

The Effect of Sectoral Employment on Labor Productivity

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ARTICLE INFO	ABSTRACT
Keywords: Labor Productivity Sectoral Employment Panel Data Analysis OECD Countries Received 22 September 2024 Revised 22 January 2026 Accepted 1 February 2026 Article Classification: Research Article	Purpose – The aim of this study is to analyze the relationship between sectoral employment and labor productivity in 32 selected OECD countries covering the years 2005 to 2022. Design/methodology/approach – The relationship between sectoral employment and labor productivity was tested with panel data analysis. Results – After deciding on the selection of the model and the basic problems, a positive relationship was found between labor productivity and agricultural and industrial employment rates as a result of the model established with the Parks-Kment estimator. However, it was concluded that there was a negative relationship between labor productivity and the service sector. Discussion – Since there is a higher effect between labor productivity and agricultural sector employment rates than service and industry employment rates, countries with high agricultural production should follow policies that encourage agriculture and workers in agriculture. Incentives for the industrial sector should also be increased, but service employment should remain in the background in terms of labor productivity.

1. Introduction

Many factors are effective in determining employment in the economy. Productivity has a large share among these factors. Productivity, which has more than one definition but is most commonly known, is an abstract concept used to measure the effect of the tools used to achieve economic goals (Akyıldız and Karabıçak, 2002: 60).

Productivity in country economies plays an important role in the increase of national welfare. Increasing productivity in a country signals that the country's economic growth and development are also increasing. The increase in productivity is an indicator that scarce resources are being used correctly in the face of unlimited economic needs. This increase shows that the factors of production are being used with greater benefit (Dogan, 2016: 23-25). In addition to the increase in Gross National Product, which is one of the indicators of the increase in national welfare, the increase in the factors of production and the increase in the quality of labor are among the reasons for the increase in productivity (Joseph, 2002: 7).

Input and labor costs are added to the expenses of goods and services produced in the market. Meeting these costs, both the use of intermediate goods, reaching final goods and the increase in the costs spent for all these depend on the efficiency obtained. Because, efficiency is the positive output obtained as a result of input. Therefore, the increase in efficiency is not only an indicator of the efficient use of resources, but also causes prices to fall. The decrease in the prices of both intermediate and final goods causes inflation to decrease and the welfare of the country to increase (Tsonas, 2003: 119).

There is also a connection between productivity and wages, which are factors in the decrease in prices. Low wages paid for labor negatively affect individuals' living standards. Regardless of the status of the employee, the low wages they receive cause them to reduce the effort they will give in return. The inadequacy of the employee's wage to meet their needs such as nutrition, education, health, and shelter reduces the standard of living of the individual and the people they live with. This situation also causes a decrease in per capita income. Individuals who cannot receive sufficient wages tend to quit their jobs, and injustice in income distribution and a decrease in employment are inevitable. As individuals quit their jobs, the productivity of

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employees begins to decrease day by day as more workload is left for the remaining employees. This situation poses a problem in the growth of the economy.

In addition to the decrease in productivity, the decrease in employment means that there are obstacles in reaching the ultimate goal of the country's economy. While employment in the broad sense is the use of all production factors, employment in the narrow sense is the use of the labor factor among the production factors. The increase in this use and its effectiveness in production causes an increase in employment.

The concept of employment is named by economists in three different groups as full, underemployment and overemployment. The effective use of production factors in production is called full, the incomplete use is called underemployment and the excess use is called overemployment (Karakayalı, 2005: 12; Rehin and Masika, 1996: 113-115). The full use of employment is what is required in the economy. The full use of production factors and the correct provision of employment take the country's economy to the next level. The employment factor is among the basic building blocks of economic growth. Considering the sectoral effect of employment ensures that the effect of employment on economic growth is increased. Sectoral employment increases, generally called agriculture-industry-service sectors, are affected by the geopolitical, geographical and social structure of the country. For this reason, the effect of employment on labor productivity and growth is expected to be different on a sectoral basis.

The aim of this study is to examine the relationship between sectoral employment and labor productivity. Panel data analysis was used in the study in which the relationship between labor productivity and agriculture-industry-service employment rates of 32 selected OECD countries was analyzed. The fact that no study was found in which sectoral employment types were analyzed simultaneously adds originality to this study.

2. Indicators and Literature Research on Selected OECD Countries

In line with the purpose of the study, the labor productivity, agriculture-industry-service employment rate indicators of 32 OECD countries are shown in Tables 1, 2, 3 and 4. Since the indicators for the years 2005 and 2022 consist of close values on an annual basis, the changes for four years from 2006 to 2022 are given in the tables. Table 1 shows the labor productivity indicators of the countries in question. When the evaluation is made within the scope of the averages of the years shown in the table, it is concluded that Poland is the country with the highest labor productivity. Poland is followed by Ireland, Latvia, Costa Rica and Slovenia. In the average evaluation, it is revealed that Greece is the country with the lowest labor productivity. Luxembourg, Australia and France follow Greece.

Table 1: Labor Productivity Indicators in Selected OECD Countries

	2006	2010	2014	2018	2022
Australia	0,5	1,6	0,5	0,0	-1,9
Austria	2,6	1,5	0,4	0,5	2,3
Belgium	0,5	1,5	1,4	0,2	-1,3
Canada	1,3	1,1	2,9	0,1	-0,8
Costa Rica	3,9	11,7	2,5	1,8	-4,6
Czechia	6,2	2,3	1,2	1,4	-2,1
Denmark	1,3	3,9	1,6	2,2	-1,3
Estonia	5,0	5,4	2,6	6,5	-5,0
Finland	2,4	3,5	0,1	-1,2	-1,2
France	2,4	1,3	1,0	0,3	-1,5
Germany	1,6	2,3	1,0	0,2	0,5
Greece	4,3	-0,9	-0,6	-3,5	1,2
Hungary	3,6	1,5	-0,8	3,8	2,4
Iceland	2,6	-1,0	0,0	2,6	1,6
Ireland	1,7	6,2	5,3	4,4	0,5
Italy	-,2	2,3	0,1	0,0	-0,2
Japan	0,2	3,1	0,2	0,6	0,8
Latvia	6,6	3,3	2,7	1,8	3,3

Lithuania	8,2	5,7	1,9	2,2	-2,7
Luxembourg	2,1	1,7	-0,2	-1,7	-1,3
Netherlands	1,3	2,0	1,0	-0,,3	0,1
New Zeland	1,2	-0,9	-0,1	2,0	-0,9
Norway	-0,7	0,5	0,8	-0,8	-0,9
Poland	2,8	6,0	1,7	6,8	2,4
Portugal	1,9	3,0	-1,0	-0,1	6,1
Slovak Republic	5,5	7,1	1,6	3,0	-1,9
Slovenia	5,9	3,4	1,1	2,4	-1,4
Spain	0,6	2,5	0,3	-0,2	1,8
Sweden	2,9	3,4	1,2	0,4	0,4
Switzerland	2,5	5,5	1,0	2,3	1,2
United Kingdom	1,9	2,6	0,2	0,2	1,0
United States	0,9	2,6	0,6	1,3	-1,6

Reference: OECD, 2024.

Table 2 shows the employment rates in the agricultural sector for 32 selected OECD countries. Costa Rica has the highest employment rate in the agricultural sector. Costa Rica is followed by Poland, Lithuania and Luxembourg. Although these four countries have higher employment rates in the agricultural sector than other countries, Poland, Lithuania and Luxembourg have seen a significant decrease in employment in the following years. The countries with the lowest employment in the agricultural sector are the United Kingdom, the United States, Belgium and Canada, in that order.

When we look at the 32 selected OECD countries in general, it is seen that employment rates in the agricultural sector have not increased from 2006 to 2022, but have gradually decreased. There are many factors affecting this situation. The main factors are the decrease in the return on agricultural products and the increase in the costs of growing these products over the years.

Table 2: Agriculture Employment Rates of Selected OECD Countries

	2006	2010	2014	2018	2022
Australia	3,4	3,2	2,8	2,6	2,2
Austria	5,2	5,4	4,8	3,7	3,5
Belgium	2,0	1,4	1,2	1,0	0,9
Canada	2,1	1,8	1,7	1,5	1,3
Costa Rica	14,0	12,4	14,2	15,8	13,4
Czechia	3,5	3,1	2,7	2,8	2,5
Denmark	3,1	2,5	2,5	2,2	2,1
Estonia	5,1	4,2	3,9	3,3	2,6
Finland	4,7	4,4	4,3	3,7	3,8
France	3,7	2,9	2,8	2,5	2,6
Germany	2,3	1,6	1,4	1,2	1,2
Greece	2,3	1,6	1,4	1,2	1,2
Hungary	4,8	4,5	4,7	4,8	4,4
Iceland	6,3	5,6	4,5	4,0	4,1
Ireland	5,7	5,8	5,4	4,8	4,0
Italy	4,3	3,8	3,6	3,8	3,8
Japan	4,2	3,9	3,5	3,4	3,1
Latvia	11,5	8,6	7,5	7,0	6,8
Lithuania	13,8	8,8	9,2	7,2	5,5
Luxembourg	13,8	8,8	9,2	7,2	5,5
Netherlands	3,6	3,1	2,3	2,1	1,9
New Zeland	7,2	6,9	6,2	5,9	6,0

Norway	3,3	2,5	2,2	2,1	2,2
Poland	15,8	13,1	11,5	9,6	8,3
Portugal	11,9	11,2	8,6	6,0	5,0
Slovak Republic	4,4	3,2	3,2	2,3	2,5
Slovenia	9,6	8,8	9,6	5,5	4,3
Spain	4,8	4,2	4,2	4,2	3,8
Sweden	2,2	2,1	2,0	1,7	1,9
Switzerland	3,7	3,6	3,5	3,0	2,3
United Kingdom	1,4	1,2	1,3	1,1	1,0
United States	1,7	1,7	1,7	1,7	1,6

Reference: The World Bank, 2024.

Table 3 shows the industrial sector employment rates of 32 selected OECD countries. The country with the highest industrial sector employment rates in general is the Czech Republic. Following the Czech Republic are the Slovak Republic, Hungary and Slovenia. Although these four countries have the highest industrial sector employment rates among the selected countries, it is seen that it has decreased over the years in general. The country with the lowest industrial sector employment rates is the Netherlands. Following the Netherlands are Ireland, Iceland and Sweden.

When we look at the 32 selected OECD countries in general, it is seen that employment rates in the industrial sector have not increased in most countries from 2006 to 2022, but have gradually decreased. There are many factors affecting this situation. The mechanization in the production of industrial products brings about a decrease in the need for human resources. This situation is effective in reducing the number of employed individuals. However, it is seen that the decrease in industrial employment rates is less than the decrease in agricultural employment rates.

Table 3: Industry Employment Rates of Selected OECD Countries

	2006	2010	2014	2018	2022
Australia	22,0	21,0	21,0	19,9	18,6
Austria	28,2	24,7	25,8	25,4	26,4
Belgium	24,7	23,4	21,4	21,1	19,1
Canada	22,1	20,2	20,2	19,6	19,2
Costa Rica	21,8	19,6	17,2	18,9	19,0
Czechia	40,5	38,0	38,0	37,5	36,4
Denmark	23,3	19,9	19,4	18,9	19,1
Estonia	33,5	30,3	30,1	29,6	28,6
Finland	25,7	23,3	21,9	22,3	21,4
France	23,7	22,3	20,5	20,2	19,3
Germany	29,7	28,3	28,1	27,3	26,9
Greece	29,7	28,3	28,1	27,3	26,9
Hungary	32,3	30,7	30,5	32,4	31,4
Iceland	21,5	18,4	18,4	16,8	18,0
Ireland	27,8	18,1	17,3	18,8	19,2
Italy	30,1	28,6	26,9	26,1	26,9
Japan	28,5	25,8	25,3	24,4	23,6
Latvia	27,4	23,1	23,8	23,7	23,7
Lithuania	29,6	24,6	24,7	25,8	25,7
Luxembourg	29,6	24,6	24,7	25,8	25,7
Netherlands	20,6	17,7	16,2	16,2	14,0
New Zeland	22,5	21,0	20,8	20,0	20,8
Norway	20,8	19,7	20,4	19,5	19,3
Poland	30,0	30,3	30,5	31,8	30,8
Portugal	30,3	27,3	23,9	24,8	24,0

Slovak Republic	38,8	37,1	36,1	36,5	35,9
Slovenia	35,5	32,6	30,9	33,3	30,2
Spain	29,4	23,0	19,5	20,3	20,1
Sweden	21,9	19,9	18,6	18,2	17,2
Switzerland	22,8	22,1	21,1	20,4	20,3
United Kingdom	22,1	19,2	19,0	18,1	18,1
United States	22,1	19,4	19,7	19,6	19,3

Reference: The World Bank, 2024.

Table 4 shows the service sector employment rates for 32 selected OECD countries. The most striking thing in this table is that the service employment rate is much higher than the industry and agriculture sector employment rates. The service sector has the largest share among the sectoral employment rates in the 32 selected OECD countries. The country with the highest rate among service sector employment rates in general is the United Kingdom. The United Kingdom is followed by the United States, Canada and Sweden.

Among the selected countries, Poland has the lowest employment rate in the service sector. Poland is followed by the Czech Republic, Slovakia and Lithuania. In the period from 2006 to 2022, the number of people employed in the service sector has increased in most countries.

Table 4: Service Employment Rates of Selected OECD Countries

	2006	2010	2014	2018	2022
Australia	74,6	75,8	76,2	77,5	79,2
Austria	66,6	69,8	69,4	70,9	70,1
Belgium	73,4	75,3	77,4	77,9	80,0
Canada	75,8	78,0	78,1	78,9	79,6
Costa Rica	64,2	68,0	68,6	65,3	67,6
Czechia	56,0	58,9	59,2	59,7	61,0
Denmark	73,6	77,6	78,1	78,9	78,8
Estonia	61,4	65,5	66,0	67,1	68,8
Finland	69,6	72,3	73,8	74,0	74,8
France	72,6	74,8	76,6	77,3	78,2
Germany	68,1	70,0	70,5	71,4	71,9
Greece	68,1	70,0	70,5	71,4	71,9
Hungary	62,9	64,8	64,8	62,7	64,3
Iceland	72,1	76,0	77,0	79,2	77,9
Ireland	66,5	76,2	77,3	76,4	76,8
Italy	65,7	67,6	69,5	70,1	69,3
Japan	67,4	70,3	71,2	72,2	73,3
Latvia	61,2	68,3	68,6	69,4	69,5
Lithuania	56,6	66,6	66,1	67,1	68,8
Luxembourg	56,6	66,6	66,1	67,1	68,8
Netherlands	75,7	79,2	81,5	81,7	84,1
New Zealand	70,3	72,2	72,9	74,1	73,2
Norway	75,9	77,8	77,3	78,4	78,5
Poland	54,2	56,6	58,0	58,6	60,9
Portugal	57,8	61,5	67,5	69,1	71,0
Slovak Republic	56,8	59,7	60,7	61,2	61,6
Slovenia	54,9	58,6	59,4	61,2	65,5
Spain	65,8	72,8	76,3	75,5	76,1
Sweden	75,9	78,0	79,4	80,1	80,9
Switzerland	73,5	74,3	75,4	76,6	77,4
United Kingdom	76,6	79,6	79,8	80,8	80,9
United States	76,2	78,9	78,6	78,7	79,1

Reference: The World Bank, 2024.

When the studies analyzing the relationship between labor productivity and employment are examined, no study has been found in which the labor productivity-employment relationship is separated sectorally and all of these separations are included in the analysis. This is the difference of this study from other studies. However, in general, there are studies in which the relationship between employment and productivity or the agricultural sector-productivity; industrial (manufacturing) sector-productivity relationship is analyzed separately. Although the studies that consider the total factor productivity indicator as the productivity indicator are in the majority, studies that address labor productivity are included in the literature review.

- Studies analyzing the relationship between labor productivity-productivity and non-sectoral general employment; In the study in which Türkiye was included, Uzay (2008) concluded that the relationship between the variables was significant and negative. However, as in the study of Saracoglu and Suicmez (2008), it was stated that the negative relationship was not very dominant. Kim et al. (2010) concluded that the relationship between the two variables was negative in the study conducted with 1985-2012 data from South Korea. In the study, it is noted that, contrary to the positive effect of technological shocks on growth as a result of increasing productivity, this effect on employment becomes negative. In the study in which variables belonging to developed and developing countries were analyzed by Junankar (2013), it is seen that the two variables significantly but negatively affect each other. In their studies covering the years 1994 and 2003, Ponikvara and Kejzara (2014) and Yardımcı and Abdullah (2021) concluded that there is mutual and positive causality in their studies in which causality tests were conducted between the two variables. Yıldırım (2015) found that the relationship between the two variables is negative in the long and short term. Habanabakize et al. (2019) concluded in their studies that there is a causality from productivity to employment. Yusof (2008) found in his study for Malaysia that the relationship between the two variables is negative in the short term and positive in the long term.
- Studies analyzing the relationship between labor productivity and only the agricultural sector and agricultural employment; Popescu (2009) made policy recommendations rather than analysis in his study examining the relationship between data from Romania and the sub-causes of the problems in the relationship. He drew attention to the fact that Romania's labor productivity was low and agricultural employment was high. Ungor (2013) stated in his study covering the years 1963 to 2005 that labor productivity did not have a high effect on employment in the agricultural sector. Popescu (2015) stated in his study investigating the effect of Romania's labor productivity on the agricultural sector that labor productivity was low in the agricultural sector and that policies should be followed to focus on the agricultural sector. Bayramoglu and Bozdemir (2018) investigated the effect of technological expenditures on agricultural employment within labor productivity in agricultural production in corn consumption in Konya province. They concluded that technological developments did not contribute to labor productivity in agriculture on agricultural employment. Yucel and Caliskan (2020) examined data from Türkiye between 2009-2018. It is concluded that there is an impact on agricultural labour productivity through agricultural mechanization on employment in the short term.
- Studies analyzing the relationship between labor productivity and only the industrial sector and industrial sector employment; Agazade and Albayrak (2018) found that the relationship between the two variables was negative in the long and short term. Hall et al. (2008) found that there was an innovation-supported positive relationship between the two variables in the study analyzing the relationship between productivity and employment in the Italian industrial sector. Tadjoeeddin (2016) examined the employment effect of productivity on wages in a study covering the years 2001-2011 for the Indonesian industrial sector. He stated that productivity had no effect on wages and that wages had a negative effect on employment. Saraçoğlu and Suicmez (2008) and Gunes (2007) found a negative relationship between the two variables in their study for Turkey covering the years 1988-2007, but it was stated that this negativity was low. Although Kose and Avci (2023) found a significant and positive relationship between variables in the short term in their study covering the years 2009 and 2021 for Turkey, it was concluded that this relationship was not statistically significant in the long term.

3. Method

3.1 Research Model

In Model 1, where the research model is established, LAB represents labor productivity; AGR represents agricultural sector employment; IND represents industrial sector employment; SER represents service sector employment. The i index in the model represents the unit and the t index represents the time dimension. The model was created by taking inspiration from similar studies in the literature. The model is as follows;

$$LAB_{it} = \beta_0 + \beta_1 AGR_{it} + \beta_2 IND_{it} + \beta_3 SER_{it} + \mu_{it} \quad (1)$$

3.2 Universe and Sample

In the study, labor productivity and agriculture-industry-service sector employment rate indicators are considered as variables. The study covers the years 2005 to 2022. Data on agriculture-industry-service employment rates are taken from the World Bank, and labor productivity percentage rate is taken from the OECD data page. The indicators used in the study belong to 32 selected countries. These countries are; Australia, Austria, Belgium, Canada, Costa Rica, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

3.3 Dataset

The study, covering the years 2005 to 2022, aimed to examine the relationship between labor productivity and employment in different sectors. For this reason, labor productivity was considered as dependent; employment rates in agriculture - industry - services sectors were considered as independent variables. Employment rates in different sectors are percentages of total unemployment and labor productivity is percentages of annual growth rate. Since the variables are percentage values, the logarithm of the variables was not taken at the beginning of the analysis and the Stata program was used to perform all tests. For the convenience of the analysis, the variables were given abbreviated names.

3.4 Analysis of Data

Time series and panel data analysis are used intensively when making econometric analysis. There is not more than one country in time series analysis but there is more than one time. Panel data analysis allows for more than one time and country and for comparison between countries (Hsiao, 2005: 144). In addition, panel analysis, which has more variables and degrees of freedom, provides more reliable results in analyzing the effects that cannot be observed in the time series and in testing micro data at the macro level (Balgati, 2005: 10-18). In this study, panel data analysis was used to make an evaluation based on selected countries.

When performing panel data analysis, it is necessary to consider which group the panel is in. For this, the time dimension is important. Panel data up to 20 years are micro panel; those over 20 years are in the macro panel group. It is not appropriate to perform unit root and cointegration tests in the micro panel group (Baltagi, 2013: 1-3). Since this study covers 18 years, it is included in the micro panel group. Three basic significance values, 0.01 - 0.05 - 0.10, are used in the analyses. 0.05 was used in the study and the results were interpreted according to this value. Each test performed in the analysis has two hypotheses, namely the null hypothesis (H_0) and the alternative hypothesis (H_1). If the value in the test result is less than 0.05, H_0 is rejected and H_1 is accepted. If it is less than 0.05, the opposite interpretation is made.

Panel data analysis begins with determining the homogeneity of the model. There are more than one homogeneity test in the literature. When choosing between these tests, the size of the unit and time dimensions is considered. However, the Pesaran Yamagata (2008) test is used in cases where the time dimension is larger than the unit or the unit dimension is larger than time. The hypothesis of this test is as follows (Pesaran and Yamagata, 2008: 55);

H_0 : All slopes are homogeneous.

H_1 : All slopes are heterogeneous.

The second test to be done is to determine the existence of correlation in the model. This test, like the homogeneity test, is decided according to the magnitudes of the unit and time dimensions. As in this study, the Friedman Test is used in cases where the unit is larger than the time dimension. The hypotheses of this test (Yerdelen Tatoglu, 2018: 230).

H₀: There is no cross-sectional dependence (correlation).

H₁: There is cross-sectional dependence (correlation).

Since the stationarity of the units is not important in micro panels, root tests are not performed. In this type of panel, it is necessary to decide which model the model is. Two tests are used to decide on the model. The first is F, the second is the Hausman test. The ultimate goal of these tests is to determine whether the model is random or fixed-effect. The first purpose is to ensure that a decision is made between a pooled - random - fixed-effect model. The F test is applied to decide between a pooled - random-effect model, and the Hausman test is applied to decide between a random - fixed-effect model. F test hypotheses (Senol and Gencturk, 2021: 1186);

H₀: The pooled model is valid.

H₁: The random-effect model is valid.

In the selection made between the pooled - random effect model, if it is decided that the model is a random effect model, it is also necessary to check whether it is fixed effect or not. For this reason, the hypotheses of the Hausman test, which is the random - fixed effect model detection test, are as follows (Hausman, 1978: 1222-1232);

H₀: The random effect model is valid.

H₁: The fixed effect model is valid.

After deciding which model it is, its basic problems need to be identified. After deciding whether the basic problems of autocorrelation, heteroscedasticity and correlation exist or not, the necessary estimator is selected. Since the correlation test is performed in the first stage of the panel data analysis, heteroscedasticity and autocorrelation tests are used to identify the basic problems. If the selected model is random, the Levene, Brown and Fosythe heteroscedasticity test is used (Saridogan, 2019: 1313). The hypothesis of this test is;

H₀: There is no heteroscedasticity.

H₁: There is heteroscedasticity.

There is no need to look at the model when choosing the autocorrelation test. Bhargava, Franzini and Narendranathan Durbin-Watson autocorrelation test is used for both random and fixed effect models. The hypothesis of this test (Baltagi, 2013: 94);

H₀: There is no autocorrelation.

H₁: There is autocorrelation.

It is decided which problems exist by performing basic problem tests. In case of two or three of correlation, heteroscedasticity, autocorrelation problems, estimator selection is made. In case of no autocorrelation but correlation and heteroscedasticity problems, Parks-Kmenta estimator is selected (Yerdelen Tatoglu, 2018: 263-264).

4. Findings

In the study, firstly the homogeneity of the model was examined. The results of the Pesaran Yamagata homogeneity tests are shown in Table 5. As a result of the probability values being less than 0.05 significance level, it was decided that the H₀ hypothesis was rejected. It was concluded that the model and all slopes in the model were heterogeneous.

Table 5: Homogeneity Test

Statistical Value	Probability Value
-2.279	0.023
-2.682	0.007

After deciding that the model is heterogeneous, it is necessary to check whether there is a correlation in the model. Since the unit dimension is larger than the time dimension in the study, the Friedman correlation test was used. In Table 6, which includes the results of the test, it is seen that the probability value is less than the 0.05 significance level. It was concluded that the H0 hypothesis, which includes the proposition that there is no correlation, was rejected and that there is a correlation in the model.

Table 6: Correlation Test

Statistical Value	Probability Value
116.314	0.0000

The analysis continues with the determination of the model. The results of the F test used to select between the pooled and random effect models are shown in Table 7. The probability value of the F test being less than the 0.05 significance level caused the random effect model to be selected. Then, the Hausman test was performed to make a selection between the selected random and fixed effect models. In Table 7, which includes the Hausman test results, it was concluded that the H1 hypothesis was accepted as the probability value was greater than the 0.05 significance level. With this test result, it was decided that the model was a random effect model.

Table 7: Model Identification Test

F Test	
Statistical Value	Probability Value
2.67	0.0000
Hausman Test	
Statistical Value	Probability Value
0.04	0.9781

After deciding that the model was a random effect model, Levene, Brown and Fosythe heteroscedasticity test was performed. In Table 8, which includes the results of the heteroscedasticity test, it is seen that the probability values resulting from the test are less than the 0.05 significance level. It was found that the H0 hypothesis of the test was rejected and that there was heteroscedasticity.

Table 8: Heteroscedasticity Test

	Statistical Value	Probability Value
W_0	5.1571	0.0000
W_{50}	4.5027	0.0000
W_{10}	4.9748	0.0000

In Table 9, which includes the results of the Durbin-Watson autocorrelation test by Bhargava, Franzini and Narendranathan, it is seen that the probability values are greater than 2. In this case, the hypothesis of no autocorrelation is accepted.

Table 9: Autocorrelation Test

Statistical Value	Probability Value
Bhargava et al. Durbin-Watson	2.0141
Baltagi-Wu LBI	2.1376

After reaching the conclusion that there is no autocorrelation in the random effect model, there is heteroscedasticity and correlation, the Parks-Kmenta estimator was selected. The model was re-established with this estimator. The model results established with the estimator are shown in Table 10.

Table 10: Model with Parks-Kmenta Estimator

Dependent variables: LAB			
Independent variables	Coefficient	Statistical Value	Probability Value
AGR	0.1905	11.64	0.000
IND	0.0483	8.62	0.000
SER	-0.0738	-16.03	0.000
C	0.4617	3.23	0.001
Wald test chi2(1):			
Statistical Value: 135.60			
Probability Value: 0.0000			

In the model established with the Parks-Kmenta estimator, the dependent variable is labor productivity, and the independent variables are agriculture - industry - service employment rates, respectively. There is a positive relationship between labor productivity and agriculture - industry employment rates, and a negative relationship between them and service employment rates. When the analysis results are evaluated, a one-unit increase in employment rates in agriculture causes a 0.19-unit increase in labor productivity. A one-unit increase in employment rates in the industry sector increases labor productivity by 0.04 units. A one-unit increase in employment rates in the service sector decreases labor productivity by 0.07 units. This situation suggests that in order to increase labor productivity, it is necessary to increase agricultural and industrial employment rates in the selected countries.

When the probability values are examined in determining the significance status of the variables, it is seen that they are less than the 0.05 significance level. The fact that the probability values are less than the selected significance level indicates that all variables are individually significant. The decision on whether the variables used in the analysis are significant as a whole and in terms of the model is made according to the wald test result. The wald test probability value seen in the table being less than the 0.05 significance level indicates that the model is significant as a whole.

5. Conclusion

While one of the fundamental building blocks of the country's economy is employment, another is productivity. Employment and productivity both affect each other and have an impact on the country's economy.

When productivity is mentioned, the productivity of labor comes to mind. Positive increases resulting from input are evaluated as productivity increases. The positive nature of this output is based on the high value given to labor. For this reason, the effect of employment growth on labor productivity is expected to be indirectly positive. Quantitative increase is important because the labor given by those employed should be valued rather than the increase in the number of those employed. For this reason, an indirect effect is expected.

In this study, the relationship between labor productivity and employment was examined on a sectoral basis. In the study where panel data analysis was used, it was revealed that the service sector had a higher effect on labor productivity than the employment rate of the agricultural and industrial sectors. The high level of this effect also indicated that employment rates, especially in the agricultural sector, were low on labor productivity. This result supported the studies conducted by Ungor (2013) and Popescu (2015).

The positive relationship between the employment rate in the industrial sector and labor productivity is similar to the studies of Hall et al. (2008) and Kose and Avcı (2023); the negative relationship between them is the opposite of the studies conducted by Agazade and Albayrak (2018), Saracoglu and Suicmez (2008), and Gunes (2007). This situation is a situation originating from 32 selected OECD countries.

The conclusion that increasing employment in the agricultural and industrial sectors increases labor productivity is also supported theoretically. Because, Poland, the country with the highest employment rate in the agricultural sector, is also the country with the highest labor productivity. This situation shows that Poland is turning to the agricultural sector and is following the right policies in this direction. Although it is important to evaluate the country from every aspect in following these policies, it is clearly seen that those employed in the agricultural sector are satisfied with the wages they receive for their labor.

Although Czechia, Slovakia and Hungary have high rates of industrial sector employment, they are not among the countries with high labor productivity. Even though it has been concluded that the industrial sector employment rate positively affects labor productivity, it has been concluded that these countries should correct the policies they follow outside the industrial sector regarding the value given to labor. Because, even if every channel is considered in reaching labor productivity, countries with high industrial sector employment can easily reach more labor and more productivity with the output they obtain from the developing industry. This is a circulation. The value given to labor results in a positive output such as productivity. This positive output ensures an increase in the country's income, ensures that a greater share is allocated to labor and leads to more efficiency.

The first three countries, the United Kingdom, the United States and Canada, are not in the top three in terms of labor productivity among the 32 countries selected in terms of employment in the service sector rather than agriculture and industry. Based on this study, it is suggested that countries, especially those in the developed country group, should not ignore labor productivity and should achieve this through the service sector. Because, when viewed on a sectoral basis, it is seen that the fastest sector in reaching labor productivity is the service sector employment.

In general, it is suggested that each selected country should focus on the service sector, unless they are in a position where labor productivity increases are dominated by agriculture and industry. The effect of employment on productivity should not be ignored. For this reason, instead of elements such as unemployment payments that increase employment, attractive offers should be presented that focus on working conditions.

Although the increase in employment may seem like a high cost on a sectoral basis, its output is positive. Employed individuals should be supported by protecting their rights, offering offers that attract them to work and produce quality, periodically rewarding employees, and meeting the basic needs of employees' relatives at certain times. Because, in a country where there is quality production, main items such as consumption, demand and supply, export and import are positively affected. As a result of all these, the country's economy grows.

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