# The Impact of International Trade on Unemployment: Evidence from OECD Countries.

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*Abstract:*
*This study aims to analyze the detail effect of trade on unemployment by investigating data from 34 OECD countries with mathematical calculations, analytical data tests, and graphical proof. We established the result using panel data regressions. The mathematical model formulation was developed by taking the values of different variables for those countries. Some analyses, tests, and graphical presentations were made to get a clear idea about how the trade is making some significant relationships between these countries. To exemplify the model, we made a correlation to see the association with Labor Market Institution, Product Market Regulations, Output Gap, Trade openness, Export, Import, and GDP. A significant relation has been found applying this correlation. To see whether the fixed effect model or random effect model is appropriate for our model, we used the Hausman test. From the scatterplot graph, some important contacts found which agree with our study. The data are taken from different official websites, and trade openness has also been calculated to examine whether the result is significant or not.*
*Finally, after calculating, analyzing, conducting several tests, a noteworthy conclusion was established to support our study. One of the significant findings of this study is independent variable trade, along with some supportive variables, had a negative relationship with the dependent variable unemployment, which means that the more trade within a country will have less unemployment rate. On the other hand, less trade will refer to a higher unemployment rate.*
*Another important outcome of this research is that the trade has a strong relationship with the unemployment rate, and in the long run, it will show a significant result as well. The more trade openness creates more job for a country and reduce the unemployment problem hence lead a nation towards development.*
***Key Word***: *Unemployment, Trade, Export, Import, Product market regulations, Labor market institutions, panel-data, Employment protection legislation, Trade openness.*

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## I.   Introduction

This paper aims to investigate how does trade can make an impact on the unemployment of OECD countries. Also, the ambitions of this paper are to determine how an increasing trade and decreasing trade can make an impact on unemployment.  This research will also try to determine the comparative advantages of them. Moreover, what kind of necessary steps should take to reduce the unemployment rate. The data I am using in this paper has taken from subsidiary sources. This investigation has utilized a mathematical model based on an existing model but from a different perspective. This research has concentrated more on trade openness.  It has been long time economists trying to compare unemployment with trade and labor market institutions. During the last decades, the theory has been changed a lot because of some reasons. It can be varied for Chronological, geographical positions, Advancement, and questions. The effects of globalization have received significant attention in economic research.

Other than taking a gander at the effects of an all-out trade and absolute imports, I additionally invest whether the low imports will have any particular impact on the total unemployment rate when contrasted with imports from high-income economies. Since the size of the trade is probably going to be endogenous, I utilize a lot of built import and fare factors, individually, as instruments for the trade factors.

To begin with, when the connection among trade and work showcase establishments is represented, trade is probably going to prompt an expansion (decline) in total unemployment in nations with generally unbending (flexible) work advertise organizations. Second, as just the direct effect of trade is considered, an increment in imports from high-income economies prompts higher unemployment. In contrast, total trade, total imports, or imports from low-salary economies will have no significant effect on the unemployment rate.

The current paper by Boulhol (2008) yields a comparable soul as the current examination. He furthermore concentrates on the significance of work showcase foundations with regards to the effect of trade on unemployment. As is done in the existing research, Boulhol signifies the cooperation between work showcase organizations and trade. Besides, the current paper additionally examines if the effects of trade on total unemployment are different across sorts of exchanging accomplices by isolating imports from low-salary economies from imports from high-pay economies. Additionally, this paper utilizes trade instruments to lighten the potential endogeneity issues of the exchange factors.

## II. Material And Methods

Many researchers worked to find the relationship between trade and unemployment and formed lots of equations. In this study, we will explain some equations and their variables on how to calculate this relationship.

**Mathematical model description:**

There is different model in the field of unemployment rate calculation, among those model, Nickellet al. (2005) model which has been presented below.

$$U_{i,t} = \sum_{s=1}^{s} \rho_s U_{i,t-1} + \beta.T_{i,t} + \lambda.LMI_{i,t} + \pi.PMR_{i,t} + \gamma.GAP_{i,t} + v_i + v_t + \varepsilon_{i,t}$$

Where i and t denote country and time, respectively. The dependent variable U is the standardized unemployment rate, also s is the number of lags of endogenous variables. $LMI_{i,t}$ and $PMR_{i,t}$ defines Labor Market Institutions and Product Market Regulations respectively. Gap is the output gap, $v_i$ is the country specific effects, $v_t$ denotes for time effects and $\varepsilon_{i,t}$ is an error term. We are principally interested by the estimation of β and expect that the impacts of LMI and PMR adjust with the proof overviewed in Bassanini and Duval (2009). This proof is mixed: Baker et al. (2004) show that those panel data information estimations need power and that unmistakable outcomes on the job of most work advertise organizations scarcely exist. There is, in any case, a developing accord that replacement rates and the tax wedge have a powerful and hypothetically reasonable impact; see Costain and Reiter (2008). They utilize summed up least squares procedures on this condition and are not especially stressed by the potential endogeneity of work or item advertise foundations. A considerable lot of the determinations studied in Bassanini and Duval (2009) compel ρs = 0

**Data sources and variables:**

This section of the thesis will discuss the data. In the regression, I am going to find how does the increase in trade will affect the unemployment rate using the panel data of OECD countries over the time 2004-2018. We also arranged the annual data to five years averages, which helps the short-term fluctuations.

The dependent variable unemployment rate is the share of the total unemployed labor force at the age of 15-64. Most of the data are available for the OECD countries, but the rest of the country's data are quite challenging to find. For some variables, some data were missing, and we had to take the averages value for our study.

**Unemployment rate**

Global foundations, for example, the OECD, the World Bank, or the International Labor Organization (ILO), give favorable unemployment rates that determined after similar shows. Crosswise over different global organizations, these principles can differ. For instance, the rates distributed by the OECD or the World Bank depend on national administrative sources, while the ILO information depends on labor market overviews. The previous procedure assumes the collaboration of national factual organizations; the last is likely more qualified for creating nations.

**Labor Market Institutions(LMI)**

The data I used in this paper, most of them collected from the OECD data panel, and some of them collected from the World Development Indicator(WDI). All the data has been discussed in detail by Bassanini and Duval (2009). All the discussion includes Union density, employment protection legislation, average tax rates on wages, unemployment insurance, degree of corporatism, and Product market regulations. The OECD has gathered information on a full cluster of institutional factors that can be required to influence the harmonious pace of unemployment. Bassanini and Duval (2009) talk about the information in detail.

**Openness measure**

The trade openness usually denoted by T, and it is the summary measure of nominal imports plus exports relative to nominal GDP. It has some advantages because it is easy to measure, and it can reflect the

actual trade of an economy to international trade. Sometimes it is difficult due to the availability of information, according to Rose (2005), membership in the trade agreements or the World Trade Organization(WTO) does not provide all the information. There are some undeniable options in contrast to the standard definition of T that might be applicable in the openness measure. To begin with, since imports and exports need not harmonize, and there might have some different effects on unemployment because rising imports and rising exports are not the same, T can redefine as nominal imports plus exports over nominal GDP. Second, Alcalá and Ciccone (2004) contend that the Balassa-Samuelson effect contorts necessary value receptiveness measures since nations with low work profitability and hence a significant amount of exchanged corresponding with non-exchanged products have artificially high degrees of transparency.

### Product Market Regulations(PMR)

Product market regulation (PMR) indicators are the set of indicators that measure the degree to which policies promote or suppress competition in areas of the product market where emulation is durable. The data for Product Market Regulation collected from the OECD data panel. But there was one problem with the info because the data was available only for five years gap. So, for our calculations, we had to use the average information for the rest of the years.

### Statistical analysis

This part of this thesis will discuss the descriptive analysis, correlations, different types of table, scatter graph, and line graph, which includes some test and represent essential data for this research. There are lots of software to do the statistical regression, but for the sake of this thesis, I had to use some software that is relatively easy to use and can get some value related to this paper. We used three software for the statistical regression and analysis part. To get a relationship among those variables, we used Microsoft Excel 2016, IBM SPSS Statistics v23.0.0, and Eviews 10 Enterprise Edition for our study.

## III. Result

### Descriptive analysis:

To compare several numeric variables side by side, we use descriptive analysis. It also summarizes the numeric variables. Table1 represents the descriptive statistics of the dependent and independent variables of the study. In this analysis, we have to remember some of the factors
1. The center of the data is mean, median.
2. How spread the information is Standard deviation or variance
3. The extremes of the data
denoted as (Minimum, maximum; Outlier)
4. The pattern of the distribution, Is it symmetric or asymmetric? If the value mostly clustered, values in the "tails" of the allocation referred to as Skewness and kurtosis.

Table 1 presents the complete Descriptive analysis for different variables. It shows the descriptive statistics for the dependent and independent variables of our study where Trade openness, Labor Market Institutions, Product Market Regulations, Output Gaps are our independent variables, and unemployment is our dependent variable. It also demonstrates the observations associated with our study. Positive and negative non zero skewness values designate that the outcomes are almost normally distributed. Form the table, we can also find Std. Dev, kurtosis, and probability value of Trade Openness and Unemployment rate. This analysis made for 34 OECD countries for the year ranged from 2004 to 2018. Some of the data was missing for Labor Market Regulations; that's why the observation number is less than 510.

### Correlation analysis

The correlation coefficient is used in this study to explore the type and intensity of the relationships among variables. It measures the degree of multicollinearity among all the variables of the study. The correlation test is also used to determine the most significant factors in the list of independent variables. The correlation matrix of dependent variables in this study is shown in table 2.

For discussion, we need some relationship with the variables, and table 3 shows us some correlation of control variables. As our paper is based on the Trade and unemployment rate, we are going to see the relationship between the dependent and the independent variables. We also used some control variables for the shake of our paper as a supportive variable. From the table, we can see that Trade openness, Labor Market Institution(LMI), Product Market Regulations(PMR), Output Gap, Exports, Import, and GDP has a significant relationship with unemployment. All of the variables, including the supportive variables, have negative correlations with the dependent variables except the product market regulations.

**Table no 1: Descriptive statistics.**

|  | TRADE OPENNESS | LMI | PMR | OUTPUT GAP | UNEMPLOYMENT RATE |
|---|---|---|---|---|---|
| Mean | 125.8483 | 6.527647 | 1.596504 | -0.552286 | 7.465953 |
| Median | 78.94236 | 6.470000 | 1.514204 | -0.737956 | 6.710500 |
| Maximum | 1290.409 | 9.260000 | 2.823160 | 16.35711 | 27.46600 |
| Minimum | 23.92236 | 3.690000 | 0.915032 | -14.58265 | 2.251000 |
| Std. Dev. | 180.5966 | 1.351714 | 0.348611 | 3.404142 | 4.030376 |
| Skewness | 4.648789 | 0.080923 | 1.085168 | 0.001612 | 2.090051 |
| Kurtosis | 25.40000 | 1.923411 | 4.313930 | 6.369637 | 8.834268 |
| Jarque-Bera | 12401.32 | 23.50724 | 136.7814 | 241.2824 | 1094.629 |
| Probability | 0.000000 | 0.000008 | 0.000000 | 0.000000 | 0.000000 |
| Sum | 63679.24 | 3107.160 | 814.2168 | -281.6661 | 3807.636 |
| Sum Sq. Dev. | 16470645 | 867.8870 | 61.85869 | 5898.384 | 8268.160 |
| Observations | 506 | 476 | 510 | 510 | 510 |

**Table2 Correlation analysis(Dependent variables)**

|  | Trade Openness | LMI | Output Gap | PMR | Unemployment Rate |
|---|---|---|---|---|---|
| Trade Openness | 1 |  |  |  |  |
| LMI | -0.002648 (0.9540) | 1 |  |  |  |
| Output Gap | 0.020595 (0.6540) | -0.032695 (0.4767) | 1 |  |  |
| PMR | -0.088397 (0.0539) | -0.325018 (0.0000) | 0.129639 (0.0046) | 1 |  |
| Unemployment Rate | -0.097031 (0.0343) | -0.233434 (0.0000) | -0.559925 (0.0000) | 0.074875 (0.1028) | 1 |

**Table1Correlation analysis(Control variables)**

|  | GDP | Total Export | Total Import | Unemployment Rate |
|---|---|---|---|---|
| GDP | 1 |  |  |  |
| Total Export | 0.831695 (0.0000) | 1 |  |  |
| Total Import | 0.939750 (0.0000) | 0.936638 (0.0000) | 1 |  |

| Unemployment Rate | -0.094939 | -0.156716 | -0.115686 | 1 |
|---|---|---|---|---|
| | (0.0384) | (0.0006) | (0.0115) | |

**Table 4Benchmark regressions: OECD panel**

| | (1) FE | (2) RE | (3) FE | (4) RE | (5) GMM |
|---|---|---|---|---|---|
| Total trade openness | | | -0.003*** | -0.0001** | -0.001*** |
| | | | (0.0339) | (0.9425) | (0.0317) |
| Wage Distortion | 0.123*** | o.113*** | -.403*** | -0.193*** | -0.023*** |
| | (0.039) | (0.028) | (0.0029) | (0.0266) | (0.6387) |
| EPL | -0.598 | -.642 | -6.801*** | -0.926*** | 0.625*** |
| | (1.156) | (0.541) | (0000) | (0.1936) | (0.1299) |
| Union density | 0.367 | -0.007 | 0.383*** | -0..25*** | -0.022*** |
| | (0.034) | (0.029) | (0000) | (0.4230) | (0.1854) |
| Output gap | -0.588*** | -0.661*** | -0.575*** | -0.580*** | -0.681*** |
| | (0.079) | (0.115) | (0000) | (0000) | (0000) |
| R-squared | .573 | .547 | 0.834 | 0.533 | 0.391607 |
| Adjusted R-squared | .215 | 0.351 | 0.820 | 0.529 | 0.386384 |
| Hausman | 0.633 | | 0.0137 | | |

From table 4, we can study the panel regressions of 34 OECD countries where the unemployment rate is the dependent variables aged from 15-64. These data have been taken from 2004-2018. Columns (1) and (2) show the regressions as followed by Bassanini and Dubal. The first column treats the country effect as fixed, and the second column addresses the country effect as random. Hausman test decide which test is preferred; in every case, we can see that the random effect(RE) model is preferred over the fixed effect(FE) model.

From the table, we can also see that the employment protection legislation(EPL) and the output gap have a negative association with the dependent variables unemployment rate, which encourage more job creations. However, the effect is not statistically significant. Again we don't find any vital role in the degree of union density. The degree of wage distortion(sum of replacement rate and the average tax on wage) has a positive relationship with the unemployment rate, and statistically significant, which means if the wage distortion increases, then the unemployment will also increase. So the wage distortion is the most important result of these regressions. The models explain the country's effects yields an R square at 63%.

Column (3) and (4) include the real openness measure into the fixed and random effect models. Again, the Hausman test will decide which test will be appropriate for our model. In every case, the fixed effect(FE) model is preferred over the random effect(RE) model. From table 2, we find that trade openness has a negative relationship whit the dependent variable unemployment rate, and it has a significant relationship with it. We found a negative correlation with the wage distortion, maybe for some limitation of data. Employment protection legislation(EPL) and the output gap has a negative relationship with the unemployment rate. That means if the employment protection legislation and the output gap increase, then the unemployment rate will decrease, and if it declines, the unemployment rate will increases.Column (5) shows the generalized method of moments(GMM).

From the table, we found that trade openness has a significant and adverse relationship with the dependent variable. Employment protection legislation and union density doesn't have a meaningful relationship. The output gap has a substantial and adverse relationship with the unemployment rate

**Table 2Generalized Method of Moments(GMM)**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 10.53025 | 1.214403 | 8.671137 | 0.0000 |
| TRADE OPENNESS | -0.001741 | 0.000808 | -2.154533 | 0.0317 |
| LMI | -0.667617 | 0.114890 | -5.810903 | 0.0000 |
| PMR | 0.739854 | 0.444906 | 1.662942 | 0.0970 |
| OUTPUT GAP | -0.681297 | 0.042834 | -15.90562 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.391607 | Mean dependent var | 7.544667 |
| Adjusted R-squared | 0.386384 | S.D. dependent var | 4.052847 |
| S.E. of regression | 3.174742 | Sum squared resid | 4696.807 |
| Durbin-Watson stat | 0.154993 | J-statistic | 7.49E-24 |
| Instrument rank | 5 | | |

This study uses GMM estimation as a statistical tool to estimate the relationship between the dependent and independent variables the identify the key determinants of unemployment. Table 5 shows some significant relationship with our dependent and independent variables. Unemployment rate is our dependent variables and trade openness, Labor Market Institutions, Product Market Regulations and output Gap are our independent variables. From the above Table, we can see that Trade openness, Labor Market Institutions and Output gap has some significant relationship with dependent variable unemployment rate. Also they have negative relationships with the dependent variable unemployment rate, that means if one variables decreases the other variables will increase. The value for Product Market Regulations is not significant, it may be due to the lack of the data collection. For Product Market Regulation there was some missing data for several years and we had taken the mean value for that missing years. This might be the main reason behind this. Also, we can see the R squared and adjusted R square values from the table.

After finding all of the result, we can also estimate the equation-

Estimation of Equation:

UNEMPLOYMENT RATE = C(1) + C(2)*TRADE OPENNESS + C(3)*LMI + C(4)*PMR + C(5)*OUTPUT GAP

Substituted Coefficients:

UNEMPLOYMENT RATE = 10.5302527832 - 0.00174075304614*TRADE OPENNESS - 0.667617412701*LMI + 0.739853746983*PMR - 0.681297317158*OUTPUT GAP

| | Value | Asymptotic Standardized Error[a] | Approximate T[b] | Approximate Significance |
|---|---|---|---|---|
| Lambda | .163 | .016 | 8.985 | .000 |
| Gamma | -.028 | .058 | -.489 | .625 |

We estimated the value of Lambda and Gamma in the effect of LMI and PMR as followed by Bassanini and Duval (2009). Again, from Baker et al (2004) showed that panel data estimations has some lack. According to Costain and Reiter (2008) tax wedge have some sensible effect. The above table shows the value of Lambda and Gamma where there is positive value of Lambda but the value of Gamma is negative. We can also see the significant level of Lambda and Gamma .

## IV. Discussion

The focal point that aimed at this work was ascribed to the fact that how does the Trade for 34 OECD countries is affecting the unemployment rate.

Secondly, to get a clear idea about the relationship between Trade and unemployment, we have studied a huge amount of related literature to this field for these 34 OECD countries. In addition to that, the interaction between Trade and Labor Market Institutions and Unemployment, Trade and inequality, and Trade and working conditions also have studied thoroughly to calculate the unemployment rate, which bears a focal contribution to this study.

Moreover, an equation and formulation was utilized based on Nickellet al. (2005), to propose new calculation method, where trade openness, Product Market Regulations, Labor Market Regulation, Output Gap were used to calculate the unemployment rate. A short description also has been presented about the working principle of the equation.

In this study, a depth data analysis was established to represent the scholastic relationship about the different variables making an impact on the unemployment rate with some significant results. Different types of data analysis software such as IBM SPSS v23.0.0, MICROSOFT EXCEL 2016, EVIEWS Statistics 10 Enterprise Edition were used in this part..

The data analysis section includes Descriptive analysis, Hausman test, regression analysis, GMM (Generalized Method of Moments), and correlation analysis, which included in this study gave us significant output to report the result.With the help of those results, we were able to conclude how Trade made an impact on unemployment.

At the time of doing those things, we had to face some difficulties. For example, to calculate the unemployment rate and trade openness, lots of variables were used, a massive number of data were required for each country. Several official websites were searched for collecting data. This task was more cumbersome when all the data were collected for 34 countries. Some data was missing for some of the variables, and we had to take help from the reference paper to get those values. All the data we used in this paper were collected from some of the official websites; the most popular sites we used in this study were from the OECD data panel and the International Labor Organization. We also used Fraser data for some of the variables.

## V. Conclusion

Trade and unemployment are closely related to each other. This study aims to examine the in-depth relationship of Trade on unemployment by investigating data from 34 OECD countries with mathematical calculations and analytical data tests. This paper establishes an empirical conclusion: the impact of Trade has a negative relationship with unemployment. Again, in most of our regression, we got some essential links for beneficial effects.

We analyzed a panel regression of unemployment for the OECD countries. In some cases, we had to equalize our data to control the business cycle effect. We had to deal with the endogeneity problem of trade openness, as followed by Frankel and Romer (1999). The ratio of exports plus imports over GDP for the trade openness affects unemployment through the factor productivity.

Again, there is satisfactory evidence that trade openness causes lower unemployment. A different set of practices has identified in this study, which has an inverse relationship for Trade and unemployment. We made the correlation of unemployment with various variables, and that shows some correlation with unemployment. From the association, we find that unemployment has a significant relationship with Labor Market Institutions, output gap, and it has a negative relationship with each of them. To see if there is any relationship with the control variables, we made the correlations with the control variables and got some significant negative association with the unemployment rate.

One of the essential findings reveals that independent variable Trade, along with some supportive variables, had a negative relationship with the dependent variable unemployment, which implies that the increase of Trade within a country will result in less unemployment rate. On the other hand, less Trade will refer to a higher unemployment rate.

Another significant outcome of this research is that Trade has a strong relationship with the unemployment rate, and in the long run, it will show a considerable result as well. The more trade openness creates more job for a country and reduce the unemployment problem hence lead a nation towards development.

Finally, we focused on trade liberalization and the unemployment rate. The findings of the result show the negative effect of trade liberalization and the unemployment rate. Almost all the primary and secondary objectives of this study have been fulfilled, and it is hoped that the findings of this study could be beneficial for the researcher and practitioners.

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