

Income Inequality and Incentives
The Quasi-Natural Experiment of Hungary,
1914-2008¹

Dimitris Mavridis
University of Luxembourg

Pálma Mosberger
Central European University
Hungarian National Bank

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¹Dimitris Mavridis, University of Luxembourg dimitris.mavridis@college-de-france.fr, Mail address: 162A Av de la Faïencerie Université du Luxembourg Campus Limpertsberg 1511 Luxembourg (Corresponding author). Pálma Mosberger: Central European University and Hungarian National Bank, mosbergerpalma@gmail.com, Mail address: Central European University, 9 Nádor St., Budapest 1051 Hungary. We are thankful for comments and suggestions from Tony Atkinson, Zsuzsa Ferge, László Katus, Gábor Kiss, Botond Kőszegi, Christos Koulovatianos, Róbert Lieli, Rajnish Mehra, Salvatore Morelli, Emmanuel Saez, László Sándor, Gabriel Zucman, and seminar participants in Southampton, Luxembourg, and the London School of Economics. Mavridis gratefully acknowledges financial support from the Central European University Foundation. Mosberger gratefully acknowledges financial support from INET-EMod during her visit at Oxford and from the Rosztóczy Foundation during her visit at UC Berkeley. Opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Hungarian National Bank.

Abstract

We construct the first top income share series of a formerly socialist economy before, during, and after socialism in order to exploit the quasi-natural experiment of the absence of markets on incentives and income inequality. We investigate top income shares dynamics and the sources of income at the upper tail of the income distribution. Within this setup, we study the effect of capital markets and liberalized wage settings on top income shares. Our estimates show that the introduction of wage-setting decentralization had a role in increasing the skill premium and income inequality in years prior the transition.

1 Introduction

What drives income inequality? Understanding what generates income disparities is important, as it has considerable normative implications. In recent years, economists are able to document the evolution of income inequality in long horizons that capture low-frequency events such as capital busts, the cycles of industrialization and financial development, and the size of government. Perhaps surprisingly, however, to date, little attention has been paid to the unique, large scale institutional experience that lays at the heart of the economic analysis of inequality, the period of socialism. We fill this void with a measurement study of top income shares covering the period before, during, and after socialism.

Research compiled in Atkinson et al. (2011) highlights among the explanations of rising top income shares the effects of tax policy shifts, labor and financial market regulations, more lenient social norms towards earning differences, and increased bargaining power of high earners (Piketty and Saez (2013), Piketty (2014)). Another strand of the literature attributes the recent surge in top income shares in some countries to skill-biased technological change and globalisation forces favouring skilled individuals that tend also to be top earners (Katz and Murphy (1992), Acemoglu (2002), Lemieux (2006), Acemoglu and Autor (2011), Kaplan and Rauh (2013)). In the wake of the recent global financial crisis, several studies have looked at the effects of growth, financial development and banking crises on top income shares (see Morelli (2012), Roine et al. (2009)). Recently, there has been much attention to the role of the return on capital behind the increase in top income shares, as was presented in Piketty (2014). The evolution of several top income series suggest that institutional and market forces may have played an important role behind these changes.

All mechanisms alluded to above operate on the distribution of income and its dynamics through latent, market-related processes. Changes in taxation alter many incentive structures, in particular, incentives for effort and human capital accumulation. The overall effect of a tax reform in the distribution of wages and the subsequent top income shares dynamics is a confluence of many factors. Moreover, the historical experience of high-income inequality may induce a rise in the progressivity of taxation, or changes in institutions that are consequential to the income distribution.

As a consequence, there is a severe issue of endogeneity. Specifically, it is difficult to identify whether latent mechanisms that are related to free markets and institutions have induced both the reform and the observed subsequent dynamics of top income shares. In order to assess these effects, economists need sophisticated models and strong identification mechanisms. Our paper is immune to this critique.

We assemble income data from a geographical and national boundary that evolves from an integral part of an Empire to a mature open market economy, through a period of socialism. We construct the first top income series of a Central-Eastern European country to exploit the exogenous institutional setup of a socialist economy and wage setting policy on the income distribution. Additionally, we look into how both the incidence of socialism, as well as the post-socialist transition have shaped the income distribution at the very top, all along the 20th century.

Our setup is tantamount to an economy with no capital markets, no population migration, and the absence of international trade in consumption and capital goods. Within this setup, we identify two periods. In the first period, the wage distribution is controlled by the political economy of the Communist Party. During this period, inequality at the top remained extremely low whereas the skill premium was decreasing, thus reflecting the distortion of incentives for effort.

The skill premium reverses its course within the period of socialism when the Central Planning Bureau delegates wage setting to state-owned enterprises. When the productivity signal of a worker becomes visible after wage-setting decentralisation, the skill premium increases, and inequality increases as a result. All other latent, market-related processes remained the same as they were at the beginning of the socialist period.

We investigate the speed and driving forces of top income shares in their convergence to Western-European levels after the transition into the market economy. The control periods are the decades before and after the communist period, when market forces determine both capital and labour income. The treatment period of the socialist economy provides a source of variation that is exogenous to the level of top income shares, or any special characteristics of the country. Comparing different time periods of one single country reduces the effect of variables other than the ones of interest on the outcome variable, which is precisely the level of top income shares. Obviously, these are not the only sources of variation between the control and treatment periods, as the institutional setup is highly consequential. In this study we do not look at other possible effects of socialism on top shares such as shortage of goods, price settings and selected access to education.

During the course of the twentieth century, Hungarian top income shares follow a U-shape as a consequence of equality by fiat rather than a secular trend in top incomes. In the period in-between the two World Wars, top shares were as high as in Western countries, is due from large capital structures and land. After the Second World War, when most Western countries experienced a compression in their top shares, the Hungarian shares decreased twice as much as a consequence of the distributional ideology of socialism. Top income shares remained constantly low

during the four decades of central planning. After the transition to a market economy we observe a rapid top income share adjustment, and in less than a decade, top income shares converge to Western levels. This increase is due to a surge both in capital and labour income components.

With the exogenous shock, we can study the effects of market forces on the top income shares, i.e. the effect of private ownership of capital and decentralised wage setting mechanisms. After the transition to the market economy, the transition from a single capital owner (the State) to multiple ones was completed, markets for capital started to operate and investment opportunities emerged. The contribution of capital income in the total gross income substantially increased, from which the top of the income distribution benefitted the most. We find that in just two decades the significance of capital income component at the very top of the distribution became supreme, reaching comparable levels even to the USA, a country with high capital income concentration.

Nevertheless, we find evidence that wage-setting decentralisation favouring the remuneration of skills also played a role in the increase of the top income shares *during* socialism. The comovement between the skill premium and top shares series is apparent during the periods of market institutions. During the decades of central planning, both series had a negative overall downward trend with a jump in 1970, exactly when for a short reform period the strict wage settings were relaxed and delegated to enterprises. The upward trend in the skill premium from the mid-80's happened parallel with the delegation of executive compensation and bonus setting to enterprise level. This policy shift, which marked the first step to complete liberalisation of the labour market, was followed by an increase in the top shares. After the transition to the market economy, both series continued to surge.

The structure of the paper is as follows. In Section (2), we briefly summarise the measurement instruments and methodology we used for constructing the top income share estimates. In Section (3), we present the top income series, and in Section (4) we present a novel estimate of the capital share, in view of assessing the functional distribution of income. We conclude by describing the institutional mechanism leading to increased income disparities in Section (5).

2 Data and Measurement

As it is the case with previous research on the documentation of top income shares, the time-frame of our analysis extends back to almost a century. In a marked distinction with the rest of the literature, our paper concerns a national boundary that has experienced significant institutional changes and historical shocks, and whose

comparative analysis yields the support of our reasoning. Our time-frame is bracketed by highly significant events such as the dissolution of Austria-Hungary under the treaties of St. Germain and Trianon, the two World Wars, the establishment of the People’s Republic of Hungary in 1949, and finally the transition to a market economy. These historical shocks mark significant institutional changes and policy orientation, by capturing the changes in economic systems that we observe over the 20th century.

We assemble primary data from official historical statistics and administrative sources. We use the tax code and its generated income tax statistics as a measurement instrument for the upper tail of the income distribution for the periods before the Second World War, and after the transition to a market economy. We use the available earnings censuses of the Socialized Sector from the period of the People’s Republic of Hungary till the transition to the Republic of Hungary, a period that we will be referring to as the socialist period. Allowing for the varying definitions of income included in our data sources, we construct homogeneous population and income control totals to establish comparability between periods, and we define the top income shares accordingly.¹

2.1 Definition of Income

The first comprehensive, progressive personal income tax in Hungary came into effect while the First World War was still unfolding. The year 1915 is the first fiscal year for which we obtain data, corresponding to income drawn in the calendar year 1914.²

We use the available income tax statistics for the period of 1914-1915 and 1927-1940 to estimate the top income shares. For 1914-1915 the figures document total declared income and tax levied on tax units across the sixty-four provinces of Hungary, and the areas of the independent Kingdom of Croatia-Slavonia along with the port of Fiume and its suburbs, which together constitute a region that fell under the jurisdiction of the Hungarian Kingdom at the time. For the inter-war years, the tax statistics cover the area of Hungary after the Treaty of Trianon after World War I. We adjust the population and income controls accordingly.

For the socialist period, we use earnings censuses reported in the Statistical Yearbooks for the period 1951-1968 and published subsequently up to 1988 by the Central Statistical Office (KSH). The frequency of the earnings statistics is irregular, with

¹A detailed description of the tax system and the data sources is included in the Appendix.

²For fiscal year 1915, the tax-reporting threshold is 20,000 crowns (*korona*). As a comparison, the remuneration of the Prime Minister is 24,000 crowns, whereas a skilled worker earns 800 crowns per year at that time.

the earliest available table referring to 1951. For the period 1955-1962, the censuses were collected yearly, while from 1962 onwards they were published biannually. The statistics depict the distribution of gross monthly earnings, including bonuses, allowances, in-kind benefits, and benefits from profit sharing. The income concept is gross earnings before deduction of the employee social security contributions for the entire period of 1951-1986, and for the year 1988 before the deduction of taxes levied under the newly introduced personal income tax.

The statistics depict the share of employees in the formal sector belonging to specific gross earning brackets based on the labour force censuses of state-owned enterprises conducted by the State. For the period 1951-1968 earnings statistics refer to workers employed at state-owned firms and state-owned farm establishments of the State Sector, and at state-owned enterprises, state-owned farms, and cooperatives in the broader Socialist sector for the rest of our time-frame. To the interest of constructing homogeneous top income shares for the entire time frame of the socialist economy, we explicitly assume that the distribution of earnings in the Socialist Sector at the top coincides with the distribution of earnings at the State Sector.³

Legislation gradually introduced the present income tax code during the period 1987 to 1991. The income declared to the fiscal authority falls into two categories: the “comprehensive” and “separately taxed” income. The comprehensive category contains three main income subcategories: *i*) income from dependent activity, mainly wages and salaries; *ii*) income from independent activity such as self-employment, the exercise of liberal professions, or small-scale agricultural activities; and *iii*) other income such as income earned abroad and tax-exempt income (pensions, scholarships, and subsidies). The comprehensive income was taxed progressively during the period 1992-2008.⁴ The separately taxed income is a “schedular” tax on capital income items, with different flat tax rates applied to separate categories of capital income, such as dividends, capital gains, and profits from business activity.

We use both administrative micro data and published aggregate income tax statistics for this period to estimate the top income shares. For both sources, the income concept that we retain is gross income before deductions, and employee’s payroll and personal income taxes, and after employers’ payroll taxes. Based on the detailed micro data we estimate the top shares both excluding and including realised capital

³Supporting evidence for this choice is provided by statistics tables published by the Central Statistical Office (and reproduced in the Appendix) on average earnings of employees with specific university degrees employed either at the state or the cooperative sectors in the year of 1963 and 1967 showing similar earning amounts.

⁴A flat-tax was introduced in 2011. The overall statutory tax rate has been gradually decreased from 20.32% (16% on the so-called “super-gross” tax base, i.e., the tax base inflated by 27%) to 15% since the introduction of a flat-tax.

gains for the period of 1992-2008. The total income denominator of the later series includes all realised capital gains.

2.2 Income Units

Tax statistics during the period before World War II report total income of an extended family dwelling under the same living quarters. The tax base in terms of units consists of either a single individual or a couple with dependent persons, with the head of the family being the primary income earner.⁵ We approximate the number of households as the total number of the population above the age of 15 minus the number of married women at province level reported in decennial censuses. We adjust the data for territory change as a consequence of the treaties after World War I. For the inter-war period, we obtain an estimate by linearly interpolating the appropriate figures from the censuses of 1920, 1930, 1940, and 1949 covering the Trianon borders of the country. For the socialist period and transition periods, we estimate a population total that consists of the entire population above the age of 15 as a proxy for the potential tax base.

2.3 Income Total

To construct an income aggregate, we first assemble GDP series during the period of study denominated in current prices, and across three different currencies (Austria-Hungary crown, pengő, and forint). We compute personal income totals for the years when these statistics are available. For the few years when these statistics are not available, we proxy the total personal income by assuming it is the same fraction of the GDP as in the neighbouring years.

For the beginning of our time frame, we use the income total series reported in Schulze (2005), consisting of GDP estimates in the 64 provinces of the Hungarian part of Austria-Hungary, Fiume, and the provinces of Croatia-Slavonia, in alignment with the income reported for tax purposes. For the inter-war period we use the output figures in Eckstein (1955) corresponding to the post World War I and Trianon treaty territory of the country, adjusting these figures to account for market prices with estimates of the indirect taxes found in Matolcsy and Varga (1938), and accounting for depreciation.⁶ Eckstein (1955) computes net national product at factor cost. To

⁵Dependent individuals are considered those related to the head of the household by blood or marriage (grandparents, children, grandchildren, in-laws), provided that they are economically dependent on the head of the family.

⁶We employ a capital depreciation of 5% to obtain the gross national product figures. An

get an output measure in market prices, we inflate the figures by 5% based on the estimate of indirect tax amount in the year of 1935 in Matolcsy and Varga (1938).

For the first decade of the socialist economy, the Central Statistical Office publishes income aggregates conforming to the socialist Material Product System. The main aggregate is the Net Material Product, an accounting concept that does not include the contribution of “unproductive” services to national income. We adjust this series by using the average fraction of the official GDP and NMP series between 1961-1988 and apply it to the period 1950-1960. For the period of 1961-1990, we use the official GDP data published by the Central Statistical Office under the modern SNA definition. From 1991 up to today, we use the official Eurostat figures reported by national authorities.

To proxy the individual income control total for the first decades of our time frame we use a 73% contribution of our constructed GDP series as a proxy for aggregate personal income.⁷ For the socialist period we compute a personal income total defined as the sum of labour income, social security contributions (including pensions, unemployment benefits, family allowances, maternity benefits, scholarship grants, other social benefits) and the part of capital income (such as lottery, interest, insurance) in the national income accounts data calculated by the Central Statistical Office. For the 1991-2010 period, we use the national income data published by the Central Statistical Office. Our constructed personal income total contains wages and salaries, mixed income, property income including net interest, dividend, property income attributed to insurance policy holders, rental income, state social contribution (pension, sickness pay, unemployment benefits, family allowances, maternity benefits), scholarships and grants. We also include the total realised capital gains amount reported at the Tax Authorities summary tables containing items corresponding to the actual tax code.

Concerning prices, we gather data from several published series to construct a cost-of-living index that honours a currency unit’s worth from 1913 to today.

2.4 Parametric Form

To estimate the top income shares from raw data tables we approximate the top tail of the income distribution by a Pareto law. We follow the methodology described in

implicit assumption in producing the estimate is that the installed capital base, albeit expanding, was relatively modest compared to the European West. Moreover, as is documented in Tomka (2001), the contribution of international capital flows is minimal at that time.

⁷We obtain this average ratio based on the total individual household income series available only for the period of 1925-1935 and reported in Matolcsy and Varga (1936, 1938), coupled with our compiled statistics.

general lines in Atkinson (2007). Accordingly, the percentage of the population with income above a given threshold y_i distributed across $i = 1, \dots, n$ brackets is given by the hazard function

$$H(y_i) = 1 - F(y_i) = \left(\frac{c}{y_i}\right)^\alpha, \quad i = 1, \dots, n$$

where α is the Pareto shape parameter, and c is the scale parameter. Assuming constancy of the shape parameter in between two neighbouring brackets $i, i + 1$ from a total of n brackets, and linearising the hazard function yields

$$\alpha = \log(p_i/p_{i+1}) / \log(s_{i+1}/s_i), \quad i = 1, \dots, n$$

where s_i is the income threshold of the bracket i and p_i is the cumulative share of people with income above this threshold. Then

$$c = s_i p_i^{1/\alpha}, \quad i = 1, \dots, n$$

Finally, given the values of the parameters (α, c) , we produce the exact income threshold and income shares for any top income quantile.

3 Top Income Shares

This section analyses the evolution of the Hungarian top income shares for the period between 1914 and 2008, projected in a historical and institutional context. We depict homogeneous series of economic performance and prices for the entire 20th century in Figure (1).⁸ An overview of real GDP per capita index reveals that the country has witnessed high growth rates after 1945 compared to the inter-war period, and a profound crisis during the transition from socialism, along with a surge in the average level of prices.

During the entire 20th century, inequality has followed a U-shape, as is witnessed in Figure (2). The measurement methodology of Gini coefficients renders the estimates incomparable across periods. The revealed pattern exhibits an increase in inequality during the Great Depression years, a much lower difference during socialism, and a surge in Gini series after the transition out of socialism. Jumps in inequality occur in historical events such as the Great Depression and the financial

⁸Tomka (2010) compares per capita GDP indices in 13 Western European countries and finds that Hungary lays in a distance of around 60% of the Western European frontier in the period 1914-1940.

crises of 1929/31, the establishment of the socialist economic model, a few years following the reforms of the New Economic Mechanism of 1968, as well as the transition to a free market economy. Income inequality is markedly higher in periods with private property and open markets in comparison with the socialist period. Our top income shares estimates are in line with this pattern.

3.1 From Austria-Hungary to World War II, 1914-1940

An established fact in the late 19th century economic historiography of the Hapsburg Empire is that the patterns of economic growth were chequered, ranging across the eastern and western constituencies of the Empire. The Hungarian Kingdom on the wake of the 20th century is still, by and large, an agrarian economy with significant historical impediments in industrialisation as nearly half of its production is drawn from the primary sector. Schulze (2000), in discussing new estimates of output in the various regions of the empire provides evidence to support the Komlos (1983) argument of a capital inflow in the Hungarian Kingdom after the Vienna stock-market panic of 1873, fostering the first wave of industrialization in a largely agrarian economy.⁹

The aftermath of the Armistice was highly consequential for both parts of the Empire. Growth slowed down after the war and its ensuing capital bust, as the Hungarian state was confined to one-third of its Imperial-era frontiers, leaving outside a sizeable part of its endowment in both labour and natural resources and disrupting trade routes. The treaties of Trianon and St. German-en-Laye deprived Hungary of more than approximately 70% of the former territories of the Hungarian Crown. There was a prolonged contraction of aggregate activity, reflecting the misallocation of resources due to the war effort.

The financial crisis of 1929-1931 and the hyperinflation that erupted after World War I slowed down economic development as it wiped out what was left of the banking industry. A stabilisation program conducted by the League of Nations was successful in setting the economy back on track. In the years leading to World War II, the fallback was reversed by strong recovery years resulting in similar growth patterns than in the developed European countries. This process was again halted by a destruction of the capital base during World War II.

⁹New and reliable estimates of the share of the primary sector outlay over total value added in late 19th century Hungary bring it to around 50% over the period 1870-1913. See Schulze (2000), Table. A2 for estimates using a value-added approach, and Schulze (2007) on regional disparities between Austria and Hungary. See Berend and Ránki (1974), Ránki (1964), for a discussion of main impediments to the industrialisation process, from the perspective of socialist-era historiography.

We estimate top income shares over the period 1914-1941. Late industrialisation and heavy reliance on the primary sector results in a skewed income distribution with three distinct societal groups, as highlighted by Éltető and Láng (1971) and Berend and Ránki (1974). The bottom 80 percent is comprised of servants, agricultural, and factory workers with below-average income, while the less than 20 percent middle class includes mainly privately employed administrative employees, civil servants, engineers, doctors, teachers with much higher than average income. The top of the income distribution consists of landowners, high-income earners such as wholesale merchants and bankers, and capital owners with sometimes 20-40 times higher than average income.

The skewed distribution of landownership of the historically numerous Hungarian nobility and large landholders had been a political predicament ever since the Revolution of 1848. Eddie et al. (1993) document a declining share of land in the hands of large holders between 1893 and 1935, with land becoming a productive asset whose property rights were increasingly traded held by financial intermediaries.¹⁰ An early inequality study by Matolcsy (1938) depicts a Lorenz curve similar to that of Germany and the United States during the 1930s.

The overall evolution of the top income shares is depicted in Figure (3). At the beginning of the first part of the 20th century, the top 1% is estimated to hold than 15% of income, while the top 0.1% in some years even reached 7.5%, which are in line with top share estimates at the Western countries that time. The top shares display an overall decreasing trend during this period, at a time where Hungary underwent the First World War, a hyperinflation, the Great Depression and a banking crisis. In 1927, our estimates exhibit similar levels to the pre-war shares. During the inter-war period, the Hungarian economy was distressed by the Great Depression. The situation worsened when it was also hit by the banking and credit crises starting in the summer of 1931 with the insolvency of the Viennese Credit-Anstalt that propagated into Hungary.¹¹

Historical accounts of banking crises show that they are followed by capital busts, liquidity shortage, recessions and high unemployment rates. Capital busts have been reported to affect the top shares more severely, especially in times when agents at the

¹⁰Growth in the late 19th century was led by increases in productivity in agriculture in which the eastern part of the Empire exhibited a comparative advantage. Capital flows increased after the Vienna panic of 1873 were directed to the primary sector, with a few notable exceptions in material processing industries and textiles. Land ownership retained its historically skewed pattern, with 0.16% of the greatest proprietors of Hungarian land owning 33% of total farming area in 1910; see Ránki (1964).

¹¹See Schubert (1991) for an account of this incident, and Berend and Ránki (1974), pp. 111-113, Fior (2008), pp. 109,138 for its consequences in Hungary.

very top are capital owners and have access to the stock market, whereas the latter affect the bottom of the distribution; see Morelli (2012). In Figure (6) we document the co-movement of the top income shares with the Budapest stock market index. The change in the top shares depends on the relative decline in the different parts of the distribution. Bordo and Meissner (2011) find that in most countries during the interwar period the top of the income distribution was hit more severely leading to contracting top shares. Our estimates show the same trend with a 17 and 33 percent decrease in the 1% and 0.1% shares between 1927 and 1934, respectively.

The income decomposition of the top shares is shown in Figure 4 for the years when income source figures are reported in the official statistics. The series shows that during the first decades of the last century more than half of the originated from capital holdings for income earners at the top 0.1%. The Figure displays that both capital and business income were hit severely in the crises period as they contracted by the beginning of 1930's compared to 1915.¹² Employment income became a significant part of the top shares, with a three- to four-fold increase in less than two decades, suggesting structural changes at the top of the income distribution. Similarly to the western parts of Europe, the Hungarian top shares started to recover only after the mid-1930's. The source of recovery in the top shares was due to an increase in the business income as depicted in Figure (4). This surge coincides with the recovery of the economy driven by some specific industrial sectors such as electrical production, and tradeables such as chemicals and pharmaceuticals.¹³ Overall, income from large capital structures, either businesses or land, dominates the composition of the top income shares in the interwar period.

3.2 Socialist Economy, 1951-1988

Central Planning and Partial Reforms Concurrently with the Western European reconstruction, albeit in an entirely different institutional setting, the Hungarian economy rapidly converts into a command economy between 1949 and 1953. Instruments of this transformation were the nationalisation of the industrial base, the forced collectivisation of agriculture, and the shut-down of capital markets. The exogenously imposed Soviet model relied on the promotion of heavy industry, and

¹²Berend and Ránki (1974), pp. 147-148 documents some aspects of this capital flight: 4500 million pengő bank deposits before World War I in savings banks reduced to 752 million pengő in the aftermath of the financial crisis.

¹³Mass production was not yet prevalent, and against the background of a deferred industrial development, Hungary was lagging behind most European countries. Slowly, though, the dominance of the agricultural and food industry started to fade away; Berend and Ránki (1974), pp. 116, 122, 134-144, 167.

the concentration of productive assets to the direct control of the central government. Private production of capital goods was abolished, investment was the responsibility of the central government, and secondary financial markets closed.

The State delegated corporate governance to the top management of State-owned companies. The central government controlled all property rights to all productive assets and was the ultimate beneficiary of any operating surplus.¹⁴ Firms had no autonomy, quantities were centrally planned in every detail, and prices were set centrally without reflecting market demand and supply. With fixed final prices and artificially low raw input prices, managers were not given the incentive to realise higher profits through lower production cost or more efficient production, as they received their bonuses if the planned production targets were fulfilled at any cost. Realised production fell short of targets in every consecutive five-year plan. This incentive mechanism led to low investment in R&D, lower quality of final goods, overproduction of some specific stocks, and shortage of other goods.¹⁵

Due to the visible defaults and the manifested discontent with the system during the Revolution of 1956, the planners initiate a series of partial reforms during the 1950s and 1960s.¹⁶ These reforms aimed at introducing efficiency considerations, without breaking from the central planning paradigm. The planners tried to achieve higher efficiency by allowing more autonomy to enterprises, and by reducing the number of centrally given commands. Nevertheless, these partial reforms did not go all the way in introducing real markets.

Some important changes concerned wage setting. In particular, instead of determining wages via the compulsory payroll figures that were decided at the central planning bureau level, wage setting was based on “average wage” instructions for various occupational categories. During the partial reforms, enterprises received more freedom to set the allocation of bonuses, although they were given serious disincentives not to do so.¹⁷

The effect of the first wave of partial reforms on the top income shares amounts to a 12% increase in 1957 compared to 1955 as portrayed in Figure (7).¹⁸ Survey

¹⁴See Portes (1969) for a description of the production sector at the time.

¹⁵Weitzman (1976, 1980) highlights the prevalent “ratchet effect” of this contractual arrangement between the central planning authorities and state-owned enterprises. The result was persistent under-performance, for fear of setting elevated future performance targets.

¹⁶See Berend (1990) for a detailed account of a series of partial, and lesser known reform attempts.

¹⁷See Berend (1990), and Kornai (1980), Ch. 16. for a detailed exposition of the socialist wage setting system.

¹⁸The increase in the 1956 top shares is due to the drastic jump in the income denominator in the year of the Revolution of 1956. The increase, however, of the 1957 shares cannot be attributed to a change in the denominator as nominal per capita GDP reversed back to its trend level.

evidence suggests that the top of the income distribution is occupied by the management of state-owned enterprises and white-collar workers. The earnings differentials between the top of the employment ladder and blue-collar workers were primarily created by allowances and similar benefits. These income items are included in our income statistics. The result of these partial reforms was, however, reversed as witnessed in the Income Survey of 1962. Skilled workers and enterprise managers observed an increase of 7% and 5% in household income between 1959 and 1962, whereas households on the bottom of the skill ladder increased by more than 10%.¹⁹

The New Economic Mechanism (NEM) of 1968 was a response to persistent sluggishness. The system evolved from a centrally planned model of development to one in which every element of the balance sheets of households and firms was either taxed or subsidised. Property rights to productive capital and corporate governance were retained by the central government. Little, if anything, was left to be determined by an unfettered market on which prices are set freely.

After 1968, and instead of explicit commands on the resources to be used and production targets, the central government tried to provide further profit incentives in view of meeting the objectives of the periodic five-year plans. Although more freedom was allowed in wage setting, the average salary was still centrally determined with upper and lower payment limits for specific occupations. Additionally, if the enterprise wage bill surges were above a certain level, then heavy taxation was imposed. As part of the NEM reforms, the surplus of state-owned enterprises was not taxed away entirely by the central government, but it was channelled back into “profit sharing” funds to be redistributed among the managers and employees. The maximum profit-share dividend was set at 15%, 50%, 80% percent of the remunerations for workers, middle-level management, and top management, respectively.²⁰ Figures 3 and 7 respectively depict an 11-26 percentage increase in the very top shares, and a 5-7 percentage increase at the lower shares between 1966 and 1970 exactly after the introduction of the New Economic Mechanism.

A mixed-price setting mechanism replaced the overall direct price determination by authorities. This process included the so-called “free” prices set by enterprises, though controlled by the state via a set of regulations. These price control instruments included profit-margin restrictions, temporary “price stops”, laws concerning “unfair prices”, instructions and direct price rules virtually everywhere in the pro-

¹⁹We cannot compute percentiles from our income threshold estimates, as these thresholds refer to individual income. We do observe however that a single earner household who is a CEO of a state-owned enterprise in 1962 takes home 3,371 forints, an amount that puts the head of the household at the top 0.5% of the income distribution, according to our estimates.

²⁰See Berend (1990), pp. 170-179 for an outline of this mechanism.

duction process.

As a result of heavy regulation, relative prices of final goods were distorted, and the shortage of goods was a widespread phenomenon (Kornai (1979, 1980)). Shortage of commodities affected the diverse segments of the society unevenly. The situation was further distorted by capital controls, manifested in foreign exchange quotas for only parts of the population.

Our data depict an image of the effect of these distortions on the income distribution, by comparing the top shares during socialism to those during the market economy decades before and after. In addition to the significant difference in the level of top shares immediately after the beginning of the new economic regime, there is an overall decreasing trend afterwards. The sharp jump in 1970 is due to a new set of partial reforms aiming at increasing wage differentials of enterprise managers particularly via sharp differences in bonus payments, to provide incentives resulting in higher productivity. The increasing trend from the mid-1980's also occurred after managerial wage and bonus setting were delegated to enterprise councils.²¹

The regulation of the price of labour was a central component of socialism, set by the State monopsony of labour. Different wage tables existed for blue and white-collar employees that prescribed earnings differentials between blue collar and white collar workers, administrative workers, and managerial staff. However for short reform periods the strict wage settings were relaxed and delegated to enterprises to increase production efficiency.²² We exploit this variation in our argument below.

Capital Income During socialism, households had limited capacity to own real or financial assets, property rights were not secure, and investment opportunities in sectors other than the government were heavily regulated. The degree of this institutional setting was absolute, even though a shadow economy was operational.²³

The monetary authority was entirely subject to the periodic plans, in effect relegating the money creation privilege to the central planners. High-powered money was financing the investments and operational capital of state-owned enterprises, and the needs of the wage bill. Loans and mortgages were issued by the National Savings Bank and the Saving Cooperatives (*Takarékszövetkezet*), two financial institutions subject to the monetary authority. All interest rates were centrally regulated. A practically unchanged nominal interest rate with suppressed inflation resulted in

²¹See Cukor (1990), p. 9 and Héthy (1990).

²²Among others, see Boote and Somogyi (1991), p. 18, and Éltető and Láng (1971), pp. 303-314.

²³In all socialist countries, an informal sector was operational in varying degrees; see Grossman (1977) for an outline. Productive assets, however, were not traded in the informal sector, and capital gains were outlawed.

negative real interest rates for several years.

Owner-occupied housing was the most important real asset. However, neither rental income nor capital gains on these real assets was part of household income. In particular, during the entire socialist period, households retained limited and non-transferable occupancy rights to residences. The rental and secondary property markets were non-existent. Quotas to ownership and limited transferability of the property rights to houses made it impossible for such a secondary market to develop. As a result, household portfolios were elementary, containing mainly cash deposits and savings.²⁴ Property rights to bank deposits were not secure.

Any capital income will have to be imputed based on assumptions whose validity is impossible to verify. Nevertheless, we provide an upper bound estimate of possible capital income in Figure (9). We do so by imputing an upper limit on capital income based on the distribution of capital income to the top percentiles in 1992, on the wake of the opening up of secondary financial markets after the transition. Capital income was negligible among the top 1% compared to the era before and after socialism.

3.3 Transition to Free Markets, 1992-2008

Post-transition, Hungary enters a rapid process of liberalising the labour market, distributing property rights to capital through privatisation, and opening up markets in productive assets and final goods. A vast assemblage of a vintage capital stock was privatised. This process started in Hungary earlier and was completed more rapidly than the rest of the countries of Eastern Europe. In 1992, one-third of the firms were privately owned.²⁵

The shock during the years of the transition into the market economy resulted in a drastic decrease in per capita output. In recent years including the financial crises years the average growth rate was of 1.8% (1992-2010).

A property restitution program was also implemented, giving back property rights on real assets that were expropriated since 1939 including the inter-war, pre-communist and communist regimes to the original owners or their descendants. The process was completed by giving partial compensation paid in freely tradeable coupons that could be used to bid in auctions for state property; Bornstein (1997), pp. 325-326.

Markets for capital started to operate, and investment opportunities emerged. Income shares of both capital and labour increased in tandem. Immediately after

²⁴See Portes and Winter (1978), and Ábel and Székely (1992).

²⁵The mode of privatisation evolved from management buyouts to an orderly, regulated process via competitive tenders; see Brown et al. (2006), p. 71.

the transition the top 0.1% share tripled and the top 1% doubled, while the next percentiles increased less markedly (P95-99 by 65%, P90-95 by 50%). The top 1% share increased much faster than the following percentiles: in 2008 the top 1% shares were still below the level seen in 1940, while the income share of the next four percentile surpassed it.

There is an apparent increasing trend in the recent top income shares as displayed in Figure (3) and Figure (7). A peak in top shares in 1999 is followed by some stagnation years and increase again from 2005 onwards. To be able to detect the driving forces behind the movement of the top income shares, we estimated the decomposition of the top shares displayed in Figure (8). Capital income shares followed clearly the market movements with significant drops in realised financial gains during 1997-1998 and 2002, when Hungary was severely hit by the financial crises originating from the Asian stock market, and by global equity market downturn. There is an increased share of realised real asset gains since the mid-90's with a drop in 2007, following the real estate boom and bust of the housing bubble, associated with decreased foreign investment in the property market. It is also apparent from our estimates that there was a significant drop in business income shares after 2002 as a result of drop in business activities among the top income recipients.²⁶

3.4 External Validity

How far did Socialism manage to compress the income distribution compared to other countries? And how quickly the shares adjusted after the transition into the market economy? We address these questions by comparing the Hungarian top 1% shares to those of other countries in Figure (10) below. Inter-war Hungarian top income shares were as high as the shares of the Western European core. Hungary converted to a Soviet satellite at a time when Europe is undergoing a massive reconstruction stage, with high public investment and the conception of the modern European welfare state. Top income shares estimates of Nordic countries cluster well above what Hungary exhibits after World War II when most of the countries experience a compression of top income shares: socialism brought a compression of top income inequality twice as much, and continued to keep low during the next four decades. It is also apparent that immediately after the transition to the market economy, the Hungarian top income shares rapidly adjusted, and continued to increase.

Comparisons with China and India offer external validity in our estimates. In

²⁶The drop in business income is unlikely to be due to simple reorganization of tax labels as only one main item was excluded from business income after 1995, but the decrease started many years later in 2001.

particular, China exhibits almost identical top income inequality at the beginning of the Deng Xiaoping reforms in the early 80s, albeit with dissimilar trends.²⁷

4 The Capital Share

Which segment of the income distribution benefited the most during the socialist period? After the transition the significance of capital component including realised capital gains at the very top of the income distribution quickly recovered in Hungary, rapidly approaching levels of the inter-war period. Those at the top 1% and top 0.1% received respectively more than 25% and 50% of their income from capital income during the years preceding the recent financial crises. Meanwhile, the lower fractiles received much smaller shares of their income from capital. In just two decades the significance of capital income component at the very top of the distribution became important, reaching comparable levels even to the USA, a country with high capital income concentration.²⁸

The factor decomposition of earners at the top 1% is displayed in Figure (5). It is clear from the income decomposition that the capital income component was a strong drive behind the surge in the top income shares after the transition to the market economy. During the inter-war period, top income shares are high, and they come from large capital structures and land, in agreement with the rest of the Western European experience at that time. During socialism, the top income shares are solely composed of labour income since profits accrue to the State. After the transition, income shares of both capital and labour increase in tandem, as secondary capital markets open up and labour services are traded in a decentralised economy.

Bengtsson and Waldenström (2015) are concerned with the relationship between capital shares and personal income inequality. Our finding is in line with the statement that both capital and labour income factors play a significant role in increasing income inequality when market forces determine endowment valuations. In particular, we depict a situation where market forces are of the first-order, and where the adjustment witnessed after the transition is due to the opening up of markets for factor services. Figure (12) displays that the capital share of GDP rapidly reached

²⁷Alvaredo et al. (2013) highlight two trends in the long run top income shares; the English speaking countries following a U-shape, and the continental European countries and Japan displaying an L-shape. The recent Hungarian top income shares show an increasing trend similar to the U-shaped countries, but the level of the shares is akin to the L-shaped countries.

²⁸The capital income component including realised gains for the top 1% and 0.1% shares in Hungary was 32.99% and 52.83% in 2006, respectively, while it amounted to 30.1% and 37.2% in the USA in that year (calculations based on Piketty and Saez (2006)).

a remarkably constant level, also illustrating that the remuneration proportion of capital in the total gross income increased substantially.

What, if anything, can the evidence compiled here say about the classical political economy problem of factor share distribution? After the transition to a market economy, self-employment and entrepreneurship started to play a role.²⁹ The share level adjusts during the six years of transition, increasing from the level on which it is clustered during the years we have data on socialism, and staying on a remarkably stable level after that.

Piketty (2014) argues that regulations on the remuneration of capital have dampened the increase in the capital share after World War II in market economies. We indeed find that this is true, in an extreme case where these regulations are far more consequential, namely the shut-down of secondary capital markets and the delegation of the investment decision to the state. Eichengreen (1994) highlights the effects of labour market institutions on the functional distribution, and in particular the degree of unionisation and the bargaining power of unions. Karabarbounis and Neiman (2014) attribute labour share movements to shocks that influence the rental rate of capital. The decline in the relative price of investment goods, often attributed to advances in technology, will substitute labour for capital and therefore increase its relative part on total income. In our case, the opening up of the economy to domestic and international markets was an indisputable factor in driving factor shares.

After the transition to a market economy, changes in fixed capital formation have been remarkable. An assemblage of vintage capital structures was privatised. On the wake of the recent financial crisis, the country was a net debtor in foreign direct investment of about 62% of GDP in 2009.³⁰ The transition from state-owned to privately owned capital also marked the transition from a single owner to multiple ones, the domestic and international secondary capital markets, as well as to global finance.

²⁹Gollin (2002) highlights the measurement issues that arise in countries where self-employment is significant. Our estimates of the capital share assume a ratio of labour and capital income in the mixed-income as that in the whole national income excluding mixed income. Details on the measurement methodology are in the Appendix.

³⁰Updated and extended version of dataset constructed by Lane and Milesi-Ferreti (2007).

5 Institutions and Incentives

5.1 Incentives

Decisions on human capital accumulation and incentives for effort are determined by the dynamics of the wage distribution. In turn, the dynamics of the wage distribution is affected by labor market imperfections, notably the technology and the market structure in the production side, conditions that induce the observed wage distribution as an outcome. These aggregate imperfections are compounded with the imperfections in capital markets, and in particular those that affect credit and borrowing constraints. When factor and product markets are perfect, and abstracting from issues of agency and imperfect information, the wage distribution will reflect differences in marginal productivity, and hence the exercise of effort in human capital investment and training.

Earned income is a major part of our top income share estimates during the periods of free markets, and the essential part of the estimates during the socialist period. Hamermesh and Portes (1972) refer to the market structure on the side of supply as being "close to the textbook level case", notably the "trade unions' insignificant effect on wages." (p. 241). With an unfettered labor supply side, and given the centralized structure of production in a socialist economy, the wage and hence the income distribution were, by and large, set by the state monopsony of labor. In order to investigate the extent to which the institutional arrangement of socialism has affected incentives for effort, we estimate the relative price of skills over the entire period of our top income shares estimates, from the 1920s to 2008.

To the interest of compiling homogeneous estimates across periods, we define the skill premium according to the availability of aggregate labor market statistics. We construct the ratio of the average wage of white collar workers over the average wage of blue collar workers. The dynamics of the skill premium closely track those of the earned income part of our top income shares estimates, as is shown in Figure (14). Both series have a negative overall downward trend during the most of the socialist period. The skill premium series displays an upward trend from the early 1980's that is followed by an increase in the top shares. Both series continue to increase around this trend after the transition to the market economy.

In our setup, the swings in top income shares during socialism reflect wage differentials between skilled and unskilled workers, as a result of a series of gradual, productivity-linked remuneration reforms. Changes in these differentials were obtained as a result of a non-transparent, political bargaining process within the Communist Party apparatus.

The introduction of partial reforms during socialism coincides with jumps in the skill premium and top labor income shares. According to Berend (1990), the New Economic Mechanism of 1968 introduced meritocratic elements that favoured those with skills and expertise, while it attacked the vested interests of the rank-and-file Communist Party members at the state or managerial apparatus, whose power was in jeopardy. Those against such productivity-linked wage reforms and profit-sharing schemes put forward arguments such as the defence of the “values of socialism” and considerations of the “workers’ interest.” Blue-collar workers were also against the reform as they claimed it shifted the income distribution unfavourably for them, essentially resisting to an increase in wage dispersion. Since blue-collar workers were the majority of the labour force, and with a political system dependent on the subsistence of the labour base, the earnings difference of skilled and unskilled workers were heavily bargained in the internal political process of the Party. The results of partial reforms in the skill premium and the income shares dynamics were short-lived at every introduction, as raises of wages at the bottom outperformed those at the top. This political process persisted up until the end of the 1970s. The persistent decrease in the skill premium over this period seems is directly linked to the decrease in the top share after the jump in 1970.³¹

As part of the New Economic Mechanism the Central Planning Bureau gave the right to state-owned enterprises to exploit some margins of compensation to workers according to productivity, essentially redistributing a fraction of any potential surplus to the middle and top management. Though this wage reform was short-lived, we see a parallel increase both at the skill premium and at the top shares exactly after the introduction of the reform in 1968. The reform was reversed almost immediately, followed by decreasing skill premium and top income shares.

The process of a gradual decrease in the skill premium is reversed in the end of the 1970s. During that time a significant reform took place, with wage and bonus settings of executives were delegated to enterprise level. This policy shift, that marks a first step to complete liberalisation of the labour market, led to a reversal of the decrease of the relative price of skills. The increase in the top shares from the mid-80’s coincides with this delegation of wages and bonuses to the enterprise level.³² This remuneration scheme favoured skilled workers over unskilled ones, as the productivity signal was more accurately observed on the enterprise level.

After the transition, evidence of skill-biased technical change is prevalent, although interrupted by labour market regulations and foreign exchange crises during the mid-2000s. Our findings are in line with Kézdi (2002) who documents a steady in-

³¹Berend (1990), p. 202, Mieczkowski (1975), pp. 222-223, Flakierski (1986), pp. 54-55 Table 4.

³²Köllő (2001) gives a rough outline of this reform.

crease in the skill premium for the years 1986-1995 as a consequence of inter-sectoral skill reallocation. Kézdi (2002) documents job loss for unskilled labor, proxied by years of schooling, and an even higher skill premium growth for the second half of the '90s with skill biased technological change at most sectors. Moreover, Brown et al. (2006) provide evidence of increased productivity differentials of labour operating in foreign-managed companies over those that are domestically held after privatizations.

5.2 Institutions

Political institutions that affect redistributive policies are endogenous to inequality. Acemoglu and Robinson (2015) summarise this approach, according to which the technology evolves endogenously as a result of economic and political institutions. Institutions, in turn, shape the technology and the labour market, on which the relative price of skills and the supply of skilled labour is formed. These labour market conditions are of relevance to the subsequent evolution of top income shares.

To illustrate this mechanism, Acemoglu and Robinson (2015) use as a case study the ratio of white to black wages compiled by Leibbrandt et al. (2010) during the 20th century in South Africa, which is a *de facto* proxy for the skill premium. They argue that the disconnect between an increasing skill premium and the rapid fall of inequality at the top in South Africa is explained by the non-market institution of apartheid, itself a result of a political process relating to the level of resource endowments and its distribution in the beginning of the 20th century. In the context of our study, this would have meant that the documented high inequality in the interwar years, stemming from a skewed distribution of capital income that favors the top percentiles, would have brought about the non-market institutional setup of socialism and its extreme capital taxation and redistributive policies.

Our paper is immune to this critique. The planned economy period we investigate is a quasi-experiment of a non-market institution that is exogenously imposed and sustained. Socialism did not arise as a result of a political bargaining process that is endogenous, that is, as a result of a heightened income inequality during the inter-war period.

Indeed, in post World War II Hungary, large parts of the population and especially small landholders, were represented by the centre-left Smallholders Party (*Független Kisgazdapárt*) that won 57% of the vote in the elections of 1945, against the 17% of the Communist Party that had a stalinist disposition. The democratic forces were gradually removed from office after a series of coups that came to be known as “salami tactics.” From then on, *de facto* political power was held by the Communist

Party. The Party was more of a Soviet-backed puppet organisation rather than a “grassroots” movement originating in the revolutionary movements of the inter-war period.

After World War I, the short-lived bolshevik revolution of Béla Kun was held responsible for exacerbating hyperinflation forces that ensued as a result of seignorage of the war expenses (Sargent (1982)). Berend and Tibor (2005) argue that the left-leaning forces were nascent during the interwar period, which may have fostered a certain kind of retaliatory disposition after the end of World War II. However, the electoral outcome of 1945 for the Communist Party precludes the possibility of such political and ideological path-dependence. While the October Revolution may have been the result, among others, of an extreme form of deprivation of the majority of the population in Tsarist Russia, socialism in Hungary was exogenously and forcefully constructed rather than inspired. Therefore, socialist redistributive policies that affected the income distribution dynamics were exogenous to prior conditions on inequality.

In free markets, fiscal instruments operate on the distribution of final outcomes and subsequent top income share dynamics through multiple, market-related latent channels. The effect of a tax on capital (structures or equipment) will affect the labour market and the wage distribution in ways that operate through production elasticities, aggregate investment, as well as the effective supply of labour. In an incomplete markets setup, and apart from preference heterogeneity, the effects will depend on the distribution of assets, skills, and the opportunities offered by the market. It is difficult to obtain clear results that will yield transparent economic mechanisms, or even identification of the channels on which a certain tax reform operates to the final income distribution.

An interpretation of the socialist experience in Hungary from 1949 to 1991 is one that is tantamount to the confiscation of private capital, an effective tax on capital of close to 100%. The fusion of the party and the government resulted in expropriating the entire productive capital stock. Corporate governance of state-owned enterprises was entirely under the direct control of the Party establishment, who operated the state apparatus. Decisions on prices and quantities reflected the political economy of socialism, rather than the workings of a free or regulated market. Moreover, the state operated as a monopsony of labour, and entrepreneurship was abolished. Secondary capital and goods markets were non-existent. All of the latent mechanisms alluded to above were shut-down, by an institutional setting that was exogenously imposed.

6 Conclusion

In this study, we used individual tax statistics to construct top income share series for the periods prior the Second World War, and after the transition to a market economy. We complemented the series with available earning censuses in the socialised sector for the planned economy period.

We have exploited the quasi-natural experiment of partial liberalization of wage setting during the socialist era to study questions such as the effects of market forces on the top income shares; how both the incidence of socialism, as well as the post-socialist transition have shaped the income distribution at the very top; and how quickly the shares returned to Western-European levels after the transition into the market economy.

During the studied period between 1914 and 2008 the Hungarian top income share series followed a U-shape. The top shares were as high as in Western countries (USA, UK, France) and came from large capital structures and land during the first decades of our time frame. After the Second World War, when most Western countries experienced a compression in their top shares, the Hungarian shares decreased twice as much and remained constantly low during the four decades of socialism. After the transition to a market economy we observed a rapid top income share adjustment: in less than a decade top income shares increased to levels prevalent in western countries, and the increase was due to a surge both in capital and labour income factors.

The constructed top share estimate series suggest that both capital income via the allocation of capital holdings from the state to private owners and securing property rights; and labour income via wage-setting decentralization favoring the remuneration of skills played a significant role at increasing income inequality during market economies. Investigating whether institutions that promote market efficiency have a more profound effect than secular movements of top income shares can be more fruitful in understanding income disparities.

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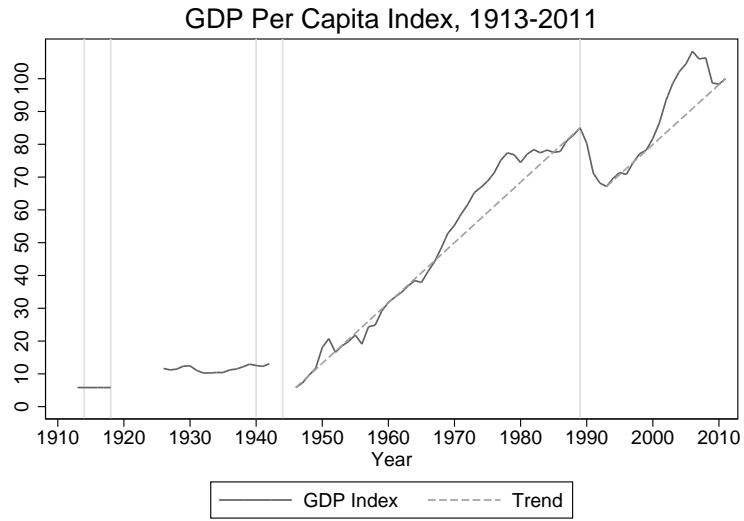
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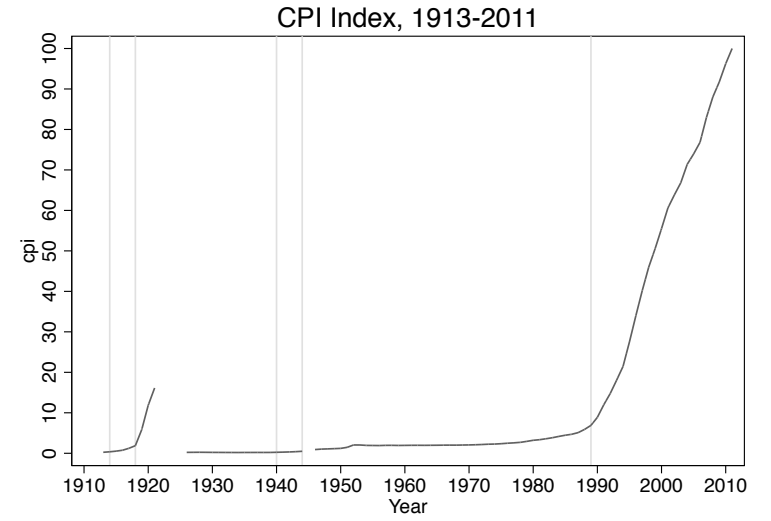
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(a)



(b)

Figure 1: (a) Real GDP per Capita Index (2011=100); Trendlines refer to periods 1946-1989 and 1993-2011. (b) CPI index (2011=100). Methodology and historical data sources are provided in the Appendix.

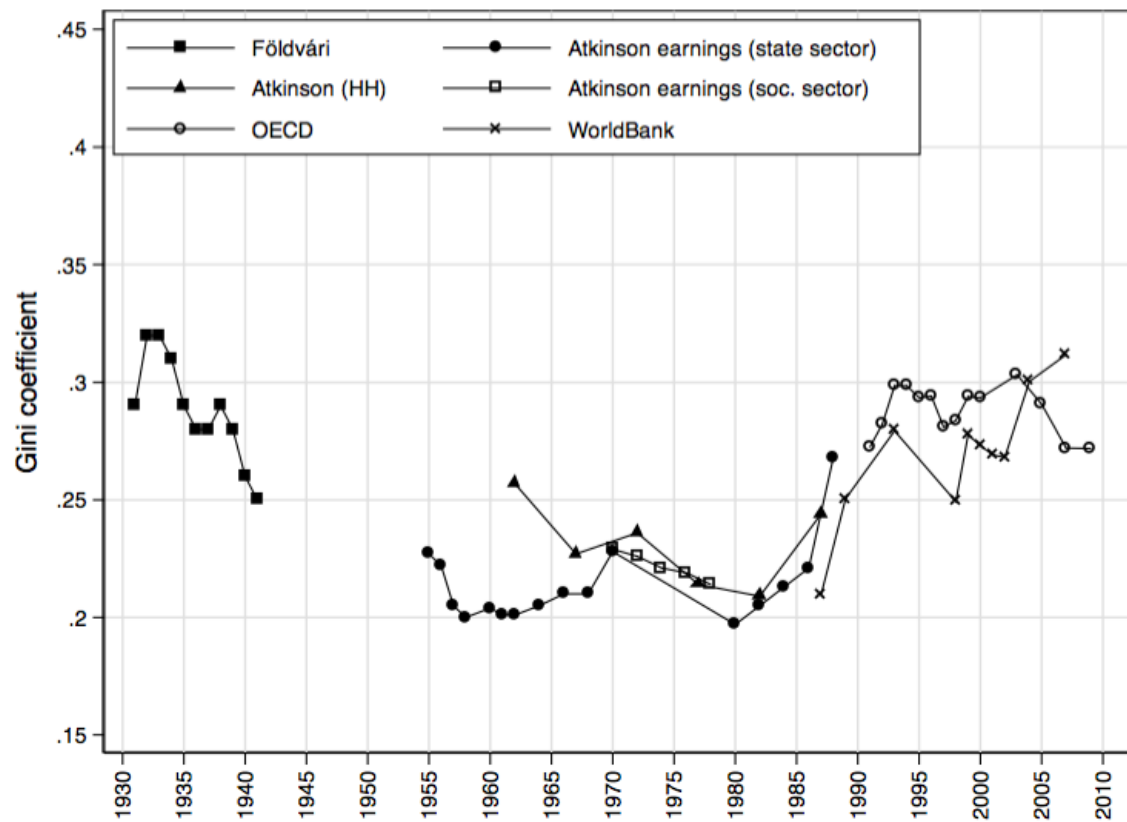


Figure 2: Gini coefficients, 1930-2010

Source:1928-1941: Földvári (2009) computes Gini estimates based on official income tax statistics, and by assuming Pareto distribution. 1951-1988: Atkinson and Micklewright (1992) calculates Gini coefficients based on per capita household income (HH), and employee earnings both at the state and socialist sectors. 1987-2009: OECD publishes per capita Gini series based on the Tárki Household Monitor survey. 1987-2007: World Bank publishes Gini series based on the household surveys of the Hungarian Statistical Office. The unit of analyses is all workers at the state or socialist sectors for the series based on the employee earning censuses, and per capita household income for all other series.

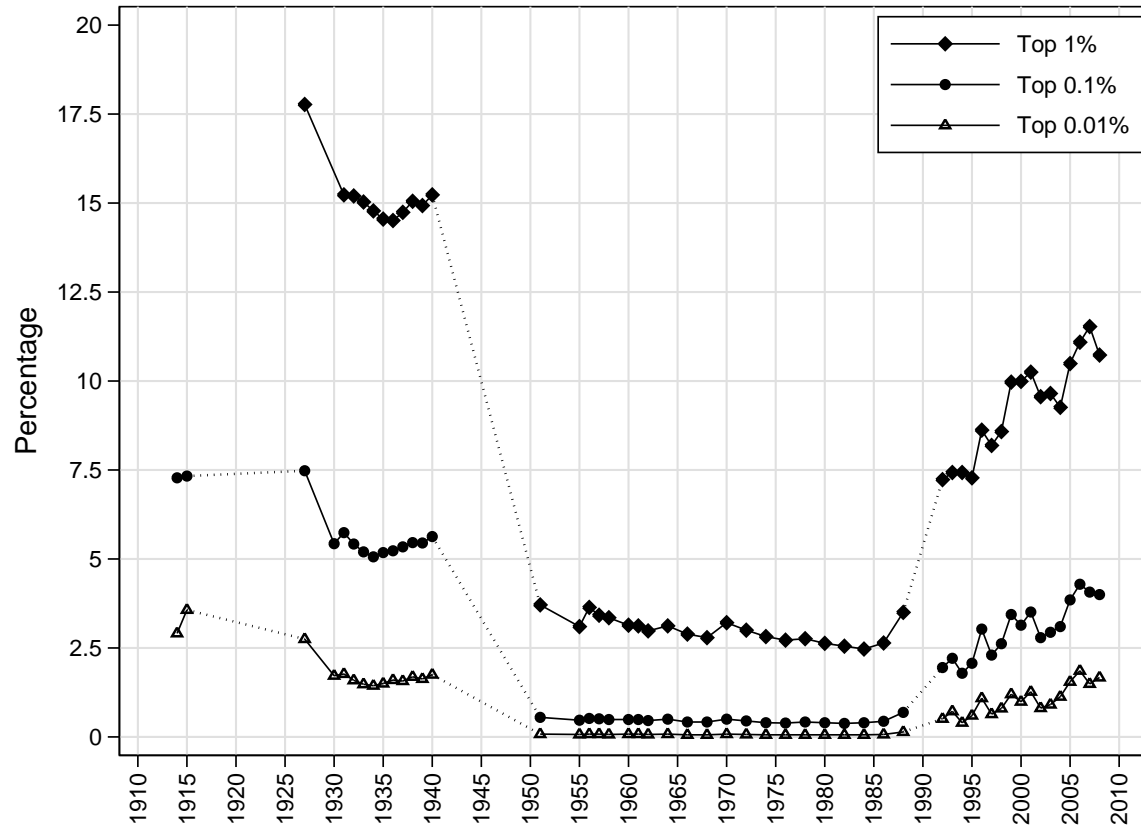


Figure 3: Percentage of total income received by each of the top groups on the income distribution, 1914-2008.

Notes: Income is defined before taxes; capital gains are excluded in years 1914-1940 and included in years 1992-2008. For the period 1951-1988, income is defined as wages and salaries of state-owned enterprises.



Figure 4: Decomposition of the top 0.1% income share, 1914-2008

Notes: Capital is defined as income from capital assets, land and buildings. For the period 1992-2008 realized capital gains are included. Labor income is defined as wages and salaries and other employment income. Business income is mixed income. In 1914 the decomposition of top 0.1 income share is assumed to be the same as the decomposition of top 0.14, and in 1915 as the top 0.2 (see Appendix 2.2). See the Appendix for a comprehensive definition of income.

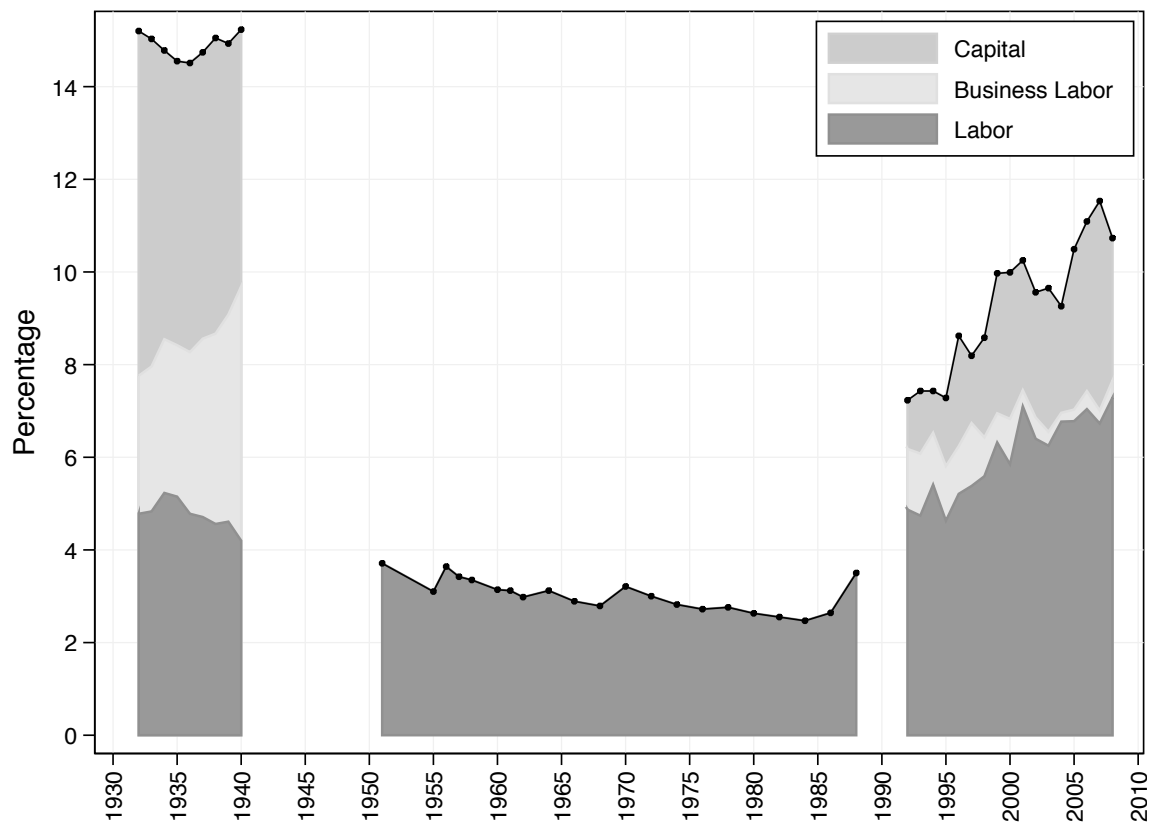


Figure 5: Income source decomposition of the top 1% income share, 1932-2008

Notes: Capital income is defined as income from financial assets (interest, dividends), land and buildings and for 1992-2008 including capital gains. Labor income includes wages and salaries and other employment income. Business income is mixed income. See the Appendix for the precise definition of income.

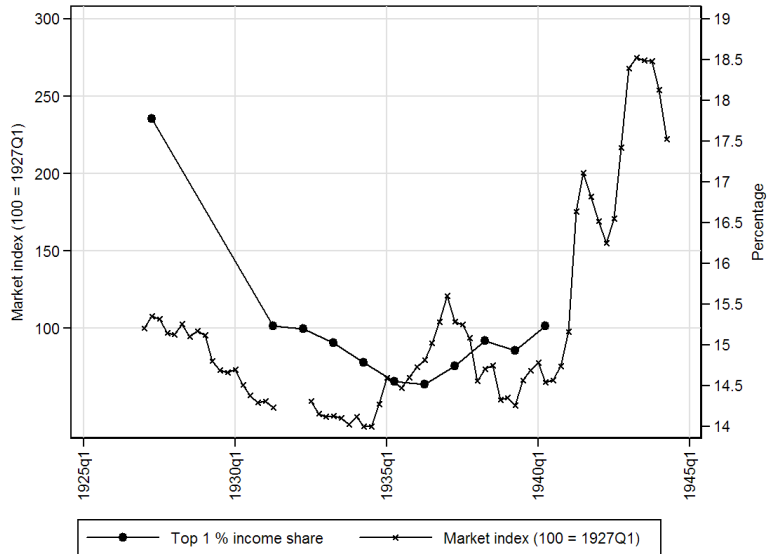
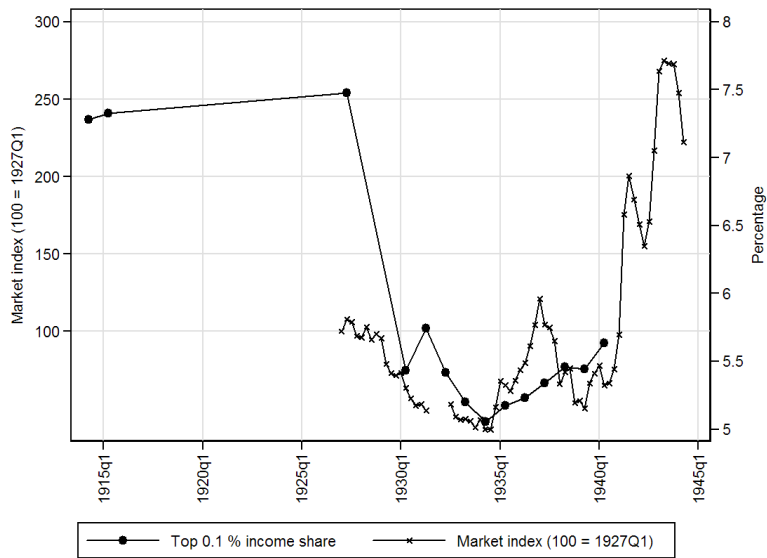


Figure 6: Quarterly market index of the Budapest stock exchange, 1927-1945, and top 1 and 0.1 percent income shares, 1914-1940. (Source: own computations, League of Nations Statistical Yearbook (various issues)).

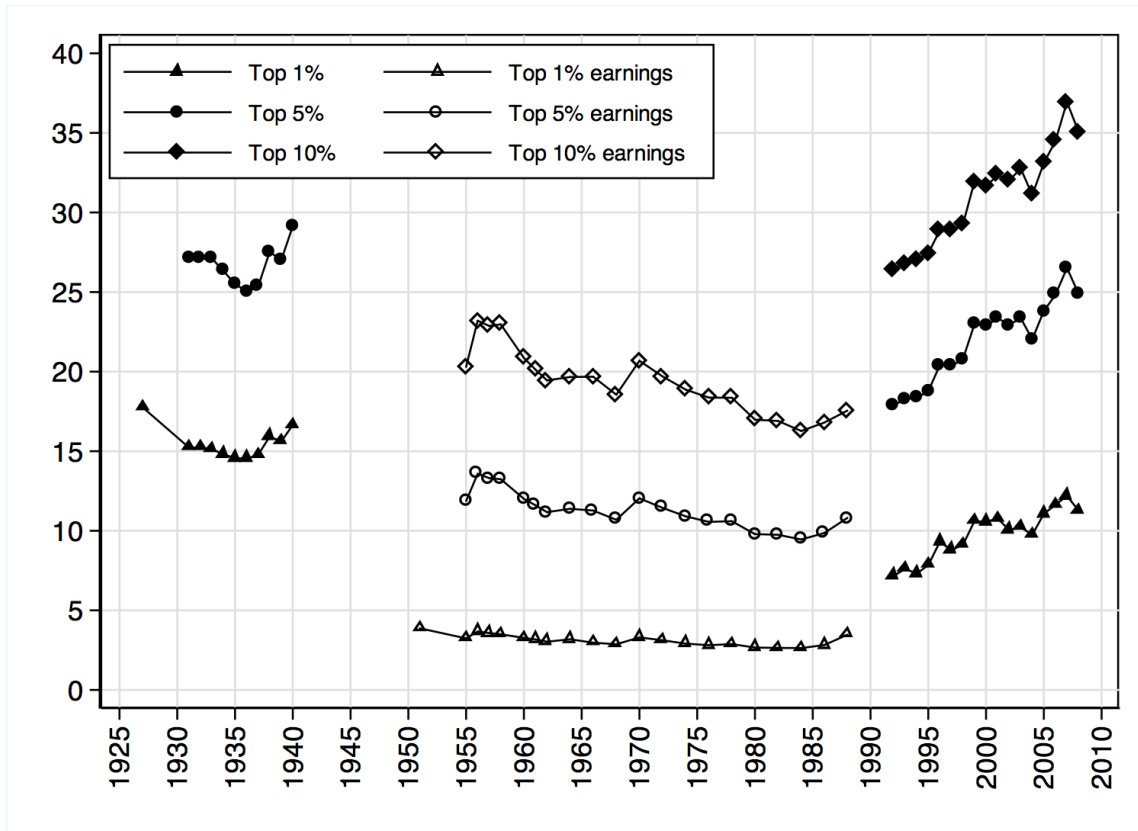


Figure 7: Top 1, 5 and 10 percent income shares in Hungary, 1914-2008

Note: Percentage of total income received by each of the top groups. Income is defined before taxes and excludes capital gains for 1914-1940, and includes capital gains for 1992-2008. For 1951-1988 income is based on earning tables. For 1914-1988 the fractiles are defined by total income excluding realized capital gains, and for 1992-2008 including realized capital gains also. (For details see Appendix section 2, 3 and 6.)

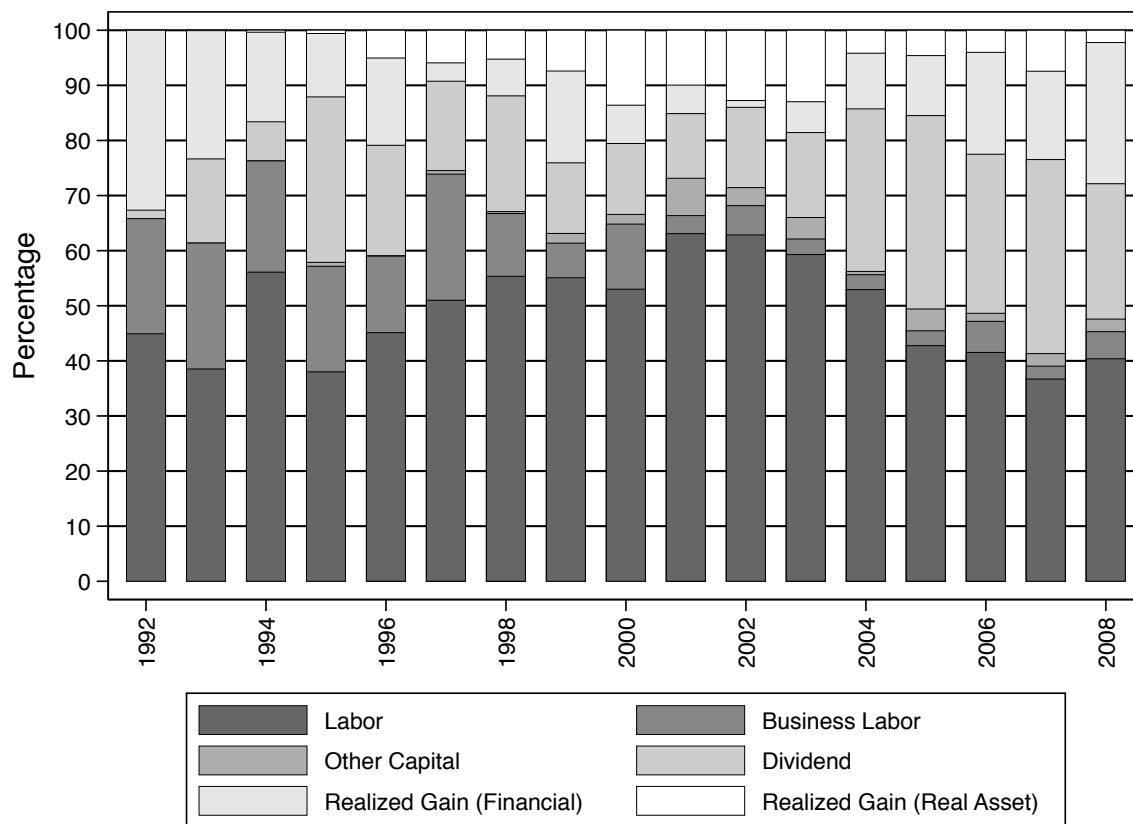


Figure 8: Decomposition of the top 0.1 percent income share, 1992-2008

Note: Income decomposition of total income received by the top 0.1 percent. Labor: wages and salaries, bonus, in kind benefit, stock option, and employee stock, taxable cost compensations, pension, unemployment and maternity benefit, scholarship. Business labor: self-employed and partnership income, liberal profession, agricultural income. Dividend: general dividends, and dividends received through partnership. Real asset capital gain: realized gain from selling property, movable goods, rights. Financial capital gain: realized gain from selling financial assets. Other capital: any other taxable capital income such as rent, annuities and interest not taxed at the source. See Table 12 for detailed income categories.

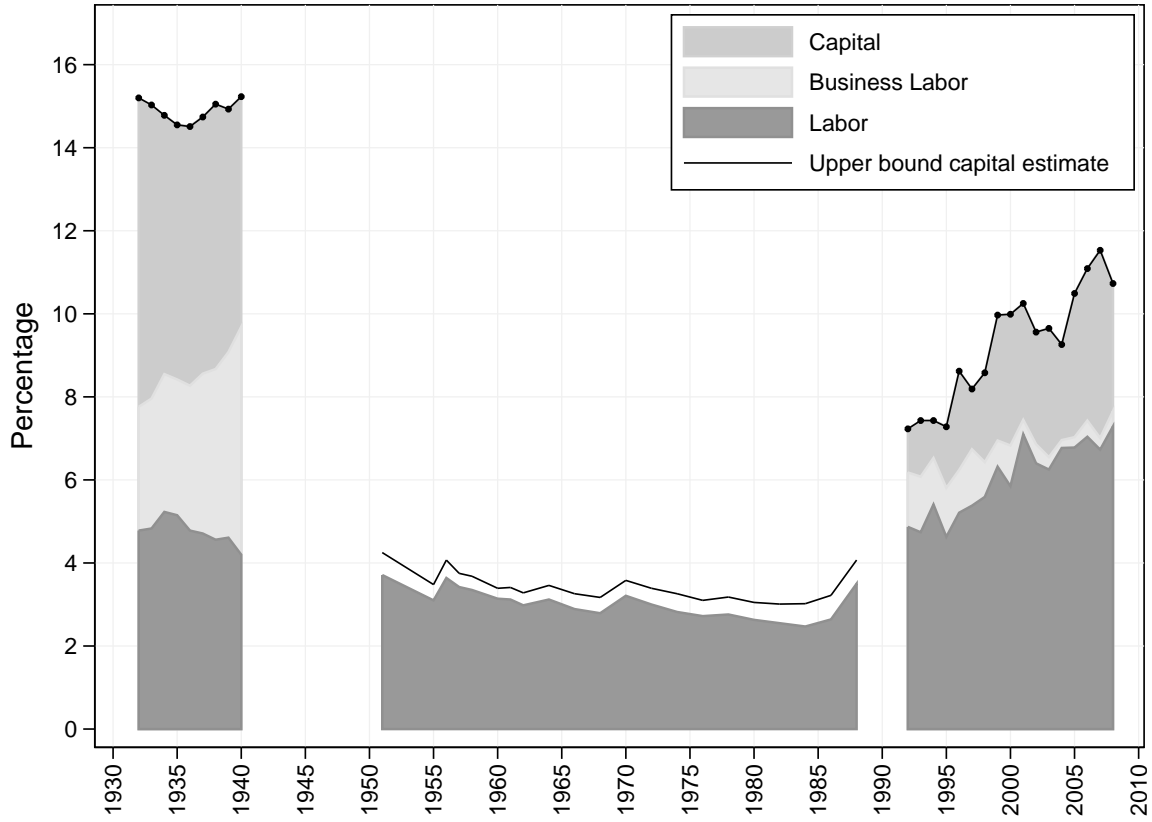


Figure 9: Imputed upper bound on capital income, 1951-1992.

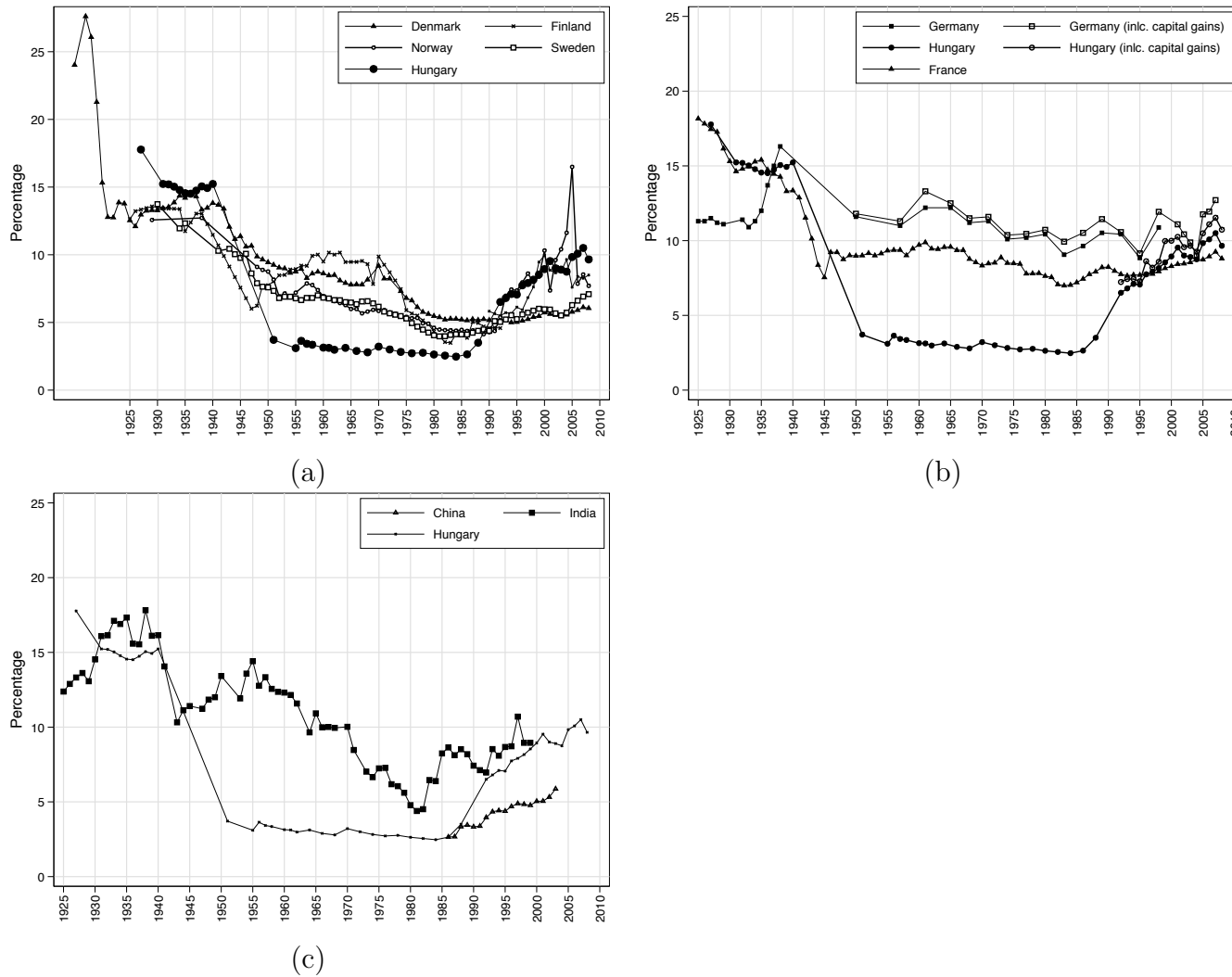


Figure 10: Top 1% income shares, 1925-2008.

Note: For Hungary the shares are reported with and without realized capital gains for 1992-2008. Source: World Top Incomes Database and our computations.

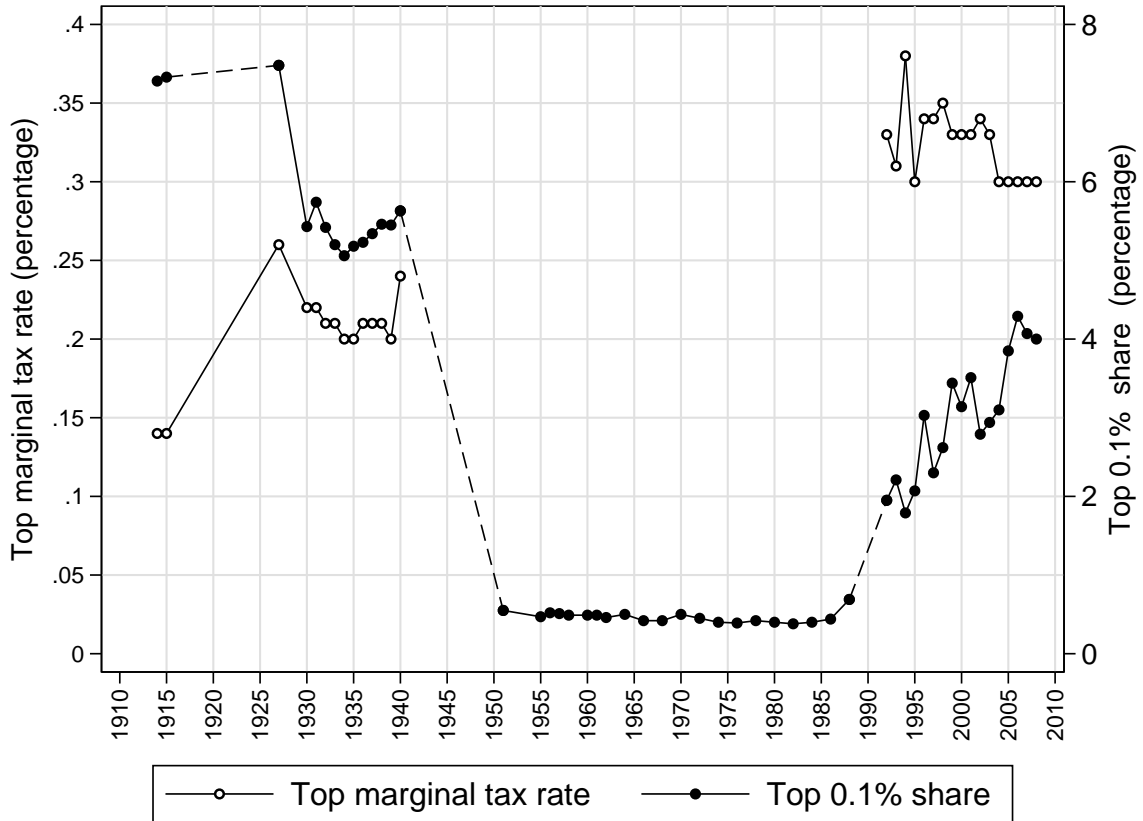


Figure 11: Top 0.1% income share and top marginal income tax rate, 1914-2008.

Notes: See the Appendix for construction of the top marginal tax rates. The top 1% income share series for 1927-1940 excludes capital gains, for 1992-2008 it includes capital gains, and for 1951-1988 it is based on earning tables. Source: Authors' computation using tax returns data and tax return law.

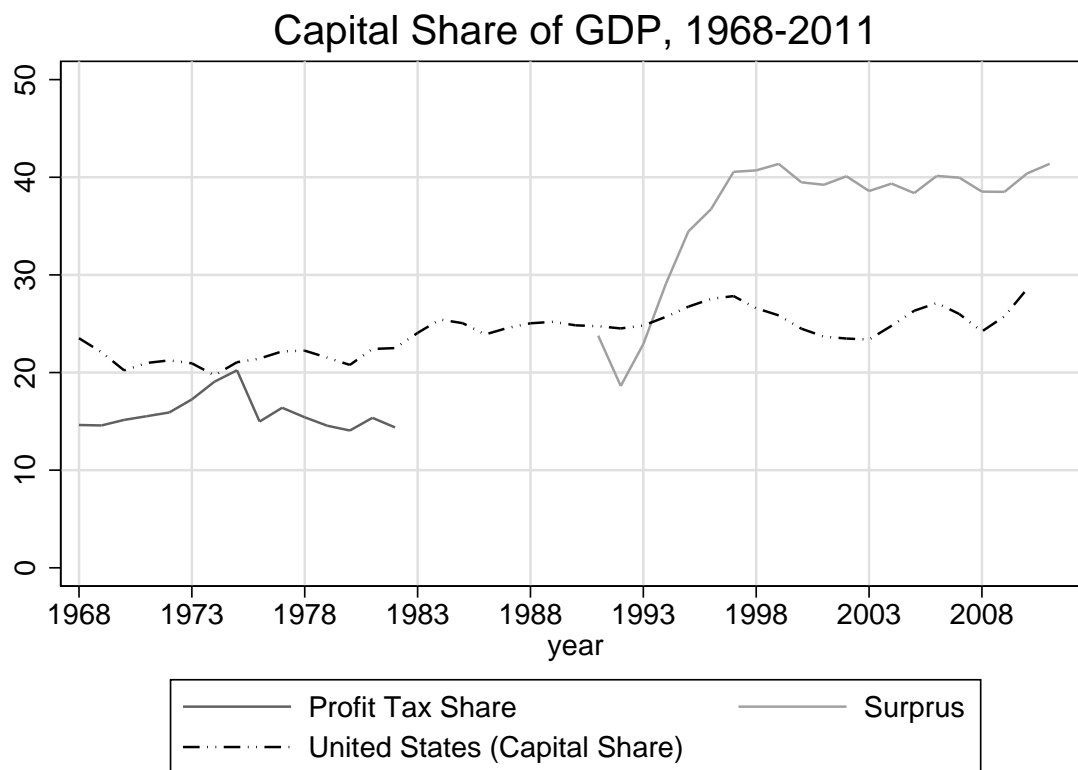


Figure 12: Capital Share, 1968-2011

Notes: Proxies of capital income share of GDP. For the period 1991-2011 the series report the capital factor share (gross operating surplus of households and firms). For 1968-1982 the series report the net income the state extracted as the owner from enterprises, i.e. profit and income tax. An alternative series includes the net of production subsidies and production tax, and is detailed in the Appendix. Sources and definition of capital share for the United States are in Bengtsson and Waldenström (2015).

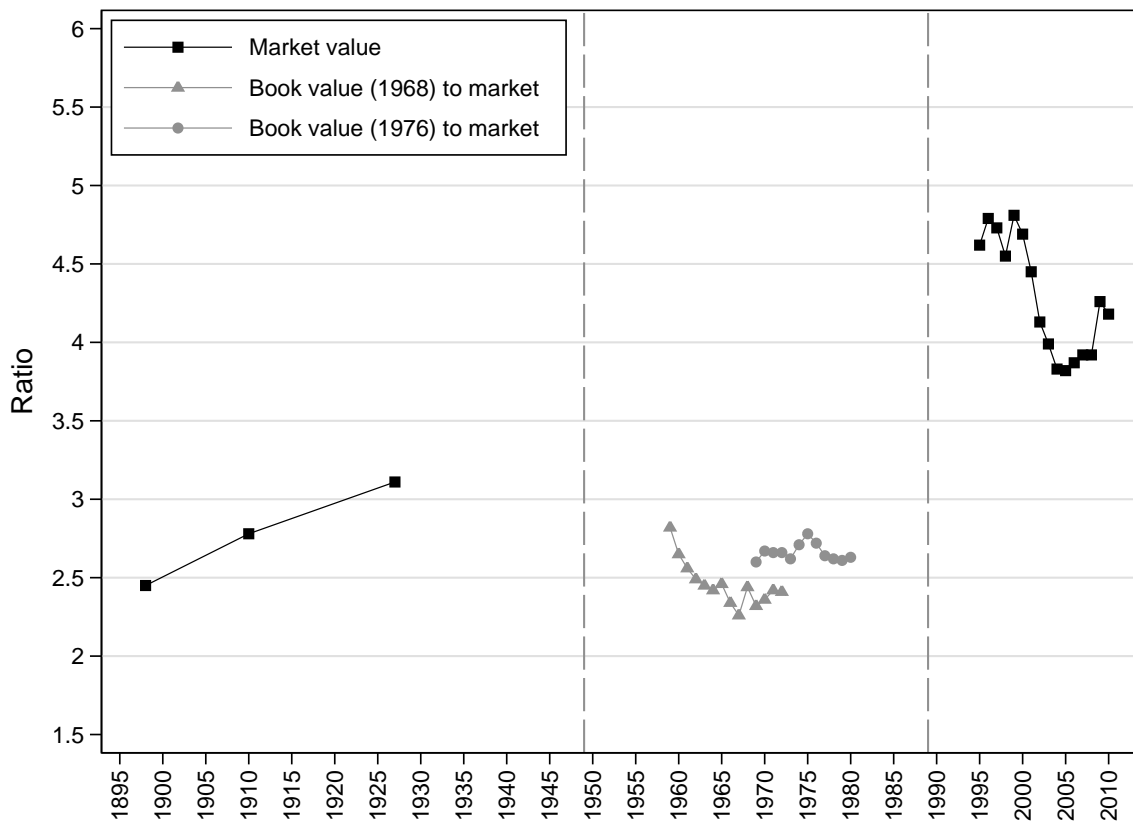


Figure 13: Capital to GDP ratios

Notes: Estimates of fixed capital to GDP, net of depreciation, based on two different methodologies and on two different sources of data. For 1995-2010 assets are calculated at market value. For 1959-1980 half of the assets such as dwellings, roads, bridges, dams, private sector assets is valued at replacement value, while the other half is valued at book value (1968 prices, and 1976 prices). Sources and measurement methodologies are detailed in the Appendix.

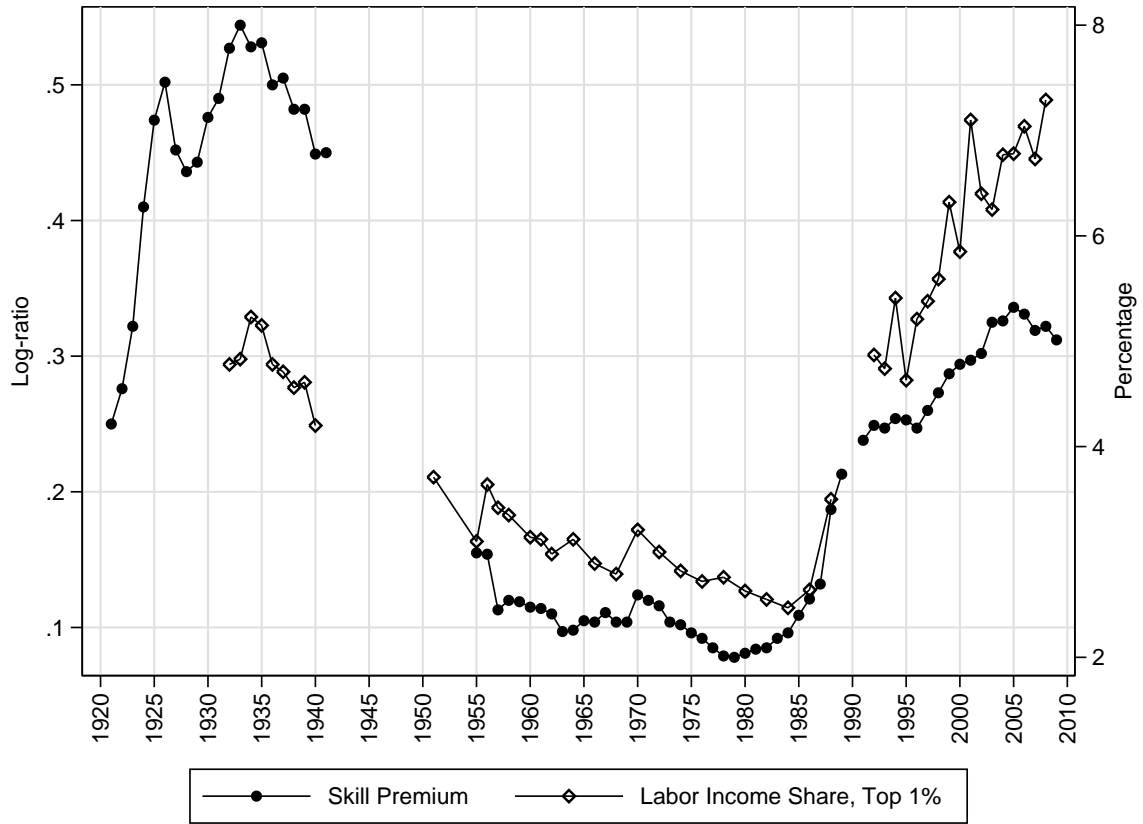


Figure 14: Top 1% labor share and the skill premium, 1920-2008.

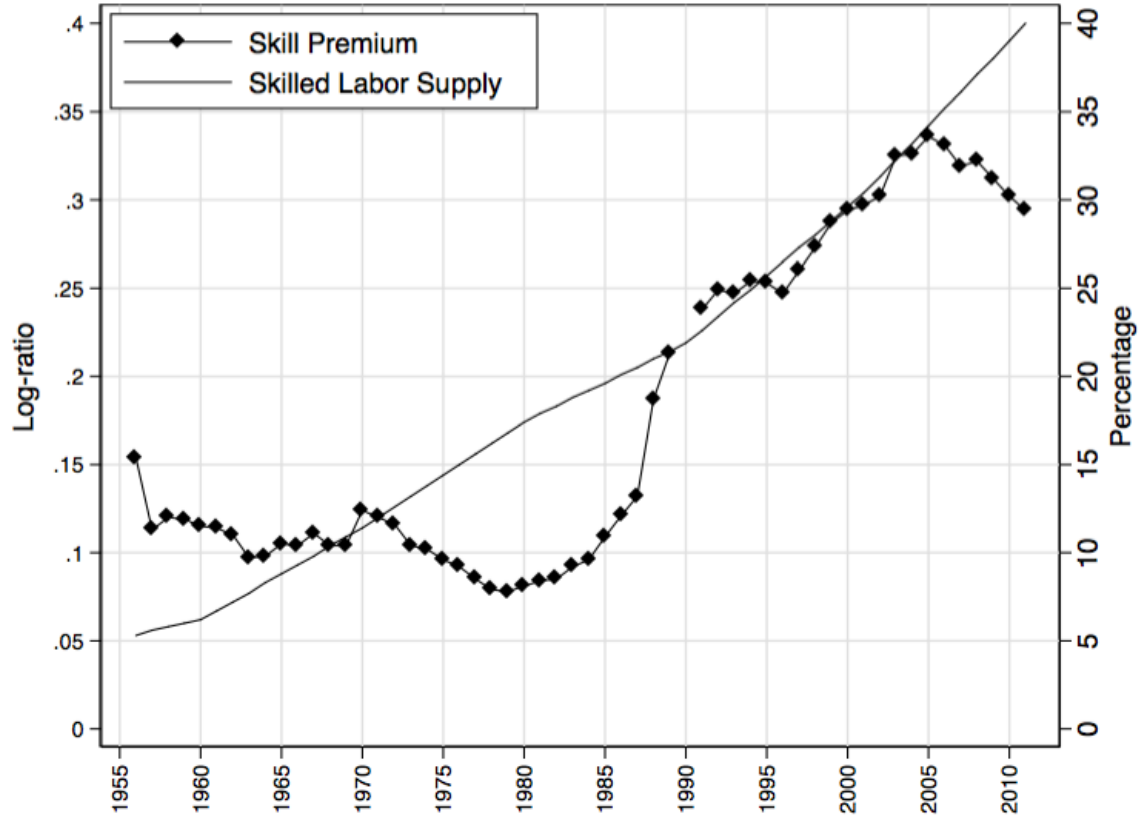


Figure 15: Skilled Labor Supply and Skill Premium, 1955-2011

Notes: Skilled labor supply is the percentage of the labor force with high school and university degrees, and skill premium is the ratio of log average white-collar worker wage over log average blue-collar worker wage. (See Appendix 7 for details.)