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The Impact of Foreign Trade on the Mobility of Factors of Production in BRICS Countries

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Abstract

In recent decades, alongside the expansion of globalization, examining the relationship between foreign trade and the mobility of factors of production has become a central issue in international economics. According to Mundell's theory, trade and factor mobility can be substitutes for one another; however, recent empirical evidence, particularly in emerging economies, points to the existence of a complementary relationship between the two .The objective of this study is to investigate the impact of foreign trade on labor and capital mobility in the BRICS member countries over the period 2000–2025 and to empirically test the validity of Mundell's theory in these countries. To achieve this objective, annual data extracted from the World Development Indicators (WDI) database are employed, and panel econometric methods are used. After testing for stationarity and cointegration among the variables, long-run coefficients are estimated using the Fully Modified Ordinary Least Squares (FMOLS) method to analyze the long-term effects of trade liberalization and tariffs on factor mobility .The results indicate that trade tariffs have a positive effect on labor mobility and a negative and statistically significant effect on capital mobility, while an increase in trade openness leads to a reduction in labor mobility and a strengthening of foreign direct investment flows. These findings suggest that the relationship between foreign trade and factor mobility in BRICS countries is not necessarily substitutive and exhibits a complementary nature in the case of capital. Overall, the results emphasize the key role of trade policies in shaping factor mobility and the need for coordination among trade, labor market, and investment policies.

Keywords: Foreign Trade, Labor Mobility, Capital Mobility, Trade Liberalization, BRICS Countries

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1- Introduction

In recent decades, alongside the deepening of globalization, the interaction between foreign trade and the mobility of factors of production (labor and capital) has become one of the central themes in the international economics literature. According to Mundell's theory (Mundell, 1957), within the Heckscher–Ohlin framework, trade in goods and factor mobility can act as substitutes; that is, as trade barriers decline, the incentive for factor movement diminishes. However, recent empirical evidence indicates that in many countries—particularly emerging and developing economies—foreign trade not only fails to substitute for factor mobility but, in practice, establishes a complementary and reinforcing relationship with labor migration and foreign direct investment flows (Abdi, 2023; Goldberg & Klein, 1999; Ghatak et al., 2009; Eger et al., 2020).

Within this framework, numerous studies have shown that the expansion of foreign trade, through various channels such as reductions in transaction costs, the transfer of knowledge and technology, the formation of migrant networks, and increased capital profitability, facilitates greater mobility of factors of production. For example, Abdi (2023), in their analysis of the trade systems of Australia and New Zealand using a computable general equilibrium (CGE) model, demonstrated that trade liberalization can asymmetrically alter labor migration patterns. Similarly, Ghatak et al. (2009) and Campaniello (2012) provide evidence of a positive effect of migration on bilateral exports and highlight the complementary nature of trade and migration in European countries. On the other hand, studies such as Kim and Park (2012) and Uprety (2019) show that the impact of trade on migration varies depending on the type of goods (exports or imports), the skill level of labor, and countries' economic structures, and that in many cases imports can be a major driver of skilled labor outflows.

With regard to foreign direct investment (FDI), a substantial strand of the literature also emphasizes its complementary relationship with trade. Studies such as Goldberg and Klein (1999), Khoon Goh et al. (2013), and Azerbayjani et al. (1391) indicate that although the trade–FDI relationship is not necessarily uniform, in many economies—especially developing ones—inflows of foreign capital have generated significant changes in foreign trade by expanding production capacity and exports. In this context, the findings of domestic studies such as Tayebi et al. (1386, 1387) and Zamani (1396) likewise point to the existence of a complementary relationship among trade, migration, and foreign direct investment in developing countries, including Iran.

Despite the relative richness of the literature, a careful review of both international and domestic studies reveals an important research gap in the simultaneous analysis of the effects of foreign trade on factor mobility in multipolar emerging economies such as the BRICS member countries. Most existing studies have either focused on developed OECD countries (Ghatak et al., 2009; Kim & Park, 2012; Eger et al., 2020) or examined only one dimension of factor mobility (migration or FDI), paying limited attention to an integrated framework capable of explaining the mutual relationships among trade, labor mobility, and capital mobility in economies with diverse institutional structures, levels of development, and trade patterns, such as Brazil, Russia, India, China, and South Africa.

From the perspective of the importance and necessity of the research, BRICS countries account for an increasing share of global trade, capital flows, and international migration and are recognized as key engines of growth in the global economy. Understanding how foreign trade affects factor mobility in these countries can play a critical role in designing coherent trade, migration, and investment policies—particularly given evidence from studies such as Khoudour-Castéras (2010) and Figueiredo et al. (2020), which suggest that the effects of trade and migration are stronger and more heterogeneous in economies characterized by weaker institutions or higher levels of trade protection, a condition observed in some BRICS countries.

Accordingly, the main contribution of the present study lies in providing a comprehensive analysis of the impact of foreign trade on factor mobility (labor migration and capital flows) across the BRICS member countries and in empirically testing Mundell's theory within the context of emerging economies. Such an analysis can clarify whether the relationship between trade and factor mobility in these countries is substitutive or complementary and can add a comparative and policy-oriented dimension to the existing literature.

Finally, the main research question is formulated as follows: What effect does foreign trade have on the mobility of factors of production (labor and capital) in BRICS member countries, and is the

relationship between trade and factor mobility in these countries substitutive or complementary in accordance with Mundell's theory?

This question provides the basis for addressing subsidiary questions regarding differences in the effects of exports and imports, the role of foreign direct investment, and the structural heterogeneity of BRICS countries in shaping this relationship.

2- Literature Review

In international economics, the relationship between foreign trade and the mobility of factors of production has long been the subject of theoretical debate. The classical framework of this discussion originates in the Heckscher–Ohlin model and its extension by Mundell (1957), according to which trade in goods and factor mobility exhibit a substitutive relationship. Under this view, trade liberalization leads to convergence in goods prices, which in turn results in convergence in factor prices, thereby reducing the incentives for the international movement of labor and capital. In other words, in the absence of trade barriers, trade can perform a role similar to that of factor mobility and diminish the need for labor migration or capital flows (Mundell, 1957).

However, empirical evidence from recent decades suggests that the substitutability hypothesis does not necessarily hold in practice, and that in many cases foreign trade and factor mobility display a complementary relationship. More recent theoretical approaches, emphasizing firm heterogeneity, adjustment costs, and structural shocks arising from trade liberalization, argue that trade can generate regional labor market imbalances and increase labor mobility. Integration into global markets intensifies competitive pressures on domestic industries and, in the short run, may lead to structural unemployment, labor reallocation, and increased migration, particularly from low-productivity sectors or regions (Redding, 2016).

With respect to labor mobility, newer approaches indicate that trade liberalization affects migration not only through price mechanisms but also via non-price channels. The expansion of international trade enhances information flows, strengthens migrant networks, and reduces migration costs, all of which increase both the capacity and the likelihood of labor migration. Especially in developing countries, improved household financial capacity and higher income expectations resulting from trade integration can lead to increased migration—a phenomenon commonly referred to in the literature as the "paradox of development" (Stark, Taylor & Yitzhaki, 1988; Clemens, 2014).

On the other hand, the relationship between foreign trade and capital mobility—particularly foreign direct investment—also often exhibits a complementary nature. Horizontal and vertical FDI theories suggest that reductions in trade barriers can stimulate capital inflows, as multinational enterprises either seek access to new markets (horizontal FDI) or aim to exploit comparative advantages and lower production costs (vertical FDI). In both cases, trade and foreign direct investment tend to expand simultaneously and exert mutual and reinforcing effects on one another (Markusen, 2002).

At the empirical level, a broad body of international studies indicates that trade liberalization and increased economic openness are frequently associated with rising migration flows and foreign direct investment. Studies such as Nana and Poot (1996), Campaniello (2012), and Eger et al. (2020) provide evidence showing that trade shocks induced by globalization—particularly in the short run and in emerging economies—intensify labor mobility. Similarly, research on foreign direct investment demonstrates that expanding foreign trade and reducing tariffs facilitate capital flows and establish a complementary relationship between trade and investment.

Overall, the recent theoretical and empirical literature suggests that the relationship between foreign trade and factor mobility is highly dependent on institutional conditions, the level of economic development, and the structure of labor markets. Contrary to the predictions of Mundell's classical theory, in many developing and emerging economies—including the BRICS member countries—foreign trade is not merely a substitute for factor mobility but instead becomes a reinforcing force for labor and capital movements through structural and institutional channels. This underscores the importance of empirically examining this relationship within specific country contexts and time periods.

In the international literature, a substantial share of studies has focused on explaining the relationship between foreign trade and the mobility of factors of production, particularly labor migration and foreign direct investment (FDI). The findings of these studies indicate that, contrary to the classical prediction

of Mundell's theory regarding the substitutability between trade and factor mobility, in practice a complementary relationship often prevails. For example, Nana and Poot (1996), using a computable general equilibrium (CGE) model, showed that trade liberalization in Australia and New Zealand altered patterns of labor migration. Goldberg and Klein (1999) and Khoon Goh et al. (2013) also argue that the relationship between trade and FDI varies depending on industry type and countries' economic structures; however, in most cases, inflows of foreign capital reinforce trade.

On the other hand, studies such as Ghatak et al. (2009), Campaniello (2012), and Uprety (2019) demonstrate that migration—particularly through reductions in transaction costs and the formation of migrant networks—enhances bilateral exports and trade in differentiated goods. Moreover, more recent studies, including Eger et al. (2020) and Figueiredo et al. (2020), emphasize the role of migrant skills, institutional quality, and the level of trade protection, showing that trade liberalization and factor mobility exert stronger effects in economies with weaker institutions.

In domestic studies, the primary focus has been on examining the relationship between foreign trade, foreign direct investment, and labor migration in developing countries, with particular emphasis on Iran. The findings of Tayebi et al. (1386, 1387) and Azerbayjani et al. (1391) indicate a positive and statistically significant relationship between foreign trade and both inward and outward FDI flows, suggesting a complementary relationship between these two variables. Karimi Hastijeh and Aghaei (1386) also showed that an increase in the degree of trade openness plays a significant role in attracting foreign direct investment. In the area of migration, studies such as Mirzaei Pooyank (1390), Zamani (1396), and Dehghani and Shafiei Kakhki (1399), employing gravity models and spatial econometric methods, confirm that labor migration has a positive and direct effect on bilateral trade by reducing transaction costs and expanding communication networks, thereby increasing trade volumes. In contrast, Hari et al. (1393), using the GTAP model, found that brain drain hurts production and foreign trade in Iran, underscoring the importance of human capital quality in the relationship between trade and factor mobility.

In summary, although Mundell's theory predicts a substitutive relationship between trade and factor mobility, both domestic and international empirical evidence largely supports the existence of a complementary relationship that is contingent upon the structural characteristics of economies. Factors such as the level of economic development, institutional quality, skill composition of the labor force, the type of traded goods, and the role of foreign direct investment determine the direction and magnitude of this relationship. Nevertheless, a considerable portion of the existing research has either focused on developed countries or examined only one channel of factor mobility. Consequently, there is a clear gap in the literature for a comprehensive study that examines the impact of foreign trade on factor mobility in an integrated and comparative framework within emerging economies such as the BRICS member countries.

3- Methodology

In this study, panel econometric methods with an emphasis on the long-run approach (FMOLS) are employed. Specifically, the analysis begins by examining the stationarity of the variables using panel unit root tests. Next, the existence of a long-run cointegrating relationship among the variables is confirmed through panel cointegration tests. Subsequently, the long-run coefficients capturing the effects of foreign trade variables—namely trade liberalization and tariffs—on capital mobility are estimated.

The FMOLS method is selected for several reasons. First, it is well suited for panel data structures characterized by cointegrated relationships. Second, it systematically corrects common problems associated with long-run estimations, such as endogeneity, serial correlation, and bias arising from simultaneity among variables. Third, FMOLS enables the extraction of stable and structural long-run relationships among the variables. Given that the primary objective of this research is to analyze the long-term effects of trade policies on capital mobility, rather than merely short-run fluctuations, the use of FMOLS is considered more accurate and more consistent with the theoretical framework of the study compared to static or short-term estimation approaches.

Independent Variables

Tariff (TARRIF) :This variable represents tariff rates imposed on imports and exports. An increase in tariffs generally leads to a reduction in imports and, consequently, affects the mobility of factors of production.

Trade Liberalization (ATRADE) :This variable refers to the difference between exports and imports. Trade liberalization can contribute to increased exports and reduced trade barriers, which in turn influence the mobility of factors of production.

Dependent Variables

Labor Mobility (LABOR) :This variable refers to labor migration. Greater trade liberalization and lower tariff rates may lead to increased employment opportunities and, as a result, higher labor mobility.

Capital Mobility (CAPITAL):

This variable refers to foreign direct investment (FDI). Trade liberalization and tariff reductions can enhance the attractiveness of investment in BRICS member countries and facilitate inflows of foreign capital. The model can generally be expressed as follows:

$$L = f(TARRIF, ATRADE)$$
$$K = g(TARRIF, ATRADE)$$

Here, the functions represent the relationships between the independent and dependent variables.

Analysis of the tariff effect:

An increase in tariff rates may lead to a reduction in both labor and capital mobility, as higher trade barriers restrict trade flows and reduce employment and investment opportunities.

Analysis of the trade liberalization effect:

Greater trade liberalization can lead to increased labor and capital mobility, as it creates more employment opportunities and encourages foreign investors to increase their investment in these countries.

This model provides an appropriate framework for analyzing the impact of foreign trade on the mobility of factors of production in the BRICS countries. By collecting data on tariffs, trade liberalization, labor migration, and foreign direct investment, it is possible to examine the relationships among these variables and their effects on one another. Such an analysis can assist policymakers in making more informed decisions regarding trade and investment policies.

The statistical population of this study consists of all BRICS member countries and all annual observations of variables related to foreign trade and capital mobility in these countries over the period 2000–2025. Given the panel nature of the data and the limited number of BRICS members, the sample is considered identical to the statistical population, and the study adopts a census approach. This means that all BRICS member countries for which data were available from the World Development Indicators (WDI) database are included in the analysis without any exclusion or selection. Accordingly, no random or non-probability sampling methods are applied, and country selection is conducted in a purposive manner based on formal membership in the BRICS group, enabling a comprehensive and comparative examination of the effects of trade policies on capital mobility across this set of emerging economies.

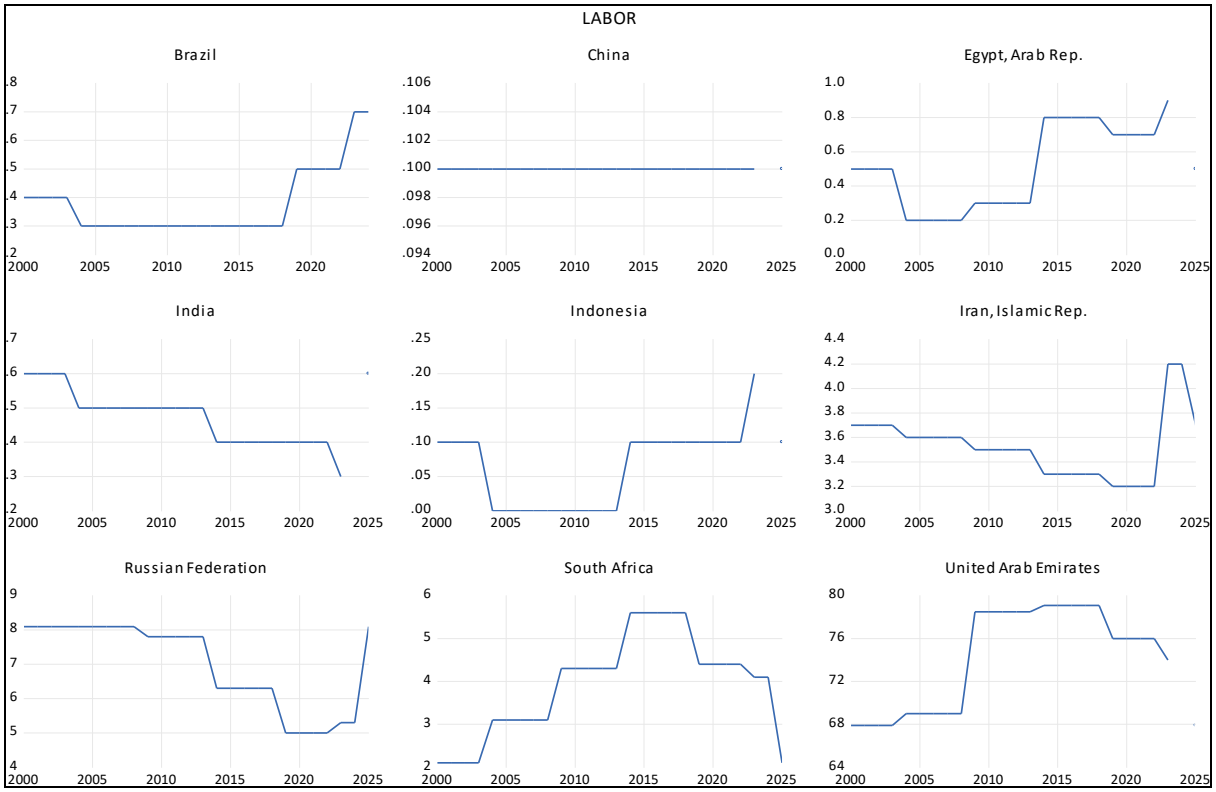

Fig1. Labor Mobility

Based on the graphs depicting labor mobility statistics for BRICS member countries over the period 2000–2025 (as shown in the submitted figure), a heterogeneous, phased, and highly shock-dependent pattern can be observed across these countries. In general, most BRICS economies exhibit relatively low or stable levels of labor mobility at the beginning of the period. However, from the mid-2000s onward—coinciding with intensified globalization, the expansion of foreign trade, and the occurrence of structural shocks—fluctuations in labor mobility increase noticeably.

In some countries, a gradual rise in labor mobility is observed, which may be attributed to integration into global value chains, changes in production structures, and increased competitive pressure from external markets on domestic labor markets. In contrast, other countries experience sharp, episodic spikes followed by marked declines in labor mobility, likely reflecting economic crises, shifts in policy regimes, or institutional constraints within labor markets.

Moreover, in the later years of the period, the presence of more pronounced volatility in several countries indicates that labor mobility in BRICS emerging economies has become increasingly sensitive to external shocks and changes in trade policies. Overall, these patterns weaken the assumption of perfect substitutability between trade and labor mobility and are more consistent with the complementarity perspective between trade and factor mobility. Specifically, trade liberalization and the shocks associated with it, rather than reducing labor movement, have in many cases led to greater labor mobility or increased instability in labor mobility across BRICS countries.

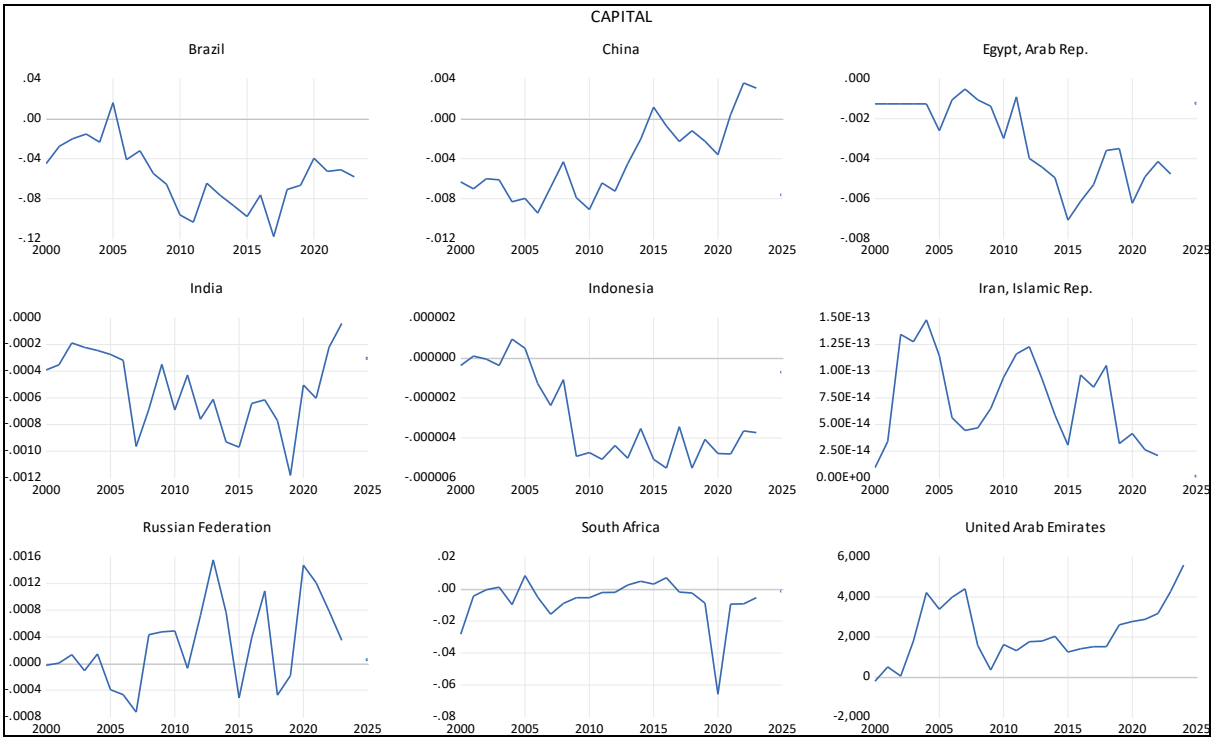

Fig2. Capital Mobility

Based on the graphs of capital mobility (foreign direct investment) in BRICS member countries over the period 2000–2025, several important and analytically relevant patterns can be identified. First, capital mobility in most BRICS economies has been volatile and highly sensitive to external shocks, reflecting the strong dependence of foreign capital flows on global economic developments, financial crises, and changes in trade and institutional policies. In many countries, a relatively stable or upward trend is observed in the early years of the period; however, with the occurrence of shocks such as the 2008–2009 global financial crisis and fluctuations in the global economy during the 2010s, sharp and sudden declines in capital mobility become evident.

Second, in a considerable number of countries, periods of decline are followed by gradual and, in some cases, abrupt recoveries in foreign capital inflows, which may reflect improvements in macroeconomic indicators, reductions in trade barriers, and reforms aimed at enhancing the business environment. This cyclical behavior indicates that capital flows respond rapidly and significantly to economic policies, particularly trade policies and the degree of trade openness. Countries that experienced tariff reductions or trade facilitation measures in later periods generally display a more pronounced upward trend in capital mobility.

Finally, behavioral heterogeneity among BRICS countries is clearly evident in the graphs. While some economies have managed to maintain foreign capital inflows at relatively high and stable levels, others have experienced severe volatility and recurrent declines. This heterogeneity suggests that the impact of trade liberalization on capital mobility is conditional on institutional quality, macroeconomic stability, and political risk. Overall, the descriptive evidence derived from the graphs is consistent with the FMOLS estimation results and supports the conclusion that tariff reductions and increased trade openness play a reinforcing and statistically meaningful role in attracting and sustaining capital mobility in BRICS countries in the long run, although the magnitude of this effect varies across countries.

4- Results

Given the nature of the data used, which consist of country-level time series arranged in a panel data structure, it is necessary to examine the statistical properties of the variables before estimating the long-run relationship between trade liberalization, tariffs, and the mobility of factors of production and capital. Since the estimation of long-run relationships is valid only when the variables are non-stationary

and cointegrated, this study first applies panel unit root and panel cointegration tests, and subsequently employs the panel FMOLS method to estimate the long-run coefficients.

4.1. Panel Unit Root Test

The first step in analyzing long-run relationships is to examine the order of stationarity of the variables. To this end, panel unit root tests are employed to determine whether the variables under consideration are stationary in levels or become stationary after taking the first difference. This step is important because the application of cointegration techniques and the FMOLS method requires that the variables be non-stationary in levels and stationary in first differences.

Table 1. Stationarity Tests of Variables

Variable	t-value	Prob
Llabor	-10.08	0.000
Lcapital	-6.25	0.000
Ltarrif	-3.87	0.0001
Latrade	-1.95	0.025

Based on the reported results, unit root tests were conducted to examine the stationarity of the variables labor mobility, capital mobility, tariffs, and trade liberalization. The null hypothesis of these tests is the presence of a unit root (non-stationarity), while the alternative hypothesis is stationarity of the variables.

The results indicate that the test statistics for all variables are negative and statistically significant, with p-values below the 5 percent significance level. Specifically, the variables labor mobility (Llabor) and capital mobility (Lcapital) exhibit large negative test statistics and p-values that are approximately zero, indicating strong stationarity at the level.

In addition, the tariff (Ltarrif) and trade liberalization (Latrade) variables are also statistically significant at the 5 percent level, leading to rejection of the null hypothesis of a unit root. Therefore, these variables are likewise stationary in levels. However, the degree of stationarity for these variables is weaker than that of factor mobility variables, which may be attributed to policy dynamics and gradual changes in trade policies.

4.2. Panel Cointegration Test

Following the confirmation of variable stationarity, the next step involves testing for the existence of a long-run equilibrium relationship among the variables under study. To this end, a panel cointegration test is employed to determine whether a stable long-run relationship exists between trade liberalization, tariffs, and the mobility of factors of production.

Table 2. Cointegration Test

statistic	**Prob**
-3.21	0.001
-2.78	0.003

The results of the Kao cointegration test conducted to examine the existence of a long-run relationship between trade liberalization and tariffs and labor and capital mobility indicate that the test statistics in both relationships are negative and statistically significant. Specifically, for the relationship between trade liberalization and tariffs and labor mobility, the test statistic is –3.21 with a p-value of 0.001, while for the relationship between trade liberalization and tariffs and capital mobility, the test statistic is –2.78 with a p-value of 0.003. Given that the p-values in both equations are below the 5 percent significance level, the null hypothesis of the Kao test—namely, the absence of cointegration—is rejected.

Therefore, the results indicate the existence of a stable and long-run equilibrium relationship between trade liberalization and tariffs and labor and capital mobility. This implies that changes in trade policies can exert long-term effects on the movement of factors of production in the countries under investigation.

Given the confirmation of cointegration among the variables, this study employs the panel FMOLS method to estimate the long-run coefficients. The FMOLS approach provides efficient and unbiased estimates of the long-run relationship by correcting for serial correlation and endogeneity bias in the explanatory variables. Accordingly, this method is particularly suitable for analyzing the long-term effects of trade policies on factor mobility in panel data covering multiple countries.

4.3. Examining the Impact of Trade Liberalization on Labor Mobility

Trade liberalization, through the reduction of tariffs and trade barriers, can influence labor mobility (migration) by altering the structure of production and the demand for labor. In the short run, increased foreign competition may lead to the displacement of part of the labor force from less competitive industries. However, in the long run, by enhancing productivity, promoting economic growth, and creating new employment opportunities, trade liberalization can provide the conditions for greater labor mobility.

Empirical evidence, particularly in developing countries, generally indicates a complementary relationship between trade liberalization and labor mobility, suggesting that the expansion of foreign trade can increase incentives for labor migration. Nevertheless, the magnitude and direction of this effect depend on institutional conditions and the structure of labor markets across countries.

Table 3. Impact of Trade Liberalization on Labor Mobility

Variable	Coef	t-value	Prob
Ltarrif	1.29	4.20	0.000
latrade	-0.830	-4.47	0.000

The estimation results indicate that trade tariffs (Ltarrif) have a positive and statistically significant effect on the mobility of the factor under study. Specifically, a coefficient of 1.29 and a t-statistic of 4.20 suggest that, in the long run, higher tariffs can strengthen incentives for the movement of factors of production—such as labor migration or capital outflows—through the intensification of economic inefficiencies, an increase in structural unemployment, and a reduction in domestic employment opportunities.

In contrast, trade liberalization (Latrade) exhibits a negative and statistically significant effect, with a coefficient of –0.83 and a t-statistic of –4.47. This indicates that greater trade openness, by improving economic conditions, increasing employment, and enhancing the returns to factors of production within the domestic economy, leads to a reduction in factor mobility.

Overall, these findings suggest that restrictive trade policies can contribute to increased movements of factors of production, whereas trade liberalization plays a deterrent role in this regard.

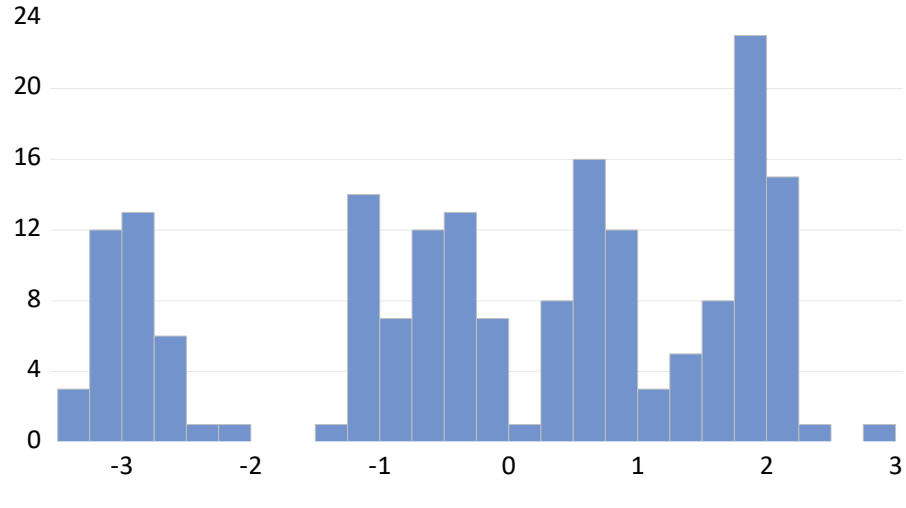

Fig3. Normality test (Labor Mobility)

Based on the distribution plot of the error terms of the estimated labor mobility model and the reported descriptive statistics, it can be stated that the distribution of residuals deviates to some extent from normality. The mean (–0.09) and median (0.27) of the error terms remain close to zero, indicating the absence of serious systematic bias in the coefficient estimates. However, the negative skewness (Skewness = –0.43) suggests a slight left-tail stretching of the distribution, and the kurtosis value (2.02) is lower than the normal benchmark of 3, implying a relatively flatter-than-normal distribution.

The decisive point in this regard is the Jarque–Bera test. The test statistic of 13.10 with a significance level of 0.001 indicates that the null hypothesis of normally distributed residuals is rejected at the 5 percent significance level. This result implies that the residuals of the labor mobility model do not fully follow a normal distribution—a phenomenon that is common in panel data with a relatively large sample size and the presence of structural heterogeneity across countries.

Nevertheless, since the coefficient estimates are obtained using the panel FMOLS method, which is robust to non-normality of residuals, this issue does not undermine the validity of the long-run results. Therefore, although the normality assumption is not fully satisfied in this equation, the findings regarding the impact of trade policies on labor mobility in BRICS countries remain econometrically reliable and interpretable.

4.4. Examining the Impact of Trade Liberalization on Capital Mobility

Table 4. Impact of Trade Liberalization on Capital Mobility

Variable	Coef	t-value	Prob
Ltarrif	-18.31	-12.44	0.000
latrade	6.69	8.57	0.000

The estimation results for the dependent variable of capital mobility (foreign direct investment) indicate that trade tariffs (Ltarrif) have a negative and highly statistically significant effect on capital mobility. Specifically, a coefficient of –18.31 and a t-statistic of –12.44 suggest that an increase in tariffs, by intensifying trade restrictions, raising transaction costs, and reducing the profitability of international activities, significantly reduces foreign direct investment flows in the long run.

In contrast, trade liberalization (Latrade) has a positive and statistically significant effect on capital mobility. The estimated coefficient of 6.69 with a t-statistic of 8.57 indicates that a higher degree of trade openness, through improving the business environment, increasing access to markets, and strengthening investor expectations, leads to a significant expansion of capital inflows into the economy.

The high statistical significance of both variables (zero probability values) confirms that trade policies play a decisive role in shaping capital mobility in the countries under investigation.

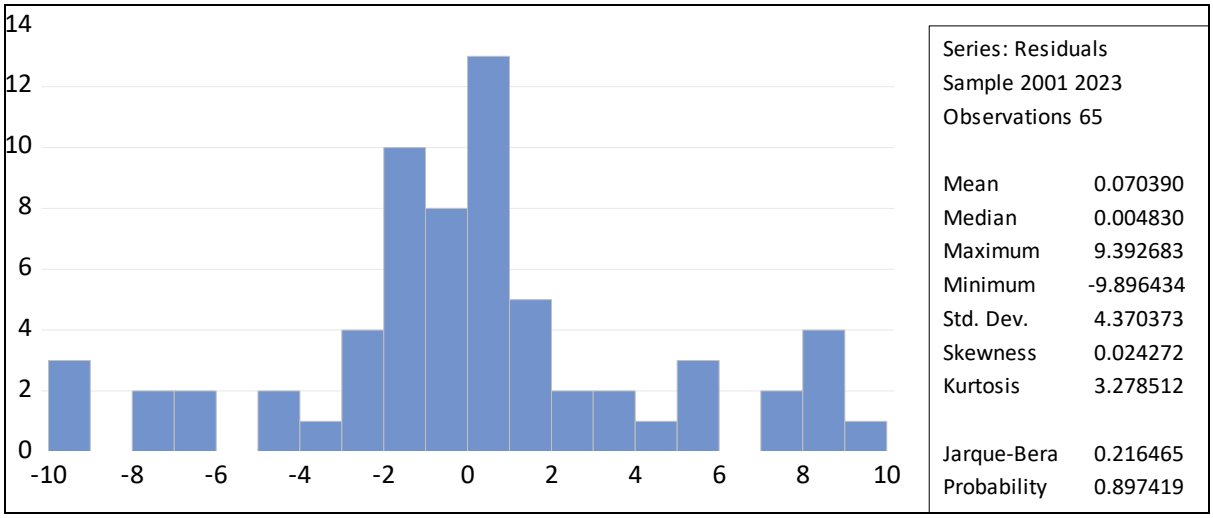

Fig3. Normality test (Capital Mobility)

Based on the distribution plot of the error terms of the estimated capital mobility model and the reported descriptive statistics, it can be stated that the classical assumptions of the model are well satisfied. The mean and median of the error terms are very close to zero, indicating the absence of systematic bias in the estimations. The skewness value (Skewness = 0.02) is close to zero, reflecting an appropriate symmetry of the residual distribution, while the kurtosis value (Kurtosis = 3.27) is also close to the normal benchmark of 3, suggesting the absence of abnormal tails in the distribution of the error terms.

Most importantly, the Jarque–Bera test (Jarque–Bera = 0.216) with a high probability value (Prob = 0.897) confirms the null hypothesis of normally distributed residuals. Taken together, these results indicate that the residuals of the capital mobility model follow a normal distribution, and there are no issues related to non-normality, skewness, or extreme deviations in the error terms.

Therefore, the statistical validity of the coefficients estimated using the FMOLS method for analyzing the effects of trade liberalization and tariffs on capital mobility in BRICS countries is confirmed, and the resulting findings are econometrically reliable and economically interpretable.

5-Conclusion

The primary objective of the present study was to examine the impact of foreign trade—including trade liberalization and trade restrictions arising from tariffs—on the mobility of factors of production, with particular emphasis on capital mobility, within the framework of a long-run econometric analysis. The importance of this issue stems from the fact that in the classical and neoclassical theories of international trade, especially in Mundell's framework, a specific relationship is proposed between trade in goods and the mobility of production factors. However, empirical evidence, particularly in developing countries and emerging economies, has yielded diverse and sometimes contradictory results relative to theoretical predictions. Accordingly, by focusing on capital mobility as one of the most critical factors of production, this study seeks to provide a clearer understanding of the role of trade policies in shaping capital flows.

The empirical findings indicate that the trade variables under consideration—namely trade tariffs and the degree of trade liberalization—have significant and substantial effects on capital mobility. The results obtained from the estimation of the long-run model using the FMOLS method reveal that an increase in trade tariffs exerts a strong and negative effect on capital mobility. The large negative coefficient of the tariff variable suggests that the imposition of trade restrictions, through higher transaction costs, reduced economic competitiveness, and increased uncertainty in the business environment, markedly diminishes the attractiveness of the economy for investors. This finding is consistent with theories of international investment that emphasize the importance of policy stability, economic openness, and the reduction of trade barriers in attracting capital.

In contrast, the results related to trade liberalization indicate a positive and statistically significant effect on capital mobility. The positive coefficient of trade liberalization implies that a higher degree of trade openness, through facilitating access to markets, reducing entry and exit barriers, improving information flows, and enhancing the competitive environment, creates favorable conditions for increased capital inflows. This finding suggests that foreign trade not only serves as a channel for the exchange of goods and services but also acts as an effective instrument for attracting capital and strengthening international financial linkages. In this context, trade liberalization can be viewed as a positive signal to foreign investors, reflecting a country's commitment to market-oriented policies and the reduction of restrictive government interventions.

From a theoretical perspective, the results support a complementarity relationship between foreign trade and capital mobility. According to this view, the expansion of trade in goods and services can lead to increased cross-border capital flows, as firms and investors relocate capital to exploit new opportunities arising from trade liberalization. This conclusion is consistent with a substantial body of empirical literature indicating that countries with higher levels of trade openness generally attract greater inflows of foreign direct investment. At the same time, the findings demonstrate that restrictive trade policies, particularly those implemented through tariffs, can exert a strong deterrent effect on capital flows and ultimately reduce capital mobility.

An important aspect of the results is the large magnitude of the estimated coefficients for the trade variables, indicating a high sensitivity of capital mobility to changes in trade policies. This highlights the fact that capital, as a highly mobile factor of production, responds strongly to shifts in the policy and institutional environment, such that an increase in trade restrictions raises the likelihood of capital outflows or discourages new inflows. From this perspective, the findings serve as a warning to policymakers, suggesting that restrictive trade policies—even if justified in the short run by protective or revenue-generating objectives—may impose significant long-term costs on the economy through reduced capital inflows and weakened economic growth.

From a methodological standpoint, the use of the FMOLS approach allowed for more accurate estimation of long-run relationships and effectively addressed issues such as endogeneity bias and autocorrelation, which commonly arise in long-term econometric models. The confirmation of cointegration among the variables prior to estimation strengthens the credibility of the results and indicates that the variables share a common long-run equilibrium path. Accordingly, the estimated coefficients reflect stable and structural relationships between trade policies and capital mobility, rather than merely short-term fluctuations.

In summary, the results of this study demonstrate that foreign trade plays a decisive role in shaping capital mobility. Trade liberalization acts as a stimulating force, enhancing capital flows and increasing capital mobility, while higher trade tariffs have the opposite effect, constituting a serious barrier to capital movement. These findings carry important implications for economic policymaking and underscore the necessity of adopting a balanced and forward-looking approach in the design of trade policies. In particular, given that attracting foreign direct investment is a key objective for many economies, the results suggest that the persistence of restrictive trade policies may pose a significant challenge to achieving this goal.

Overall, the present study provides robust empirical evidence emphasizing the simultaneous importance of foreign trade and capital mobility in the process of economic development. The findings indicate that trade policies influence not only the flow of goods and services but also, indirectly yet powerfully, the direction and magnitude of capital movements. Therefore, policymaking in the trade domain should take into account its long-term effects on capital mobility and economic growth. Based on the results, approaches that prioritize reducing trade barriers, enhancing transparency, and creating a stable and predictable environment for economic agents can play an effective role in attracting capital and strengthening the foundations of economic development.

In light of the findings showing that higher trade tariffs have a strong negative effect on capital mobility, while trade liberalization exerts a positive and significant influence on capital flows, it is recommended that economic policymakers adopt a targeted and gradual approach toward reducing tariff barriers and increasing trade openness to enhance the attractiveness of the economy for both domestic and foreign investors. Within this framework, the design of smart and time-bound tariffs, avoidance of

unpredictable trade policies, and alignment of trade policy with macroeconomic, monetary, and fiscal policies can help reduce uncertainty and prevent capital outflows. Furthermore, the results suggest that trade liberalization is most effective in promoting capital mobility when accompanied by improvements in institutional quality, regulatory stability, trade facilitation, and the strengthening of financial and banking infrastructure. Accordingly, trade policies should be implemented as part of a comprehensive package of structural reforms to ensure that their positive effects on capital inflows and long-term economic growth remain sustainable and reinforced.

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