

The Nexus between Income Inequality and Employment in Industry in the USA

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Abstract

The article is devoted to the analysis of the relationship between market income inequality in the USA and the employment in the US industrial sector. The main idea of the paper is as follows: changes in the share of employment in industry is a key factor of market income inequality in the USA. A decrease in demand for industrial workers and, as a consequence, a decline in the level of employment in industry result in higher levels of market income inequality, as it is demonstrated by the regression analysis. Such a decline is, in its turn, caused by technological progress, trade liberalization, socio-economic and political features of the USA.

Keywords: income inequality, industrial sector, employment structure, income distribution.

JEL Classification: D63, J21.

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1. Introduction

The problem of income inequality in the United States is one of the most acute social and economic problems in modern American society. High inequality polarizes the United States (Stiglitz, 2012), threatens its democracy (Stiglitz, 2015): with increasing inequality, the richest part of the population (1%) has more levers of influence on political elites; the “American dream” is losing its original meaning² (Fogli, 2019), and economists are arguing about the impact of high inequality on crises, including the 2008 financial crisis (Krugman, 2010). Undoubtedly, the increase in income inequality also affects the medical indicators of the population: in particular, the shrinking middle class now has less time and financial resources to maintain physical activity and have an appropriate rest (Matthew & Brodersen, 2019), that leads to a deteriorating health. American economist P. Krugman (2009: p. 9) emphasizes that the growth of inequality in the United States is higher than in other developed economies, and therefore concludes that political changes are a key factor in the growth of inequality in the United States. However, this article is devoted to the analysis of market income inequality (i.e. income before taxes and transfers is considered), rather than disposable income inequality among American households. The aim of the article is to demonstrate that a decrease in the share of

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² However, there are also studies (e.g.: Bloome, 2015) proving the absence of a significant relationship between economic inequality and intergenerational social mobility.

employment in the industrial sector leads to an increase in market income inequality in the United States. Therefore, the key factor of the growth of inequality in the United States is changes in the structure of employment – that is the main thesis of the paper. To prove this point, a regression analysis is used.

2. Theoretical overview

Structural changes in the economy were considered in terms of their impact on income inequality by the American economist S Kuznets. In the paper "Economic growth and income inequality" (1955), S Kuznets analyzes groups of factors that cause fluctuations in income distribution. Kuznets' hypothesis can be formulated as follows: inequality in income distribution first increases, then decreases as the economy develops, and, as a result, inequality will remain at a low level in developed economies. Among the reasons for this process, S Kuznets, in particular, highlights the very nature of a dynamically developing economy (Kuznets, 1955: p. 10): due to technological development, new industries are emerging, and old industries are experiencing a decline accordingly. In parallel, there is also a movement of labor from low-paid to high-paid, mainly new industries. S Kuznets published his work in 1955, when such a movement of labor was associated with less difficulties, since in a modern economy workers would need more time and resources to change their specializations or upgrade their skills. Kuznets's assumption about reducing inequality as the economy develops has not been justified, and his forecast is especially far from being realized if we consider the period from the 1980s to the present moment in developed economies. In this regard, economist B. Milanovich (2016) refined the assumptions of S Kuznets and proposed "Kuznets waves" instead of the Kuznets curve: the period of decreasing inequality in developed economies until the 1980s was replaced by a phase of its growth due to the action of a group of factors that B. Milanovich calls "TOP": technological progress, openness (in the meaning of trade liberalization), policy. The impact of trade liberalization and globalization on the economies of various countries, on the structure of these economies and on income inequality is assessed by researchers in different ways depending on the region, the degree of economic development and the functioning of the institutions of the country selected for analysis. For example, in the works of Asteriou et al. (2014), Bergh and Nilsson (2010), Dreher and Gaston (2008), globalization is assessed as a phenomenon that negatively affects the level of inequality (i.e. the level of inequality increases with the acceleration of globalization). As for American scientists (e.g.: Burtless, 1996), during the period of accelerating globalization in the late 1990s, trade liberalization was recognized by them as one of the reasons for increasing income inequality, but was not considered as a decisive factor. Relatively recent opinion polls (Horowitz et al., 2020) show that more and more Americans (more than 4 out of 10) believe that trade liberalization,

specifically the outsourcing of jobs to other countries, is the main reason for the growth of inequality in the United States, surpassing technological progress in terms of its impact. Other scientists (for example, Harjes (2007: p. 9-10)) deny the existence of a direct relationship between globalization and income inequality and give other explanations (such as changes in labor markets) for the growth of inequality in developed countries, and some economists (for instance, Sato and Fukushige (2009)) state that the extent of the impact of globalization on inequality depends on which aspects of globalization are considered as determinants of inequality. In some articles (Adams and Klobodu (2019), Ghosh et al. (2022), etc.), trade liberalization is given a positive role in overcoming inequality in income distribution, and changes in the structure of economy themselves are not considered as having a clear and significant impact on the level of inequality. It is also necessary to mention the papers of Mehic (2018) and Storchevoi (2024), in which changes in the structure of employment, i.e. the reduction in the number of jobs in the industrial sector, are defined as one of the main factors of increasing inequality in developed countries, while the changes themselves are mainly caused by technological progress and globalization.

3. Data and econometric model

The data sources used in the article are the US Bureau of Labor Statistics³ and the 'Our World in Data' portal (Hasell, 2023), which takes estimates and data from the Organization for Economic Cooperation and Development (OECD) as a basis. Despite the reliability of the sources, it should be remembered that there are statistical errors. The share of employment in the industrial sector for a particular year is a quotient of the number of manufacturing jobs and the number of total nonfarm jobs for this year. The relationship between inequality in the distribution of market income and employment in the industrial sector has been demonstrated using regression analysis. The ordinary least squares (OLS) method was used to estimate the regression equation.

Table 1. Data on market income inequality and share of employment in the industrial sector in the USA

Year	Gini index (market income before taxes and transfers; from 0 to 1)	Share of employment in the industrial sector (from 0 to 1)
1971	0,400	0,2386
1972	0,410	0,2412

³ See: Federal Reserve Bank of St. Louis. *Current Employment Statistics (Establishment Survey). Manufacturing*. Available at: <<https://fred.stlouisfed.org/series/MANEMP>> (Accessed: 11 August 2024).

Year	Gini index (market income before taxes and transfers; from 0 to 1)	Share of employment in the industrial sector (from 0 to 1)
1973	0,408	0,2412
1974	0,409	0,2278
1975	0,422	0,2197
1976	0,419	0,2203
1977	0,422	0,2195
1978	0,417	0,2180
1979	0,419	0,2129
1980	0,424	0,2050
1981	0,429	0,2005
1982	0,442	0,1880
1983	0,446	0,1903
1984	0,440	0,1875
1985	0,445	0,1794
1986	0,447	0,1739
1987	0,449	0,1718
1988	0,451	0,1686
1989	0,454	0,1643
1990	0,453	0,1593
1991	0,456	0,1562
1992	0,464	0,1531
1993	0,489	0,1497
1994	0,487	0,1482
1995	0,482	0,1456
1996	0,483	0,1427
1997	0,486	0,1412
1998	0,480	0,1367
1999	0,480	0,1321
2000	0,480	0,1295
2001	0,486	0,1199
2002	0,484	0,1143
2003	0,487	0,1095

Year	Gini index (market income before taxes and transfers; from 0 to 1)	Share of employment in the industrial sector (from 0 to 1)
2004	0,488	0,1077
2005	0,491	0,1050
2006	0,491	0,1021
2007	0,483	0,0993
2008	0,492	0,0953
2009	0,504	0,0884
2010	0,505	0,0886
2011	0,513	0,0888
2012	0,512	0,0885
2013	0,508	0,0880
2014	0,508	0,0876
2015	0,507	0,0864
2016	0,507	0,0850
2017	0,506	0,0850
2018	0,506	0,0854
2019	0,505	0,0843
2020	0,521	0,0856
2021	0,517	0,0840
2022	0,512	0,0838

Source: Author's calculations on the base of Hasell (2023) and Federal Bank of St. Louis data.

There is a strong negative correlation (a correlation coefficient equals -0,98) between variables.

The econometric model is as follows:

$$Y_t = \alpha + \beta_1 X_t + \varepsilon_t, \quad (1)$$

where:

Y denotes Gini index (market income, before taxes and transfers, from 0 to 1), X is the share of employment in the industrial sector (from 0 to 1), t is a period of observations.

Figure 1. Regression Analysis Results

<i>Regression statistics</i>	
Multiple R	0,97844416
R Square	0,95735298
Adjusted R Square	0,95650004
Standard Error	0,00736527
Observations	52

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0,06088787	0,06088787	1122,41491	6,4061E-36
Residual	50	0,00271236	5,4247E-05		
Total	51	0,06360023			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0,56578463	0,00304357	185,895255	1,111E-72	0,55967145	0,57189782
Share of empl.	-0,6637229	0,01981117	-33,502461	6,4061E-36	-0,7035148	-0,623931

The regression equation is as follows:

$$\hat{Y}_t = 0,5658 - 0,6637X_t \quad (2)$$

$R^2 = 0,9573$ means that 95,73% of variation of Gini index before taxes and transfers in the USA (Y_t) can be explained by the share of employment in industrial sector (X_t). P-values of the coefficients are less than a significance level $\alpha=0,01$; modulo *t-stats* of all coefficients are greater than $t_{crit} = 2,67779327$, i.e. $H_0: \beta_1 = 0$ is rejected, and there is a statistically significant relationship between variables. Consequently, all regression coefficients are significant at the 1% significance level. There is no need to provide F-test results in the case of the simple linear regression, as F-stats equals t-stats squared here, and $F_{crit} = t_{crit}^2$.

4. Conclusions

Changes in the employment structure of the American economy, as shown by the results of regression analysis, significantly affect market income inequality in the United States (a strong negative relationship), however, these changes do not occur by themselves, but they are caused by the action of certain economic and partly political forces. These forces primarily include globalization in the sense of trade liberalization, which has led to the outflow of capital from the United States to countries with cheap resources and workforce (China, India and other, mainly Asian, countries), as well as with a large sales market. In many respects, the reason for these effects of globalization is the course of "Reaganomics": under the presidency of R Reagan, the American economy went through great changes – the processes, that most strongly influenced the employment structure, are the deregulation of financial markets and trade liberalization. The result was rapid economic growth, but there were also negative effects - capital outflow from the United States (according to the World Bank data⁴, the values of net FDI flows in the USA were negative during the whole R Reagan's presidency (1981-1989), while they had been positive for the 1970-1980 period) and an increase in income inequality in the country. In the following decades, the second effect intensified, as we can see from the Table 1.

The shift of the center of gravity in the employment structure from the industrial sector to the service sector also implies a greater dispersion in workers' wages, since the service sector is much more heterogeneous and includes a huge number of specializations: from low-skilled maintenance staff to highly paid specialists with higher education (managers, bankers, IT specialists, etc.). Despite the fact that the "managerial form" of capitalism developed at the turn of the XIX-XX centuries in the USA (Remini, 2009), a bounce in the amount of bonuses to managers⁵ has occurred at the end of the XX-beginning of the XXI century, and these bonuses are still growing, especially in the financial sector (Piketty (2017), Stiglitz (2012), Wolf (2015)). It is also important to mention that the cost of higher education at American universities and colleges is also growing, therefore, it is increasingly difficult for people from families with lower-than-average incomes to get a quality education. An equal level of education is one of the pillars of the middle class, and the education factor is often identified as one of the key factors reducing income

⁴ World Bank Group. *Foreign Direct Investment, net (BoP, current US\$) – United States*. International Monetary Fund, Balance of Payments Statistics Yearbook and data files. Available at: <https://data.worldbank.org/indicator/BN.KLT.DINV.CD?locations=US> (Accessed: 13 October 2024).

⁵ The impact of rising salaries and other income of CEOs (executive pay) on income inequality in the United States is also highlighted in Polacko's work (2021).

inequality, especially in egalitarian countries (e.g.: Becker & Chiswick, 1966). As a result, with the increase in the cost of higher education, one of the pillars (i.e. equal educational opportunities), which the well-being of the middle class is based on, is being undermined.

The United States is one of the most technologically advanced countries, that cannot but affect the American industrial sector. Thus, according to the International Federation of Robotics⁶, the United States is among the leaders in the field of automation and robotization of industrial production, that, in its turn, reduces the demand of the industrial sector for labor (especially for low-skilled one). As a result, the employment rate in the industrial sector is falling, and the level of market income inequality is growing.

Finally, it should be noted that the role and influence of trade unions in the United States is generally lower than in European countries⁷, that is confirmed by the OECD data⁸. In addition, the positions of left-wing political parties, like the European Social Democratic parties, are not strong in the United States, hence, it is not possible to discuss their impact on income distribution.

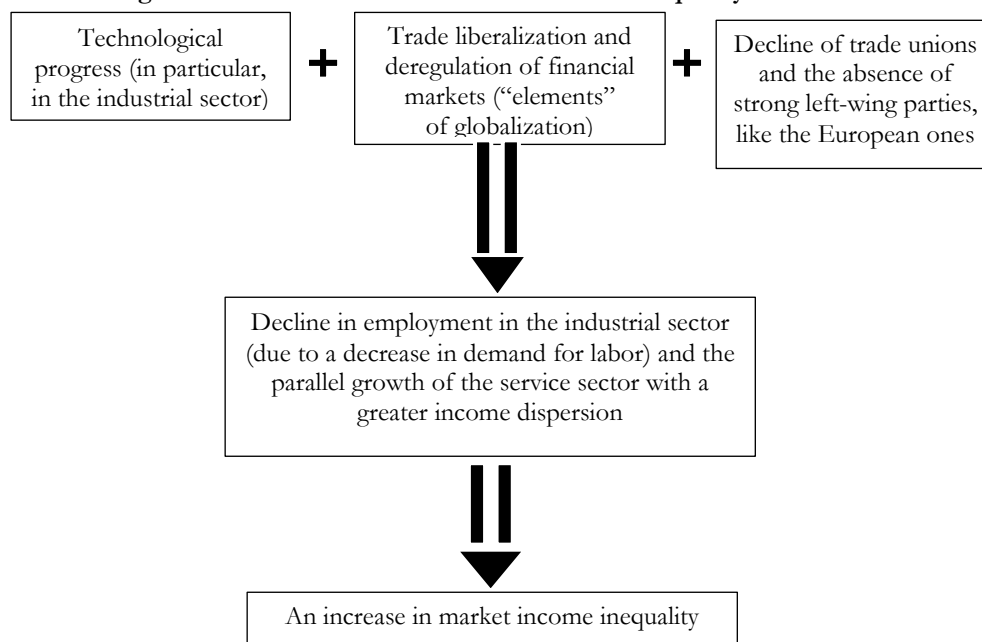
To summarize, we can state that there is a strong negative relationship between the level of employment in the industrial sector and market income inequality in the United States, as evidenced by the results of correlation and regression analyses, and this relationship, in turn, is caused mainly by factors of globalization and technological progress, as well as by socio-political features of the United States. The decline in employment in the industrial sector is accompanied by an increase in employment in the service sector, which has greater heterogeneity and a large spread in incomes. Thus, we can conclude that the structure of employment plays a key role in the market income distribution in the United States.

⁶ See the reports at: International Federation of Robotics. *World Robotics - Industrial Robots*. Available at: <https://ifr.org/wr-industrial-robots/> (Accessed: 13 October 2024).

⁷ However, there are articles in which the decline of trade unions, coupled with a drop in real minimum wages, is considered as one of the key factors of the inequality growth in the United States. See: Krystal & Cohen, 2017 (here the authors conclude that these factors explain about 50% of the changes in income inequality in the United States).

⁸ OECD. *Trade Unions: Trade union density*. OECD Employment and Labour Market Statistics (database). DOI: <<https://doi.org/10.1787/data-00371-en>> (Accessed: 13 October 2024).

Figure 2. Scheme of factors of market income inequality in the USA



At the same time, it should be taken into account the fact that technological progress, automation, robotization and AI creation processes are proceeding rapidly, the structure of the industrial sector itself is changing, the nature of labor is being transformed, and, as a result, the model, built in this article, may become irrelevant in the near future. Nevertheless, at the moment, the governmental policy on job creation in industry retains the status of an issue of paramount importance and is still able to significantly affect the distribution of market income in the United States.

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