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Panel data analysis on the impact of immigration on Economic Growth

Abstract

As the world is moving forward, immigration has also increased, which has a widespread effect. This paper focuses on the impact of immigration on economic growth; this is conducted through panel data analysis. The analysis is conducted in two parts, separated by high-immigration countries and low-immigration countries. By carrying out fixed effect and random effect models in both low and high immigration countries, the results have shown a negative impact on GDP per capita if the inflow of foreign population increases. Panel GLS allowed us to see which model was appropriate for our specific model, where the result of panel GLS indicated a random effect model. The tests revealed that low immigration countries have a negative impact on remittances. Therefore, results suggest that there is an inverse relationship.

Keywords: Panel data, GDP per capita, Random effect, Fixed effect, Remittance

1. Introduction

A few decades back, our civilization wasn't developed as much as it is now. If resources weren't managed properly, many people wouldn't get their necessary items within reach. There were also political problems, such as dictatorships and other political feuds. To look for better opportunities, people would move from place to place for a better livelihood, which we now call "immigration."

Immigration plays an essential role in the history of the human race and humankind. Immigration is not something that started in the modern era, but it has existed since the early ages. Immigration was a way for people to survive and look for better opportunities in a foreign land or wherever they could get better benefits than in their native land. We had a shortage of clean water and good food sources in the early days. Thus, throughout history, humans have moved in search of better hunting grounds, better sources water, better sources of water, and better security and safety. But now immigration is widely seen in every part of the world, especially from low-developing countries to developed countries.

The United States of America has been the primary destination for immigrants since Christopher Columbus discovered the New World. During the 1600s, many immigrants came to America to escape religious persecution and hope to find a better livelihood in the New World. Since then, immigration has seen a new face. Many people of different origins started to immigrate to different countries, not only the USA but other countries such as Spain, Italy, Sweden, etc. But heavy movements were seen only in the USA because when the new world was discovered, many enslaved people were brought into the USA in the 17th to 19th centuries. Then again, in 1882, there were many Chinese immigrating to America, for which the first significant federal legislation restricting immigration was passed, known as the Chinese Exclusion Act. Ellis Island was America's first civil immigration station, opening its doors in 1892. Before the creation of Ellis Island, each state had its regulations regarding immigration. Laws were created in 1965 that ended the share system designed to favor European emigrants. During the preceding 16 months of the 21st century, America is enduring another surge of emigrants, the bulk coming from Asia and Latin America.

As time goes on, our civilization has advanced, and we have aimed for higher standards. Many mentionable countries are developed and equipped with the most advanced technologies, many of which are yet to know the name of the particular item. So people seek their fortune in better countries where they will receive the best facilities, from medical, education, and health care to proper housing. People now move from one country to another for better livelihood and higher education. Even in this modern era, some countries still can't provide quality education, let alone education in some parts. There are places where they can't get a three-meal meal. Since our transportation also has advanced, people can easily migrate from one country to another, yielding benefits for human capital and the particular country. "Education is the backbone of every nation." If, through immigration, people receive proper education and can develop their standard of life, in the long run, it will contribute to the GDP of the country, which will be beneficial for the entire economy.
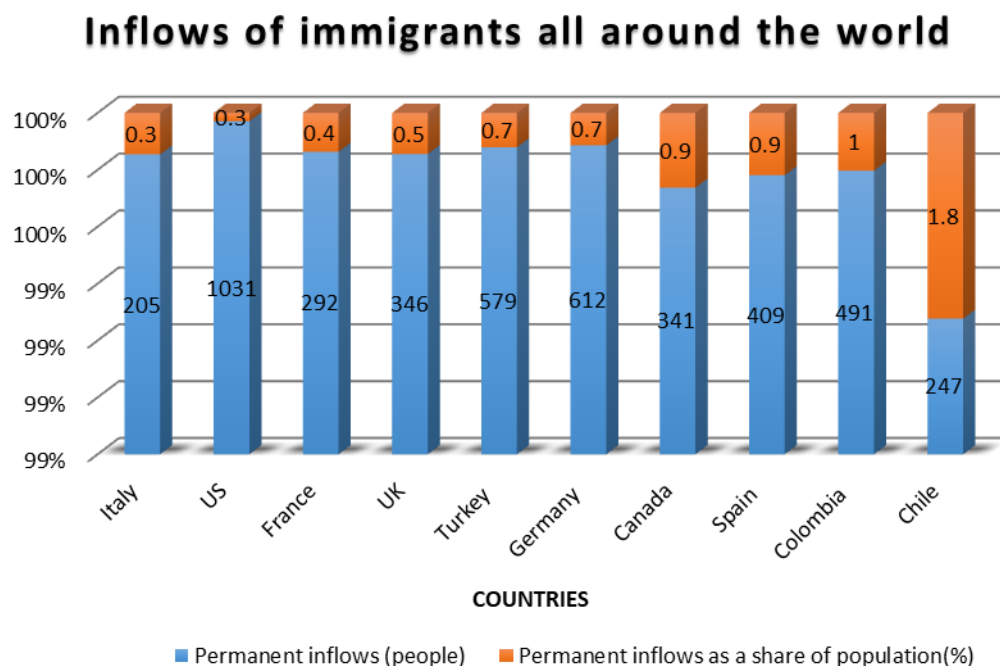

Figure 1: The chart shows population inflows and share of people as percentages.

From the depicted picture, we can learn that people now prefer to move not only to the USA but worldwide. Although the most preferred place is still the USA, that doesn't indicate that people only move to the state but also that many now prefer to move to other destinations as immigrants. From the given data, we can also see that the population share is also higher in Chile. They have a vast diversity in their culture with a diverse population. Many people choose

to move to Chile because of better job opportunities, which is helpful for those who are immigrating.

Most of the time, it can be seen that many people immigrate from Asian countries to European countries and the United States of America. From the perspective of Bangladesh, many students pursuing higher studies opt to pursue their studies in other developed countries and look for better opportunities because the job markets in other nations are vaster yet competitive, so they get their preferred job after completing their studies. On the other hand, many workers relocate to Middle Eastern countries because the wages are higher. The market wage rate in middle eastern countries is more elevated than Bangladesh's market offers, so many low-income people, such as day laborers and garment workers, move to those countries in search of better wage rates. This eventually helps our country because they send a massive amount of remittance, which allows the economy to grow. This positively affects the country's GDP and boosts the GDP more readily than other economic variables.

But in this world, many believe that immigrants are an economic burden on the nation's economy because many claims that immigrants are the reason for the drain on social services and unemployment. It is alleged that immigrants increase the rate of violent crimes in the area they reside, decrease property values and erase the host nation's cultural identity. The adverse effect they have is on the job market of the host nation. This is where the natives are worried, with the immigrants taking their jobs away.

On the other hand of this debate, many are saying that immigration helps a country to maintain its economic structure. As a result, one of the most pressing issues is job displacement for native workers.

In this current world, where immigration is on the rise, people are choosing to immigrate now and then. After COVID-19, there has been a sharp rise in immigration because people want to seek their fortune where they can earn their future. Due to the increase in immigration, there has been an impact on GDP, remittance, and employment, which intrigued me to look deep into it. A conclusion can be made through research, or new findings can be found on how immigration shapes our modern life. In this current world, where immigration is on the rise, people are choosing to immigrate now and then. After COVID-19, there has been a sharp rise in immigration because people want to seek their fortune where they can earn their future. Due to the increase in immigration, there has been an impact on GDP, remittance, and employment,

which intrigued me to look deep into it. Through research, a conclusion can be made, or new findings can be found on how immigration is shaping our modern life.

2. Literature Review

There are numerous papers published, and extensive studies have been done about the relationship between immigration and GDP. Still, we cannot easily exhibit a linear relationship as other factors prevail over us. In this research paper, panel data analysis has been conducted on 20 countries by taking countries from different continents such as Asia, Europe, Australia, Africa, the Middle East, and America. The main aim is to find out how inflows of immigration affect GDP per capita, remittances, and employment.

Mete Feridun (2005) utilized the Granger causality test to examine the causal relationship between immigration and GDP per capita in Norway using annual data from 1983 to 2003. Utilizing the unit root test, it was determined that all series are non-stationary and in the l(1) process. In contrast, the Johansen co-integration test revealed that the data set lacked co-integration. The Granger causality test showed that when the degree of immigration increases, the GDP per capita also increases. It also demonstrated that immigration has no effect on unemployment and vice versa.

In his 2007 paper, Asadul Islam explored the correlation between unemployment and immigration in Canada. The bi-directional causality test indicates no apparent association between immigration to Canada and unemployment. In addition, the co-integration examination reveals that immigration does not create a long-term increase in aggregate unemployment. In contrast, the vector error correlation model demonstrates that in the short run, prior unemployment does result in (reduced) immigration but not vice versa and that there is a positive long-term correlation between per capita GDP and the immigration rate of real wages. The findings imply that, in the near term, higher immigration may be associated with more attractive Canadian policies and that, in a long time, native-born Canadians are likely to benefit from increased immigration as the labor market evolves.

In the published papers and journals, we find several views of authors. For example, a report by Ekrame Boubtane and Jean-Christophe Dumont (2010) carried out a survey on "Immigration and economic growth in the OECD countries." For a specific period (1986 to 2006), 22 OECD countries were included. This was based on a particular data set that assisted in distinguishing the net migration of native-born and foreign-born by skill level. Migration is put forward in an augmented Solow-Swan model, and estimation is carried out based on system GMM to deal with possible endogeneity of the migration variables. Hence, this paper shows

the positive impact of human capital on economic growth. The contribution of immigrants to human capital accumulation tends to dominate the mechanical dilution effect. However, the net change is insignificant as well in countries that have highly selective immigration policies.

Using cointegration analysis and a Granger non-causality test, Chletos, Michael, Roupakias, and Stelios (2012) demonstrated the causal relationship between migration in Greece and two macroeconomic variables: real GDP and unemployment. The years from 1980 to 2011 were considered. Cointegration analysis and the Granger Non-Causality test were employed to determine the relationships. Therefore, Granger's output proved that the growth rate of GDP and unemployment cause migration. In contrast, no evidence of reverse causality was discovered.

A paper published by J.Muysken and T.H.W. Ziesemer (2012) showed how immigration could lessen the burden of aging for the betterment of most Western economies. A decomposition framework for GDP was developed, which deals with the impact of both aging and immigration on economic growth. From 1973 to 2009, a vector error correction model was used. The results showed that the slightest immigration might help ease the aging problem by positively contributing to employment, wages, and GDP per capita. But the participation of immigrants is necessary along with the native population in the labor force. Also, adverse effects could be avoided by a gradual phasing in of immigration policy.

Al-AbdulrazagBashi and AmaniJaiser Siam (2014) determined that natural capital and indigenous labor have a favorable effect on economic growth, whereas the influence of migrant workers is negligible. For the study, the years 1980 through 2012 were used to determine the impact of foreign workers on Jordan's economic growth. The FMOLS (Fully Modified Ordinary Least Square) method was utilized. Using unit root and co-integration, it was found that all variables (capital, domestic labor, and guest worker) are integrated into the order I. Co-integrated showed a long-run equilibrium relationship between the variables in the model, which meant that FMOLS could be used to estimate the economic model.

In a fascinating study, John Tzougas (2016) investigated the causal relationship between immigration and two macroeconomic indicators, GDP per capita and unemployment, using annual data from 1980 to 2007. The method endogenously identifies structural breakdowns in various macroeconomic series and integrates these structural breaks into unit root tests. A primary finding is that two key events that occurred in Greece between 1991 and 1999 and

endogenously determined structural fractures closely coincide. The first is the unanticipated inflow of undocumented immigrants, their informal integration, and the 1998 legislation that legalized their residency. The second was establishing the Revised Convergence Program (RCP) by the Greek government in 1993, with the eventual objective of meeting the criteria for membership in the European Monetary Union by 1999. The error-corrected version of the autoregressive distributed lag technique is then used to describe the short-and long-term causes of immigration, taking into account these structural discontinuities. The results of the ARDL limits test are consistent with the hypothesis that the variables have a long-term equilibrium level connection. The results of the Granger causality test, on the other hand, indicate that immigration and GDP per capita have a long-term, bidirectional causal relationship. However, the short-term statistics show a unidirectional causal relationship between immigration and per capita GDP. In addition, the findings do not support the claim that immigration causes unemployment in the short run. In contrast, research suggests that unemployment is the cause of immigration.

Using annual time series data, Howard Wayne McGruder (2016) analyzed the influence of immigration on GDP growth from 1950 to 2013. For estimation and analysis, an aggregate production function model is constructed, using total capital, labor, and immigration as variables that explain real GDP. Before building and estimating the model, the time series characteristics of the data are recognized, and an error correction model is constructed. According to the calculated results, capital and labor significantly influence output growth. However, statistical evidence indicates that immigration does not affect the actual GDP.

A 2016 study by MihaelaSimionescu, Daniel Ciuiu, YuriyBilan, and WadimStrielkowski examined GDP and net migration in several eastern and south-eastern European nations. Panel data and Bayesian analysis were utilized. The panel data analysis covered the years 1991 through 2013. There was a negative correlation between net migration and the real GDP rate during the previous period. At a significance level of 5%, each 10% increase in the GDP rate was associated with a 0.6% decrease in net migration during the transitional period of 1991-1994. The period of economic recession (1994-2000) saw an increase, while the period of economic expansion saw a decrease (4.58 percentage points for every 10% increase in GDP). Because Ukraine's estimate had a more significant range, we calculated that the expected differences between Ukraine and Poland would be -17.7187 and 15.745.

In 2016, Francesco Furlanetto and OrjanRobstad conducted research on immigration and the macroeconomy. The analysis was performed using Norwegian data from 1990 to 2014. Identification requires a quarterly net immigration series. In the model, immigration is an endogenous variable that can fluctuate based on the state of the economy. The fundamental factors of immigration dynamics are identified as shocks to the domestic labor supply and immigration shocks. Exogenous shocks lower unemployment (even for local workers), have a long-term positive effect on prices and public budgets, have no impact on home prices and consumer credit, and harm productivity.

Tim Kane and Zach Rutledge authored a 2018 article on immigration and economic success in all fifty U.S. states. Since 1980, immigration has increased differently in each of the fifty states of the United States. Yet, they all share the same institutional environment, allowing us to study how immigration has affected several macroeconomic performance indicators. To uncover exogenous variation in migration by state and decade since 1980, the researchers utilized a variety of public data sources and the well-known shift-share instrument. A regional and temporal variation study demonstrates a negative growth association between the percentage of foreign-born workers and GDP, per-capita GDP, employment, and per-capita income. Most longer-term impacts decline when level regressions are employed to assess them.

The literature on the consequences of migration on the tourism demand of the host country's population is vast. For instance, Daniel Dragievi, Suzana Herman, and MajaNikiRadi (2019) examined the migration impact as a positive change in tourism demand. For 28 European countries, the period from 1990 to 2017 was used. A comparison approach and correlation were chosen to determine the possible relationship between observable variables. For 18 nations, the results demonstrated a significant correlation between tourism (nights spent) and immigration, suggesting that an increase in the number of nights spent utilizing accommodation services may be associated with an increase in immigration. Migration and tourism are conceptualized in a manner compatible with the paper's conclusions. This study provides a novel viewpoint on the relationships between migration and tourism. Migration is a significant contributor to the growth of VFR tourism. The findings can be used to model travel demand and provide methods that best suit the travel requirements of immigrant groups.

In a comprehensive empirical analysis, Burca Ozcan (2020) examined the relationship between immigration, labor market conditions, and GDP for the 15 U.S. host states from 1990 to 2016.

The Granger causality test was utilized. The data indicates that immigration worsens unemployment in the seven most populous host states but has no discernible influence on the unemployment rates of the remaining eight states.

In addition, Minh Doan Van (2021) published a journal on the influence of migration on economic growth and human development in the Philippines. Where he took a period of 1985 to 2021 for the research; according to the panel's estimates, critical determinants of human development or per capita GDP in the Philippines include social spending, domestic investment, finance, income disparities, income, and human poverty. Future research on the association between remittances and country development should consist of additional variables, according to the findings of this study. According to the policy proposal of the investigation, the government should take the appropriate steps to manage the migration source and prevent the issue of gray matter flowing for talent.

In addition, Carol Ohenewa Bruce-Tagoe (2022) conducted a comprehensive analysis of the influence of immigration on unemployment and wages in the United States, utilizing data from 2007 to 2019. He determined the growth rates of two models: wages and unemployment. The findings of the pooled OLS estimation indicate that immigration has minimal effects on the U.S. labor market. The increasing number of immigrants in the United States has a positive but statistically insignificant impact on the unemployment rate. In addition, the results indicate that immigration has a positive but statistically insignificant effect on the rate of wage growth in the United States. Other factors such as GDP growth and degree completion substantially reduce unemployment growth. According to the study, wage growth can be negatively affected by college graduation rates and rising unemployment, but it can be significantly increased by increasing GDP growth. As a strategy to lower the unemployment rate, the report recommended that the U.S. government focus on expanding its GDP and encouraging Americans to pursue a college education rather than focusing on immigration. If all other conditions remain constant, the expansion of the GDP will contribute to wage growth over time.

3. Methodology

This research has been approached by different methods previously. While some conducted panel data cross-country analysis, some have created a suitable model based on their survey on the findings of past studies. To comprehend the relationship between immigration and other independent variables, which are employment, remittance, and GDP per capita, We would have to go through the published works of previous authors, journals, and researchers, then come to a final verdict. This paper will have to be checked for Autocorrelation and heteroscedasticity. This paper was completed using the quantitative method and panel data analysis. We made two panels of countries. Then we acknowledged how the variables were affected.

In this paper, this objective is to measure the relationship between the impact of economic growth on immigration.

The empirical result is measured using the following model:

$$Immigration_{it} = \alpha + \beta_1 GDP_{it} + \beta_2 employment_{it} + \beta_3 remittance_{it} + u_{it}$$

Here,

      I = no of countries

      t = time period

The empirical model is estimated for two separate groups of countries. One is high immigration, and the other is low immigration. Where the countries are selected from 7 different continents, and based on the number of inflows of immigrants, Both the pools contain OECD countries.

The **high immigration** pool contains ten countries. The ten countries are:

Australia
Canada
United States
United Kingdom
Spain
Germany
Ireland
Italy
Japan
New Zealand

The **low immigration** pool contains ten countries. The ten countries are:

Denmark
Estonia
Finland
Iceland
Latvia
Israel
Luxembourg
Mexico
Norway
Slovenia

The time period used in this study starts from 2000 to 2019, so there are 19 time periods in the study.

GDP per capita:

Gross domestic product per capita equals gross domestic product divided by population. GDP is the sum of the gross value added by all resident directors in the frugality, plus any product charges, minus any allocations that are not included in the value of the products. It is estimated without taking into account the depreciation of manufactured assets or the diminution and decline of natural resources. The data is presented in current U.S. dollars.

Personal remittances, paid:

Specific remittances consist of specific transfers and worker compensation. Particular transfers correspond to all existing cash or in-kind transfers from resident households to nonresident households. Therefore, particular transfers encompass all current transfers between residents and nonresidents. Employees' compensation refers to the income of border, seasonal, and other short-term workers employed in a territory where they are not residents and the income of residents hired by nonresident realities. Data represent the total of two characteristics defined in the sixth edition of the IMF's Balance of Payments: Homemade specific transfers and worker compensation. Data are presented in U.S. money.

Employment to population ratio, total (%):

The employment to population ratio is the percentage of a country's population that is employed. Employment is defined as persons of working age who, during a short reference period, were engaged in any exertion to produce goods or provide services for pay or profit, whether at work during the reference period (i.e., who worked in a job for at least one hour) or not at work due to temporary absence from a job or working-time arrangements. In general, those aged 15 and older are considered the working-age population.

Panel dataset

The research for this paper was done using panel data. The purpose of using panel data is to allow us to control variables we cannot observe or measure. For example, cultural factors or indifference like a preference for whether or education. This arises because we have included countries from different continents and various cultural backgrounds, where preference differs for each individual. Here we could consist of the measurable variables, but there are other intangible variables that we are including, but those variables are unobserved, thus creating a bias. This is where panel data accounts for individual heterogeneity.

4. Methods and Results

High immigration country:

Sum:

Initially, we ran sum tests to get an overall view of our data. Here we can deduce that there are 200 observations for our data. Since we have taken countries from different continents and there are ten high-immigration countries, we would like to see the mean of our dependent and independent variables. Along with the standard deviation in each independent and dependent variable, this would give us a brief idea of the dataset.

Variable	Observation	Mean	Std. Dev.	Min	Max
inflowsoff~n	200	414911.7	356977.9	23900	2016241
GDP per capita	200	39983.2	12167.12	13641.1	80886.62
employment~t	200	3975.045	12047.68	42.839	47959.99
remittance~d	200	1.00e+10	1.53e+10	1.81e+08	7.14e+10

Pooled OLS Regression:

Since we performed panel data analysis, we have performed some tests that are essential requirements for panel data analysis. So, we started with a pooled OLS regression. This is because pooled OLS gives us the value of F statistics to see the overall significance of the model. This helps us to understand how preferable our model is. When t 0.05, it shows that our model is significant. We can also deduce that the t-value and p-values test represent the explanatory variable's significance. R squared helps us to understand the goodness of fit. Here, 75% of the inflow of the foreign population is explained by GDP per capita, employment, and remittance.

Further explanations for the table are:

A decrease in GDP per capita by 1 US dollar decreases the inflow of foreign population by the amount of -3.914 units. This means, on average, one foreign worker is attracted by a rise of $1 US for a particular country. According to the t-statistics and significance level, this interrelation is highly significant. (a negative value in GDP).

The result shows there is a "positive" association between employment in a particular country and the inflow of a foreign population attracted to that particular country. This means that if the employment opportunities of a country decrease, then it signifies that the working opportunities of foreign people in that country actually increase.

The variable remittance paid shows the amount of currency that the foreign population working in that particular country earns and sends back to their home country. The regression result shows that if inflows of the foreign population increase by almost one person, the extra worker earns a remittance of an amount of 0.0000171US dollars.

As mentioned earlier, pooled OLS shouldn't be the appropriate model since heterogeneity and entity problems occur, which cannot be identified by pooled OLS. Even though we are getting good results from pooled OLS, for a reason mentioned above, we need to use the fixed and random effect models.

Pooled OLS						
inflowsofforei~n	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
GDP per capita	-3.914085	1.115769	-3.51	0.001	-6.114539	-1.713632
employmentiloest	12.55354	1.064071	11.80	0.000	10.45504	14.65203
remittancepaid	.0000171	8.93e-07	19.14	0.000	.0000153	.0000189
_cons	349821.6	44327.05	7.89	0.000	262402.4	437240.9
Adjusted R^2	0.7486(75%)					

Fixed effect model:

A fixed-effect model is used to analyze the variables' impact that may vary over time. Fixed effects help us to identify those unobserved factors which change over time. Fixed effect research investigates the relationship between outcome and predictor within a single entity (country). Each entity has characteristics that may or may not influence the predictor variables. The fixed-effect model removes the time-invariant predictors so that we can assess the net effect of the predictor on the outcome variable.

For Fixed effect model we can see that:

A one-dollar increase in GDP per capita increases the inflow of foreign population by 0.369 units. This means, on average, one foreign worker is attracted by a rise of $1 US for a particular country. According to the t-statistics and significance level, this interrelation is highly significant.

The result shows a "positive" association between employment in a particular country and the inflow of a foreign population attracted to that specific country. This means that if the employment opportunities of a country decrease, then it signifies that the working possibilities of unfamiliar people in that country increase.

The variable remittance paid shows the currency the foreign population working in that particular country earns and sends back to their home country. The regression result shows that if foreign population inflows increase by nearly one person, the extra worker earns a remittance of 0. 00001 US dollars.

Sigma-u: 168957.55 explains standard deviation of the residual within groups

Sigma-e: 144328.24 explains standard deviation of residual of overall error term

Rho: 58% of variance is due to the difference across panels.

corr(u_i, Xb) = -0.2237   here is correlation

Fixed effect model						
inflowsofforei~n	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
gdppercapita	.3690934	1.303396	0.28	0.777	-2.202155	2.940342
employmentiloest	20.47979	4.321622	4.74	0.000	11.95439	29.00519
remittancepaid	.0000116	3.21e-06	3.61	0.000	5.26e-06	.0000179
_cons	202406.4	44886.68	4.51	0.000	113857.1	290955.8
sigma_u	168957.55					
sigma_e	144328.24					
rho	.57813323 (fraction of variance due to u_i)					

Random-Effect model:

In contrast to the fixed effects model, the random-effects model implies that change between entities is random and uncorrelated with the predictor or independent variables in the model. For Fixed effect model we can see that:

A decrease in GDP per capita by 1 US dollar decreases the inflow of foreign population by -0.351 units. This means, on average, one foreign worker is attracted by a rise of $1 US for a particular country. According to the t-statistics and significance level, this interrelation is highly significant. (a negative value in GDP).

The result shows a "positive" association between employment in a particular country and the inflow of a foreign population attracted to that specific country. This means that if the employment opportunities decrease, it signifies that the working chances for foreign people in that country increase.

The variable paid remittance shows the currency the foreign population working in that country earns and sends back to their home country. The regression result shows that if inflows of foreign population increase by almost one person, the extra worker earns a remittance of 0.0000149US.

Sigma-u: 168957.55 explains standard deviation of the residual within groups

Sigma-e: 144328.24 explains standard deviation of residual of overall error term

Rho: 58% of variance is due to the difference across panels.

corr(u_i, Xb) = -0.2237 here is correlation

Random Effect Model						
inflowsofforei~n	Coef.	Std. Err.	z	P>|z|	95% Conf.	Interval
gdppercapita	-.3514608	1.187011	-0.30	0.767	-2.67796	1.975039
employmentiloest	15.18464	2.570585	5.91	0.000	10.14639	20.2229
remittancepaid	.0000149	2.05e-06	7.25	0.000	.0000108	.0000189
_cons	219484.9	56768.87	3.87	0.000	108220	330749.8
sigma_u	111947.46					
sigma_e	144328.24					
rho	.37563414 (fraction of variance due to u_i)					

Our findings from Pooled OLS and Random Effect show that inflows of population impact GDP per capita negatively, whereas we assumed the relationship to be positive. As a country's foreign population grows as a result of immigration, there is a good chance that the labor force will grow as well. Population growth is good for a country because it means there will be more people to work. But when foreign workers enter the market, this creates a challenge for the native workers, as foreign workers are seeking their fortune in the new country. Hence, they will sign up for jobs below the market structure wage. The native people will think their jobs are being taken away, which might ultimately trigger a risk of unemployment in the economy. Native people losing jobs might cause poverty and economic inequality. Although GDP only focuses on the amount rather than the distribution of output, from this, we can conclude that if there is an increase in the foreign labor force, it will trigger unemployment among the native people, hence causing GDP to decline.

Hausman Test:

We have already conducted Random effect and Fixed effect, for this particular analysis we have to look for the best model. Hausman test is conducted to carry out comparison between Random effect or Fixed effect and which one is appropriate based on the data set.

Here,

H_o: RE model is appropriate
H_A:FE model is appropriate
If $P < 0.05$ then we reject H_o
P= 0.067

In order to select between null and alternative hypothesis, we have to see probability value.

Here P=0.067, so we do not reject H_o, indicating that Random effect (RE) is suitable.

Breusch-Pagan Lagrange multiplier:

The Breusch-Pagan Lagrange multiplier test helps us to distinguish between simple OLS regression and Random effect model.

Here,

H_o: No panel effect
H_A: RE is appropriate
If $P < 0.05$ then we reject H_o
P=0.0000

In order to select between null and alternative hypothesis, we have to see probability value.

Here P=0.0000, so we reject the null hypothesis; hence there is a panel effect indicating Random effect model is appropriate.

Diagnostic Test

Modified Wald Test for Heteroscedasticity:

This is done whether or not the model contains error terms and variance. We will determine whether or not Homoscedasticity has been violated.

H_O : There is Homoscedasticity in the model
H_A : There is Heteroscedasticity
IF P< 0.05 then we reject H_O
P= 0.0000

Consequently, homoscedasticity is broken and heteroscedasticity exists. Therefore, the amount of the error term varies across all values of an independent variable.

Woolridge test for Autocorrelation:

Autocorrelation is typically performed on time series since it reveals the degree of similarity between the values of the same variable across subsequent time intervals. Since the panel data analysis in this research spans the years 2000 to 2019, it is a lengthy study. We wish to determine whether or not Autocorrelation is present.

Here,

H_O : There is no first order autocorrelation
H_A : There is first order Autocorrelation
If P< 0.05 then we reject H_0
P= 0.0000

In order to select between null and alternative hypothesis we have to see probability value

Here P = 0.0000 so we reject Ho. There is Autocorrelation, however there is no first-order autocorrelation, indicating that consecutive errors are connected.

Feasible Generalized least square model:

Since our model have both heteroscedasticity and autocorrelation problem to solve that problem we are going to use panel GLS

A decrease in GDP per capita by 1 US$ decreases the inflow of foreign population by the amount of –0.351 unit. This means, on an average, 1 foreign worker is attracted by a rise of $1 US of a particular country. According to the t-statistics and significance level this interrelation is highly significant. (negative value in GDP)

The result shows there is a "positive" association between employment of a particular country and inflow of foreign population attracted to that particular country. This means, that if employment opportunity of a country decrease, then it signifies that the working opportunity of foreign people in that country actually increase.

The variable remittance paid shows that the amount of currency that the foreign population working in that particular country earns and sent in their home country. The regression result shows that if inflows of foreign population increase by almost 1 person the extra worker earns a remittance by an amount of .0000149 US dollar.

Sigma-u: 111947.46explains standard deviation of the residual within groups

Sigma-e: 144328.24explains standard deviation of residual of overall error term

Rho: 38% of variance is due to the difference across panels.

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inflowsofforei~n	Coef.	Std.Err.	Z	P>|z|	95%conf	Interval
gdppercapita	-.3514608	1.187011	-.30	0.767	-2.67796	1.975039
employmentiloest	15.18464	2.570585	5.91	0.000	10.14639	20.2229
remittancepaid	.0000149	2.05e-06	7.25	0.000	.0000108	.0000189
_cons	219484.9	56768.87	3.87	0.000	108220	330749.8
sigma_u	111947.46					
sigma_e	144328.24					
rho	.37563414 (fraction of variance due to u_i)					

Low immigration

Sum:

We will run the sum test for the low-immigration countries as well, since it gives us an overall view of the data and helps us understand it much better.

Variable	Observation	Mean	Std. Dev.	Min	Max
inflowsoff~n	200	19408.54	16537.53	759	70759
GDP per capita	200	40485.51	30394.1	3361.641	123678.7
employment~t	200	58.27368	6.195565	47.41	76.85
remittance~d	200	2.09e+09	3.15e+09	0	1.42e+10

Just as we had conducted Fixed effect, Random effect and Pooled OLS regression for High immigration country we would run those similar tests for the low immigration countries as well.

Pooled OLS regression:

Since similar tests are being conducted again but for different set of data so we might get different answers. R squared helps us to understand the goodness of fit, here 19% of the inflow of foreign population is explained by GDP per capita, employment and remittance.

An increase in GDP per capita by 1 US $increases the inflow of foreign population by 0.253 units. This means, on average, one foreign worker is attracted by a rise of US $1 in a particular country. According to the t-statistics and significance level, this relationship is highly significant.

The results also show a negative relationship between employment in a particular country and the inflow of foreign population attracted to that country. This means, that if the employment opportunity increases, it signifies that the working chance of foreign people in that country decreases.

The variable paid remittance shows the currency the foreign population working in that country earns and sends back to their home country. According to the regression results, if the inflow of foreign population increases by nearly one person, the extra worker earns a remittance of 0.002 US dollars.

Pooled OLS						
inflowsoff~n	Coef.	Std. Err.	T	P>|t|	95% Conf.	Interval
GDP per capita	.2527637	.0732558	3.45	0.001	.108293	.3972345
employmentiloest	-85.11619	214.444	-0.40	0.692	-508.03	337.7976
remittance~d	-6.77e-08	6.75e-07	-0.10	0.920	-1.40e-06	1.26e-06
_cons	14276.84	11639.81	1.23	0.221	-8678.509	37232.19
Adjusted R^2	0.1860(19%)					

Fixed effect model:

Fixed effect model is used in analyzing the impact of the variables that may vary overtime.

For Fixed effect model we can see that:

An increase in GDP per capita by 1 US \$increases the inflow of foreign population by the amount of 0.315 units. This means, on average, one foreign worker is attracted by a rise of \$1 US for a particular country. According to the t-statistics and significance level, this interrelation is highly significant.

The result shows a negative association between employment in a particular country and the inflow of a foreign population attracted to that particular country. This means that if a country's employment opportunity increases, it signifies that the working opportunity of foreign people in that country decreases.

The variable paid remittance shows the currency the foreign population working in that country earns and sends back to their home country. The regression result shows that if inflows of the foreign population increase by almost one person, the extra worker earns a remittance of 0.007US dollars

Sigma-u: 14299.091explains standard deviation of the residual within groups

Sigma-e: 8452.1653 explains standard deviation of residual of overall error term

Rho: 75% of variance is due to the difference across panels.

corr(u_i, Xb) = -0.3603 here is correlation

Fixed effect model						
inflowsoff~n	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
GDP per capita	.3153943	.087765	3.59	0.000	.1422574	.4885311
employmentiloest	-710.5292	278.5904	-2.55	0.012	-1260.113	-160.9452
remittance~d	8.49e-07	8.03e-07	1.06	0.292	-7.35e-07	2.43e-06
_cons	46270.07	15970.53	2.90	0.004	14764.52	77775.63
sigma_u	14299.091					
sigma_e	8452.1653					
rho	.74107178 (fraction of variance due to u_i)					

Random effect model:

In contrast to the fixed-effects model, the random-effects model implies that change between entities is random and uncorrelated with the predictor or independent variables in the model.

A one-dollar increase in GDP per capita increases the inflow of foreign population by 0.317 units. This means, on an average, 1 foreign worker is attracted by a rise of $1 US for a particular country. According to the t-statistics and significance level, this interrelation is highly significant.

The results also show a negative relationship between employment in a particular country and the inflow of foreign population attracted to that country. This means that if the employment opportunity of a country increases, then it signifies that the working opportunity of the foreign people in that country actually decreases.

The variable remittance paid shows the amount of currency that the foreign population working in that particular country earns and sends back to their home country. According to the regression results, if the inflow of foreign population increases by nearly one person, the extra worker earns a remittance of 0.006 US dollars.

Sigma-u: 15496.93 explains standard deviation of the residual within groups

Sigma-e: 8452.1653 explains standard deviation of residual of overall error term

Rho: 77% of variance is due to the difference across panels.

corr(u_i, Xb) = 0 (assumed) here is correlation

Random effect model						
inflowsoff~n	Coef.	Std. Err.	t	P>|t|	95% Conf.	Interval
GDP per capita	.3175781	.0843825	3.76	0.000	.1521914	.4829647
employmentiloest	-636.9423	.0843825	-2.41	0.016	1155.965	117.9196
remittance~d	6.97e-07	7.69e-07	0.91	0.365	-8.11e-07	2.20e-06
_cons	42211.38	7.69e-07	2.66	0.008	11104.89	73317.87
sigma_u	15496.93					
sigma_e	8452.1653					
Rho	.77073015 (fraction of variance due to u_i)					

Hausman Test:

Hausman test is conducted to carry out comparison between Random effect or Fixed effect and which one is appropriate based on the data set.

Here,

H_o: RE model is appropriate
H_A:FE model is appropriate
If P < 0.05 then we reject H_o
P= 0.067

In order to select between null and alternative hypothesis, we have to see probability value.

Here P=0.067, so we do not reject H_o, indicating that Random effect (RE) is suitable.

Breusch-Pagan Lagrange multiplier:

The Breusch-Pagan Lagrange multiplier test helps us to distinguish between simple OLS regression and Random effect model.

Here,

H_o: No panel effect
H_a: RE is appropriate
If P < 0.05 then we reject H_o
P=0.0000

In order to select between null and alternative hypothesis, we have to see probability value.

Here P=0.0000, so we reject the null hypothesis; hence there is a panel effect indicating Random effect model is appropriate.

Diagnostic Test

Modified Wald Test for Heteroscedasticity:

This is done whether or not the model contains error terms and variance. We will determine whether or not Homoscedasticity has been violated.

H_O : There is Homoscedasticity in the model
H_A : There is Heteroscedasticity
IF P< 0.05 then we reject H_O
P= 0.0000

Consequently, homoscedasticity is broken and heteroscedasticity exists. Therefore, the amount of the error term varies across all values of an independent variable.

Woolridge test for Autocorrelation:

Autocorrelation is typically performed on time series since it reveals the degree of similarity between the values of the same variable across subsequent time intervals.

Here,

H_O : There is no first order autocorrelation
H_A : There is first order Autocorrelation
If P< 0.05 then we reject H_0
P= 0.0000

In order to select between null and alternative hypothesis we have to see probability value

Here P = 0.0000 so we reject Ho. There is Autocorrelation, however there is no first-order autocorrelation, indicating that consecutive errors are connected.

In our low immigration data, we have found a negative relationship between the inflows of foreigners and remittances. According to one hypothesis, when a country receives a large influx of foreign population, GDP and remittances are expected to rise. But as this is a low immigrant country, fewer people would go there. So there is a negative relationship found, which indicates that since this is a low immigrant count, the amount of remittance is given out less as fewer workers go there.

Feasible Generalized least square model:

Since our model have both heteroscedasticity and autocorrelation problem to solve that problem we are going to use panel GLS.

An increase in GDP per capita by 1 US $increases the inflow of foreign population by 0.318 units. This means, on average, one foreign worker is attracted by a rise of US $1 in a particular country. According to the t-statistics and significance level, this relationship is highly significant.

The results also show a negative relationship between employment in a particular country and the inflow of foreign population attracted to that country. This means, that if the employment opportunity increases, it signifies that the working chance of foreign people in that country decreases.

The variable paid remittance shows the currency the foreign population working in that country earns and sends back to their home country. According to the regression results, if the inflow of foreign population increases by nearly one person, the extra worker earns a remittance of 11.946 US dollars.

inflowsofforei~n	Coef.	Std.Err.	Z	P>|z|	95%conf	Interval
gdppercapita	.3175781	.0843825	3.76	0.000	.1521914	.4829647
employmentiloest	-636.9423	264.8124	-2.41	0.016	-1155.96	-117.919
remittancepaid	6.97e-07	7.69e-07	0.91	0.365	-8.11e-07	2.20e-06
_cons	42211.38	15870.95	2.66	0.008	11104.89	73317.87
sigma_u	15496.93					
sigma_e	8452.1653					
rho	. 77073015 (fraction of variance due to u_i)					

Comparative analysis between high immigration and low immigration country

In both the statistical results, the random effect model is more suitable, therefore we will now conduct a comparison between both High immigration country and Low immigration country. To see immigration is having an impact on the independent variable given below.

	High Immigration	Low immigration
Dependent variable	RE	RE
Immigration	-	-
Independent variable		
GDP per capita	-3.914**	2.52**
	1.11	.073
Employment	12.55**	85.11**
	1.06	214.44
Remittance	.0000171**	-26.40
	17.27	11.34

We conducted a comparative analysis to compare the two sets of data. This will help us to have an overall look and have better insight into it. Here we have 95% significance in high immigrating in a random effect model, which tells us that our result is good. At high immigration, the GDP per capita is negative, whereas we are getting a positive relationship at low immigration. The employment rate in areas of low immigration is higher, but it is not significant. Remittance earned in high immigrant countries is low, but it is positive as more remittance will be given out due to the inflow of a high amount of population.

Conclusion

The research question was whether there was any impact of immigration on economic growth; it can now be said that there is an impact, but it differs for the two sets of data.

After conducting tests on two separate data, even if the population inflow increases, it doesn't always bring sound economic output. In high immigration countries, we have seen that population and GDP per capita inflows have a negative relationship, which indicates that even if the countries are developed. Still, substantial population inflows can disrupt a country's economic condition and cause an adverse effect. But on the other hand, the amount of remittance from such countries will be positive.

Secondly, in low immigration countries, the chance of people going there is very less as those are less developed countries, so people won't have their desired lifestyle. As a result, there will be a negative impact on remittance.

Regarding the other independent variables, such as employment, it has good results in high immigration countries as job creation is higher there, and so is the amount of remittance. Some conflicts may arise due to a large influx of foreign populations and a negative GDP per capita.

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