PRE-PANDEMIC GLOBAL MIGRATION TRENDS: AN RSTUDIO ANALYSIS OF OECD DATA (2015-2019)

Ankara Social Sciences University

Sociology Department

2024 Summer RStudio Workshop Report

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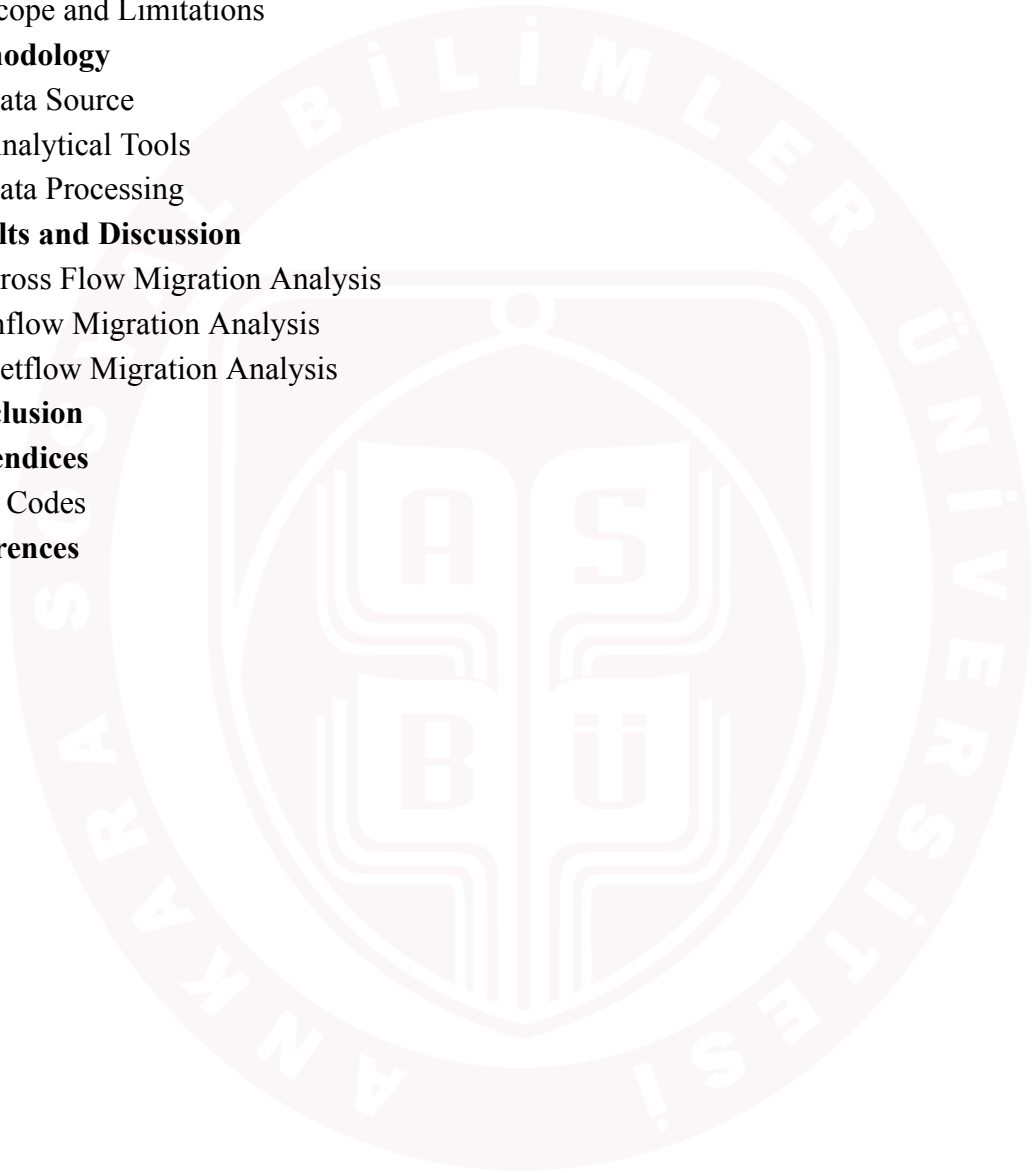
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Purpose:

This report presents the findings of an 8-week workshop aimed at analyzing global migration trends from 2015 to 2019 using data from OECD and RStudio. The study provides insights into the migration patterns leading up to the COVID-19 pandemic.

Abstract:

This study examines global migration trends in the five-year period preceding the COVID-19 pandemic, specifically from 2015 to 2019. By analyzing data collected from OECD's open sources, the study aims to provide insights into migration patterns before the pandemic and explore how these trends may have shifted afterward. The analysis was conducted using RStudio and the ggplot2 package, focusing on net flows, gross flows, and directional migration across countries and regions. The findings reveal that migration patterns have increasingly favored developed countries, particularly in Europe and North America, while regions such as the Middle East and North Africa have seen declining net migration. This research contributes to a deeper understanding of pre-pandemic migration flows, offering a foundation for future studies on the impact of the COVID-19 pandemic on global migration.

Keywords: *Global Migration Trends, Pre-Pandemic Migration, OECD Migration Data, Regional Migration Patterns, 2015-2019 Migration Trends*

1. **Introduction**

    a. **Background and Significance of The Study**

    The COVID-19 pandemic has significantly changed many aspects of life, including migration trends. Analyzing a five-year period before the pandemic can provide valuable insights to help us understand its aftermath.

    b. **Objectives of the Study**

    Therefore, this study aims to understand global migration trends just before the pandemic. Comparing countries and regions across the world between 2015 and 2019 could offer important insights.

    c. **Scope and Limitations**

    The scope of this study focuses on global migration trends between 2015 and 2019. Periods before these years and after the pandemic are not included, making time an important limitation for this study.

2. **Methodology**

    a. **Data Source**

    The raw data was collected from OECD's open data sources. The dataset includes the following dimensions: countries, World Bank regions, World Bank development categories, direction of migration, gross flows, outflows, inflows, and net flows between 2015 and 2019.

    b. **Analytical Tools**

    The analysis was conducted exclusively using the open-source RStudio programming environment. The data was summarized into visual graphs using the ggplot2 package.

    c. **Data Processing**

    To understand the trends, various aspects of migration were compared across countries, regions, and years. The net flows and gross flows of the top ten and lowest ten countries were analyzed. Additionally, development rates were

considered to investigate any changes. A directional analysis was also conducted to identify the migration paths.

3. Results and Discussion

a. Gross Flow Migration Analysis
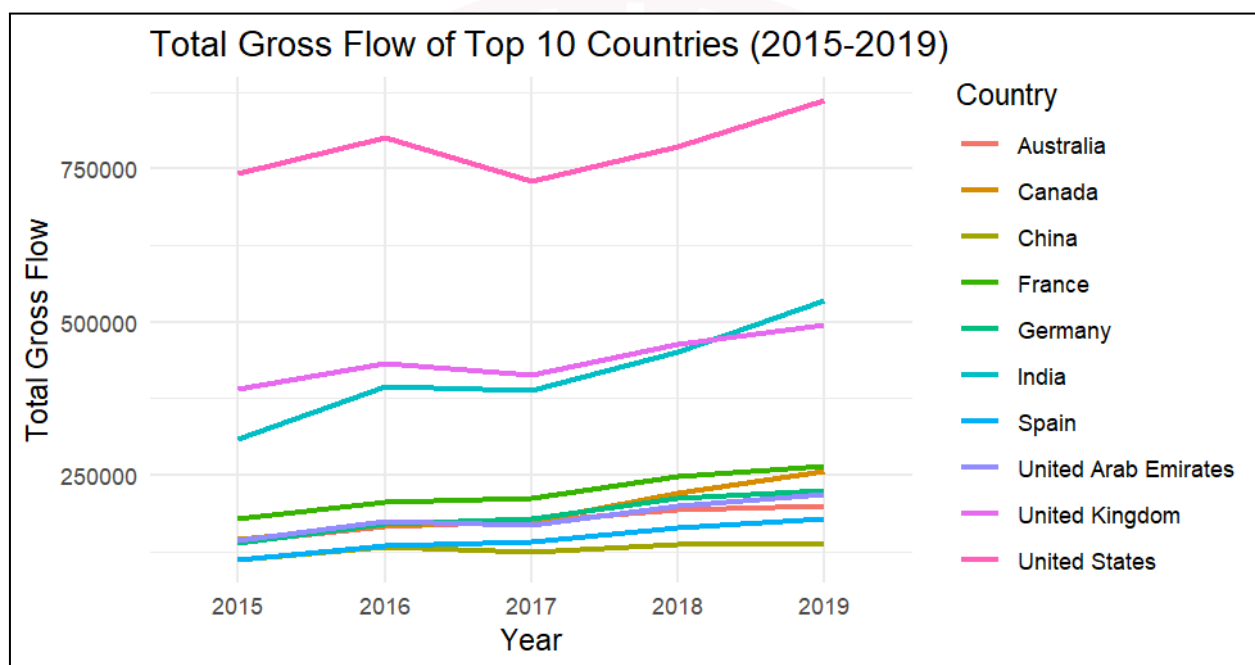
Graph 1: *Total Gross Flow of Top 10 Countries Between 2015 and 2019*

The United States has by far the highest total gross flow in the world between 2015 and 2019. India and the United Kingdom follow. There is a general increase in all top 10 countries throughout 2019. However, due to their high population values, India and the United States should be compared based on their respective ratios. An index of gross flow/total population would provide more information about general tendencies.
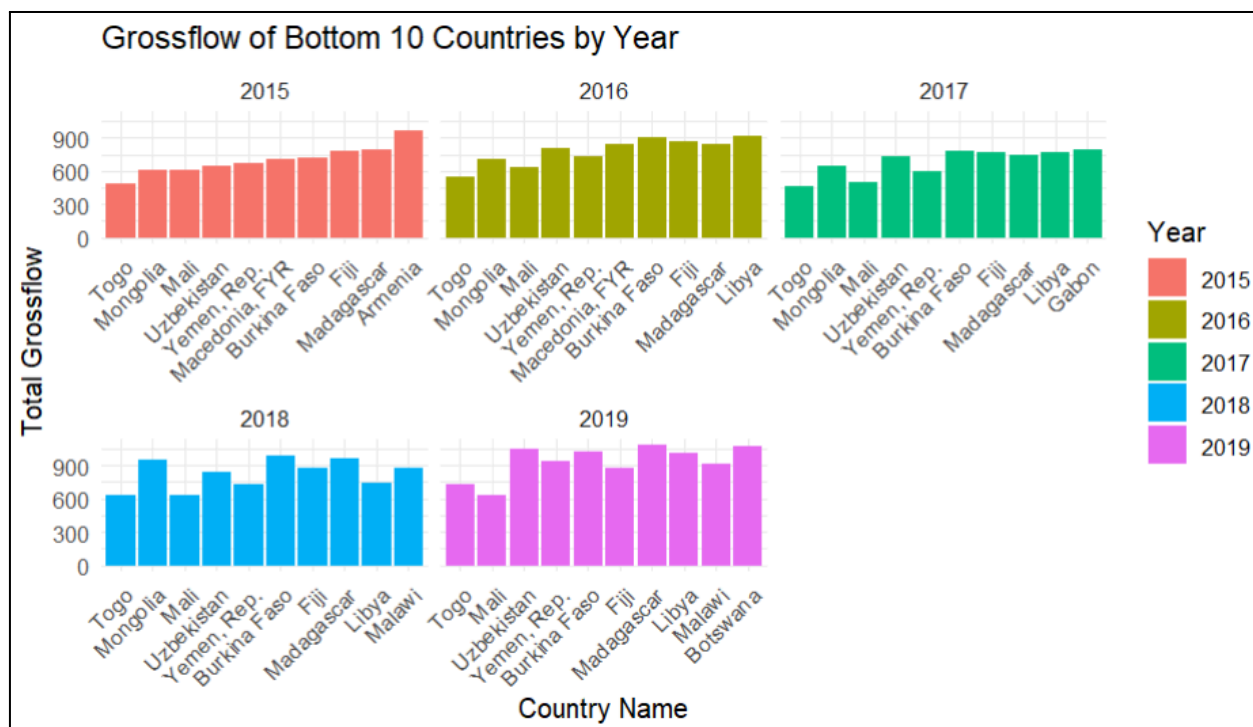
Graph 2: *Grossflow of Bottom 10 Countries by Year*

Another perspective that can help us understand the migration patterns of OECD countries is examining the areas with the least movement. By doing so, we can investigate the prominent features of those countries where minimal movement has occurred and correlate the main reasons behind this pattern. It has been stated that migration is closely related to the economic development of a country (Icduygu, Sirkeci & Muradoglu, 2001). The idea that 'poverty breeds migration' has been the general opinion in explaining migration flows (2001). It is also stated that based on economic development, migration flows can either increase or decrease to a certain level (2001). A country's economic growth, geographical location, and political state can be determinant factors in shaping this type of flow.
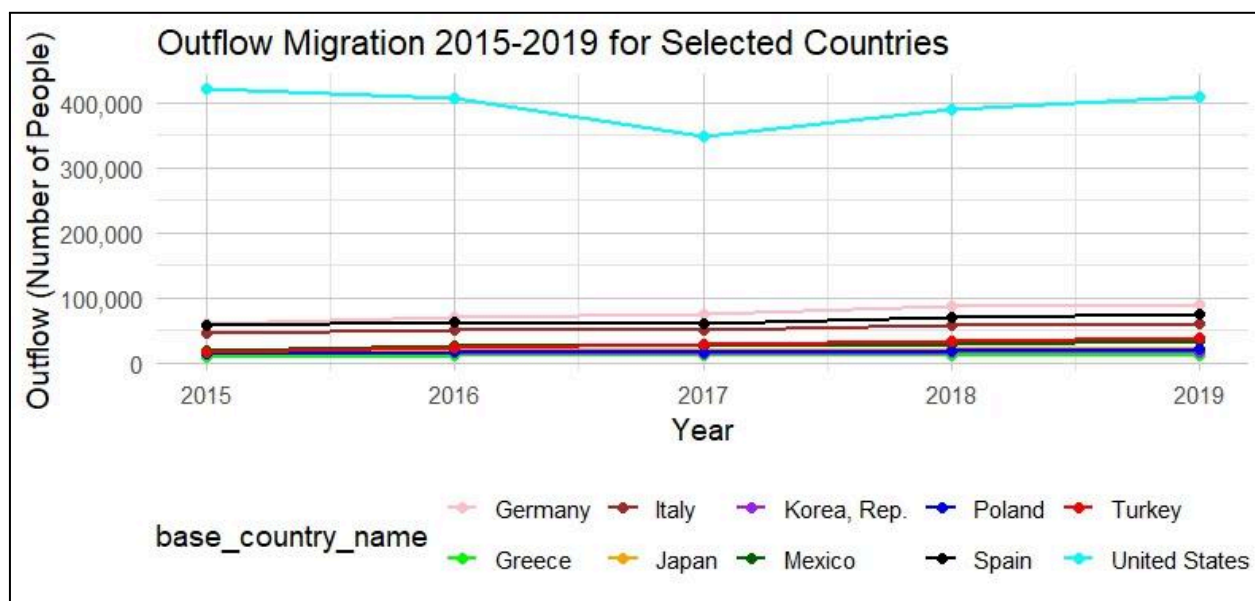
Graph 3: *Outflow Migration between 2015 and 2019 for Selected Countries*

This line graph for outflows from Germany, Greece, Italy, Japan, the Republic of Korea, Poland, Mexico, Spain, Turkey, and the United States between 2015 and 2019 is designed to clarify and compare the outgoing migration of each country. The United States, with the highest outflow, is at the top of the graph, showing a decline between 2016 and 2017 and a rise back to nearly the same level from 2017 to 2018. All the other countries on the graph are lower by at least 300,000 compared to the U.S. Additionally, except for the U.S., Germany, Italy, and Spain, the outflows are so similar that it is difficult to differentiate the lines for each country up until the 2019 results.
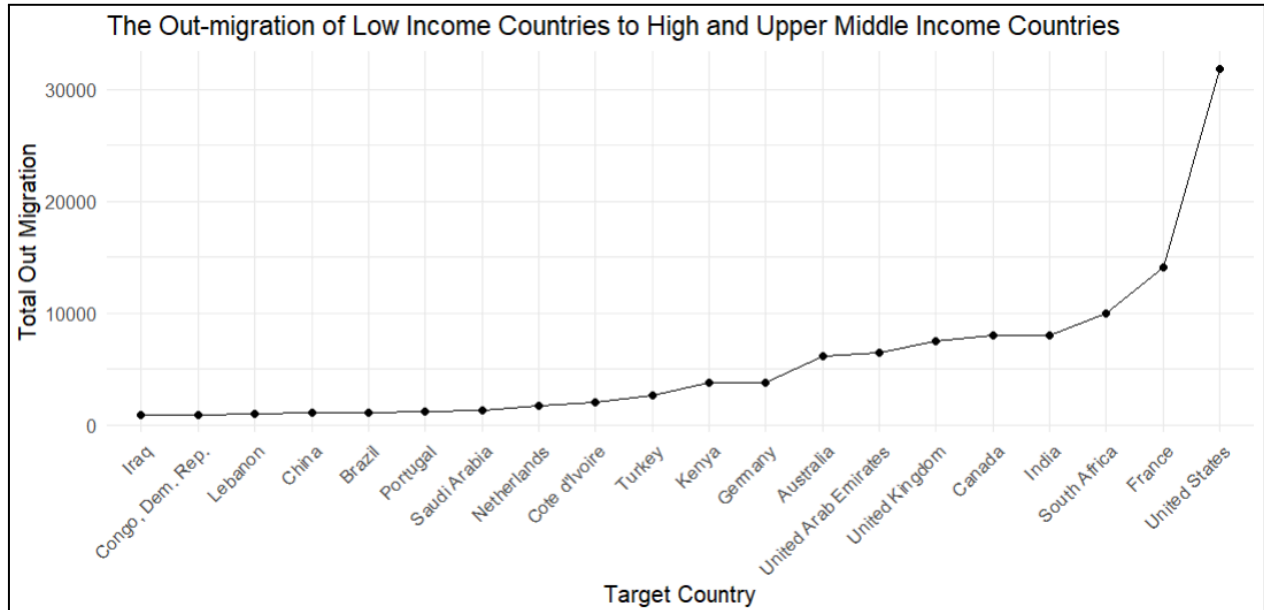
Graph 4: *The Out-migration from Low Income Countries to High and Upper Middle Income Countries*

In another graph that shows the total out-migration of underdeveloped countries between 2015 and 2019, we can also understand how these countries contribute to shaping migration statistics. It is important to consider the capabilities of these countries. While the United States is the most immigrant-receiving country in this graph, it is important to note that, due to geographical and historical reasons, these underdeveloped countries are mostly dependent on their core regions. Observing South Africa and Kenya supports this argument.

b. Inflow Migration Analysis
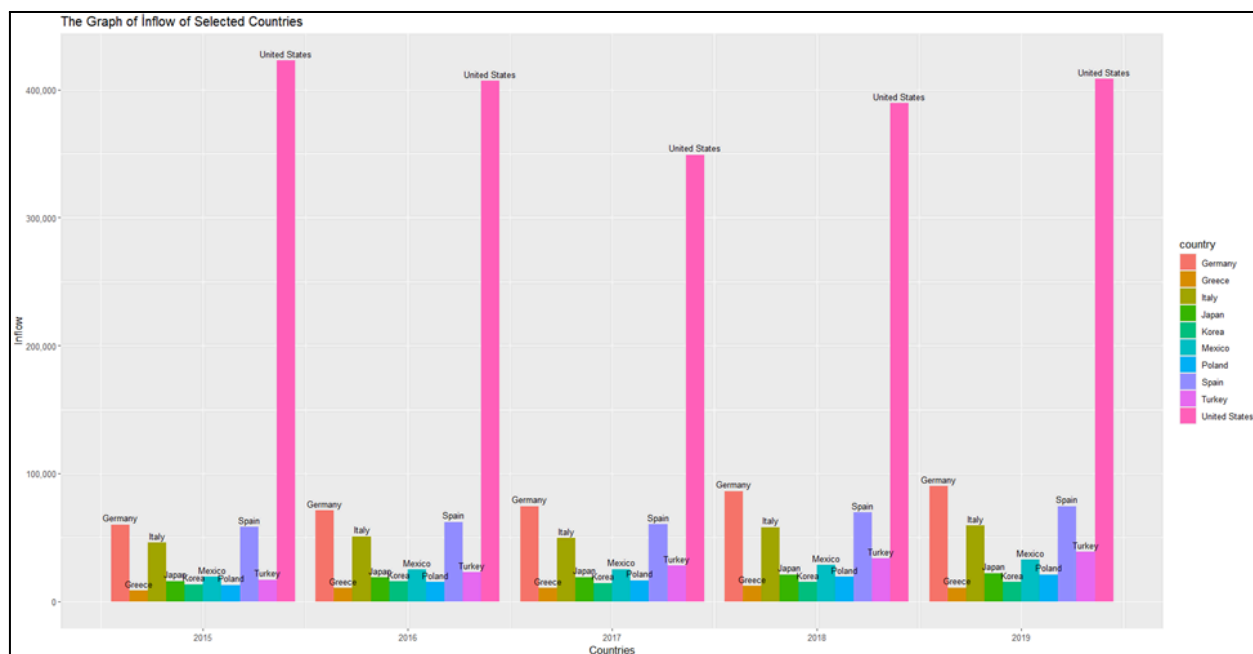
**Graph 5**: *Inflow Migration of Selected Countries Between 2015 and 2019*

These neighboring countries were selected to conduct a meaningful analysis of the inflow rate. The countries in the table can be divided into five different areas:

1- Asia Minor (Greece, Turkey) 2- North America (Mexico, United States) 3- Asia (Japan, Korea) 4- Southern Europe (Italy, Spain) 5- Northern Europe (Germany, Poland)

In this context, while there is no visible change in categories 1, 2, and 3, changes have been observed in some countries in categories 4 and 5. The increase in migration flow, especially to Germany, Italy, and Spain, clearly shows that a significant portion of the migration flow is directed toward European countries over this 4-year period. The increase in Italy and Spain, in particular, indicates the extensive use of the Mediterranean migration route by immigrants. Considering variables such as population, labor force needs, and illegal immigration, it is natural that the United States ranks first in the graph.

c. **Netflow Migration Analysis**
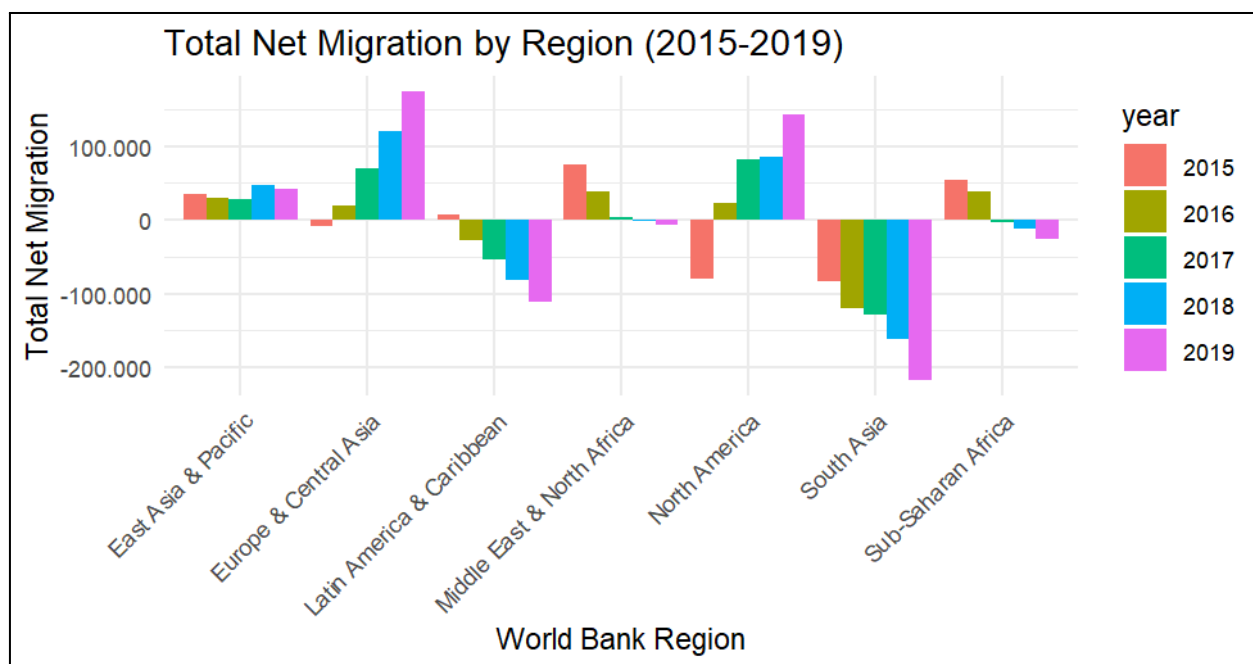
Graph 6: *Total Net Migration by Region between 2015 and 2019*

While East Asia & Pacific, Middle East & North Africa and Sub-Saharan Africa regions show small net migration changes, there is a considerable increase in net migration changes of other regions. Especially, Europe & Central Asia and North America regions show important increases and get migrations from South Asia and Latin America & Caribbean regions. What is interesting is that the net migration value turns out to be negative throughout the 2019 in Middle East & North Africa Regions. Today, we know that this tendency has accelerated and the Middle East & North Africa region does probably have higher negative net migration values.
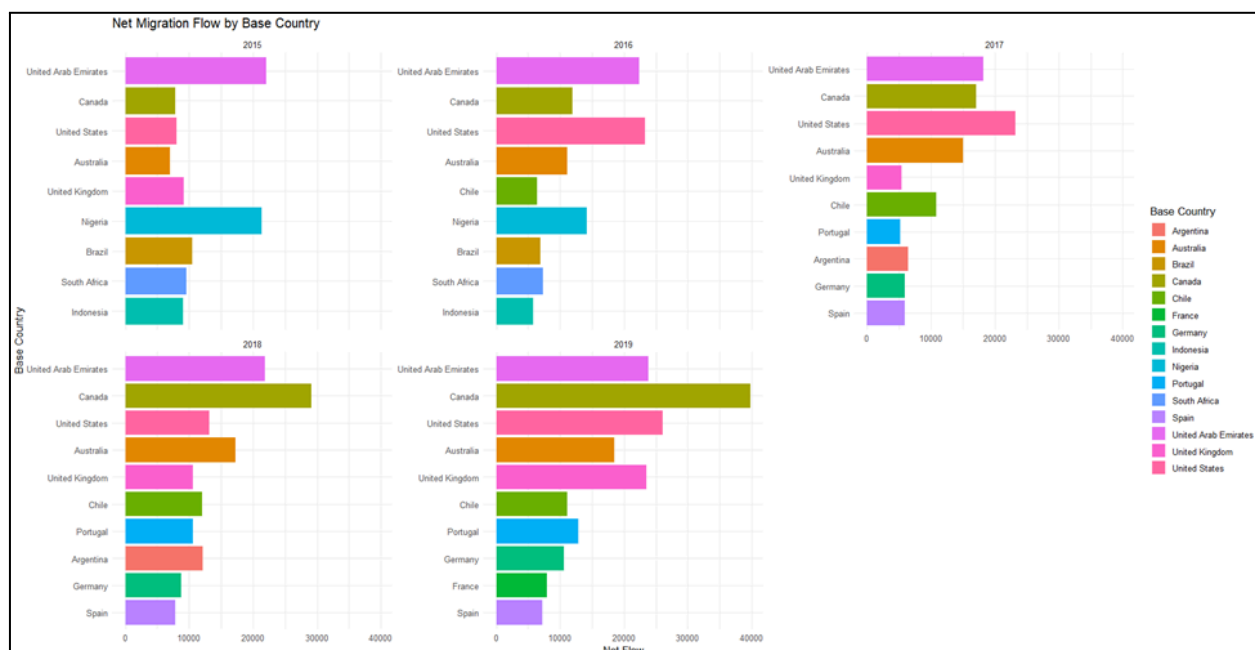
Graph 7: *Net Migration Flow by Base Country Between 2015 and 2019*

The term 'net flow' refers to the difference between the number of immigrants and emigrants in a country. As shown in this graph, while the countries with the highest net flow in early 2015 were spread across various regions of the world, by 2019, Europe and other developed countries dominated the list. The fact that highly developed countries like the United States and Canada, which have remained at the top of this 4-year ranking, provides insight into the shifting patterns of global migration. In other words, when we examine the countries that dropped off the list and those that entered it over the 4-year period, it is evident that global migration flows have increasingly shifted toward developed countries.
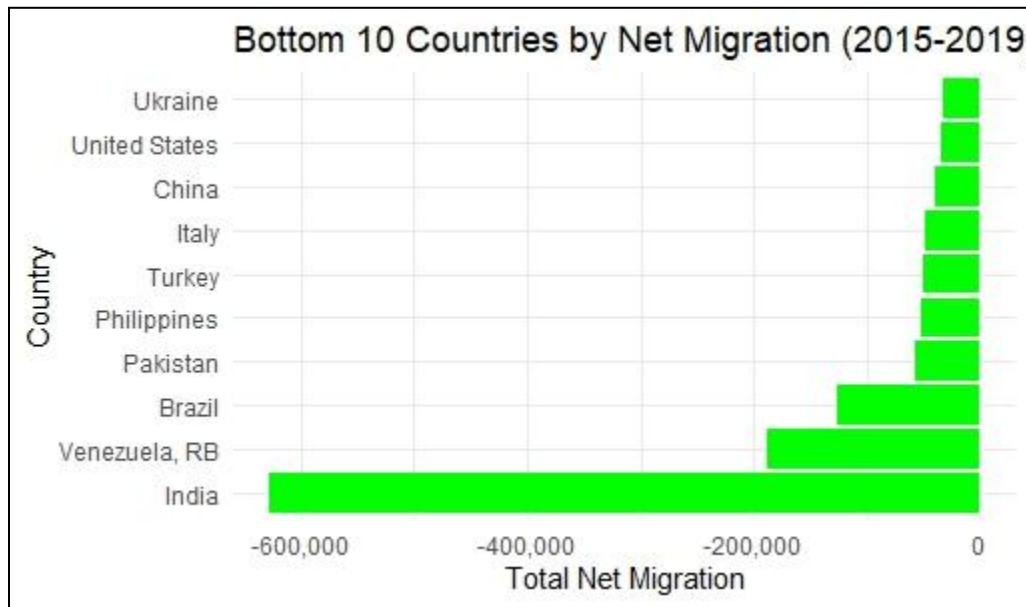
Graph 8: *The Bottom 10 Countries by Net Migration Between 2015 and 2019*

In this bar graph, the 10 countries with the lowest net migration between 2015 and 2019 are shown. India leads with a significant difference from the second-lowest, Venezuela, with a gap of more than 400,000. These negative net migration results indicate that these countries experienced more outflows than inflows during these years. Except for India, all the other countries have net migration values of over -200,000, closer to zero. In Turkey's case, the results are very similar to those of Italy and the Philippines, with approximately -50,000 in net migration.
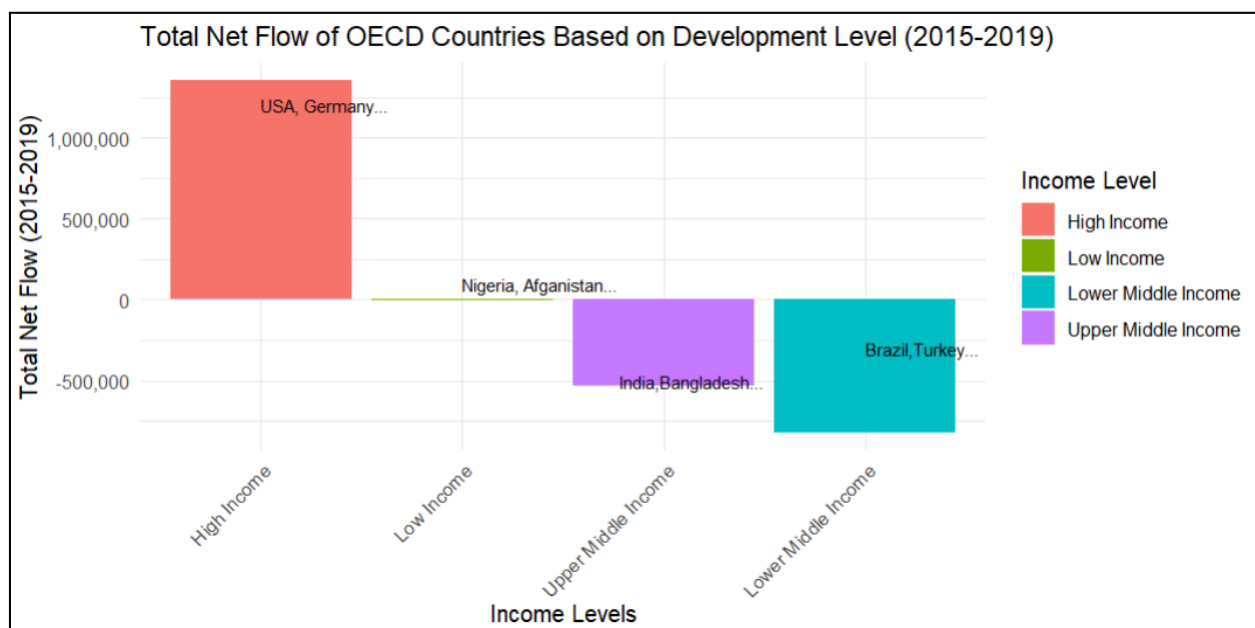
Graph 9: *Total Netflow of Countries Based on World Bank Income Levels between 2015 and 2019*

When we examined the total net flow of OECD countries between 2015 and 2019, it is evident that the migration flow is predominantly from underdeveloped to more developed countries. While the largest portion of this flow comes from lower-middle-income countries, low-income countries contribute less. This suggests that in countries with very low economic development, migration or movement is more limited compared to those where development is more advanced. It would be beneficial to observe the change in net flow patterns of OECD countries by examining the year-by-year changes (see the graph below).
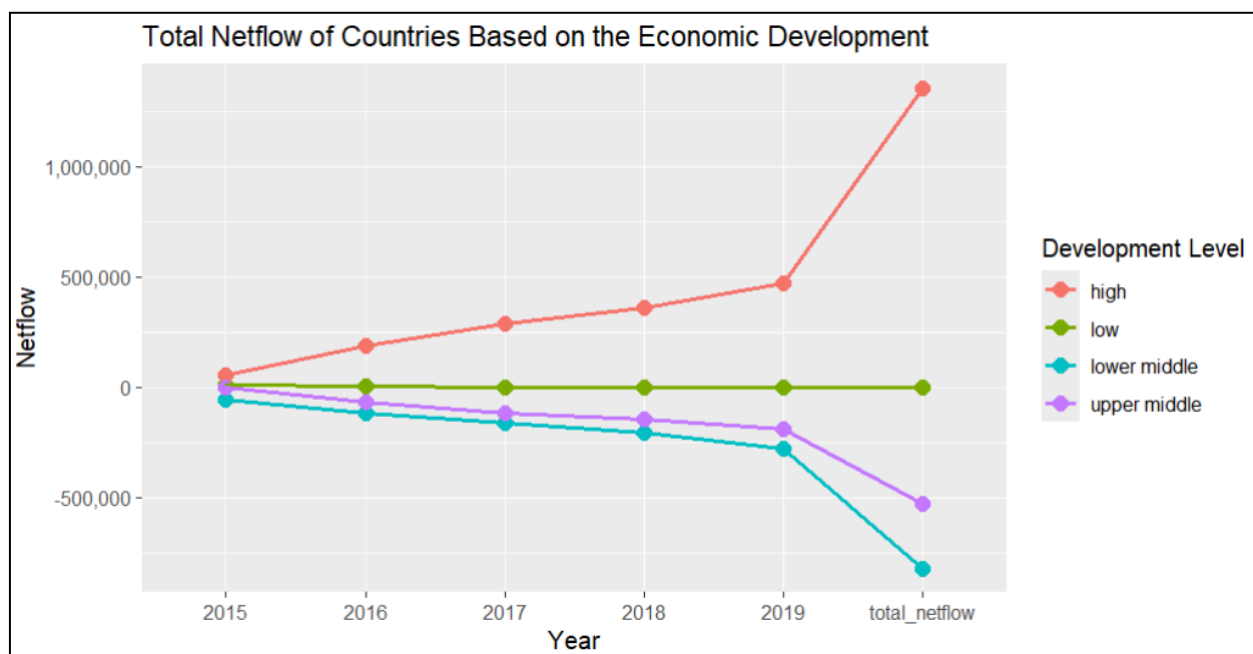
Graph 10: *Netflow Migration Change of Countries Based on World Bank Income Levels between 2015 and 2019*

It is easier to interpret the migration patterns of OECD countries based on their economic levels. While high-income countries gained over 1 million in population by the end of 2019, lower-middle and upper-middle-income countries have predominantly been the sending countries. It is crucial to note that there is a strong positive correlation between economic development and greater flexibility in terms of international migration.

4. Conclusion

The analysis of global migration trends from 2015 to 2019 highlights significant shifts in migration flows, with developed countries, particularly in Europe and North America, emerging as primary destinations. The study reveals a strong correlation between economic development and migration inflows, underscoring the role of economic factors in shaping global migration patterns. While regions such as East Asia, Sub-Saharan Africa, and the Middle East experienced more modest changes, the overall trend indicates a growing concentration of migration towards economically advanced countries. These findings provide a critical baseline for understanding how the COVID-19 pandemic may have further influenced global migration, emphasizing the need for continued research in this area.

5. Appendices

a. R Codes

Graph 1: *Total Gross Flow of Top 10 Countries Between 2015 and 2019*

```
ggplot (filtered_data_2,
        aes (x = year,
        y = total_grossflow,
        color = base_country_name,
        group = base_country_name)) +
        geom_line(size = 1) +
        labs(title = "Total Gross Flow of Top 10 Countries (2015-2019)",
        x = "Year",
        y = "Total Gross Flow",
        color = "Country") +
        theme_minimal()
        )
```

Graph 2: *Grossflow of Bottom 10 Countries by Year*

```
ggplot (bottom_10_grossflow,
        aes ( x = reorder (base_country_name, grossflow),
        y = grossflow, fill = factor(year))) +
        geom_bar(stat = "identity", position = "dodge") +
        facet_wrap(~year, scales = "free_x") +
        labs(title = "Grossflow of Bottom 10 Countries by Year",
         x = "Country Name",
        y = "Total Grossflow",
         fill = "Year") +
        theme_minimal() +
        theme(axis.text.x = element_text(angle = 45, hjust = 1)
        )
```

Graph 3: *Outflow Migration between 2015 and 2019 for Selected Countries*

```
ggplot (aggregated_data,
        aes (x = year,
        y = value,
        color = base_country_name,
        group = base_country_name)) +
        geom_line(size = 1) +
        geom_point(size = 2) +
        labs( x = "Year",
        y = "Outflow (Number of People)",
        title = "Outflow Migration 2015-2019 for Selected Countries") +
        scale_color_manual(values = colors) +
        scale_y_continuous(labels = scales::comma) +
        theme_minimal(base_size = 14) +
        theme(
        panel.grid.major = element_line(color = "gray80", linewidth = 0.2),
        panel.grid.minor = element_line(color = "gray90", linewidth = 0.1),
        legend.position = "bottom")
 )
```

Graph 4: *The Out-migration from Low Income Countries to High and Upper Middle Income Countries*

```
ggplot (dusuk_top_20_outflow,
        aes( x = reorder(target_country_name, total_outflow),
         y = total_outflow, group = 1)) +
        geom_line() +
        geom_point() +
        labs(title = "The Out-migration of Low Income Countries to High and Upper Middle Income
        Countries",
```

```
x = "Target Country",

y = "Total Out Migration") +

theme_minimal() +

theme(axis.text.x = element_text(angle = 45, hjust = 1)

)
```

Graph 5: *Inflow Migration of Selected Countries Between 2015 and 2019*

```
ggplot (sten,

        aes(x = reorder(country, -inflow),

        y = inflow, fill = country)) +

        geom_bar(stat = 'identity') +

        facet_grid(years ~ .) +

        coord_flip() +

        scale_y_continuous(labels = scales::comma) +

        labs(title = 'The Graph of Inflow of Selected Countries',

        x = 'Countries',

        y = 'Inflow')

        )
```

Graph 6: *Total Net Migration by Region between 2015 and 2019*

```
ggplot (total_net_migration,

        aes (x = base_country_wb_region,

        y=total_netflow, fill = year))+

        geom_bar(stat = "identity", position ="dodge")+

        labs(title="Total Net Migration by Region (2015-2019)",

        x = "World Bank Region",

        y = "Total Net Migration") +

        scale_y_continuous(labels = number_format(big.mark = ".", decimal.mark = ","))+

        theme_minimal() +

        theme(axis.text.x = element_text(angle=45, hjus =1 )

        )
```

Graph 7: *Net Migration Flow by Base Country Between 2015 and 2019*

```
ggplot (df_long,
        aes(x = reorder(base_country_name, netflow),
        y = netflow, fill = base_country_name)) +
        geom_bar(stat = "identity", size = 2) +
        facet_wrap(~ year, scales = "free_y") +  # Yıl bazında ayırma
        coord_flip() +  # Yatay bar grafiği
        labs(title = "Net Migration Flow by Base Country",
        x = "Base Country",
        y = "Net Flow",
        fill = "Base Country") +
        theme_minimal()
        )
```

Graph 8: *The Bottom 10 Countries by Net Migration Between 2015 and 2019*

```
ggplot (bottom_10_countries,
        aes(x = reorder(base_country_name, total_net_migration),
        y = total_net_migration)) +
        geom_bar(stat = "identity", fill = "green") +
        coord_flip() +
        labs(title = "Bottom 10 Countries by Net Migration (2015-2019)",
        x = "Country",
        y = "Total Net Migration") +
        scale_y_continuous(labels = comma) +
        theme_minimal()
        )
```

Graph 9: *Total Netflow of Countries Based on World Bank Income Levels between 2015 and 2019*

```
ggplot (sum_of_total_net_flow_for_years,
```

```
aes(x = reorder(Base_Country_Income_Level, -total_netflow),

y = total_netflow,

fill = Base_Country_Income_Level)) +

geom_bar(stat = "identity") +

labs(title = "Total Net Flow of OECD Countries Based on Development Level (2015-2019)",

x = "Income Levels",

y = "Total Net Flow (2015-2019)",

fill = "Income Level") +

scale_y_continuous(labels = scales::comma) +

theme_minimal() +

theme(axis.text.x = element_text(angle = 45, hjust = 1)

)
```

Graph 10: *Netflow Migration Change of Countries Based on World Bank Income Levels between 2015 and 2019*

```
ggplot (aes (Year, Netflow,

colour = development_level,

group = development_level)) +

geom_point(size = 3) +

geom_line(size = 1) +

scale_y_continuous(labels = scales::comma) +

labs(title = "Total Netflow of Countries Based on the Economic Development",

colour = "Development Level")

)
```

6. References

Icduygu, A., Sirkeci, I., & Muradoglu, G. (2001). Socio-economic development and international migration: a Turkish study. *International Migration*, *39*(4), 39-61.

OECD. (2020). International Migration Database. Retrieved August 1, 2024, from https://data-explorer.oecd.org/