# CHANGES IN INCOME INEQUALITY IN THE CZECH REPUBLIC IN THE YEARS 2008 - 2021

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**Abstract**

If we apply the Gini coefficient, the Nordic and Central Eastern European countries show the lowest income inequality in the current world. By the World Population Review, these countries are claiming seven of the top 10 slots, including the second rank in the Czech Republic. But it does not mean the situation in these countries is not changing in time. The contribution analyses the changes in income inequality in the Czech Republic in the years 2008 – 2021. This period is split into three parts – recession 2009 – 2013, growth 2014 – 2019, and Covid pandemic 2020 and 2021. In the first part of the paper, we describe the development of net national income and the Gini coefficient during these three periods. In the second part of the paper, we apply the approach of the French economist Piketty and we analyse the impact of the recession or growth on the "lower class" the bottom 50% of households (i.e. households from the first to the fifth income decile), the "middle class" as the middle 40 percent (i.e. sixth, seventh, eighth and ninth 10%), and the "upper class" (top 10 percent) of the Czech society. In the last part of the paper, we study the changes in the development of four forms of gross money income (income from employment, income from self-employment, social income, and capital earnings) which allow us to explain the fluctuations in income inequality in the examined years.

**Keywords:** income distribution, income inequality, Czech Republic

**JEL Code:** D310, J31

## Introduction

In my contribution to the conference the 12th International Days of Statistics and Economics in 2018, I studied the relationship between the recession of 2009 – 2013 and income inequality in the case of the Czech Republic (Soukup, 2018).

In this analysis, I verified the statement of the French economist Thomas Piketty "In economic booms, the share of profits in national income tends to increase, and pay at the top end of the scale (including incentives and bonuses) often increases more than wages toward the bottom and middle. The opposite trend occurs during economic slowdowns or recessions (of which war

can be seen as an extreme form). Various noneconomic factors, especially political ones, ensure that these movements do not depend solely on the economic cycle." (Piketty, 2015), p. 324.

In 2018, my conclusion was in line with Piketty's hypothesis: it was possible to observe the decline in income inequality in the Czech Republic during the recession of 2009 – 2013. The analysis was found on the statistical data up to 2015. In this contribution, I will expand my examination and we will monitor the period 2008 – 2021.

# 1 Business Cycle in the Czech Republic 2008 - 2021

Figure 1 illustrates the business cycle in the Czech Republic in the years 2008 – 2021. I split this period into three phases.

The first phase corresponds to the global recession in 2009. This year, the real GDP declined in most European countries (except for Poland whose economy continued to grow without any recession). But the economic development was diverse in different countries in subsequent years, including Czech neighbours.

In Slovakia and Austria, the recovery started in 2010 and the real HDP in these two countries was in 2011 higher than in 2009 and their economies continued to grow during the following years. In Hungary and the Czech Republic, we can observe the recession with two bottoms (or "W type" recession). The first decline falls in the year 2019 for both countries. But the second decline in GDP lasted two years in the Czech Republic (2012 and 2013) and it lasts only one year in Hungary (2012).

**Fig. 1: Real GDP and net national income of the Czech Republic 2008 – 2021 (CZK, 2015 prices)**
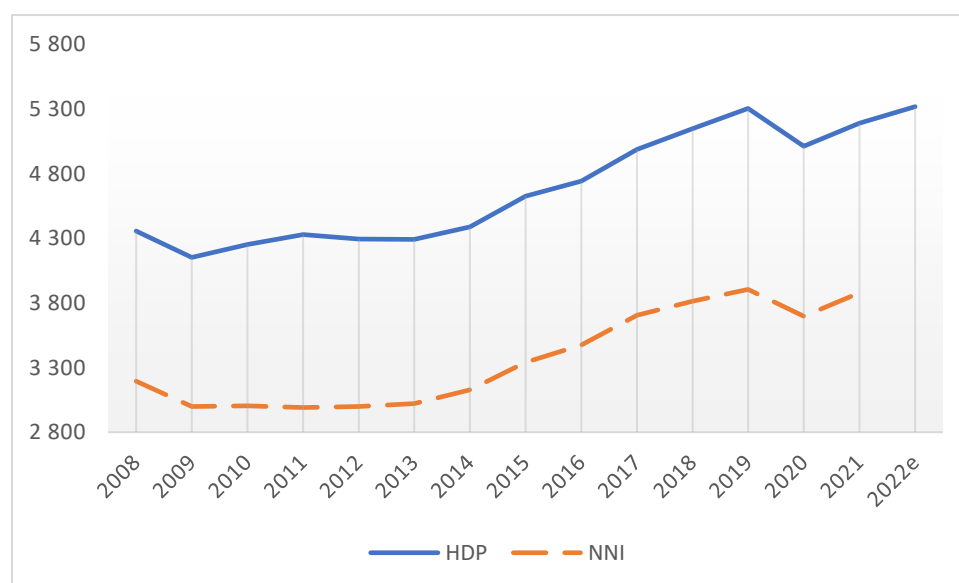


Source: own calculation, based on Public Database of the CZSO (2023)

For the description of the impact of the recession on income, the net national income (NNI) is more suitable as NNI measures the amount of income available to residents of the country. NNI declined in 2009 and it remained at this lower level during the whole recession period 2009 – 2013. If we apply NNI, we can regard only one recession throughout the years 2009 – 2013. The Czech economy reached the pre-recession level in 20014 (if we regard GDP) and in 2015 (if we regard NNI). The growth continued until 2019 and it was interrupted by the decline in GDP as NNI in 2020. The reason was the Covid pandemic and connected demand and supply shocks.

The decline of the economy lasted one year (2019) and recovery started in 2020 (in terms of GDP and NNI). The preliminary data indicate the GDP exceeded the pre-crisis level in 2022. As we mentioned above, we confirmed Piketty's hypothesis for the recession 2009 in the contribution. Now we will check whether it is valid also for the period of economic growth 2014 – 2019 and the recession 2020 and recovery 2021.

## 2      Income Inequality in the Czech Republic: General View

It is possible to apply various instruments to measure income inequality, see, for example, Hejdukova, P., Kurekova, L. (2017). I characterize the overall development of income inequality using the Gini coefficient. Let us briefly recall the computing of the Gini coefficient. The Gini index measures the extent to which the distribution of income among individuals (households) within an economy deviates from a perfectly equal distribution.

If the distribution of income among individuals (households) is represented with the function f(x) over the interval [0, 1], the Gini coefficient may be calculated employing this formula:

$$G = \frac{\int_0^1 [x - f(x)]dx}{\int_0^1 x\,dx} = 1 - 2\int_0^1 f(x)\,dx$$

With the distribution of income among individuals (households) that have been generated using discrete data points, the Gini coefficient may be calculated using the formula:

$$G = \frac{n+1}{n} = \frac{2\sum_1^n (n+1-i)\,x_i}{n\sum_1^n x_i}$$

with Xi being ordered from smallest to largest.

The Gini coefficient can theoretically range from 0 (complete equality) to 1 (complete inequality); in a percentage, it is ranging between 0 and 100. Theory suggests that the analysed number of groups is very large. If it is not true the Gini index for complete inequality is not equal to 1. For example, if we divide households into 5 groups and the richest group owns all

wealth or income the Gini index is only 0.8 or 80% in a percentage. But if we divide households into 10 groups and the richest group owns all wealth or income (i.e., complete inequality again) the Gini index is 0.9 or 90%.

Naturally, the general formula and concrete indices computed by different subjects are not the same things. In Figure 2, I present the Gini coefficient published by three institutions: the OECD, the World Bank, and the Czech Statistical Office (CZSO).

The Gini coefficient calculated by OECD is based on the comparison of cumulative proportions of the population against cumulative proportions of income they receive. Income is defined as household disposable income in a particular year. The World Bank's Gini coefficient is based on the comparison of cumulative proportions of the income against a cumulative number of recipients. Where the original data are available, they have been used to calculate the income shares by quintile. It means that the Gini for complete inequality is only 0.8 or 80%.

The CZSO calculates the Gini coefficient from the ordered distribution of equivalised income. It reflects the relationship between the cumulative proportions of persons and cumulative proportions of income. My calculation is based on income defined as household net money income. Households are divided into deciles according to net money income per person.

So, we can compare four different results as can be seen in Figure 2. Nevertheless, all four analyses indicate a similar tendency.

**Fig. 2: Gini coefficient for the Czech Republic 2008 - 2021**
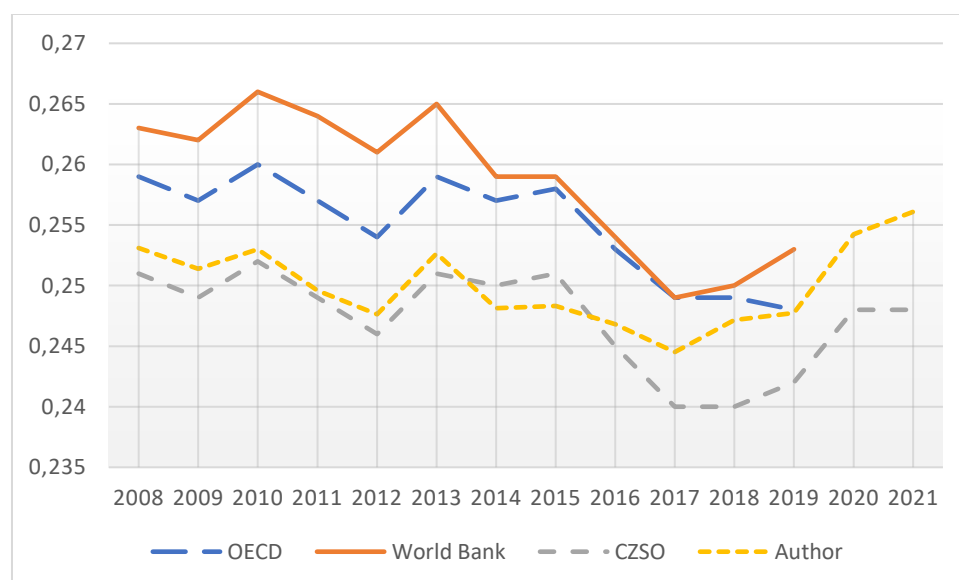


Source: own calculation, based on OECD (2023), WB (2023), CZSO (2009) - CZSO (2022).

We can see the value of Gini indices declined in the first year of the recession (2009). In the first year of the economic recovery, in 2010, the Gini index indicates the growth of income

inequality. But the second part of the recession, period 2011 and 2012, is connected with the decrease of income inequality again.

The overcoming of the recession and the transitioning of the Czech economy to a growth phase leads to the attempt to return income inequality to the pre-recession level (2013). But the economic growth for the next five years was connected with the continued decline in income inequality.

The last years of economic growth (2018 and 2019) are connected with a change in this tendency. Since 2018, income inequality is increasing but it does not reach the level of the year 2009 yet. The decline of GDP (and NNI) in recession 2020 this trend slowed down, but it didn't change.

The data for the Czech Republic confirms Piketty's hypothesis for the recession of 2009 but they confirm it for the subsequent growth only partly: there was a significant time lag between the beginning of economic growth and the change in a tendency toward the growth of income inequality. On the other hand, the recession of 2020 appears too weak to reverse the trend toward the growth of income inequality.

## 3      Income Structure and Inequality

However, the household's income consists of various forms. The CZSO published information about four core income types: income from employment, income from self-employment, social income, and other income. Social income consists of pensions, health insurance benefits, child allowances, scholarships, and other social benefits. The "other income" includes mainly income from capital assets, i.e. interests on deposits, bond yields, dividends from shares, profits from companies, income from capital abroad, rental income, life insurance income, and supplementary pension insurance income.

Again, we apply Piketty's methodology (Piketty, 2015). Piketty defines the "lower class" as the bottom 50 percent (individuals or households), the "middle class" as the middle 40 percent (i.e. sixth, seventh, eighth, and ninth 10%), and the "upper class" (top 10 percent).

Figure 3 illustrates the income structure of all three classes in 2008 and 2021. Income from employment is the core type of income for all classes. With the growth of total income, the role of social income decreases, and the importance of income from self-employment increases.

Quite many articles deal with the relationship between social income and income inequality (for example, Jansky, P., Kaliskova, K., Munich, D. (2016) or Kotlanova (2018). In 2021 social income represents 36% of the total income of which 11% are state social support benefits and 89% pensions for the lower class. The structure of social income is not the same for all deciles

that form this class. The state social support benefits represented 50% and pensions also 50% of all social income for the lowest decile. But the state social support benefits represented only 3% and pensions 97% of all social income of the fifth decile. For comparison, pensions form 98% of all social income for the upper class.

**Fig. 3: Income share structure (2008 – left, 2021 - right)**
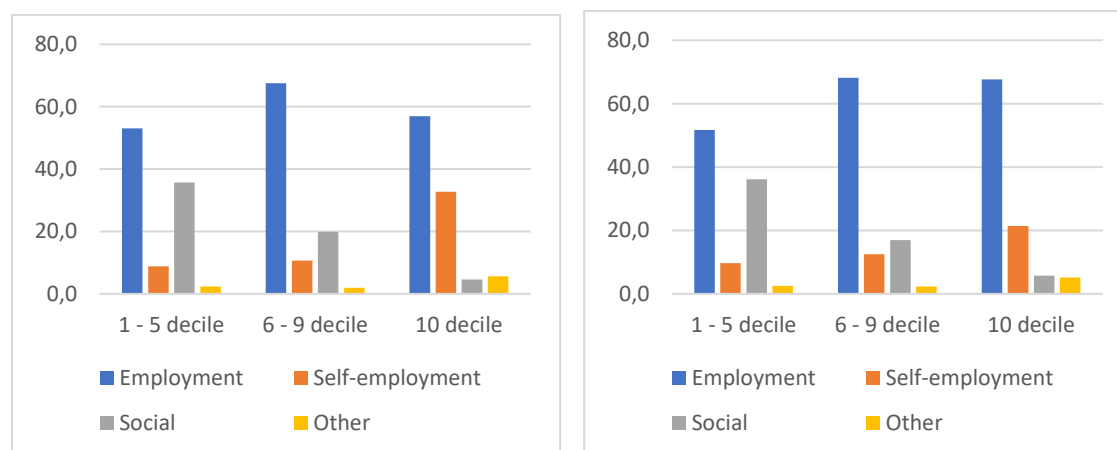


Source: own calculation, based on CZSO (2009) - CZSO (2022).

The other income (i.e., mainly income from capital assets) plays a specific role. Its importance for the lower and middle classes is marginal. But this income is also the smallest source for the upper class. Piketty (2015) explains this through the structure of the upper class. The majority of this class (nine-tenths) are top managers and their main source is income from employment. Income from capital assets is concentrated in hands of only one-tenth of this class and is their main income source. For the Czech Republic, this situation may be the same but we cannot confirm it because we do have not adequate statistical data.

*Tax impact*

In the Czech Republic, income inequality is relatively low compared to other countries of the European Union. It can be partly explained by the transfer of taxes (including contributions to mandatory social security schemes) from the upper class to the lower class.

This statement is evidenced by Tab. 1 which provides information about gross and net money income for all three analyzed classes in 2008 and 2021. The difference between gross and net money income represents income tax and contributions to mandatory social security schemes. The share of net income to gross income is the highest for the lower class (90.5%). It means income tax and contributions to social security schemes represent 10% of their gross money income. On the other hand, the share of social income in total income is 35.7% for this class in 2008. A similar result is valid also for the year 2021 (10% and 36.1%).

The value of both shares, i.e. the share of net income to gross income and the share of social income in total income, are similar for the middle class. The share of income tax and contributions to the social system in the total income is 16.3% in 2008 (and 14.4% in 2021). Social income was a source of 19.9% of total income in 2008 and 17% in 2021. In other words, contributions to the social system and income from it are similar for this class as a whole.

**Tab. 1: Share of net money income to goss money income, 2008 and 2021**

| | 2008 | | | 2021 | | |
|---|---|---|---|---|---|---|
| **Decile** | **1 - 5** | **6 - 9** | **10** | **1 - 5** | **6 - 9** | **10** |
| Number of persons | 5 694 719 | 3 819 365 | 826 188 | 5 668 253 | 3 829 833 | 763 269 |
| Gross money income, mil CZK | 595 711 | 741 296 | 359 885 | 1 001 085 | 1 297 092 | 547 600 |
| Net money income mil CZK | 539 608 | 620 640 | 284 626 | 921 322 | 1 109 780 | 443 531 |
| Share net/gross money income (%) | 90,58 | 83,72 | 79,09 | 92,03 | 85,56 | 81,00 |

Source: own calculation, based on CZSO (2009) - CZSO (2022)

The relative contribution to income tax and contributions to the social system of the upper class are the highest. The share of income tax and contributions to the social system in the total income was 16.3% in 2008 and 14.4% in 2021. The upper class has the lowest share of social income in total income (4.6% in 2008 or 5.8% in 2021). Of course, social income takes exclusively the form of pensions.

*Social income stability*

As I have already stated, the Czech Statistical Office is publishing information about four core income types: income from employment, income from self-employment, social income (i.e. state social support benefits and pensions), and other income (mainly income from capital assets). Now, we will discuss changes in these four income types to the business cycle in the Czech Republic.

The pro-cyclical behaviour of real net income from employment is apparent from Figure 5 in the period 2008 – 2021. The same type of behaviour for the income from self-employment is seeming in Figure 6. During the recession of 2009 – 2013, we can saw a decline in both types of income. The period of economic growth from 2014 to 2019 was connected with the growth in real net income from employment and income from self-employment. This movement confirms the statement of Wedrowska, E., Muszynska, J. (2019) that labour earnings dominate in determining inequalities.

The relationship between other income (i.e. income from capital assets) and the business cycle is not so obvious. We can observe the decline of this income in the recession years 2011 and 2012 but also in the growth years 2014, 2018, and 2019. In the first part of the recession 2009 – 2013 (i.e. years 2009 and 2010) and in the Covid pandemic recession (2020 and 2021), other

income was increasing. But generally speaking, we can observe the growing tendency for this income.

In comparison with other sources of income, real social income shows a smoother development, with softer fluctuations (in comparison with other income forms) as illustrated in Figure 6 again. The real social income was growing the whole period, except for 2012 and mainly in the second year of the Covid pandemic recession (2021). The stability of social income led to the relative stability of total real money income mainly of the lower class and so kept income inequality at a low level. The minimum wage also influences the stability of income from employment of the lower class, see (Pavelka, Skála, Čadil, 2014) or (Bittner, 2023).

**Fig. 5: Real income from employment in 2008 – 2021**
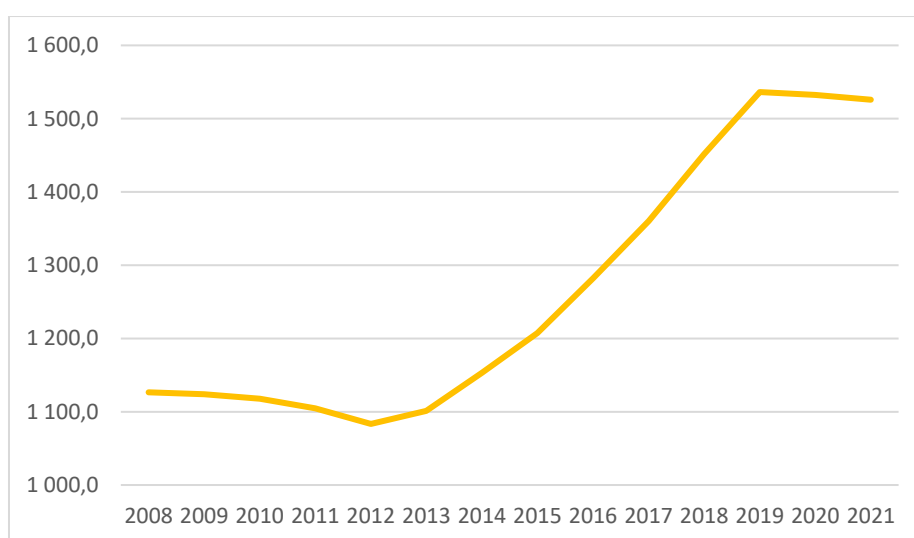


Source: own calculation, based on CZSO (2009) - CZSO (2022).

**Fig. 6: Income from self-employment, social income (left axe both), and other incomes (right axe) in 2008 – 2021**
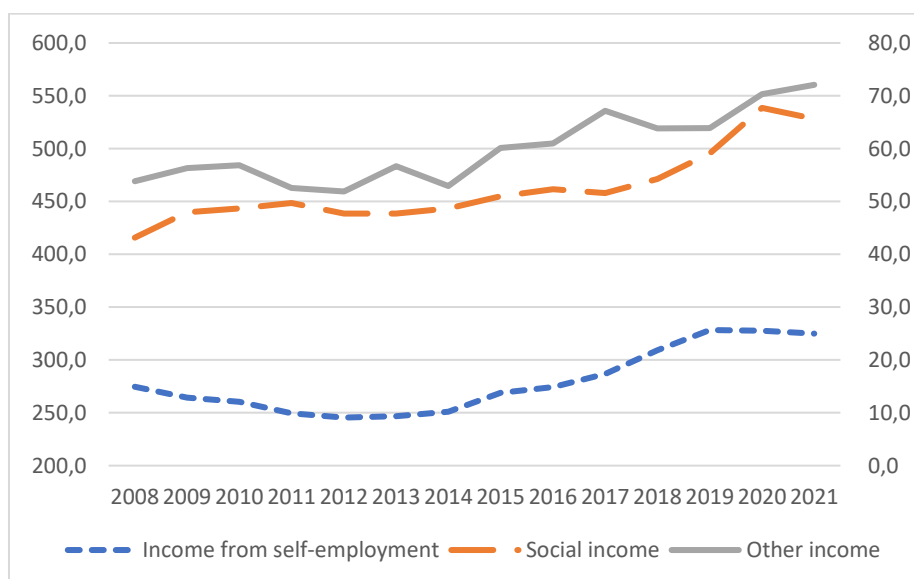
Source: own calculation, based on CZSO (2009) - CZSO (2022).

## Conclusion

The contribution presents the results of income inequality analysis for the Czech Republic in the period 2008 – 2021. This period covers two recessions 2009 – 2013 and 2020 – 2021 and growth from 2014 to 2019.

For the recession of 2009 - 2013, the analysis confirms the hypothesis of French economist Thomas Piketty that recessions decrease income inequality. But it was not true for the Covid pandemic recession. Similarly, the trend in the development of income inequality was opposite to Piketty's expectations during the growth period 2014 – 2019: Piketty's hypothesis predicts an increase in income inequality but there was a decrease in income inequality in the Czech Republic.

Piketty warns that the assumed trend may be disturbed by various noneconomic factors, especially political ones, to ensure that these movements do not depend solely on the economic cycle (Piketty, 2015). It seems true for the relatively short period examined. The main political factors were fiscal measures, mainly stability of social income provided to the lower class (i.e. bottom five income deciles). Other factors are examined, inter alia, in articles by Hasman, J., Novotny, J. (2015) or Brazdilova, M., Svarcova, P. (2015).

The overall development of various types of income in the period under review led to the fact that income inequality appears to be stable. This conclusion is consistent with other studies, e.g., Ptáčková, Z. (2022).

## Acknowledgment

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