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The Relationship of Remittances, Macroeconomic Variables, and Unemployment Rates in the World

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Abstract- Unemployment is one of the crucial problems in the world. Unemployment in a country indicates low economic growth and low economic performance. One effort that can be done to reduce unemployment is to create jobs. The lack of jobs in a country sometimes requires the country to export domestic labor services abroad, where the wages that will be received by these migrant workers are known as remittances. This research conducted to obtain clear conclusions on the analysis of remittances and other macroeconomic variables on their impact on reducing unemployment rates, and to see whether there are differences response between countries with low, medium and high remittance rates using dynamic panel data Generalized Method of Moment (GMM) in 65 countries in the world within period 2000-2021. Unlike previous studies, this study categorizes countries into 3 categories based on the remittances received by a country. Namely countries with low remittances (0%-3%), medium (>3%-10%), and high (>10%). The variables used in this research are unemployment rate as the dependent variable, while the independent variables are previous unemployment rate, remittances, exchange rates, real interest rates, trade openness, inflation, and GDP per capita. The unemployment rate variable in all categories is most influenced by GDP and the unemployment rate itself in the previous period. The remittance variable which is the main variable of this study, although significant in all categories, the influence it exerts is still very low. Based on the results of the remittance coefficient, the country category that contributes the most to the unemployment rate is in the category of high remittance countries. This result is in accordance with the hypothesis where the most influential country is the country that receives the most remittances. One of the factors that can cause this because the remittances received can be used to improve community performance, such as being used in the development of education, skills, and others, which is in the long term this factor is useful when applying for a job to suppress the growth of the unemployment rate.

Keywords- Dynamic panel data, GMM, remittance, unemployment.

I. INTRODUCTION

Unemployment is a crucial problem in the world. When someone is willing to work and able to find a job, whereby they can meet their daily needs and other expenses in their life, but they do not reach the point of getting a job or income, this is what is known as unemployment. Every citizen will try to find employment opportunities, and it is the government's responsibility to provide employment, including for workers with low education.

Unemployment in a country indicates low economic growth and low economic performance. Unemployment also shows that the resources cannot be optimally utilize so that the economy works below its full capacity. According to a report by the Bureau of Labor Statistics, unemployed workers cause their families to lose income, which can have an impact to its country. Where a country will lose its participation in the economy to produce goods and services. In other words, unemployment does not only affect people who are not working, but can also affect those who have jobs and even affect a country's economy (Siddiqa A. 2021). The relatively high unemployment rate has prevented the community from achieving robust economic growth. This can be clearly seen from the various negative economic impacts caused by the unemployment problem. The main negative impact is the increase in poverty. Poverty is an issue that cannot be avoided when discussing the economy. Although there has been a significant improvement in world poverty over the last half century, poverty cannot be completely eliminated and is still common, especially in developing countries (Todaro and Smith. 2010).

When the unemployment rate increases, the economy will not produce a maximum output, so efforts are needed to reduce unemployment. One effort that can be done is to

having a lot of job vacancies. However, the lack of job vacancies in a country sometimes requires a country to export domestic labor services abroad, where the wages that will be received by these migrant workers are known as remittances.

Remittances are currently receiving special attention; this is due to remittances are considered quite significant in dealing with the issue of unemployment. Adams and Page (2005) show that remittances can suppress the growth of the unemployment rate significantly moreover in developing countries. This is also corroborated by the data summarized in Figure 1 where shows the movement of remittances during the 1970-2021 period had a positive trend, which mostly increased every year and also had a relatively high magnitude.

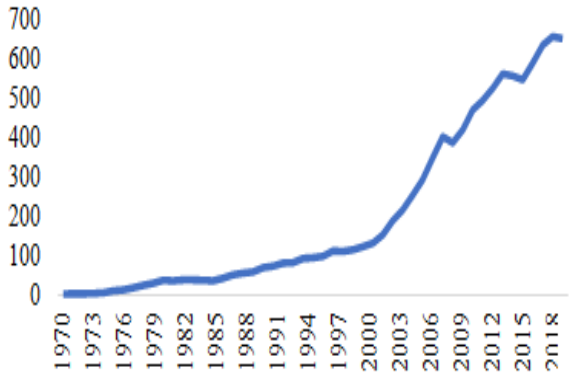

Fig 1. Development of World Remittance Period 1970 - 2020 (billion USD).
Source: World Bank, 2022

Remittances are currently receiving special attention; this is because remittances are considered quite significant in dealing with poverty issues (Azam et al. 2016). (Adams & Page, 2005) show that remittances can significantly reduce the depth and severity of poverty in developing countries. This is also corroborated by the data summarized in Figure 1 where remittances show quite a lot of volume and have a stable trend.

Figure 2 shows a comparison of the growth of remittance inflows and unemployment rates globally from 2000 to 2021. The graphs for remittances and unemployment move in the opposite directions based on these figures. This implies that at a specific point in time, remittances received by a nation can lower the unemployment rate there. There are certainly several instances that are inconsistent and improper, though. Therefore, remittances received by a nation may cause its unemployment rate to rise. However, this is possible because there are many other aspects that can affect the unemployment rates. In the long term, the receipt of remittances received by a country in addition to reducing the unemployment rates will also have an impact on poverty alleviation and increased welfare.

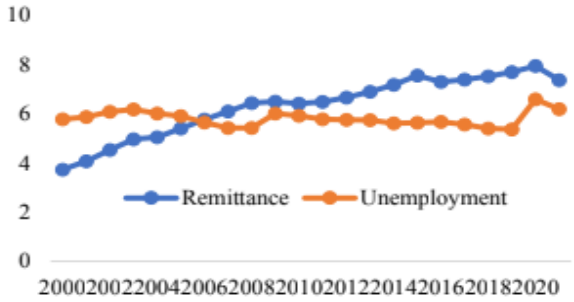

Fig 2. Comparison of Remittance Acceptance Rates and Unemployment Rates (Percent)
Source: World Bank, 2022

In order to analyze remittances and other macroeconomic variables that may effects on lowering the unemployment rates with a bigger cross-section of data and a longer and more recent time series, this research was conducted. In contrast to earlier studies, it appears that no research on remittances and unemployment has compared a wide range of nations according to the amount of remittances inflows, categorizing them as low remittance countries (0%-3%), medium (>3%-10%), and high (>10%). The issues that need to be discussed are as follows in light of the explanation provided above.

First is to describe the dynamics of receiving remittances, the unemployment rate and macroeconomic variables in the world, and see whether there are differences in character between countries with low, medium and high remittance rates. Second to analyze the effect of remittances and other macroeconomic variables on the world unemployment rate, and see if there are differences in response between countries with low, medium, and high remittance rates. Last one is to analyzing the remittance inflows and other macroeconomic variables on the convergence of unemployment rates in the world.

II. LITERATURE REVIEW

The high unemployment rate can be due to the limited number of available job vacancies. Limited job vacancies are sometimes one of the reasons people in the world migrate to find work abroad. apart from the possibility of higher job vacancies, differences in wages may also be one of the reasons for this migration. The wages that migrants earn that are transferred to family or relatives in their country of origin are called remittances.

These remittances are an important source that can financially support migrant families and acquittances, which can directly increase household income so that in addition to reducing unemployment, it can also reduce poverty and reduce inequality. In the long term, remittances can improve the welfare and standard of living of the country of origin because the flow of these remittances can strengthen the economy, education, health, etc.

Arslan and Zaman (2014) research on the determinants of unemployment for the Pakistani economy in the 1999-2010 period. They use FDI, GDP, inflation, and population as independent variables and use Ordinary Least Square (OLS) to determine the results. They found in their study that FDI, GDP, and inflation had a negative effect on unemployment, while population had a positive effect. Their study also confirms the tradeoff that occurs between inflation and unemployment rates.

Another research was by **Adams and Page (2005)** that analyze whether international migration has a role in reducing unemployment in developing countries in the world through receipt of remittances earned by migrants. The method used is panel data with a cross section of 71 developing countries in the world with a time period from 1980. The variables used are unemployment, quality of human resources, productivity, and income using data on the percentage of the population living below the poverty line, the gini coefficient, migration, remittances, and GDP per capita. The results obtained are migration and remittances significantly reduce unemployment in developing countries in the world.

Akobeng (2015) analyzes the effectiveness of the role of remittances in helping countries in Sub-Saharan Africa escape poverty and inequality. The method used is dynamic panel data with a cross section of 41 countries with a time period from 1981-2010. The variables used are the percentage of the population living below the poverty line, the Gini index, GDP per capita, interest rates, inflation, and remittance receipts. The results found are that remittance receipts have a negative and significant effect on poverty and inequality in Sub-Saharan Africa.

Vacaflores (2017) analyzes whether receiving remittances helps Latin American countries escape poverty and inequality. The method used is dynamic panel data with a cross section of 18 countries with a time period of 2000- 2013. The variables used are the percentage of poor people and the Gini coefficient as the dependent variable. The independent variables used are the growth rate of GDP, GDP per capita, and remittances as a share of GDP. The results show that remittances have a negative effect on poverty and inequality.

Wagle and Devkota (2018) analyze remittances and their impact on poverty in Nepal which aims to explore how the dynamics of remittances have evolved and impacted poverty and household welfare in Nepal. The method used is panel data, using data from the NLSS survey of 434 households in Nepal in 1996, 2004 and 2011. The variable used is poverty as the dependent variable. The independent variables used are remittance receipts and variables that represent human capital, demography, and household characteristics. The result is that remittances have an effect on poverty in Nepal, but the drawback is that the NLSS survey results do not represent all the population in Nepal.

Research that says remittance does not affect unemployment in a negative way but in positive way is a study **by Imai et al. (2014)** that analyzed the effect of remittances on per capita GDP growth and poverty in Asian countries. The method used is dynamic panel data with a cross section of 24 countries in Asia with a time period from 1980-2009. The variables used are the growth of GDP per capita, receipt of remittances, and the determinants of economic growth such as inflation, investment, openness, etc. The results prove that remittances have a positive effect on economic growth and positive on poverty.

Meanwhile Abdi (2016) that analyzed the effect of receiving remittances on income per capita and unemployment in Indonesia shows that remittances is not significantly affect unemployment in Indonesia. The method used is panel data with a cross section of 15 provinces with a time period from 2007-2015. The variables used are per capita income and poverty as the dependent variable. The independent variables used are the labor force participation rate, remittance receipts, and foreign investment.

III. RESEARCH METHOD

This study uses secondary data originating from the World Bank. The type of data used is panel data, which is a combination of time series and cross-section data. The time series data used in this study covers the period 2000-2021, while the cross-section data used covers 65 countries. The variables used are the unemployment rate as the dependent variable, and the independent variables are previous unemployment, remittances, exchange rates, real interest rates, trade openness, inflation, and GDP per capita.

The analytical method used in this research is in the form of qualitative and quantitative methods. The qualitative method is used to analyze descriptively the development of the variables used, and the quantitative method used is the dynamic panel data method using the Generalized Method of Moment (GMM) method.

This research method uses a cross-country model to analyze the effect of remittances and other variables on reducing unemployment rates in various countries in the world. The model used in this study refers to Yoshino et al. (2017) model. The general model in this study can be formulated as follows:

$$UEit = \alpha + \gamma UEi(t-1) + \beta 1 remitit + \beta 2 Ln\,(EXRit) + \beta 3 RIRit + \beta 4 Ln\,(Tradeit) + \beta 5 INFit + \beta 6 GDPCapGrit + \varepsilon it$$

where α denotes intercept, γ = Slope / coefficient of the dependent lag variable, β1-β6 = Slope / independent variable coefficient, i = Individual (country), t = the time period (year), ε = errors, EU = unemployment rate, remit = Ratio of receipt of remittances to GDP, ER = exchange rate against USD, RIR = real interest rate, trade = Trade openness; export-import ratio to GDP, INF = inflation, and GDPCapGr = GDP growth per capita.

In this study will also develop research. Where the countries studied will be categorized into three groups based on the level of receipt of remittances, namely countries with low remittance receipts (0%-3%), medium (3%-10%), and high (>10%).

After that, it will be examined whether there are differences in characteristics between the three categories, especially in the relationship of remittances to the reduction in the unemployment rate.

IV. RESULT AND DISCUSSION

1. Remittances in the World and Grouping Categorized Based on Remittances Inflows Level:
According to Maimbo and Ratha (2005) in a developing economy, remittances are a source of state inflows which are often of greater value than ODA and are also more stable than private capital flows. This is corroborated by data from the World Bank for 2020 which shows that the number of remittances in the world continues to increase from year to year which can be seen in Figure 2 on the previous page. The volume of remittances in 2020 reached 651.05 billion USD, which was 17.10% higher than the volume in 2015, which was 556.02 billion USD.

Remittances inflows can be categorized into several groups of categories. The division of this group is usually divided into three categories based on the size of the share of remittances to GDP received by a country, namely the group of countries with low, medium and high remittance receipts. There are no definite benchmarks in determining whether a country is included in the low, medium, or high categories. However, the World Bank (2022) states in its article that if remittances in Sub-Saharan Africa increase to 10.3%, this amount is a high receipt of remittances. So that to determine the category of distribution of country groups in this study will be based on the following benchmark sizes; low 0-3%, medium 3-10%, and high >10%.

Based on the division of country category groups into 65 countries in the world, the most occupied category is the low remittance group with 39 countries, then the medium remittance category with 15 countries, and the high remittance category with 11 countries. This means that the majority of countries in the world receive low remittances, which range from 0-3% of their country's share of GDP. This shows that even though remittances are currently growing quite significantly from year to year, most countries receiving remittances still don't contribute much to their country's GDP.

2. Best Model Determination
In this study, data testing using the dynamic panel method was carried out by using the Generalized Method of Moment (GMM). Before concluding the results of the GMM estimation, we first test whether the GMM model used is correct, so that the estimation results are good and can be examined for further analysis. In determining this, the GMM method has its own criteria that are used, namely by carrying out three stages of testing as follows (Firdaus, 2011):
3.Instrument validity test (Sargan test): In order for the instrument used to be valid, H0 must be rejected or the p-value must be statistically insignificant, meaning that the p-value > α
4.Consistency test (Arellano-Bond correlation test): In order for the instrument used to be consistent, the Auto-Correlation AR (2) must not reject H0 or it must not be statistically significant, meaning AR (2) > α.
5.Unfamiliarity test: So that the instrument used is not biased, the value of the lag coefficient of the dependent variable in the GMM method must be between the lag coefficient values of the dependent variable in the Pooled Least Squares (PLS) and Fix Effect Model (FEM) methods. Which is, the lag coefficient is dependent on FEM < GMM < PLS.

2.1 Low Remittance Countries (0%-3%):
2.1.1 Instrument validity (Sargan Test): The results of the instrument validity test with the Sargan test in low remittance category countries using both FD- GMM and Sys-GMM show values above α = 5%, where the rejection criterion is if the p value < α then reject H0, so the decision is not rejected H0. This means that there is no correlation between residuals and overidentifying restrictions. So, it can be concluded from the results of the Sargan test that the instruments used both FD-GMM and Sys-GMM are valid.

2.1.2 Consistency test (Arrellano-Bond Test)- The test results using FD-GMM and Sys-GMM show that the p-value of the AR test (2) is above α=5%. So that using both FD-GMM and Sys-GMM proves that the estimates made are consistent and there is no autocorrelation in the second-order first difference error, so that from the Arellano-Bond test results it can be concluded that the research model uses both FD-GMM and Sys -GMM has been consistent.
2.1.3 Unfamiliarity Test- Table 1 shows the estimation results from the GMM unfamiliarity test in low remittance countries. From these results it can be seen that the lag coefficient value of the dependent variable in the FD-GMM and Sys-GMM methods is between the lag coefficient values of the dependent variable in the PLS and FEM methods. So this indicates that the model used

is not biased. These results indicate that the estimation model using FD-GMM and Sys- GMM both meet the criteria so that the estimation results can be concluded.

Table 1. GMM Unfamiliarity test results in Low Remittance Countries.

Variable		Coefficients		
	FD-GMM	Sys-GMM	FEM	PLS
$unemp_{it}$	0.89793	0.90505	0.87576	0.98688

Source: Processed data

However, due to the category of countries with low remittance income, both FD-GMM and Sys-GMM both meet the requirements. If this happens, determining the model to be used it can be seen from the number of variables that are consistent in the estimation results of each of these methods.

After comparing the two on the FD-GMM estimation results, there were six significant variables with two variables at 1% significance level, three variables at 5% significance level, and 1 variable at 10% significance level. The results of the Sys-GMM estimation show that there are four variables that are statistically significant. Where two variables are significant at 1% significance level, one variable at 5% significance level, and 1 at 10% significance level. From this comparison we conclude that the best model for countries in the low remittance category is FD- GMM.

2.2 Medium Remittance Countries (3%-10%):

2.2.1 Instrument validity (Sargan Test)- Based on the results of the Sargan test in countries with moderate remittance receipts, Sargan's estimation results show a p-value for FD-GMM of 0.7226 and for Sys-GMM of 0.69731, where both values are greater than the significance level of α=5%. So that both FD-GMM and Sys- GMM do not reject H0. From this, it can be concluded that the instruments used for both FD-GMM and Sys-GMM medium remittance countries are valid.

2.2.2 Consistency (Arrellano-Bond Test)-

The test results using FD-GMM show that the p-value of the AR (2) test is 0.10319, which means that there is not enough evidence to reject H0. As for the estimation results using Sys-GMM, the p-value of the AR (2) test is 0.10788 which also means that there is not enough evidence to reject H0. So based on the results of the Arrelano-Bond test in countries with medium remittances, it shows that the dynamic panel method with the GMM approach meets the criteria for the best model statistically, namely consistent.

- **Unfamiliarity Test:** Table 2 shows the estimation results from the GMM unfamiliarity test in countries with moderate remittance receipts. Based on these results it can be seen that the value of the lag coefficient of the dependent variable in the Sys-GMM method is between the lag coefficient values of the dependent variable in the PLS and FEM methods. Whereas in FD-GMM the value is above the value of FEM and PLS. So that the Sys-GMM model used is not biased, and is the best model.

Table 2. GMM Unfamiliarity test results in Medium.

Variable		Coefficients		
	FD-GMM	Sys-GMM	FEM	PLS
$unemp_{it}$	0.95182	0.90574	0.87959	0.94696

Source: Processed data

2.3 High Remittance Countries (>10%)

2.3.1 Instrument validity (Sargan Test)

The estimation results of the Sargan test show that the p-value on the FD-GMM is 0.69238 and on the Sys-GMM is 0.71561. The second p-value for both FD-GMM and Sys- GMM is above 0.05 so the decision is not to reject H0. So, it can be concluded from the results of the Sargan test that the instrument variables used are valid.

2.3.2Consistency (Arrellano-Bond Test)

The results of the consistency test using FD-GMM show that the p-value of the AR (2) test is 0.098847, which means that there is not enough evidence to reject H0. As for the estimation results using Sys-GMM, the p-value of the AR (2) test is 0.276409, which means that there is not enough evidence to reject H0 either. Thus, the conclusion is that using both FD-GMM and Sys-GMM proves that the estimates made are consistent.

2.3.3 Unfamiliarity Test-

The estimation results from the GMM unfamiliarity test in countries with high remittance receipts are shown in Table 3. Based on the estimation results it can be seen that the value of the lag coefficient of the dependent variable in the FD-GMM method does not meet the requirements or is biased. While the estimation results with Sys-GMM the dependent variable lag coefficient values are between the coefficient values with the PLS and FEM estimation methods, so they are not biased. So, for high remittance countries it indicates that the Sys-GMM model used is unbiased and is the best model.

Table 3. GMM Unfamiliarity test results in High Remittance Countries.

Variable		Coefficients		
	FD-GMM	Sys-GMM	FEM	PLS
$unemp_{it-1}$	0.77889	0.91729	0.86850	1.07277

Source: Processed data

3. Estimation Results and Comparing the Results in the Low, Medium and High Remittance Country Categories:

Table 4. Comparation of Estimation Results in Low,

variables		Responses	
	Low	Medium	High
$unemp_{it-1}$	0.8979351	0.9057412	0.9172936
	(0.0000)***	(2.2e-16)***	(2.2e16)***
Remit	-0.0561187	-0.0618531	-0.1210119
	(0.05815)*	(0.059679)*	(0.06135)*
Log_EXR	-0.7163167	-0.3721507	-0.6766757
	(0.04298)**	(0.038781)**	(0.03932)**
RIR	0.0177723	0.0187841	0.0438938
	(0.01204)**	(0.13564)	(0.03593)**
Log_Trade	-0.6140375	-0.2461660	-0.4648102
	(0.03788)**	(0.02556)**	(0.12053)
INF	-0.0030571	0.0359289	0.4278400
	(0.39175)	(0.02245)**	(0.02385)**
GDP	-1.5427834	-1.2911585	-1.1848122
	(8.288e06)***	(1.814e05)***	(5.311e06)***

Notes: ***, **, * significant at α = 1%, 5%, 10% Source: Processed data

Table 4 shows the results of a comparison of estimates on the unemployment rate in the low, medium and high-country categories. Based on these results it can be seen that the unemployment rate variable in all categories is most influenced by the GDP variable, namely in countries with low remittance receipts of 1.54 percent, medium remittance countries 1.29 percent, and high remittances of 1.18 percent. The effect of this GDP variable even exceeds the effect of the unemployment rate variable itself in the previous period, whose average effect was around 0.90 percent. This is the same as research by Arslan and Zaman (2014) which states that GDP is a key variable in overcoming the problem of unemployment. Even so, the previous unemployment rate variable is the second variable that is very influential on the unemployment rate. This is natural because unemployment is an economic and social problem that is difficult to eliminate. So that the previous high unemployment rate will also continue to affect the unemployment rate in the following period.

The remittance variable, which is the core variable of this study, turns out that the estimation results do not contribute too much to the unemployment rate. All categories, both in countries with low, medium and high remittances, the estimation results state that all are statistically significant but at the 10% level of significance or at the significance level with the highest error rate. The influence or contribution given by the remittance variable in each country category is also still very low. That is, in countries with low remittance receipts of -0.05 percent, medium remittances -0.06 percent, and high remittances -0.12 percent.

The remittance variable in all of these country categories has a negative effect on the unemployment rate, which is in accordance with the research and research hypotheses of Siddiqa (2021). Based on the coefficient of influence, the most influential on the unemployment rate is in the category of countries with high remittances, the second is countries with medium remittances, and the last is countries with low remittances. These results are also in accordance with the hypothesis where the most influential are countries that receive the most remittances or countries with high remittances. This is due to the fact that the remittances received by countries in this category can prosper the people in countries in the high remittance category. For example, such as making remittance receipts for education costs, where in the future this education will be useful in finding work and will be able to reduce unemployment rates in these countries.

The real interest rate variable only has a statistically significant positive effect on countries with high remittance and low remittance categories, which is in accordance with researches of Nizar (2014), and Akobeng (2015). Meanwhile, in the middle category countries, it does not have a significant effect. Based on the coefficient value, the category that has the greatest influence on the unemployment rate is in countries with a high category, namely 0.04 percent, then countries with low remittances, with 0.01 percent. This could be due to the fact that the majority of countries that are included in the high remittance category come from developed countries, where these developed countries often invest.

V. CONCLUSION

Based on the GMM estimation results, the unemployment rate variable in all categories is most influenced by GDP. The effect of this GDP variable even exceeds the influence of the unemployment rate variable itself in the previous period in the short term. This is natural because unemployment is an economic and social problem that is difficult to eliminate. So that the previous high unemployment rate will also continue to affect the unemployment rate in the following period.

The remittance variable, which is the main variable of this study, turns out that the estimation results do not contribute too much to the unemployment rate in the short term. All categories, both in countries with low, medium and high remittances, the estimation results stated that all were statistically significant but at the 10% level of significance or at the significance level with the highest error rate. The influence or contribution given by the remittance variable in each country category is also still very low. The biggest contribution to the remittance variable is shown by countries with high remittance categories, and this is according to the hypothesis.

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