Chapter 2

Income Inequality and Industrial Sector Employment: Evidence From Türkiye

Özge Arpacıoğlu Özdemir[1]

Abstract

Income inequality is a significant issue with both economic and social dimensions in Türkiye as well as all over the world. The accurate analysis of the relationship between income distribution, the factors affecting it and the direction in which this relationship progresses is essential for the implementation of necessary policies to eliminate inequality. This study aims to investigate the relationship between industrial sector employment and income inequality in Türkiye. In the study, industrial sector employment and income inequality for the period 2000-2024 have been analyzed by using time series analysis. Engle-Granger co-integration test and Engle-Granger causality test methods have been used in the analysis. In addition, the results provide useful insights, particularly for countries like Türkiye that are still undergoing structural transformation. Income inequality should be considered not only as an outcome of labor market conditions, but also as a factor shaping employment patterns in the industrial sector. So, policies to reduce inequality should not focus only on increasing employment. Education, skill development, and wage distribution also need to be taken into account. Improving the quality of industrial jobs and supporting a more balanced income distribution may contribute to a more stable and sustainable economic structure.

1. INTRODUCTION

Economic activity is generally classified into three main sectors: agriculture, industry, and services. In 2024, 57.9% of those employed in Türkiye are in the services sector, 14.8% are in agriculture, 6.3% in construction, and 21.2% in industry.

1 Dr. Öğr. Üyesi, Gaziantep Üniversitesi, Sosyal Bilimler MYO, Yönetim ve Organizasyon Bölümü, arpaciogluozge@gmail.com, 0000-0002-2424-8700

https://doi.org/10.58830/ozgur.pub1347.c5426

The emphasis on industrial sector employment stems from Türkiye's ongoing structural transformation process. Industrial employment represents a transitional stage between agricultural and the service sector employment and plays a critical role in shaping labor market outcomes in developing and middle-income countries, such as Türkiye.

Unlike agricultural employment, which has low productivity, and service sector employment, which can exhibit heterogeneous wage structures, industrial employment is a distinct employment sector in terms of providing more stable income. Therefore, changes in industrial employment are expected to have significant effects on income distribution.

Furthermore, whereas the majority of previous studies focus on the relationship between income inequality and total employment or service sector employment, studies focusing specifically on industrial sector employment remain relatively limited. Therefore, this study examines the relationship between income inequality and industrial sector employment within the framework of Türkiye's structural transformation.

This study examines the long-term relationship and the direction of causality between income inequality and industrial sector employment in Türkiye. The present study extends the literature by concentrating on a single-country case, specifically Türkiye, and by examining the role of industrial sector employment rather than total or service sector employment within a time series framework.

2. THEORETICAL FRAMEWORK

Employment trends in Türkiye can be better understood through recent data. Figure 1 presents the employment rate in Türkiye for the period 2015–2024.

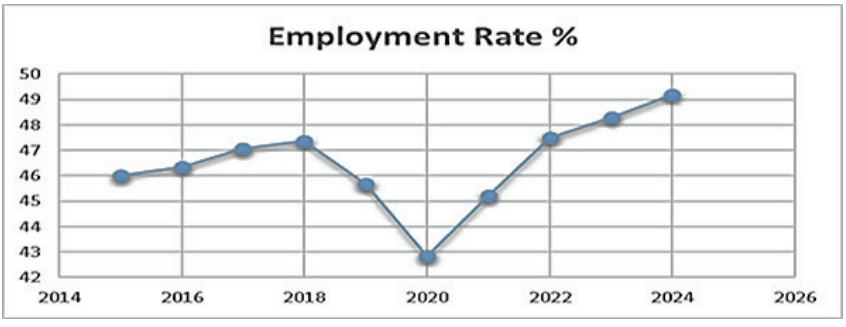

Figure 1. Employment Rate in Türkiye, 2015-2024

Note: Data from ILO (2024).

The sectoral structure of employment plays a key role in the development of a country. The three-sector theory of W. Arthur Lewis, one of the pioneers of development economics, states that prior to economic development, employment was concentrated in the agricultural sector, and with development, it gradually shifted to the industrial sector and then to the services sector.

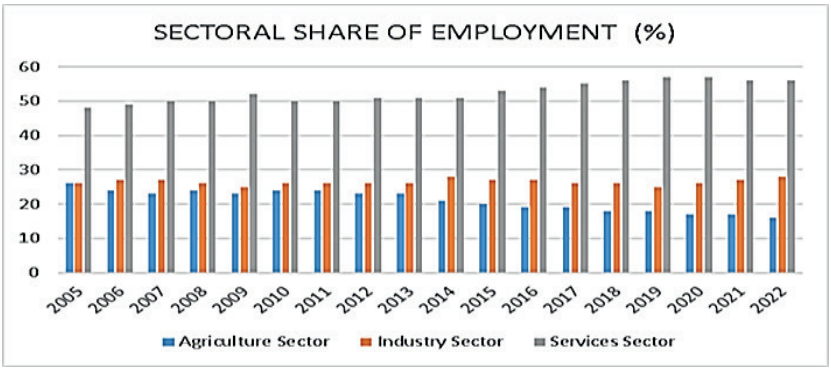

Figure 2. Sectoral Distribution of Employment in Türkiye, 2005-2022

Note: Data from ILO (2024)

In 2005, when the sectoral structure of employment in Türkiye was analyzed, as shown in Figure 2, the employment rate in agriculture and industry (around 26%) were almost equal to each other. In spite of that, the employment rate in the service sector is around 48%, which is more than twice the employment rate in other sectors. Although employment in the service sector is higher than employment in other sectors in the period between 2005 and 2022, it has gradually increased, particularly after 2015. These findings indicate that the employment gap in the agricultural and industrial sector has widened further after 2016 and a significant portion of agricultural employment has shifted towards the industrial sector especially in 2022. This trend is consistent with the process of structural transformation.

2.1. Income Inequality

The 2022 World Inequality Report indicates that while the richest 1% of the world population doubled their wealth as a result of the 2020 pandemic, 160 million people were pushed into poverty. The report also shows that income distribution is a critical issue that has not only economic but also social aspects. Even though there are many methods used to measure income distribution, one of the most frequently adopted measures in the literature

is the Gini coefficient. Corrado Gini (1884-1965) was an Italian statistician who introduced the Gini coefficient.

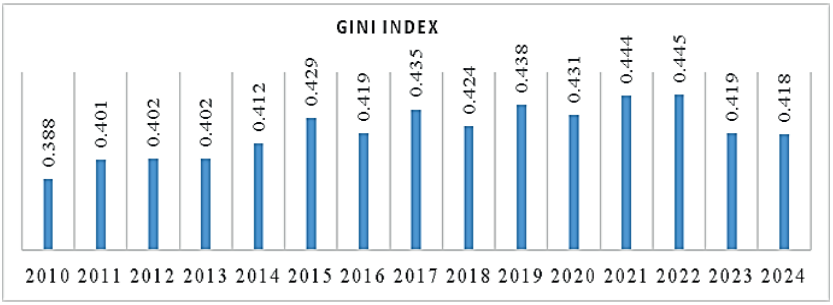

Figure 3. Gini Coefficient in Türkiye, 2010-2024

Note: Data from WB (2024)

Figure 3 presents the Gini coefficient in Türkiye for the period 2010–2024. The year with the lowest income inequality was 2010, with a Gini coefficient value of 0.388. The highest level of income inequality in the last 15 years occurred in 2022. In 2022, the Gini coefficient increased compared to previous years and reached a value of 0.445. The report further indicates that, the richest 10% of the population in Türkiye received 54.5% of the total income, while the poorest 50% received merely 12% of the income. Income inequality decreased during the period from 1980 to1990, but gradually increased in the last 15 years. In the period from 2018-2021, average income in all population groups declined due to economic contraction. In the report, which also examines wealth inequality, in 2021, the poorest 50%, the middle 40% and the richest 10% of the population held 4%, 29% and 68% of the total national wealth, respectively, and this distribution indicates that a notable portion of the population in Türkiye still lives in poverty (World Inequality Report, 2022).

2.2. Mechanisms Linking Income Inequality and Industrial Sector Employment

Income inequality and industrial sector employment may be connected through several economic and social mechanisms. One important channel operates through the wage structure of the industrial sector. In economies where income inequality is high, industrial employment often expands in low-wage and labor-intensive segments. This expansion may increase the level of employment without generating an equalizing effect on income distribution. Under such conditions, the industrial sector absorbs labor within unequal

wage structures, which limits its potential contribution to reducing income inequality.

A second channel operates through human capital accumulation and access to industrial employment. High levels of income inequality tend to restrict access to education and skill acquisition for lower-income groups. This constraint affects not only employment opportunities but also the quality and productivity of industrial jobs. Consequently, income inequality may influence industrial sector employment by shaping the composition of employment rather than the overall employment level.

A third channel is associated with aggregate demand and investment dynamics. Higher income inequality weakens domestic demand, which may reduce incentives for productive industrial investment. This situation can negatively affect industrial employment decisions and slow down the process of structural transformation. Accordingly, the interaction between income inequality and industrial sector employment may also run from inequality to employment. Within this framework, examining the causal relationship between income inequality and industrial sector employment is essential for understanding the dynamics of structural transformation and labor market outcomes in Türkiye.

3. LITERATURE REVIEW

This section summarizes empirical studies examining the association between income inequality and employment. While a significant portion of the existing literature focuses on the relationship between income inequality and total employment or employment in the service sector, studies that directly address employment in the industrial sector are relatively limited. Furthermore, the findings obtained in the literature vary depending on the structural characteristics of countries, their levels of development, and the methods used. In this context, the studies listed below address the association between income inequality and sectoral employment in the context of different countries and methods; they help position the current study's country-specific approach focused on industrial sector employment.

3.1. Studies Suggesting Service Sector Employment Increases Income Inequality

Nelson & Lorence (1985) found that employment in the service sector significantly increased income inequality in major metropolitan areas in the United States. Tahsin and Börü (2020) in their study examining the association between income inequality and employment levels in the industrial and service

sectors in Türkiye during the 2006–2018 period using panel data analysis, concluded that the explanatory power of industrial employment for income inequality weakened, while the explanatory power of service sector employment strengthened, and that service sector employment contributed to an increase in income inequality.

3.2. Studies Suggesting Industrial Sector Employment Reduces Income Inequality

Mehic (2018) analyzed industrial employment and income inequality in 27 high- and middle-income countries for the period 1991- 2014 by employing a dynamic panel data method and found that there is a significant inverse relationship between industrial employment and income distribution and that middle-income countries are mostly affected by income inequality. Samadi & Abolhasani (2021) examined the impact of industrial sector employment on income inequality in Middle Eastern countries for the period 2000-2018 using panel data analysis and demonstrated that industrial sector employment is negatively associated with income inequality.

3.3. Studies with Mixed or Country-Specific Findings

Cafri (2017) analyzed the relationship between the value-added of the agricultural and service sector and income inequality in Türkiye for the period 1978-2016 using symmetric and asymmetric causality methods. The results indicate that no causal link exists between the agricultural sector and inequality, while a symmetric unidirectional causal relationship between income inequality and the service sector. Under asymmetric conditions, a bidirectional causal relationship is observed. Raeskyesa (2020) analyzed sectoral growth and income inequality in ASEAN countries and found that the share of agriculture sector is negatively associated with income inequality. Eren (2025) analyzed income distribution dynamics in Türkiye through wage income. Cointegration and causality tests were applied using time series data. The findings indicate that the wage structure plays a significant role in determining income inequality.

3.4. Other Related Empirical Studies

Tansel (2012) examined wage inequality in Türkiye by sector and education level. The quantile regression method was applied using microdata. The findings show significant wage differences in the industrial sector. Töngür and Elveren (2014) analyzed the relationship between unionization and wage inequality in OECD countries using panel data and the Granger causality test. The findings show a causal ralationship between unionization and wage inequality. Elveren and Özgür (2016) analyzed the relationship between

income inequality and the informal economy in Türkiye. The study used annual data from 1970 to 2011 and analyzed long-term relationships using the ARDL bounds test. The findings show that the informal economy increases income inequality.

This study provides country-specific evidence from Türkiye by focusing explicitly on industrial sector employment rather than total or service sector employment. It examines the relationship between income inequality and industrial sector employment in Türkiye, a country that has experienced significant structural transformation in recent decades, and uses a time series framework to complement previous panel data studies that examine broader cross-country relationships.

The findings reveal a unidirectional causality running from income inequality to industrial sector employment. This result highlights the role of distributional factors as determinants of employment outcomes and offers an alternative perspective to studies that emphasize the impact of employment on income inequality.

Empirical literature shows that the relationship between sectoral employment and income inequality varies across countries and stages of development. While some studies emphasize that industrial sector employment balances income distribution, others indicate that the service sector impact on income distribution is increasing. These differences indicate that country-specific structural characteristics are decisive in the effect of sectoral employment on income inequality. In countries undergoing structural transformation, such as Türkiye, country specific analyses are needed to better understand this relationship.

4. EMPIRICAL ANALYSIS

4.1. Data Set and Variables

Annual data for the period 2000-2024 were utilized in the study. The variables used in the study, their data sources, and their definitions are presented in Table 1.

Table 1 Variables and Definitions

Variables	Definition	Data Source
GINI	It is a statistical measure of income distribution that represents the degree of income inequality within the total population.	World Bank (WB)
LNEIND	Share of individuals employed in the industrial sector within total employment (%)	International Labour Organization (ILO)

4.2. Methodology

The relationship between income inequality and industrial sector employment is investigated using Engle-Granger cointegration and Granger causality tests. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were employed at the first stage to determine the stationarity properties of the series.

The hypotheses required for testing time series analysis are expressed as follows;

$H_0: \gamma_0 = 0$, Yt series is non-stationary, there is a unit root in the series.

$H_1: \gamma_0 \neq 0$, Yt series is stationary, there is no unit root in the series.

The rejection of the null hypotheses indicates that the series is stationary. Unless the null hypotheses is rejected, the series is considered to contain a unit root. In this study, the presence of unit roots in the series was examined using the Phillips and Perron (1988) and ADF tests. In the second stage of the study, the existence of cointegration between the series indicates that they move together in the long run. In the study, the Engle-Granger test was applied as the co-integration analysis. In fact, the Engle-Granger test is more commonly preferred in bivariate models (Halaç & Şaşmaz, 2017). In the case of multiple cointegration relationships, the Engle-Granger method is not appropriate for distinguishing among them. The application of this method requires both variables to be stationary at the same level. According to the results of the ADF unit root test applied, the dependent and independent variables used in the study are I(1) stationary at the first difference, not at the level. Therefore, the use of the Engle- Granger method was considered appropriate for the study.

For the Engle-Granger cointegration test, a regression equation was first formulated using the level values of the series based on the ordinary least squares (OLS) method. In the next step, the error terms (residuals) of the

regression equation were obtained, and the ADF test was applied to the error terms of the equation.

The existence of cointegration between the variables indicates that a unidirectional or bidirectional Granger causality relationship may also exist. Granger (1969) defined causality as follows: "X is the Granger cause of Y if the prediction of Y is more successful when past values of X are used compared to when past values of X are not utilized". After testing the accuracy of this definition, the relationship is denoted as X→Y (Granger,1988, p.554). In the final part of the study, the Granger causality test was applied.

The empirical methodology employed in this study is designed in line with the scope of the analysis and the time series properties of the data. Given the bivariate structure of the model and the integration order of the variables, the Engle–Granger cointegration approach is considered appropriate for examining the existence of a long-run equilibrium relationship. The Engle–Granger method is widely used in studies focusing on two-variable systems and offers a straightforward framework for analyzing long-run dynamics. Although alternative econometric techniques such as the ARDL bounds testing approach or the Toda–Yamamoto causality test could be employed, the present study prioritizes methodological consistency and simplicity. Moreover, the relatively limited number of annual observations imposes a significant constraint on the selection of more parameter- intensive models. Future research may extend the analysis by employing alternative methodologies or higher- frequency data to test the robustness of the results.

This study is subject to certain data limitations that should be considered when interpreting the findings. The analysis is based on annual data covering the period between 2000 and 2024, resulting in a relatively limited number of observations. Although the selected period is sufficient to examine long-run relationships, the relatively small sample size may reduce the power of econometric tests and restrict the generalizability of the results.

In addition, the use of annual data may conceal short-term fluctuations and sector-specific shocks that could affect both income inequality and industrial sector employment. Therefore, the findings should be interpreted with caution and regarded as indicative of long- run tendencies rather than short-term dynamics. Future studies may extend the analysis by using higher-frequency data or incorporating additional variables to further strengthen the empirical framework.

4.3. Analysis Results

The model employed in the study is specified as follows;

$$GINI = \beta_0 + \beta_1 LNEIND_t + \varepsilon_t \quad (1)$$

In the model, GINI is one of the most widely used indices for measuring income inequality. The index measures inequality on a scale from 0 to 1. Higher values indicate higher inequality and lower values indicate less inequality. In the equation, β represents the parameters and ε denotes the error term. Stationarity tests were conducted in the study and the results are presented in Table 2.

Table 2 ADF Unit Root Test Results

Variables	Model	t-statistic	1% Critical Value	5 % Critical Value	10 % Critical Value	Prob.
GINI	Intercept	-2.3867	-3.7529	-2.9980	-2.6387	0.1561
	Trend and Intercept	-1.6978	-4.4164	-3.6220	-3.2485	0.7193
	No trend, intercept	-0.5159	-2.6693	-1.9564	-1.6084	0.4819
LNEIND	Intercept	-2.4407	-3.8315	-3.0299	-2.6551	0.1446
	Trend and Intercept	-2.1512	-4.3943	-3.6121	-3.2430	0.4933
	No trend, intercept	0.7707	-2.6648	-1.9556	-1.6087	0.8734
ΔGINI	Intercept	-5.5108	-3.7529	-2.9980	-2.6387	0.0001
	Trend and Intercept	-6.7225	-4.4163	-3.6220	-3.2485	0.0001
	No trend, intercept	-5.6001	-2.6693	-1.9564	-1.6084	0.0000
ΔLNEIND	Intercept	-5.1409	-3.8315	-3.0299	-2.6551	0.0006
	Trend and Intercept	-5.3141	-4.5325	-3.6736	-3.2773	0.0022
	No trend, intercept	-4.6804	-2.6693	-1.9564	-1.6084	0.0001

Note: The Schwarz information criterion is applied in determining the appropriate lag length, and Δ indicates that the series is expressed in first differences.

The results indicate that the GINI and LNEIND variables are non stationary at their level in all three model specifications, indicating the presence of unit roots. As reported in Table 2, both variables become stationary after taking first differences.

Table 3 Phillips Perron Unit Root Test Results

Variables	Model	t-statistic	1% Critical Value	5% Critical Value	10% Critical Value	Prob.
GINI	Intercept	-2.2634	-3.7378	-2.9918	-2.6355	0.1909
	Trend, Intercept	-1.4416	-4.3943	-3.6121	-3.2430	0.8212
	No trend, intercept	-0.4977	-2.6648	-1.9556	-1.6082	0.4898
LNEIND	Intercept	-1.6570	-3.7378	-2.9918	-2.6351	0.4393
	Trend, Intercept	-2.1512	-4.3943	-3.6121	-3.2430	0.4933
	No trend, intercept	0.7920	-2.6648	-1.9556	-1.6087	0.8773
ΔGINI	Intercept	-5.5023	-3.7529	-2.99806	-2.6387	0.0001
	Trend, Intercept	-8.8341	-4.4163	-3.62203	-3.2485	0.0000
	No trend, intercept	-5.5903	-2.6693	-1.95640	-1.6084	0.0000
ΔLNEIND	Intercept	-4.8761	-3.7529	-2.9980	-2.6387	0.0007
	Trend, Intercept	-5.0133	-4.4163	-3.6220	-3.2485	0.0028
	No trend, intercept	-4.6786	-2.6693	-1.9565	-1.6084	0.0001

Note: The Phillips-Perron unit root test is applied. Δ denotes the first difference of the series.

The results of the Phillips Perron unit root test are consistent with the ADF test findings. In all three models, the variables contain a unit root at their levels, while Table 3 shows that they become stationary after taking first differences. Since the conditions of Engle-Granger co-integration analysis were satisfied, the analysis proceeded to the next stage.

Table 4 Engle-Granger Cointegration Test Results

Model	Prob.	t-statistic	1 % Critical Value	5 % Critical Value	10 % Critical Value
Intercept	0.0000	-6.1590	-3.7529*	-2.9980**	-2.6387***
Trend, Intercept	0.0000	-7.5287	-4.4163*	-3.6220**	-3.2485***
No intercept no trend	0.0000	-6.3026	-2.6693*	-1.9564**	-1.6084***

Note: *,**,and denote statistical significance at the 1%, 5%, and 10% levels.***

Table 4 presents the findings obtained from the Engle-Granger cointegration analysis. The Engle-Granger cointegration test results indicate that the probability values of the residual series in all three models are below the 0.05 significance level, impliying stationary. This finding suggests that the two variables are cointegrated in the long run, indicating the existence of a long run equilibrium relationship in which they tend to move together over time.

Table 5 The Optimal Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	100.75	NA	6.39e-07	-8.5875	-8.4887	-8.562
1	122.26	37.40163*	1.40e-07*	-10.109*	-9.8135*	-10.03*
2	125.96	5.799136	1.45e-07	-10.084	-9.5904	-9.959

Note: * indicates the lag length selected by the corresponding criterion

For the Granger causality test, it is necessary to determine the optimal lag length, as shown in Table 5 above. There are many methods for determining the appropriate lag length. The modified LR test statistic, the final prediction error (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SC), and the Hannan-Quinn information criterion (HQ) have all indicated the optimal lag length as one.

The hypothesis for the Granger causality test is as follows;

H_0: X does not Granger-cause Y

H_1: X Granger-causes Y

Table 6 below presents the findings obtained from the Granger causality test, which was applied to identify the direction of causality between the series.

Table 6 Granger Causality Results

Direction of Causality	Chi-square	Lag Length	Prob.
LNEIND⇒GINI	1.721065	1	0.1895
GINI⇒LNEIND	4.097552	1	0.0429

Note: The null hypothesis (H0) states that there is no Granger causality.

The null (H_0) hypothesis for the first direction is that LNEIND is not the cause of GINI. Since the p- value is greater than 0.05, The null (H_0) hypothesis can not be rejected. It is observed that there is no causal relationship from industrial sector employment to income inequality. Accordingly, industrial

sector employment does not Granger cause income inequality. The null (H_0) hypothesis of the second direction states that income inequality does not Granger cause industrial sector employment. Since the p-value is below 0.05, the null hypothesis is rejected. This indicates the existence of Granger causality from income inequality to industrial sector employment. In conclusion, the Granger causality test results indicate the existence of a unidirectional causality between the variables.

5. CONCLUSION

When examining the period between 2005 and 2022 in Türkiye, it is observed that a large portion of those employed in the agricultural sector shifted to the industrial sector in 2016 and thereafter.

Data obtained from the World Bank show that the difference between agricultural and industrial employment in Türkiye between 2005 and 2022 has gradually increased since 2016, indicating a significant increase in industrial employment over agriculture. When examining Türkiye's income inequality data between 2010 and 2024, it is evident that 2022 was the most unequal year. According to the 2022 World Inequality Report, the richest 10% of the population in Türkiye received 54.5% of the total income, while the poorest 50% received only 12% of the income. The report also states that income inequality in Turkey has increased over the last 15 years.

This study analyzes the relationship between industrial sector employment and income distribution in Türkiye between 2000 and 2024 and identifies a long-term relationship between the variables. The results indicate a one-way causal relationship between the variables based on the Granger causality test. In this regard, while no causality was found from industrial sector employment to income inequality, causality was found from income inequality to industrial sector employment. The results indicate that industrial sector employment is not a cause of income inequality, whereas income inequality is a cause of industrial sector employment.

Granger causality results showing a one-way relationship from income inequality to industrial sector employment can be explained within the framework of Türkiye's structural and institutional characteristics. The empirical result does not suggest that industrial employment is unrelated to income distribution, but rather shows that distribution conditions can shape employment outcomes in the industrial sector.

An environment with unequal income distribution may see industrial firms primarily expanding employment in low-wage positions, while higher-quality jobs that generate greater productivity may remain limited. Consequently,

income inequality can be a determinant of the structure and composition of industrial employment.

Furthermore, unequal income distribution can limit access to education and skills development, thereby affecting the workforce's ability to participate in industrial activities that generate higher added value. From this perspective, the causality from income inequality to industrial sector employment reflects the broader effects of changes in income distribution on the labor market rather than a direct relationship between employment and inequality.

The findings suggest various policy implications, particularly for Türkiye. The results show that employment growth in the industrial sector does not automatically lead to a reduction in income inequality, especially when employment growth is concentrated in low-wage and low-skilled positions. Therefore, policies targeting income inequality must go beyond simply increasing industrial employment. In this regard, complementary labor market and education policies can play an important role in increasing equality in industrial sector employment.

References

Abolhasani, M. J., & Samadi, S. (2021). Investigating and analyzing the impact of employment in industry on income inequality. *Stable Economy Journal, 1(*1), 1–24. https://sedj.usb.ac.ir/article_6052.html?lang=en

Cafri, R. (2017). The effect of agriculture and service sectors on income inequality in Türkiye: Asymmetric causality analysis. *International Journal of Management Economics and Business, Special Issue,* 598–606. https://dergipark.org.tr/tr/pub/ijmeb/issue/54601/744500

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427–431. https://doi.org/10.1080/01621459.1979.10482531

Elveren, A. Y., & Özgür, G. (2016). The effect of informal economy on income inequality: Evidence from Turkey. Panoeconomicus, 63(3), 293–312. https://doi.org/10.2298/PAN1603293E

Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica,55*(2), 251–276. https://doi.org/10.2307/1913236

Gini, C. (1912). Variabilità e mutabilità. Bologna: C. Cuppini.

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica, 37*, 424-438. https://doi.org/10.2307/1912791

Granger, C. W. J. (1988). Causality, cointegration and control. *Journal of Economic Dynamics and Control, 12*, 551–559. https://doi.org/10.1016/0165-1889(88)90055-3

Halaç, U., & Şaşmaz, F. D. (2017). The relationship between industrial production and employment under structural breaks. *Business & Management Studies: An International Journal, 5*(3), 684–702. https://doi.org/10.15295/bmij.v5i3.151

International Labour Organization. (2024). *ILOSTAT database*. https://ilostat.ilo.org/

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School, 22*(2), 139–191.https://la.utexas.edu/users/hcleaver/368/368lewistable.pdf

Mehic, A. (2018). Industrial employment and income inequality: Evidence from panel data. *Structural Change and Economic Dynamics, 45,* 84–93. https://doi.org/10.1016/j.strueco.2018.02.006

Nelson, J. I., & Lorence, J. (1985). Employment in service activities and inequality in metropolitan areas. *Urban Affairs Quarterly, 21*(1), 106–125. https://doi.org/10.1177/004208168502100109

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335–346. https://doi.org/10.1093/biomet/75.2.335

Raeskyesa, D. G. S. (2020). Sectoral growth and income inequality in ASEAN-5 countries. Journal of ASEAN Studies, 8(1), 1–13. https://doi.org/10.21512/jas.v8i1.6435

Tahsin, E., & Börü, F. (2020). Structural transformation, income inequality and employment linkages in Turkish regions. *Journal of Economy Culture and Society, 62*, 91–121. https://doi.org/10.26650/JECS2020-0020

Tansel, A. (2012). Wage inequality in Turkey: Decomposition by gender and sector. *Review of Income and Wealth, 58*(3), 467–493.https://doi.org/10.1111/j.1475 4991.2012.00518.x

Töngür, Ü., & Elveren, A. Y. (2014). Deunionization and pay inequality in OECD Countries: A panel Granger causality approach*, 38*, 417–425. https://doi.org/10.2298/PAN1403289T

World Bank. (2024). *World Development Indicators*. https://data.worldbank.org/

World Inequality Lab. (2022). *World Inequality Report 2022*. https://wir2022.wid.world/