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Article

# Incidence of unemployment and poverty on migration flows in the South-North international corridor (1990–2022). An econometric panel data approach

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**Abstract:** The aim of this research is to determine the incidence of socioeconomic variables in migration flows from the main countries of origin that form part of the international South-North migration corridor, such as Mexico, China, India, and the Philippines, during the 1990–2022 period. The independent variables considered are GDP per capita, unemployment, poverty, higher education, and public health, while the dependent variable is migration flows. An econometric panel data model is implemented. The tests conducted indicate that all variables have an integration order of I (1) and exhibit long-term equilibrium. The econometric models used, Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS), reveal that unemployment and poverty had the strongest influence on migration flows. In both models, within this international migration corridor, GDP per capita, higher education, and health follow in order of importance.

**Keywords:** migration flows; unemployment; poverty; South-North migration corridor; DOLS and FMOLS

## 1. Introduction

Migration is the movement of people from one place to another with the purpose of settling temporarily or permanently in a new destination. This phenomenon can be driven by a variety of factors, including economic, social, political, environmental, and cultural (Mason, 1999; Pécoud, 2015). Migration is a relevant topic of study due to its impact in various areas, positioning itself as one of the central issues on national, regional, and international agendas in countries of origin, transit, and destination. Understanding the motives, patterns, and consequences of migration is crucial for developing effective policies and addressing the challenges that arise from population movements (Castles et al., 2014; IOM, 2021; McAuliffe et al., 2019).

According to Guillén et al. (2019), Appleby (2020), and Vitorino (2021), the diversity of economic, social, and political events has formed the backbone of the foundations of migration. The recent increase in global emigration highlights one of society's major problems or challenges, considering that inequality plays an important role in discrimination during migration processes.

In the works of Méndez and Gómez (2022), and Gutiérrez et al. (2020), international migration is understood as a complex phenomenon with economic, social, political, and cultural factors as its main drivers. The importance of this phenomenon for local development is emphasized, underscoring the need to address it without cultural prejudice, as it should be a priority on state and international agendas due to its impact on the future of humanity.

Delgado et al. (2022) examine the complex relationship between migration and informality in the context of asymmetric regional integration between Mexico and the United States. In particular, they argue that the industrial reserve army drives Mexican emigration to the United States to meet labor demand.

Migration is a response to global crises and imbalances, such as the vast income and welfare gaps between countries. Around 84% of immigrants lived in a country wealthier than their own in 2021 (CONAPO and BBVA Foundation, 2023).

In 1960, the international migrant population was 77.1 million, but by 2020, the United Nations (UN) estimated that number at 281 million persons, with 48.1% being women, and an average age of 39.8 years for women and 38.6 for men (CONAPO and BBVA Foundation, 2023).

According to the International Labor Organization (ILO) (2015), there are around 232 million migrants worldwide; however, data from the International Organization for Migration (IOM) (2018) indicate that this number has reached 244 million people, 65% of whom are workers. This represents a significant percentage of individuals who have left their home countries' labor force to become productive in other lands, meaning they are of working age (including young people), and many are skilled workers. This situation concerns the ILO and IOM, among other international organizations, which have addressed the issue to outline global migration policies.

The movement of the international migrant population has been studied through what are known as migration corridors. Among these, the Mexico-United States migration corridor has been the most significant in terms of cumulative volume worldwide, with 10.9 million migrants (3.7%), followed by Syria-Turkey (1.4%) and India-United Arab Emirates (1.2%). Regarding gender composition, the Russia-Ukraine, Ukraine-Russia, Kazakhstan-Russia, and Bangladesh-India corridors stand out, with 50% or more female populations. Between 2015 and 2020, the countries with the largest population gains due to international migration were Germany (5.3 million), Saudi Arabia (2.7 million), and the United States (2.2 million). Meanwhile, the countries with the largest population losses during the same five-year period were Venezuela (3.4 million), India (2.3 million), and Syria (2.0 million) (CONAPO and BBVA Foundation, 2023).

By identifying the most active migration corridors and the reasons behind them, researchers can propose more effective migration management policies and suggest socioeconomic development strategies that address the specific needs and challenges of migrant origin, transit, and destination regions (Fonseca and Guimares, 2021; Iglesias and Rivera, 2021; Ismael, 2024; Maldonado et al., 2018; Vitorino, 2021).

Therefore, this study seeks to answer the following research question: How did GDP per capita, unemployment, poverty, higher education, and public health influence migration flows of the main origin countries that make up the South-North international migration corridor, including Mexico, China, India, and the Philippines, during the period from 1990 to 2022?

The research gap addressed in this study focuses on the need to analyze the increase in global human mobility, as it provides a detailed understanding of migration patterns and trends, as well as the factors influencing population movements (Black, 2021; Chugh, 2020; Delgado et al., 2021, 2022; Gottardo and Rego, 2021; Newland et al., 2019).

The aim of this research is to determine the incidence of socioeconomic variables such as GDP per capita, unemployment, poverty, higher education, and public health in the migration flows of the main origin countries that make up the South-North international migration corridor, including Mexico, China, India, and the Philippines, during the period from 1990 to 2022.

This paper is structured as follows. It begins with an introduction. The second section covers the theoretical framework, where the main migration theories are presented, and relevant literature is reviewed. The third section specifies the methodology used, including the development of the proposed econometric model. The fourth section presents and discusses the results obtained. Finally, the fifth section outlines the main conclusions derived from the study.

## 2. Migration and its theoretical approaches

Several theoretical approaches have been developed to explain the origins of international migration, each offering a distinct perspective with its own concepts and frameworks. While these approaches differ in their goals and focus, they all seek to break down the complexity of migration into more manageable elements for analysis.

### 2.1. Classical emigration theory

The beginnings of migration studies can be traced back to the proposals of Ravenstein (1885). According to this author, migration originates from the search for better paid work than in the migrants' places of origin. Ravenstein's work laid the foundation for further research on migration.

Lee (1966) stated that migration encompasses a series of elements related to both the place of origin and the destination, the obstacles involved, and personal characteristics. This principle has served as a hypothesis to explain the volume of migration under different conditions, the development of migration and counter migration flows, and the characteristics of migrants. Lee concluded that migration is determined by a push-pull process.

The classical international migration theory, originally conceived to explain labor movements in the context of economic development, suggests that migration, both national and international, arises from disparities in the supply and demand for labor across different geographic regions. In many economies, there is an unlimited supply of labor at subsistence wages. These wage disparities drive the movement of workers from low-wage areas to higher-wage regions (Harris and Todaro, 1970; Lewis, 1954; Ranis and Fei, 1961).

### 2.2. Neoclassical emigration theory

From the neoclassical perspective, the labor market is not solely governed by individual decisions aimed at maximizing income, but also by factors beyond economics, such as legal restrictions or policies that affect migration, as well as competition among countries to attract workers. In this context, countries or companies offer employment contracts, and individuals evaluate these options to make the best possible decision (Borjas, 1989).

According to neoclassical economic theory, the origin of international migration

is primarily economic, driven by differences in wage rates between countries, resulting from labor supply and demand. These differences are reflected in income levels and social welfare asymmetries. People move toward regions where wages are higher (Gómez, 2010; Massey et al., 2000; Varela et al., 2017).

## 2.3. New economics of emigration theory

The new economics of migration theory is linked to neoclassical approaches in its microeconomic perspective and emerges as an extension of this theoretical proposal. According to the new economics of migration theory, migration decisions are not made by individual actors but by units such as families and communities from which migrants originate. This approach posits that families or households act collectively and resort to sending members abroad not only to maximize expected income but also to minimize risks associated with various market failures beyond just the labor market (Canales, 2017; González and Salazar, 2023; Massey et al., 1993).

In this theory, the existence of wage differentials is not a necessary condition for migration abroad. Households send their members abroad not only to increase their income but also to improve their relative status compared to other, more affluent households, thereby reducing their relative poverty. If the development process exacerbates socioeconomic and income differences between social groups, this can act as an additional incentive for members of relatively poorer families to emigrate (Canales, 2017; Stark and Taylor, 1991, 1989).

## 2.4. World systems theory

World systems theory starts from macroeconomic systems and shares characteristics with the structuralist approach. It extends the ideas from Wallerstein's (1974) work, which posits that macro-level migration originates from the structure of the global market, consisting of core states, semi-peripheral and peripheral zones. As capitalism expands, more developed countries extend their influence through multinational corporations in peripheral countries, which have raw materials and labor available. This deepens social and economic inequalities between countries. Underdevelopment is thus related to the expansion of industrialized nations, creating poverty, exploitation of labor, and income concentration, which in turn generates conditions conducive to labor emigration (Arango, 2003; Dos Santos, 2002; Gómez, 2010; González and Salazar, 2023; Portes and Walton, 1981; Spicker et al., 2007).

According to Castles and Miller (1993/2004), migration occurs through interacting microstructures and macrostructures. Microstructures refer to the social networks of emigrants, such as personal connections and familial or friendship ties that help future emigrants reduce costs, risks, and maximize benefits. These networks influence migration decisions and constitute the basis of communities in the destination area. In contrast, macrostructures refer to the institutions between states, laws, policies, and practices that occur between two geographic areas, aimed at regulating or promoting migration in the contexts of trade, employment, and globalization.

The flow of people is a component of historical structural changes, characterized by emigration occurring in specific national sectors, whether induced or spontaneous,

between nations within the same international system. The driving forces are economic, creating a movement pattern, and involving labor migration. Networks built by the movement and contact of people across space are central to the microstructures that sustain migration over time (Portes and Walton, 1981; Portes and Böröcz, 1989).

## 2.5. Dual labor market theory

In Piore's (1979) dual labor market theory, migration is seen as a response to labor needs in modern industrial societies. This model divides the labor market into two segments: a stable (primary) segment, which is capital intensive, characterized by well-paying jobs, favorable working conditions, and opportunities for advancement; and a precarious (secondary) segment, which is labor intensive, with poorly paid, insecure, and unfavorable working conditions. Migration primarily originates in the latter. This author argues that in advanced capitalist nations, there is a division between quality jobs in one segment and insecure, poorly paid jobs in another.

For this approach, there are three explanations that describe labor demand as the driving force behind migration. First, labor demand responds to a general shortage of the workforce. Second, it fills the most basic positions in the social hierarchy. The third explanation lies in dual labor markets, which consist of two sectors: primary and secondary. The primary sector is made up of native, skilled workers, often unionized or part of local labor organizations at the destination. The secondary sector, by contrast, consists of migrant workers who are confined and concentrated in specific industries (e.g., construction and manufacturing) performing manual, low skilled jobs, such as services, and are excluded from industries where native workers are employed (Domínguez, 2009; Novelo, 2008; Piore, 1979).

According to Massey et al. (1993), the dual labor market theory links migration to the structural needs of modern industrial economies, where international migration originates from the intrinsic labor demands of such societies.

## 2.6. Emigration in development theories

The main economic development theories emerged to address the difficulties faced by some countries in achieving economic growth or development, in contrast to others that are more competitive in the international market. Three models, in particular, explain the conditions of underdevelopment in some countries, which ultimately contribute to the phenomenon of migration.

The first model is Lewis's development model (1955), which focuses on the wage differentials between two regions: industrial and subsistence areas. Lewis formulated the idea of a dual economy, consisting of a capitalist sector and a subsistence sector. In the capitalist sector, with higher levels of industrialization, wages are higher, and there is intensive use of capital and technology. The subsistence sector is traditional and mainly focused on agricultural activities, offering lower wages, low capital intensity, and labor-intensive work, with a marginal product lower than that of the capitalist sector. It is in this latter sector that there is a greater availability of labor willing to migrate.

The second model analyzed in terms of emigration in development theories is Keynes's model (1936/2014). Keynes argued that in a capitalist economy,

unemployment is determined by deficiencies in aggregate demand, which contrasts with the views of Lewis and the neoclassicals, who believed that labor surpluses were due to low capital-to-labor ratios in the economy. According to them, a scarcity of capital increases the supply of labor. Keynes, however, proposed that economic reactivation should occur through increases in aggregate demand. In the keynesian approach, migration is encouraged from regions with higher unemployment rates to those requiring more labor. When consumption and investment conditions are lacking, leading to an increase in unemployment, people are compelled to migrate to find employment and generate income in regions experiencing economic growth (Bosch, 2000; González and Salazar, 2023; Keynes, 1936, 2014).

The third model, migration within the structuralist framework, stems from the center-periphery concept proposed by Prebisch (2012). The Economic Commission for Latin America and the Caribbean (ECLAC) presents a macroeconomic structuralist alternative to classical, neoclassical, and Keynesian theories, explaining the negative effects of industrial and technological development among countries. It asserts that there is no balance between the supply and demand in the labor market.

This approach divides nations into two categories: central and peripheral. The central nations have a diversified, homogeneous productive structure, driven by the productivity of their sectors. In contrast, the peripheral countries focus on primary export production, with labor engaged in low value-added activities, such as agriculture. These ideas constitute the basis of the dependency relationship between peripheral and central countries through the process of import substitution. The negative outcomes of this process -such as economic stagnation, inflation, and capital flows in several Latin American countries- exacerbated unemployment, making emigration a mechanism to increase personal and family income (Blanchard and Pérez, 2011; González and Salazar, 2023; Prebisch, 2012).

## 3. Materials and methods

The migration phenomenon and its determinants have recently been studied through migration corridors, since analyzing their behavior allows for the formulation of more effective policies and strategies to address the phenomenon in the communities of origin, transit, and destination (CONAPO and BBVA Foundation, 2023; Fonseca and Guimares, 2021; Iglesias and Rivera, 2021; Ismael, 2024; Maldonado et al., 2018; Vitorino, 2021). In this regard, to identify the determinants of migration flows, such as socioeconomic variables, robust quantitative instruments have been used, among which the econometric models developed by Andrienko and Guriev (2004), Bunea (2012), Aldashev and Dietz (2014), Morales et al. (2018), and Hernández and Serrano (2018) stand out.

There are several types of econometric models, and Mehrara (2007) classifies them into four generations: the first is the methodology using VAR models with the causality tests of Sims (1972), and Granger (1969); the second uses the cointegration methodology developed by Engle and Granger (1987); the third applies Johansen's methodology (1991); and the fourth consists of cointegrated models in conjunction with unit root tests for panel data, implemented by Maddala and Wu (1999), Breitung (2001), Choi (2001), Levin, Lin and Chu (2002), and Im, Pesaran and Shin (2003).

### 3.1. Econometric panel data models

In this research, a fourth-generation econometric model is developed, as cross-sectional data are available from the main countries of origin within the international corridor in the South-North direction, and time series data are used covering the period from 1990 to 2022.

### 3.2. Stationarity test of the variables

To test for the possible presence of unit roots, the stationarity properties of the variables are verified using the Levin et al. (2002) unit root test. The specification of the corresponding hypothesis tests is as follows: $Ho$ = The panel has a unit root, and $Hi$ = The panel does not have a unit root.

### 3.3. Cointegration tests

Several cointegration tests have been developed to assess the existence of a stable long-term equilibrium relationship between variables in panel data (Wiredu et al., 2023). This test is carried out once it has been confirmed that the series are integrated of the same order. In this research, the Kao cointegration test (1999) is applied, a method used in econometrics to evaluate the presence of cointegration relationships in the context of panel data, which analyzes whether there is a cointegration relationship between variables over time and across individual units in the panel. The null hypothesis of no cointegration between the series used is compared with a cointegration vector.

### 3.4. Model estimation

After completing the unit root tests of the variables and the cointegration test, the next step is model estimation. If the conventional Ordinary Least Squares (OLS) model is used, panel data may present endogeneity problems among variables (Pedroni, 2001). To address these problems, the Dynamic Ordinary Least Squares (DOLS) and the Fully Modified Ordinary Least Squares (FMOLS) estimators are used (Kesternich, 2017).

### 3.5. DOLS

In the DOLS model, proposed by Stock and Watson (1993), the dynamic relationship is characterized by the presence of a lagged dependent variable among the regressors. The DOLS model should be considered a parametric approach since the lagged terms in first differences are accurately estimated. This model aims to create a more extensive equation than the OLS model, which includes all the explanatory variables and their first differences, whether lagged or lead. This approach helps handle endogeneity (Kesternich, 2017).

One advantage of dynamic over static models is that they statistically represent more accurate results, though they are more complex but up to date. They account for the slowness that occurs when trying to adjust dependent variables due to external factors such as psychological, technological, or institutional effects. For this reason, these models include lagged or differenced variables to capture adjustment dynamics (Roodman, 2009).

### 3.6. FMOLS

The FMOLS regression was initially developed by Phillips and Hansen (1990), who proposed an estimator that uses a semi-parametric correction to eliminate problems caused by long-term correlation between the cointegration equation and innovations from stochastic regressors. The resulting estimator is asymptotically unbiased and allows standard Wald tests to be applied using Chi-square asymptotic statistical inference.

### 3.7. Model equation

DOLS and FMOLS models are considered, and they are implemented to determine the incidence of socioeconomic variables such as GDP per capita, unemployment, poverty, higher education, and public health in migration flows from the main countries of origin within the international South-North corridor, such as Mexico, China, India, and the Philippines, during the 1990–2022 period. The following equation is developed:

$$lnmig_{it} = \beta_0 + \beta_1 lnPIBpc_{it} + \beta_2 lnpo_{it} + \beta_3 lndes_{it} + \beta_4 lnES_{it} + \beta_5 lnMM_{it} + \varepsilon_{it} \quad (1)$$

where:

$lnmig$ = Logarithm of the dependent variable total number of migrants.
$lnPIBpc$ = Logarithm of variable GDP per capita.
$lnpo$ = Logarithm of variable poverty.
$lndes$ = Logarithm of variable unemployment.
$lnES$ = Logarithm of variable higher education.
$lnMM$ = Logarithm of variable maternal mortality.
$\varepsilon$ = Compound random error.
$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Parameters to be estimated.
$i$ = Country.
$t$ = Period.

### 3.8. Variables and indicators of the model

This research aims to determine the incidence of socioeconomic variables in migration flows from the main countries of origin within the international South-North corridor during the 1990–2022 period.

The socioeconomic variable indicators used in the model are drawn from key authors in the consulted literature (Arango, 2003; Bosch, 2000; Blanchard and Pérez, 2011; Canales, 2017; Dos Santos, 2002; González and Salazar, 2023; Gómez, 2010; Harris and Todaro, 1970; Keynes, 1936/2014; Lewis, 1954, 1955; Massey et al., 1993, 2000; Prebisch, 2012; Piore, 1979; Portes and Walton, 1981; Ranis and Fei, 1961; Stark and Taylor, 1991, 1989; Spicker et al., 2007; Varela et al., 2017) and are as follows:

Dependent variable:

- Total migrants: persons.

Independent variables:

- GDP Per capita: US$ at constant prices, base 2010.
- Poverty: percentage of the population living in poverty.

- Unemployment: percentage relative to the total active population.
- Higher education: gross enrollment rate in tertiary education.
- Maternal mortality rate: estimated per 100,000 live births.

### 3.9. Countries of origin in the South-North international migration corridor

Among the main countries of origin that form part of the South-North international migration corridor are Mexico, Kazakhstan, China, India, and the Philippines (CONAPO and BBVA Foundation, 2018). All these countries have the United States as their primary destination, except for Kazakhstan, whose main destination is Russia.

This research centers exclusively on the primary countries within this migration corridor that have the United States as their destination. This decision is based, firstly, on the need to ensure greater homogeneity in the analysis, and secondly, on the challenges associated with obtaining reliable statistical data for the Kazakhstan-Russia route.

### 3.10. Databases

The data were obtained from the World Bank (2024) for the 1990–2022 period and for the selected countries.

## 4. Results and discussion

This section presents the results derived from the implementation of the DOLS and FMOLS models to determine the incidence of socioeconomic variables in the migration flows of the main countries of origin in the South-North international corridor during the 1990–2022 period. In the first stage, the Levin, Lin and Chu (2002) unit root test is performed to evaluate the stationarity of the series. In the second stage, a cointegration analysis is conducted using the Kao (1999) statistic. In the third stage, the relationship between the variables is estimated using the DOLS and FMOLS models. In the fourth stage, the normality test of the data is presented. Finally, the analysis and discussion of the results are conducted.

## 4.1. Levin et al. (2002) unit root test

This test examines the null hypothesis, which states that the series has a unit root and is therefore non-stationary. In contrast, the alternative hypothesis asserts that the series does not have a unit root, meaning it is stationary at any confidence level. The resulting statistics are presented both at level and in first differences.

**Table 1** presents the variables used in the model in their two analyses -at level and in first differences. The results indicate that the series are integrated of order I (1). All variables at level present a unit root, meaning they are not stationary. However, in first differences, the series do not show a unit root, indicating they are stationary. This determines the possibility of a long-term relationship through cointegration analysis.

**Table 1.** Levin et al. (2002) unit root test.

| Variable | Levels | | First Difference | |
|---|---|---|---|---|
| | **Statistic** | **Probability** | **Statistic** | **Probability** |
| *lnmig* | −0.7601 | 0.2236 | −2.9037 | 0.0018 |
| *lnPIBpc* | 4.4987 | 1 | −3.1715 | 0.0008 |
| *lnpo* | 2.051 | 0.9799 | −3.3744 | 0.0004 |
| *lnES* | 3.2444 | 0.9994 | −2.6288 | 0.0024 |
| *lndes* | 2.0456 | 0.5182 | −2.6695 | 0.0038 |
| *lnMM* | 2.9587 | 0.2485 | −2.8756 | 0.0001 |

Source: authors' design based on calculations made in STATA 17, using statistical indicators from the World Bank (2024).

## 4.2. Kao (1999) cointegration test

The purpose of conducting cointegration tests with panel data is primarily to find evidence of a potential long-term relationship between the variables and also to avoid obtaining spurious relationships. The cointegration analysis of the series was performed using the Kao (1999) test, and the results are shown in **Table 2**.

**Table 2.** Kao's (1999) cointegration test.

| **Ho: No cointegration** | | |
|---|---|---|
| **Ha: All panels are cointegrated** | | |
| | **Statistic** | **p-value** |
| Modified Dickey-Fuller t | −3.5164 | 0.0002 |
| Dickey-Fuller t | −2.6585 | 0.0039 |
| Augmented Dickey-Fuller t | −3.0852 | 0.001 |
| Unadjusted modified Dickey-Fuller t | −1.2742 | 0.1013 |
| Unadjusted Dickey-Fuller t | −2.4207 | 0.0077 |

Source: authors' design based on calculations made in STATA 17, using statistical indicators from the World Bank (2024).

The Kao statistic allows us to reject the null hypothesis of no cointegration at the 99% confidence level and accept the alternative hypothesis of cointegration. This means that all variables exhibit long-term equilibrium, and therefore, it is possible to use the DOLS and FMOLS models.

## 4.3. DOLS and FMOLS models

The regression using the DOLS model was significant and exhibited the expected signs (see **Table 3**). The first variable shows a negative sign, indicating that a one-unit increase in GDP per capita leads to a 0.097 reduction in migration flows. The second variable, unemployment, has a positive sign, meaning that a one-point increase in unemployment results in a 0.283 rise in migration flows, making it the variable with the greatest impact on these flows. The third variable, higher education, also displays a negative sign, suggesting that a one-unit increase in the population with higher education reduces migration flows by 0.058. Regarding poverty, the positive coefficient indicates that a one-point increase in poverty leads to a 0.182 rise in

migration flows. Lastly, the health variable, represented by maternal mortality, shows that an increase in maternal mortality rates is associated with a 0.014 increase in migration flows.

**Table 3.** Estimation of DOLS and FMOLS models.

| **DOLS** | | | **FMOLS** | | |
|---|---|---|---|---|---|
| | **Coef.** | ***P*** **> \|*z*\|** | | **Coef.** | ***P*** **> \|*z*\|** |
| *lnPIBpc* | −0.0974471 | 0.051 | *lnPIBpc* | −0.05114 | 0.000 |
| *lndes* | 0.2834608 | 0.001 | *lndes* | 0.17625 | 0.000 |
| *lnES* | −0.0575227 | 0.021 | *lnES* | −0.02751 | 0.001 |
| *lnpo* | 0.1822901 | 0.000 | *lnpo* | 0.12290 | 0.020 |
| *lnMM* | 0.0136299 | 0.001 | *lnMM* | 0.00943 | 0.001 |

Source: authors' design based on calculations made in STATA 17, using statistical indicators from the World Bank (2024).

The results from the FMOLS model are more robust, though very similar and aligned with those obtained from the DOLS model (see **Table 3**). The first variable, GDP per capita, shows a negative sign, indicating that a one-unit increase in GDP per capita leads to a 0.051 reduction in migration flows. The second variable, unemployment, has a positive sign, meaning that a one-point increase in unemployment results in a 0.176 rise in migration flows, making it the variable with the greatest impact on these flows. The next variable, higher education, also shows a negative sign, suggesting that a one-unit increase in the population with higher education reduces migration flows by 0.028. Regarding poverty, the positive coefficient indicates that a one-point increase in poverty leads to a 0.123 rise in migration flows. Finally, the health variable, represented by maternal mortality, shows that an increase in maternal mortality rates is associated with a 0.009 increase in migration flows.

## 4.4. Normality test

Lastly, the normality test is presented, which verifies the validity of the models. In this test, the null hypothesis stating that the residuals are normally distributed is contrasted with the alternative hypothesis stating that the residuals are not normally distributed. As shown in **Table 4**, with a Prob > chi2 value of 0.4896, the null hypothesis is accepted, indicating that the residuals are normally distributed.

**Table 4.** Normality test.

| **Variable** | **Obs** | **Skewness** | **Pr (Kurtosis)** | **Chi2 (2)** | **Prob >chi2** |
|---|---|---|---|---|---|
| res1 | 145 | 0.5975 | 0.8425 | 24.05 | 0.4896 |

Source: authors' design based on calculations made in STATA 17, using statistical indicators from the World Bank (2024).

The results obtained from the DOLS and FMOLS models provide valuable insights into the factors influencing migration flows from origin countries within the South-North corridor. Variables such as GDP per capita, unemployment, higher education, poverty, and health are shown to have significant effects on migration, with

unemployment and poverty exerting the greatest influence on migration flows in this corridor.

These findings suggest that policies aimed at increasing per capita GDP, reducing unemployment and poverty, as well as improving higher education and public health, can have a positive impact on reducing migration flows from the main origin countries in the South-North international corridor. By addressing these social challenges, governments in countries of origin, transit, and destination can improve the economic and social conditions of their communities, particularly for migrant populations (Arango, 2003; Blanchard and Pérez, 2011; Bosch, 2000; Canales, 2017; Dos Santos, 2002; Gómez, 2010; González and Salazar, 2023; Harris and Todaro, 1970; Keynes, 1936/2014; Lewis, 1954, 1955; Massey et al., 1993, 2000; Prebisch, 2012; Piore, 1979; Portes and Walton, 1981; Ranis and Fei, 1961; Stark and Taylor, 1989, 1991; Spicker et al., 2007; Varela et al., 2017). This can be achieved through policies that promote income generation, enhance social welfare, and reduce poverty. That is to say, holistic strategies that create more favorable socioeconomic environments (Fonseca and Guimares, 2021; Iglesias and Rivera, 2021; Ismael, 2024; Maldonado et al., 2018; Vitorino, 2021).

## 5. Conclusion

The theoretical approaches to migration consider a diversity of variables in search of explanations regarding human mobility, always considering the increasingly complex context that characterizes this phenomenon. This study emphasizes socioeconomic variables as the main drivers of migration movements, while recognizing that social, political, and cultural elements also influence the issue. In this vein, it could be said that the arguments of the emigration paradigm in development theories can serve as key references for understanding migration flows.

This document presents an analysis of the incidence of socioeconomic variables in migration flows from the main origin countries in the South-North international corridor, such as Mexico, China, India, and the Philippines, during the period from 1990 to 2022. The common characteristic of these countries is that their primary destination is the United States, and internationally, they are also the leading exporters of migrants. In this study, the total number of migrants was considered the dependent variable, while GDP per capita, unemployment, poverty, higher education, and maternal mortality were the independent variables.

From a methodological perspective, the first step involved applying the Levin, Lin and Chu (2002) unit root test, where it was observed that all variables had an order of integration of I (1). In the second stage, the Kao (1999) cointegration test was used, proving that all panels were cointegrated, showing long-term equilibrium. In the third stage, long-term DOLS and FMOLS models were estimated, yielding the expected signs; unemployment and poverty, in that order, displayed the greatest incidence on international migration in the South-North corridor in both models. Lastly, in the fourth stage, a normality test was applied, which confirmed that the models are valid.

The relationship between the studied socioeconomic variables and migration is complex and multifaceted. Migration often serves as a strategy for individuals and families seeking better economic and social opportunities. When conditions in the

country of origin are unfavorable -characterized by high unemployment, widespread poverty, and limited access to quality education and healthcare- people are more inclined to consider migration as a viable option in their pursuit of a better life.

The study of the relationship between socioeconomic variables and migration flows in the South-North corridor holds significant relevance in the current global context. Migration has gained increasing importance due to its impact on the economy, society, and welfare of the involved populations. Understanding how factors such as GDP per capita, unemployment, and poverty influence migration movements allows policymakers to design more effective strategies to address the challenges associated with migration, both in the countries of origin and destination.

Among the contributions to migration literature is the review and analysis of migration corridors, particularly the migratory flows that take place in the countries that are part of these corridors. This is done from a quantitative perspective, using econometric techniques, with the aim of identifying the impact of social and economic variables on international mobility, in this case, the movement of people within the South-North international migration corridor. Studies in this direction will surely contribute to a better understanding of the international dynamics of the migratory phenomenon.

This study provides valuable information on how to improve living conditions in migrants' communities of origin. By identifying the socioeconomic variables that have the greatest impact on migration flows, comprehensive policies can be developed to help reduce forced migration. Policies that promote job creation, poverty reduction, improvements in education and health care can contribute to creating more stable and prosperous environments in the countries of origin, thereby reducing the need to migrate as a survival strategy. Ultimately, this comprehensive approach not only benefits migrants and their families but also contributes to overall development and social welfare.

Although this research focused on the implementation of quantitative methods to identify the relationship between key socioeconomic variables and migratory flows in the South-North corridor, it is important for future studies to consider the impact of other indicators, such as immigration policies, global crises, and social networks, which will undoubtedly strengthen the analysis of the migration phenomenon.

**Data availability statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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