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The role of capital income in Hungarian income distribution from 2007 to 2021

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Abstract

Capital income represents a significant and growing share of total income at the aggregate level in most countries. However, the link between capital income and overall income inequality is not clear, as it is influenced by the distribution of capital income among individuals and its overlap with labour income. Using administrative personal income tax data, we explore the characteristics of taxable capital income in Hungary for the period from 2007 to 2021 and assess its role in overall income inequality. Capital income, which accounted for 8 to 12 per cent of total taxable income in the period under review, was distributed among just 5 to 7 per cent of taxpayers. The highest income percentile obtained 74 per cent of capital income, while the share of the highest income decile exceeded 90 per cent in 2021. Given its concentration at the top of the total income distribution, capital income significantly increased income inequality. By decomposing the change in inequality measured by the Gini index, we show that although the increase in overall income inequality is largely attributable to the growing concentration of labour income, capital income also exerted a major influence during this period. In our simulation, we demonstrate that an increase in the share of capital income within total income leads to a notable increase in inequality.

Keywords: income inequality; capital income; personal income tax; Gini index

1 Introduction

Since the mid-2010s, there has been a notable surge in professional and public interest in the evolution of income inequality and the role of capital income in this process. Although Asia's economic development has reduced global inequality in recent decades (Milanovic, 2022), the empirical evidence points to an increase in within-country disparity (Chancel et al., 2023). Increases in income inequality may have consequences for economic growth (Acemoglu & Robinson, 2015), social mobility (Chetty et al., 2014) and social cohesion (Vergolini, 2011). Some research suggests that increasing inequality is due to an increasing share of capital income, which tends to be more concentrated than labour income (for example, Piketty, 2014; Ranaldi, 2021). While the literature generally agrees that capital

income has increased as a share of overall income in recent decades, various explanations have been proposed to elucidate the underlying reasons. According to Piketty (2014), the increase in the capital income share is due to the fact that the return to capital income exceeds economic growth in the long run, resulting in an increase in the capital-labour ratio. Alternative explanations include the globalisation of production, such as the outsourcing of certain production phases (Elsby et al., 2013; Decreuse & Maarek, 2015), the decline in the relative price of capital goods (Karabarbounis & Neiman, 2014) and automation (Acemoglu & Restrepo, 2018). A further explanation is the emergence of 'superstar' firms (Autor et al., 2020) and the consequential rise in average market power and average profit rate in recent decades (De Loecker et al., 2020).

However, an increase in capital income as a share of total income does not necessarily increase overall income inequality. Total income inequality, as measured by the Gini index, is determined by three factors: the share of labour and capital income, the concentration of these two types of income, and the correlation between each type of income and total income. This correlation reflects the degree of overlap between groups of income earners (Schechtman & Yitzhaki, 1999). This is in line with Ranaldi's approach (2022), which highlights that if capital income is concentrated at the top of the income distribution and labour income at the bottom, this leads to a strong positive relationship between functional and personal inequality. The complexity of the relationship may contribute to the conflicting research findings on this topic. While several studies (Bengtsson & Waldenström, 2018; Fräßdorf et al., 2011) have found that an increase in capital income increases income inequality, others (e.g. Francese & Mulas-Granados, 2015) have not found a relationship between the two variables.

Considering this background and based on personal income tax files, we explore the characteristics of personal taxable capital income and its influence on income inequality in Hungary between 2007 and 2021. Our research aims to investigate how the concentration of pre-tax and post-tax capital and labour income and their relationship changed throughout our sample period and how these factors shaped the distribution of total income.

On the one hand, our work can be considered a follow-up to research by Tóth and Ábrahám (1996) and Tóth (1997), which are the earliest papers, to the best of our knowledge, to investigate inequalities in capital income in Hungary based on personal income returns. On the other hand, our work is closely related to a new wave of research published in the second half of the 2010s that focused on income distribution in Central and Eastern European countries using administrative databases, typically based on personal income tax returns. These studies provide comprehensive analyses of the evolution of pre-tax total income inequality in Poland (Bukowsky & Novokmet, 2017), Czechia (Novokmet, 2018), Slovenia (Stanovnik & Verbic, 2014) and Croatia (Kump & Novokmet, 2018). The same approach is applied by Mavridis and Mosberger (2017), who explore changes in Hungarian income distribution covering the period from 1914 to 2008. Our paper contributes to this literature by extending the surveyed period to 2021 and highlighting the role of capital income in the change in income inequality.

Survey-based empirical evidence indicates that income inequality in Hungary started to rise in the early 1980s and rose more rapidly after the transition from the socialist regime to a market economy in the second half of the 1990s (Éltető & Havas, 2009; Tóth

& Szelényi, 2018). Then, evidence based on both administrative and household survey data suggests that income inequality stagnated until roughly the mid-2000s (Kovács, 2011; Mavridis & Mosberger, 2017), and according to some measures, it may have declined (Tóth, 2015). The Great Recession and the introduction of a flat tax system in 2011-2012 have exerted a major influence on income inequality. Microsimulation estimations show that the policy measures that followed the 2008 financial crisis led to a widening of inequality. Based on 2011 data, tax reform was expected to further increase income inequality in the early 2010s (Benczúr et al., 2012; Tóth & Virovácz, 2013). Household survey data also demonstrate an increase in income inequality until 2014 (Tóth & Szelényi, 2018; Huszár, 2022).

Only a few studies were published on the evolution of income distribution in the subsequent period using administrative data, but these tend to concentrate on specific aspects of income distribution. Krekó et al. (2023) focused solely on labour income and pointed out that by 2020, the redistributive effect of personal income tax on income inequality had declined to zero. On the other hand, Svraka (2021) exclusively examined pre-tax incomes and, covering the period from 2012 to 2019 found that the rise in overall pre-tax income inequality was accompanied by a decrease in the concentration of pre-tax labour income. This highlights the increasingly important role that capital income has played in income distribution alongside labour income over the last few decades. This is underlined by the fact that capital income as a share of total income exceeded 7 per cent by the second half of the 1990s and 10 per cent by the turn of the millennium (Kovács, 2011). Furthermore, Mavridis and Mosberger (2017) found that in 2008, the top 0.1 per cent and the top 1 per cent of earners accrued 25 per cent and 50 per cent of capital income, respectively. This clearly demonstrates that by 2008, capital income played an important role in income distribution.

Some of the papers mentioned above used the administrative dataset to investigate the distribution of pre-tax (Svraka, 2019) or post-tax (Krekó et al., 2023) income, while some looked at household survey data to explore post-tax income inequality. Others considered capital income in exploring the evolution of income inequality over time, although only until 2008 (Mavridis & Mosberger, 2017). To the best of our knowledge, our paper is the first to combine all these approaches. The novelty of our paper is its comprehensive approach, as well as the administrative dataset covering recent years that includes labour and capital income before and after taxation and covers the whole range of the income distribution, which is necessary for measuring inequalities. In addition to describing changes to the pre-tax and post-tax inequality of labour and capital income, we identify their roles in total income inequality through decomposition.

We find that capital income is more concentrated than labour income. The top income decile based on overall income was receiving more than 90 per cent of total capital income by the end of the surveyed period, while this proportion was around one-third in the case of labour income. While capital income constitutes a relatively small share of total income, it markedly amplifies overall income inequality due to its high concentration compared with labour income and strong correlation with total income.

Inequality indicators substantially increased between 2007 and 2021. The decomposition of the Gini indicator reveals that the bulk of the increase occurred between 2007 and 2015 due to a growing concentration of post-tax labour income. Notably, the Gini

index of pre-tax labour income did not experience a significant increase in this period, suggesting that the introduction of the flat tax system played a major role in the heightened concentration of labour income. Subsequently, between 2015 and 2021, we observe a further slight increase in the overall Gini index, driven by an increase in capital income as a share of total income.

In the next chapter, we introduce the dataset. Then, we present the main characteristics of capital income compared to labour income based on data from 2021. In Chapter 3, we describe the changes in pre-tax and post-tax inequality using different indicators from 2007 to 2021. We consider both capital and labour income and identify their contributions to total income inequality. This is followed by a simulation to evaluate the impact of (further) increasing the share of capital income on overall income inequality. Chapter 5 summarises our findings and concludes the paper.

2 Data

We use anonymised individual-level personal income tax (PIT) returns from the National Tax and Customs Administration (NTCA) for the analysis. For the years 2015 and 2021, we have a complete database of returns, while for the year 2007, we have a database containing a random sample of 10 per cent of the returns.

In many respects, the administrative databases of tax returns provide a more accurate picture of taxable income than the survey data. They include both the lower and upper-income strata of the population and are not biased by interviewer or respondent errors. Lakner and Milanovic (2013) show that adjustment for the likely under-reporting of top incomes in survey results considerably increases the global Gini index measured solely based on surveys.[1] B. Kis and Tóth (2016), based on a comparison of questionnaire surveys (EU-SILC at the European level and the Tárki Monitor, which includes Hungarian households) with administrative data, conclude that questionnaire surveys typically do not reach the top 5–8 income percentiles of the population at all. Therefore, they show an income distribution narrower than the actual one, and 23 per cent of total income is not covered. Flores (2021), comparing national accounts and survey data in many countries, demonstrates that capital income is even more underreported than labour income. As a consequence, surveys significantly exaggerate the impact of labour income distribution and underestimate capital share and its dynamics.

Individual tax-return data also have their own limitations. The distribution of individual earnings may not accurately reflect the true income situation of individuals, given the potential impact of intra-household income sharing and as social transfers are not included in the data.

Against this background, while household surveys or household level administrative data might more suitable if the main question of interest is the welfare of individuals. Household administrative data from tax returns can be more useful to answer questions such as the role of top incomes, distributional impact of capital incomes and the impact of personal income tax on the distribution of income.

[1] From 70.5 to 76 in 2008. They use the gap between national accounts consumption and survey means in combination with a Pareto-type imputation of the upper tail to adjust the income distribution.

In addition, research suggests that major swings in individual-level inequality correspond to changes in household-level inequality. Substantial evidence from numerous developed countries indicates a tendency for individuals to choose partners with similar socio-economic backgrounds and education levels. Given the strong correlation between potential income and formal education, assortative mating results in a higher level of inequality at the household level compared to the individual level. A study by Greenwood et al. (2014) reveals that the increasing returns to education, the rise in married female labour force participation, and the growing prevalence of assortative mating have collectively heightened inequality in the United States over the last few decades. For Hungary, Naszódi and Mendoca (2022) document the high prevalence of homogamy, with more than two-thirds of marriages being between spouses who have the same level of education. In addition, along with the other four countries, they demonstrate an increasing trend in the preference for selecting a spouse with a similar education level between 2000 and the early 2010s.

In our study, labour income is represented by the consolidated tax base included in the income tax return, while capital income is represented by separately taxable income and, from 2015, by income from abroad that is taxable in the home country. For economic reasons and to ensure comparability between years, we reclassify or exclude certain income types when defining the primary indicators of our analysis, namely labour and capital income (For a summary of tax returns and main income categories, see Table 1). The most important of these changes is that income related to self-employment and agricultural holdings is excluded from both consolidated and separate taxable income. On the one hand, the methodologies of the national accounts and the economics literature (e.g. Valentiny & Herrendorf, 2008) include self-employed income as a third category alongside capital and labour income, within which the separation of capital and labour income is rather arbitrary. On the other hand, with the introduction of the itemised lump sum tax construction for self-employed (KATA) in 2013 and its gradual take-up, income tax returns cover a steadily decreasing share of self-employed income (see Appendix A for further details on the definition of income). Our analysis is based on the personal income tax database, but in calculating the tax liability and, through this, the taxable income, we impute social security contributions paid by employees for all taxpayers in accordance with tax year legislation.

3 Characteristics of capital income

Personal taxable capital income (hereafter: capital income) represents a much smaller share of taxpayers' total income than labour income. Between 5 and 7 per cent of taxpayers reported having some capital income between 2007 and 2021, which ranged between 8 and 12 per cent of total income (see Table 1). The share of capital income depends on the economic cycle. It declined sharply during the financial crisis between 2008 and 2010,[2] but started to rise again with the recovery and exceeded the level of 2007 in 2021. The largest

[2] Source: Annual reports of NTCA.

category of capital income is dividend income (50–70 per cent depending on the year), with significant income also coming from property rental, property sales and capital gains on financial investments (see Table 1).

It is important to note that the share of capital income in total taxable personal income differs in concept and is much smaller in magnitude than the share of the capital factor in gross domestic product (GDP). There are several income components in the property income of households in the national accounts that are not included in tax returns: income from foreign investments and income taxed exclusively abroad, as well as non-taxable capital income, such as interest income on government securities and yields on long-term investment securities accounts or pension savings. The PIT returns do not include any information on the personal income tax paid by income provider agents (for example, the financial institution which pays the interest income). However, this missing taxable capital income made up a relatively small share of total capital income, equivalent to 3 per cent on average in the surveyed years.[3] In addition, income that has not been legally earned or has not been reported is not included in the database, so could not be considered in our analysis.[4] It is also worth emphasising that an assessment of wealth, which is clearly one of the main factors determining the financial status of individuals, goes beyond the scope of this document. However, capital income can reflect wealth in several ways.

In addition to household property income items that are not taxable or reported by financial intermediaries, the aggregate capital share includes many components that do not show up in personal capital income. The most important items are the depreciation of capital, imputed rent paid by homeowners to themselves, the capital income of foreign residents paying taxes abroad, and undistributed profit. On the other hand, income from selling property – which is included in the capital income concept used in the study – is not included in the national accounts but is considered a change in net worth (UNECE 2011). While the share of capital income in total income in the tax records does not exhibit an explicit rise, the aggregate labour share in Hungary decreased significantly between 2007 and 2018 (see Kónya et al., 2020).

The impact of capital items not included in our data on income distribution is not straightforward. While imputed rents from owner-occupied housing are presumably less unequally distributed, income from foreign investments might be even more unequal than other types of capital income.

In the following, we present the main characteristics of capital income based on 2021 data. Although the overall share of capital income is small, its distribution is markedly more uneven than that of labour income, which finding is in line with international trends.[5] The Lorenz curves for capital and labour income before tax (see Figure 1) reveal a

[3] Source: Authors' calculation using NTCA database.

[4] Regarding labour income, Benedek and Lelkes (2011) determined that income-underreporting accounts for 9–13% of reported income, with the highest rates in the two poorest tenths (29–30%). However, Filep-Mosberger and Reiff (2022) pointed out that the rate of underreporting decreased in the 2010s. In the case of capital income, we do not have information about the size and the trend of underreporting.

[5] Attractive as it may be, comparing our results directly with foreign trends would encounter serious difficulties. This is because our analyses are based on personal income tax returns, and even if we only considered studies that use the same administrative database in different countries, fundamental differences in tax regulations result in different income coverage. Because of this, the comparison would involve serious distortion and misinterpretation.

sharp contrast, demonstrating the concentration of capital income at the upper percentiles. Since capital income comprises only 11.5 per cent of total income, the Lorenz curve for total income closely resembles that of labour income, albeit with a noteworthy impact at the highest levels of the income distribution.

Table 1 Descriptive statistics from the PIT databases

	2007	**2015**	**2021**
Number of tax files	4 568 170	4 624 677	4 998 343
Number of persons with taxable income	3 638 860	4 342 602	4 679 774
Number of persons with labour income	3 604 350	4 275 552	4 580 901
Number of persons with capital income	237 360	243 385	344 551
Share of taxpayers with capital income (%)	6.5	5.3	6.9
Share of capital to total income (%)	10.5	8.0	11.5
Total income (billion HUF)	7296	10 744	20 678
Labour income (billion HUF)	6528	9 882	18 308
Capital income (billion HUF)	769	862	2 370
In total income:			
Mean (HUF)	2 005 073	2 474 180	4 418 660
Median (HUF)	1 306 045	1 642 700	3 045 571
1. decile (HUF)	349 333	299 455	375 616
9. decile (HUF)	3 766 700	4 668 200	8 148 840
9. decile/ Median (HUF)	2.9	2.8	2.7
Decomposition of capital income (%):			
Dividends	48.3	69.8	65.4
Income from property rental	8.2	7.0	9.6
Capital gains	10.2	7.2	7.3
Income from property selling	28.1	4.7	6.6
Income also taxed abroad	1.7	5.3	3.9
Other	3.5	6.0	7.2

Source: NTCA database

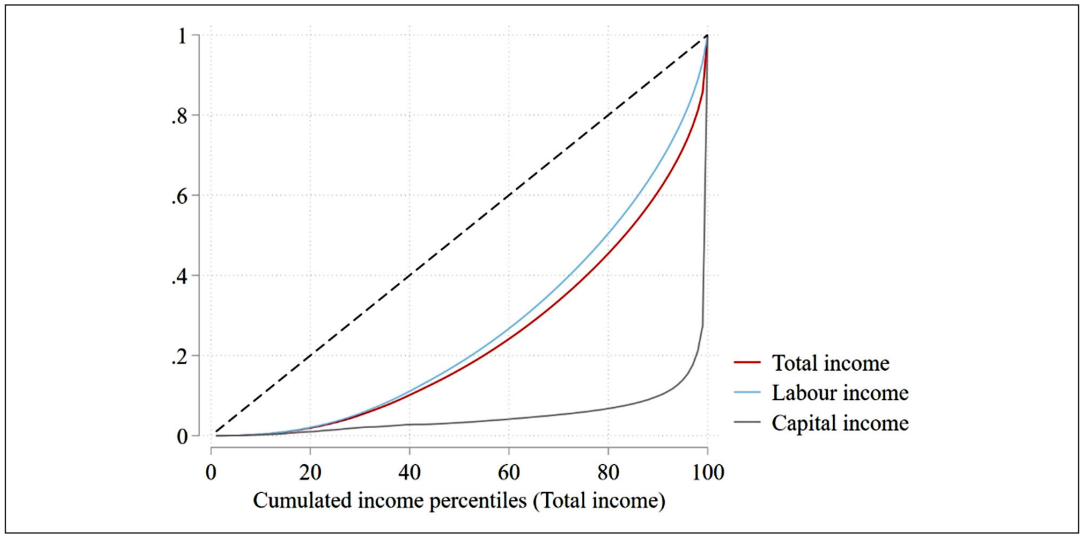


Figure 1 Lorenz curve – share of income percentiles based on capital, labour and total income (before tax, 2021)

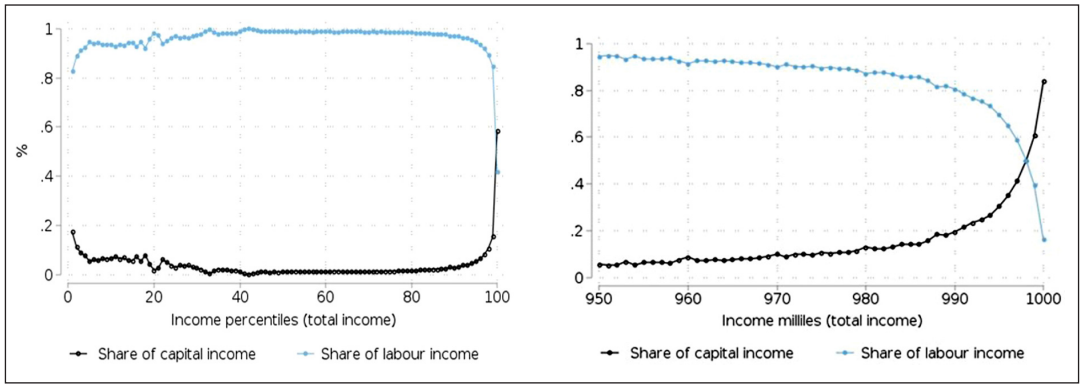
Notes: The Lorenz curve shows the share of labour and capital income at each cumulative income percentile. The diagonal line represents the case in which all taxpayers have the same share of total income.
Source: NTCA database

The division of total income between labour and capital income shows that capital income is concentrated at the highest end of the total income distribution, playing a dominant role only in the top income quintile. Its share of total income remains negligible across most of the income distribution, exceeding 20 per cent only in the top income percentile and 50 per cent in the top three-thousandths of the distribution (Figure 2). The share of capital income exceeds 80 per cent in the top thousandth of the income distribution, showing that the main income source is capital income for the highest-income taxpayers.[6] In addition to the highest end of the income distribution, the share of capital income exceeds 10 per cent at the bottom of the distribution. However, it should be noted that the bottom two income brackets have low incomes below the minimum wage, a significant share of which is irregular or one-off income, so the fluctuation in the share of capital income is not surprising.

Nevertheless, capital and labour income is not fully segmented, as capital income earners also tend to have high labour income. There is a strong relationship between the level of labour income and the share of taxpayers with capital income at each percentile. In the bottom seventy labour income percentiles, 5 per cent of taxpayers have capital income, but the share rises steeply towards the top of the income distribution, reaching over 30 per cent for the top 1 per cent of the income distribution (Figure 3). In addition, there is

[6] The concentration of capital income at the highest end of the income distribution is not specific to Hungary – for example, Piketty (2014, p. 215) presents a similar chart for the United States in 2007.

a significant share (12 per cent) of taxpayers with capital income among those whose earned income equals the guaranteed minimum wage – the minimum payable salary to full-time employees hired for jobs requiring at least a secondary school qualification or secondary vocational qualification. Presumably, this arises from entrepreneurs who are employed at their own firms at the lowest possible wage and take the remaining income from the enterprise as capital income.[7]



A: by income percentile *B: In the top fifty income milliles*

Figure 2 Share of capital and labour income in total income, 2021

Source: NTCA database

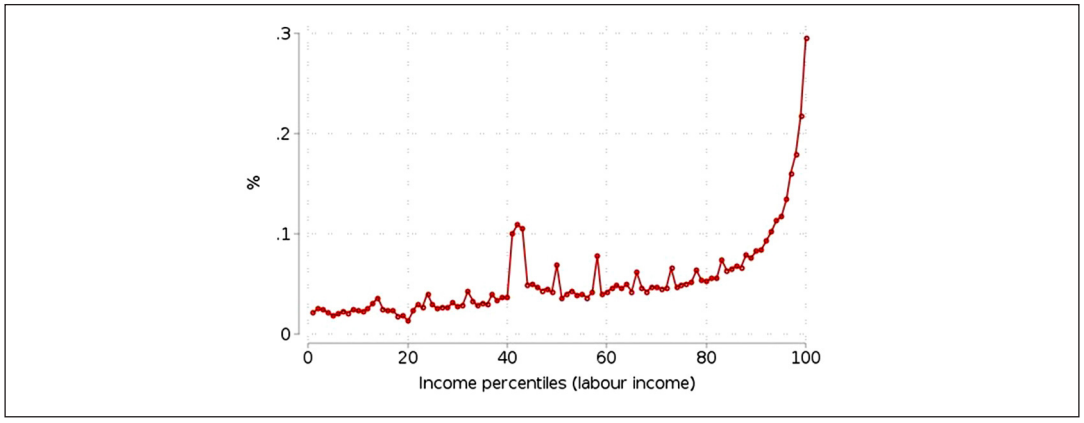


Figure 3 Share of taxpayers with capital income by percentiles of labour income

Source: NTCA database

[7] Although we exclude sole proprietors and self-employed farmers to exclude mixed income, owners of companies are usually registered as employees at their own company to meet social security payment obligations. The division of labour and capital income can also be arbitrary in this case.

To examine in more detail the factors associated with the existence and amount of capital income, we carried out a regression analysis (Table 4). First, we used a linear probability model and a logit model to examine factors related to the binary variable, which represents whether a taxpayer has any capital income. The explanatory variables in the model are the taxpayer's sex, age, county of residence, and labour income decile. Consistent with Figure 3, high labour income increases the likelihood of capital income: the odds of receiving capital income in the top labour income decile are almost five times higher than in the bottom decile, while for earners in the eighth decile, the odds ratio probability is 1.8. The odds of receiving capital income increase with age: taxpayers between 31 and 40 are about 2.6 times, and taxpayers over 50 are almost five times more likely to have capital income than taxpayers under 30. Residence in Budapest is also associated with a higher probability that a taxpayer has some capital income.[8]

Table 2 Regression results: determinants of capital income, 2021

	OLS	**Logit (odds ratio)**	**OLS (conditional on capital income) (thousand HUF)**
	Dependent var: has capital income		
	(1)	**(2)**	**(3)**
Labour income			
8. decile	0,0181***	1,798***	
	(0,000478)	(0,0219)	
9. decile	0,0324***	2,311***	
	(0,000479)	(0,0272)	
10. decile	0,107***	4,850***	
	(0,000486)	(0,0538)	
Labour income (thousand HUF)			0,330***
			(0,00786)
AGE			
31–40 years	0,0189***	2,615***	476,3
	(0,000326)	(0,0263)	(773,3)
41–50 years	0,0383***	3,817***	3042***
	(0,000311)	(0,0364)	(728,9)

[8] The absolute values of the remaining county dummies in the logit regression were much smaller than that of Budapest. This indicates that regional variation between other counties is smaller than between Budapest and the rest of the country. In addition, we carried out a regression with Budapest being the only regional variable, without adding other county dummies, and obtained a similar parameter value for Budapest.

Table 2 *(continued)*

	OLS	Logit (odds ratio)	OLS (conditional on capital income) (thousand HUF)
	Dependent var: has capital income		
	(1)	(2)	(3)
Above 50 years	0,0535***	4,947***	3833***
	(0,000300)	(0,0462)	(701,7)
Male	0,00996***	1,246***	4706***
	(0,000212)	(0,00540)	(302,4)
Budapest	0,0334***	1,720***	3219***
	(0,000690)	(0,0246)	(980,8)
Constant	0,00247***	0,0116***	−2102*
	(0,000790)	(0,000192)	(1,158)
Number of observations	4 506 834	4 506 834	341 375
R^2	0,037		0,007

Note: standard errors are in brackets
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: NTCA database

Similar factors affect the amount of capital income received by taxpayers, but the importance of each variable varies. For example, although the odds of having some capital income are predicted to be 1.24 times larger among men (controlling for age, labour income and county) than they are among women, the average capital income of men is higher by almost five million HUF (conditional on having capital income). This implies that whether a person has capital income depends only moderately on the gender of the taxpayer compared to the impact of age and labour income, but it is the most important factor in determining the amount of capital income.

4 Changes in inequality between 2007 and 2021

Income inequality within a population should be assessed using several indicators together, as each indicator may give different results depending on which part of the distribution it captures. Accordingly, in this chapter, by using different indicators, we try to provide a comprehensive picture of how inequality of income distribution before and after tax evolved between 2007 and 2021, highlighting the separate roles of capital and labour income.

The Gini index measures the concentration of the overall income distribution: zero if everyone has exactly the same income and one if all income is concentrated in the hands of one person. For labour income, pre-tax income inequality did not change significantly,

with the Gini index fluctuating between 0.47 and 0.49 (Figure 4). In contrast, for post-tax labour income, the index rose sharply from 0.39 in 2007 to 0.48 in 2015 and stabilised until the end of the period under review.

The significant difference between the Gini indices of pre-tax and post-tax labour income indicates that the increase in income inequality in the first half of the surveyed period is mainly explained by the introduction of the flat tax system in 2011 and the phasing out of the tax credit. Meanwhile, the abolition of the social security contribution ceiling moderated their impact to a lesser extent. From 2015 onwards, the concentration of pre-tax and post-tax labour income was equal, indicating that this channel of state redistribution left the concentration of income unaffected, which conclusion is in line with the results of Krekó et al. (2023). However, this does not mean that income redistribution through the tax system was no longer implemented after 2015, but instead that this did not change the overall inequality of income distribution. For example, the number of children still affected tax liability after 2015.

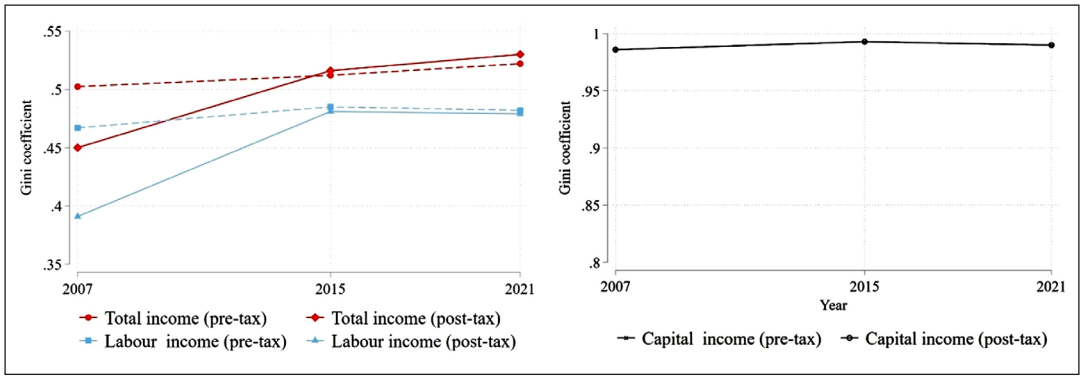


Figure 4 Changes in the Gini index for total income, labour income and capital income (2007–2021)

Source: NTCA database

For capital income, whether we look at pre-tax or post-tax income, the Gini index was very high at 0.99 and did not change significantly over the period. For total incomes, including labour and capital income, pre-tax inequality increased slightly from a Gini index of 0.50 in 2007 to 0.52 in 2021. In contrast, for total post-tax income, the changes observed for labour income caused the index to jump from 0.45 to 0.52 between 2007 and 2015, indicating a significant increase in inequality. Thereafter, it increased by a small amount to 0.53 in 2021.

As mentioned in the introduction, the evolution of capital and labour income can affect total income inequality through several channels. To explore these channels, we use the decomposition method developed by Schechtman and Yitzhaki (1999):

$$G_0 = \sum_{i=1}^{n} S_i \, R(Y_i, Y_0) G_i \tag{1}$$

where G_0 is the Gini index of total income (Y_0), G_i is the Gini index for each separate income group (labour and capital income), is the weight of these income groups in the

total income, $R(Y_i,Y_0)$, and the correlation between these income groups and the total income. This shows that total income inequality can increase if inequality increases for any income type, if the weight of the income type for which inequality is higher increases, or if the correlation between each income type and total income, i.e. the overlap between groups of income earners, increases.

By decomposing the change in inequality in this way, we find that the slight (one percentage point) increase in the Gini index for the total pre-tax income between 2007 and 2015 is due to an increase in the concentration of labour income by 1.6 percentage points, which was moderated by a fall in the share of capital income (Table 3). The latter is a typical phenomenon in times of economic downturn. Subsequently, in the second half of the decade, the reason for the further one percentage point increase in the concentration of pre-tax total income was the growing share in capital income. Between 2007 and 2021, the Gini index for total pre-tax income increased by two percentage points, mainly due to a moderate increase in labour income inequality and, to a lesser extent, an increase in capital income as a share of total income.

Table 3 The effect of changes in various factors on the change in the Gini index of total income

The impact of changes in various factors	Pre-tax income			Post-tax income		
	I. Period (2007-2015)	II. Period (2015-2021)	Total period (2007-2021)	I. Period (2007-2015)	II. Period (2015-2021)	Total period (2007-2021)
Share of capital and labour income	-1,1%	1,5%	0,5%	-2,0%	1,7%	0,2%
Gini of labour income	1,6%	-0,3%	1,3%	7,5%	-0,2%	7,4%
Gini of capital income	0,1%	0,0%	0,0%	0,1%	0,0%	0,0%
Correlation between labour and total income	0,5%	-0,3%	0,2%	0,7%	-0,3%	0,5%
Correlation between capital and total income	-0,1%	0,1%	0,0%	-0,3%	0,1%	-0,2%
Indirect effects	0,1%	0,0%	0,0%	0,6%	0,0%	0,1%
Total change in the Gini of total income	1,0%	1,0%	2,0%	6,6%	1,4%	8,0%

Source: authors' calculation

Similar changes were observed in post-tax income simultaneously; however, the magnitudes of these changes were significantly larger. Between 2007 and 2015, total income inequality increased by 6.6 percentage points, mainly because of an increase in the concentration of labour income (largely as a result of the 2011 tax reform), which increased total income inequality by 7.5 percentage points (Table 3). The increase in the correlation, that is, the overlap between income groups for total income and labour income, made a smaller contribution to the growing Gini index (0.7 percentage points), while their impact was moderated by the aforementioned reduction in the weight of capital income (two percentage points). In the following period, between 2015 and 2021, the Gini index for total income increased slightly (1.4 percentage points), mainly due to the rebound in the weight of capital income, while the impact of other factors remained largely unchanged. Over the whole period, the eight percentage point increase in post-tax total income inequality was driven by the increase in the Gini index for labour income.

The relative position of the highest-earning taxpayers is measured by the share of income received by the top total income percentile (top row of Figure 5). For labour income, the income share of the top 1 per cent fluctuated between 6 and 8 per cent for both pre-tax and post-tax income, remaining broadly unchanged throughout the period. However, for capital income before and after taxation, the indicator jumped from around 60 to 72–73 per cent both before and after taxation between 2007 and 2015 and stabilised at this level for the rest of the period. As a result of the increasing concentration of capital income, the overall income share of the top 1 per cent has also risen slightly. Their share increased from 13 to 14 per cent of pre-tax income between 2007 and 2021 and from 13 to 16 per cent of post-tax income. To sum up, in contrast to the Gini indicator and the share of the top 10 per cent (see below), the increase in the income share of the highest income decile from 2007 to 2021 is mainly driven by capital income.

The relative income position of a broader group of high earners is measured by the ratio of the top 10% of incomes to the total income (middle row in Figure 5). Again, the difference between labour and capital income is remarkable: The top income decile accrues around one-third of labour income but 90 per cent of capital income. For pre-tax labour income, this proportion declined slightly over the period, after a small increase, but fluctuated between roughly 33 and 35 per cent. For post-tax labour income, the share of the top 10 per cent of earners jumped from 28 to 34 per cent between 2007 and 2015, following the introduction of the flat tax reform, and then declined to 32 per cent by 2021. The co-movement of the pre-tax and post-tax labour income indicators between 2015 and 2021 suggests that the slight reduction in the share of labour income in the top decile of total labour income is due to changes in market income, with the impact of tax policy being neutral.

For the top decile, there was a smaller jump in the concentration of capital income than for the top percentile. The indicator started from 89 per cent and increased by one percentage point for pre-tax income and two percentage points for post-tax income between 2007 and 2021, which means that roughly 90 per cent of all capital income during this period went to those in the top total income decile. The difference between the top percentile and the top decile over time suggests that while the top decile's capital income-earning advantage has not changed significantly, the capital income of the top percentile rose much faster than that of all taxpayers between 2007 and 2015.

The time trend of the top decile for total income is somewhat similar to that for labour income. For pre-tax income, the share of income received by the top 10 per cent has fluctuated between 39 and 40 per cent. For post-tax income, the share rose from 36 to 40 per cent between 2007 and 2015 and remained at roughly this level until 2021. The latter can be explained by the fact that for the top decile, the decline in the share of labour income was offset by a moderate increase in the share of capital income.

The opposite end of the income distribution, namely the relative position of those who earn less than the median income, is captured by the following indicator, which compares the income of the bottom 50 per cent with the income of all taxpayers (bottom row of Figure 5). For pre-tax labour income, this share gradually declined from 20 to 18 per cent between 2007 and 2021. In contrast, for post-tax income, the share of income fell from 25 to 19 per cent between 2007 and 2015, largely due to the introduction of the flat tax system and the abolition of the tax credit, and then declined by a further one percentage point by 2021.

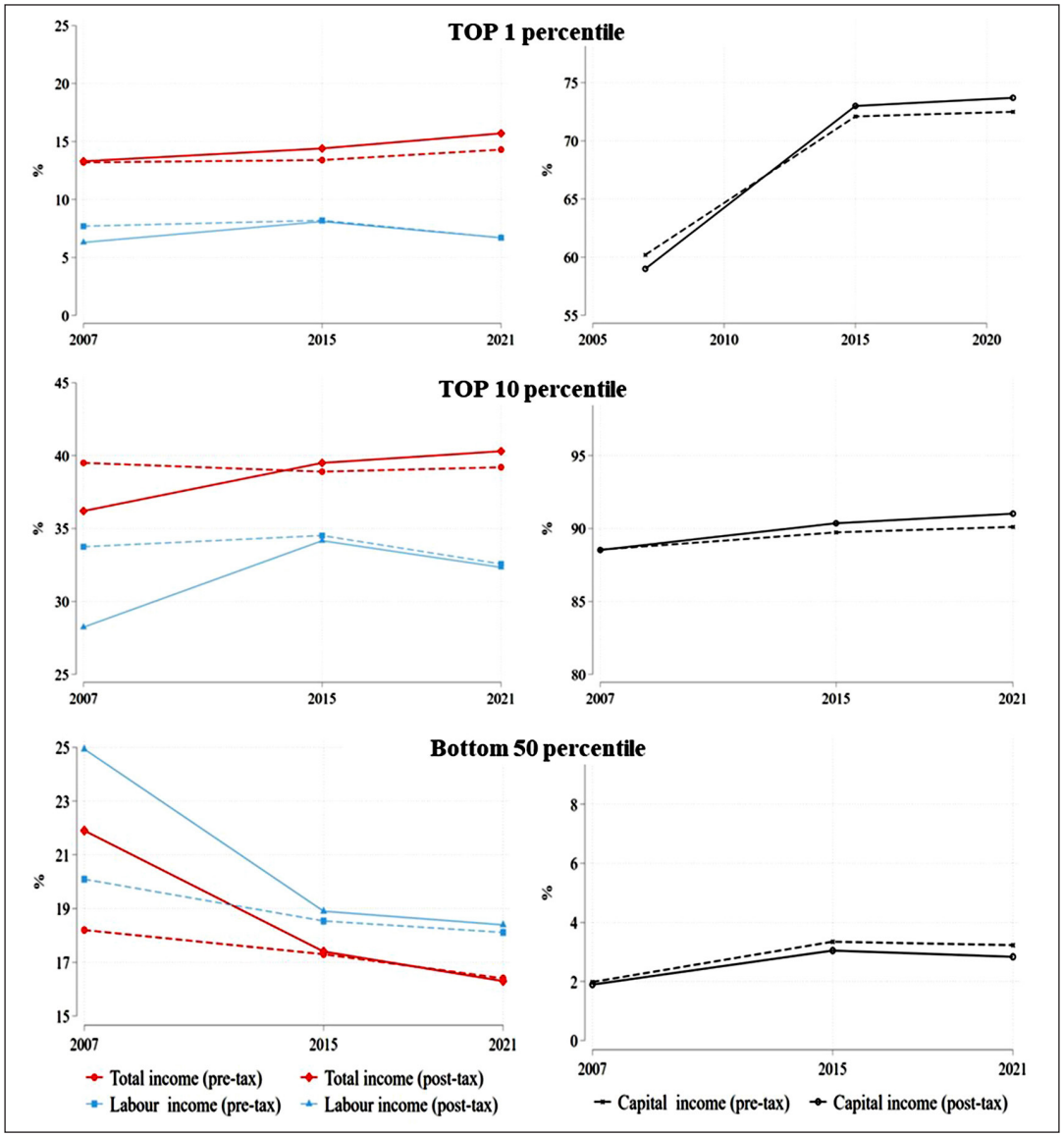


Figure 5 Income shares of the top 1% (top row), top 10% (middle row) and bottom 50% (bottom row) for total income, labour income and capital income (2007–2021)*

Note: the top 1, top 10, and bottom 50% represent taxpayers in the top 1%, top 10% and bottom 50% of the distribution based on total income.

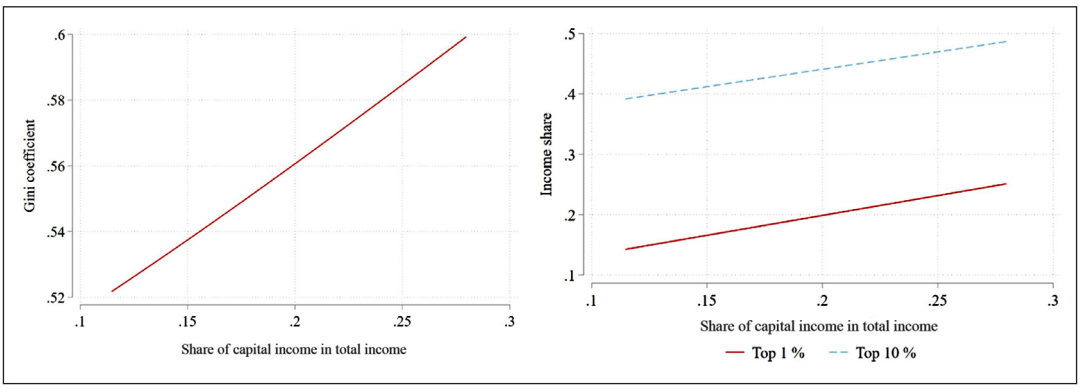
Source: NTCA database

For capital income, the share of pre-tax and post-tax income in the bottom 50 per cent has risen from two per cent by one percentage point. As the share of capital income among those earning less than the median income is very low, the indicator for all incomes describes a similar picture to that for labour income. For total income before taxation, the

share of income in the bottom 50 per cent has gradually declined over the surveyed period, while after taxation, the indicator first fell significantly between 2007 and 2015 due to the restructuring of the tax system and then declined by a small amount.

5 Simulation exercise

The aforementioned evidence indicates a positive correlation between capital income and total income, showing a concentration of capital income at the upper end of the income distribution. This implies that if the share of capital income increases, income inequality is anticipated to rise. To quantitatively assess the potential impact of an increased share of capital income on overall income distribution, we conducted a simulation exercise as follows: using the 2021 distribution of capital income among taxpayers; we raised the capital income of all holders by the same percentage while keeping labour income unchanged. Subsequently, we calculated inequality indicators for the simulated sample.



A: Gini coefficient *B: Top income shares*

Figure 6 Simulation: the impact of an increase in the share of capital income on inequality indicators

Notes: The figures display the result of a simulation exercise in which the capital income of all capital earners is increased by the same percentage. Source: NTCA database

The results reveal that if the share of capital income in total income rises from the current level of 11.5 to 20 per cent via a proportional increase in the capital income of all capital income earners, it would elevate the Gini indicator by four points and the share of the top decile by five percentage points. In comparison, the Gini index increased by eight percentage points between 2007 and 2021.

Future developments in the share of capital income in household income in Hungary are uncertain. Kónya et al. (2020) show that Central-Eastern-European countries typically have lower aggregate factor labour shares in gross value added than other EU countries. However, this is not indicative of the share of capital income in domestic households' budgets, as a significant proportion of profit goes to foreign-owned companies. Although

differences in taxation hinder international comparability, capital income and business income accounted for about 24 per cent of the total taxable income (excluding retirement income) of taxpayers in the United States in 2020,[9] suggesting that the convergence of the economies of Central and Eastern European countries to the level of developed countries may result in heightened inequality through an increase in the share of business and investment income of domestic taxpayers. However, its impact on inequality might be less than major changes in income taxation.

6 Conclusion

Growth in capital income as a share of total income is a global phenomenon, as is rising inequality within countries, so the relationship between these two factors has become highly relevant in the last few decades. However, survey-based data, which have been widely used to measure income inequality, give misleading results when considering capital income inequality. In light of this, we used administrative data to examine the role of taxable capital income in the income distribution for the period from 2007 to 2021.

We found that capital income plays an important role in the structure of income in Hungary in several respects. Between 2007 and 2021, 5 to 7 per cent of taxpayers were receiving taxable capital income from investments or businesses, accounting for around one-tenth of total taxable personal income. On the other hand, capital income was much more unequally distributed among taxpayers than labour income. While the top decile received one-third of labour income, their share in capital income was 90 per cent in 2021. More of the highest-earning taxpayers had capital income: while the share of people with capital income was only 5 per cent in the bottom seven labour income deciles, this rose steeply towards the top of the income distribution, reaching over 30 per cent for the top percentile.

Post-tax inequalities increased significantly between 2007 and 2021, but their size and source varied across periods. The bulk of the increase occurred from 2007 to 2015 and was driven by the growing concentration of labour income, partly due to the flat tax reform introduced in 2011. This effect was mitigated by the temporary decline in capital income as a share of total income. Overall income inequality increased slightly after 2015, driven by an increase in capital income as a share of total income. By decomposing the change in inequality measured by the Gini index, we found strong evidence of the significant influence of capital income on changes in overall income inequality. Our work contributes to the literature on compositional inequality since our results can be considered new evidence of the positive relationship between functional and personal inequality. In our simulation exercise, we also demonstrate that an increase in the share of capital income within total income is likely to lead to a notable increase in inequality.

Our findings regarding the role of capital income in Hungary partly reflect experiences observed in other developed and transitioning countries. Capital income tends to be significantly more unevenly distributed than labour income (Ranaldi, 2022), with concen-

[9] Source: taxfoundation.org

trations primarily at the upper echelons of the income distribution (Piketty, 2014; Ranaldi, 2021). Consequently, it disproportionately contributes to overall inequality compared to its share in total income, especially when considering inequality indicators focusing on the upper strata of the income distribution (Fräßdorf et al., 2011).

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Data availability statements

The data supporting this study's findings are available from the National Tax and Customs Administration (NTCA), but restrictions apply to their availability. These data were used under licence for the current study and are not publicly available.

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Appendix A

Income calculation used in the study

Labour income was calculated by the consolidated tax base in the personal income tax return, while capital income was based on separately taxable income and, from 2015, on income from abroad (also taxable in the country) reported separately (on form 05). For economic reasons and to ensure comparability between years, minor adjustments to the consolidated tax base and separately taxable income have been made by reclassifying or excluding certain income types to define the primary indicators of our analysis, namely labour and capital income (for a summary of tax returns and main income categories, see Table 1.) The most important of these adjustments is that we have excluded income related to self-employment and agricultural holdings from both consolidated and separate taxable income for economic and practical reasons. On the one hand, the methodologies of the national accounts and the economics literature (e.g. Valentiny & Herrendorf, 2008) include self-employed incomes in the category of mixed-income, within which the separation of capital and labour income is rather arbitrary. On the other hand, with the introduction

of the itemised lump sum tax form in 2013 and its gradual take-up, the income tax returns cover a steadily decreasing share of self-employed income. Our analysis was based on the personal income tax database, but in calculating the tax liability and, through this, the taxable income, we imputed social contributions paid by employees for all taxpayers in accordance with tax year legislation.

The main income categories were adjusted as follows.

1) In 2007, non-taxable benefits were excluded from consolidated income. Although these incomes (e.g. pensions, childcare allowance) are not taxable, they increased the tax base until 2010, which increased the tax burden under the progressive tax system.
2) In 2007, a special tax on individuals was added to the tax on labour income, amounting to 4 per cent of income above the pension contribution ceiling subject to the consolidated tax. It was not included in the tax on the consolidated tax base but on a separate sheet (sheet 07).
3) For the years from 2015 to 2021, rental income from real estate has been reclassified from consolidated income to separate taxable income on the basis that it is considered capital income in substance. Note, however, that in 2007, it was possible to declare income from the rental of immovable property as part of consolidated income, but this cannot be separated from income from other independent activities. As the tax rate on separate income (25 per cent) was lower than the top rate (36 per cent), we believe that a significant part of the income was presumably declared under separate income, and the resulting distortion is not significant.
4) The income of self-employed persons and farmers subject to lump sum taxation has been excluded from the consolidated tax base.
5) In 2007, the dividend income of sole proprietors was excluded from separately taxable income. From 2015 onwards, the income of sole proprietors not subject to consolidation has been included on a separate sheet (sheets 13-05; 13-06), so that in those years, the income of sole proprietors was excluded from the separately taxable income.
6) The tax on the income withdrawn from the consolidated tax base was reduced in proportion to the ratio of the income withdrawn to the consolidated tax base and, in the case of the transfer of income from the rental of immovable property, the corresponding amount was added to the tax on capital gains.
7) Each year, we deducted the flat-rate lump-sum tax for the caterer from the tax on separately taxable income. No income is included in this line; the tax is based on the number of rooms issued.
8) In addition to personal income tax, we have also taken into account the contributions payable by taxpayers on after-tax income. The family tax credit and the contributions payable by taxpayers on capital income are also included in the social security database, while the contributions payable on earnings are calculated on the basis of the current annual employee contribution rates.