize branch-specific wage distributions for transport, trade, public administration, healthcare, and education. For banking, we apply the service-sector wage distribution. Starting from the average wage in each branch, we estimate the ratio to the mean for five income classes: bottom 30%, 30-50%, 50-70%, 70-90%, and top 10%. The average wage is available annually from 1948 to 1988 in Statistical Yearbooks.[59] We observe wage distributions from household budget surveys taken in 1956, 1958, 1960 1965, 1970, 1973, 1976 and 1980.

[58]Federalni statisticky urad (1960, 1965, 1968, 1971, 1973, 1975, 1977, 1979, 1980, 1983, 1984, 1986, 1989).

[59]Federalni statisticky urad (1958, 1959, 1960, 1963, 1967, 1969, 1973, 1977, 1979, 1984, 1985, 1989).

Appendix B: sources

B.1. Bulgaria

Population censuses.

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