



The Effect of Emigration on Foreign Trade: The Case of Afghanistan (2001-2019)

Hasan Rohani^a, Ahmad Googerdchian^{a,*} , Seyed Komail Tayebi^a 

a. Department of Economics, Faculty of Administrative Sciences and Economics, University of Isfahan, Isfahan, Iran.

* Corresponding author, E-mail: a.googerdchian@ase.ui.ac.ir

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Abstract

Immigration is one of the factors affecting macroeconomic variables, including foreign trade. Considering the large number of Afghan migrants throughout the world, this study sought to investigate the effect of Afghan migrants on the imports and exports of this country during 2001-2019, using the semiparametric augmented gravity model for the empirical purpose of the study. The results of the semiparametric estimation of the fixed effects model have indicated that the role of emigration on the volume of exports and imports of Afghanistan has a non-parametric effect. That is, on some levels of emigration, the increase in the number of immigrants abroad has increased trade and confirms the existence of a complementary relationship between labor migration and trade, contrary to the theory of Heckscher-Ohlin, but at other levels, the accumulation of immigrants has caused a decrease in the volume of Afghanistan's imports and exports. This result is consistent with Heckscher-Ohlin's theory. Of course, it can be due to the integration of immigrants in the host society and the disconnection with the destination countries, the difference in skills level and information of immigrants.

Keywords: Foreign Trade, Migration, Gravity Model, Semiparametric Model, Trade Policy.

JEL Classification: C14, C23, F10, F13, F22.

1. Introduction

Migration is a hot debate in the world economy and influences both the guest and host countries politically, socially, and economically. It is defined as the movement of an individual or a group across the political boundaries of a geographical unit to

another for permanent or temporary residency in a location other than the mother country and as a factor altering the status of the migrants (Kothari, 2002). Many theories such as neoclassical theory, human capital theory, new economic theory, world system theory and dual labor market theory, network theory, migration system theory, and transnational migration seek to explain the reasons for migration.

According to the report of the United Nations (2021), the world's migrant population equaled 271 million individuals in 2019, amounting to 3.5% of the world's population. Migration flows out of some specific bonds between the origin and destination countries, such as foreign trade and foreign direct investment (Castles and Miller, 2009). Migration has implications for both origin and destination countries. One of the important effects of migration on economic issues is its effect on the volume of trade between the origin and destination countries (Gould, 1994; Girma and Yu, 2002; Lewer and Berg, 2009; Chao and Yu, 2002; De Arcangelis et al. 2022). Migrants influence the volume of foreign trade between the origin and destination countries by reducing transaction costs (Gould, 1994), altering the labor force supply and labor force demand (Entzinger et al., 2004), changing labor force productivity (Ottaviano et al., 2018), providing information about host and origin countries (Murat and Pistiresi, 2009; Dunlevy, 2004), changing in consumer preferences (Gould, 1994; Tai, 2009; White, 2007), sending remittances (McKenzie and Sasin, 2007; Tung, 2018; Portes et al., 1989; Poot and Strutt, 2010; Hubler, 2016) and finally changing in foreign direct investment (Light and Rosenstein, 1998; Saxenian, 2002; Lucas, 1990; Van den Berg and Lewer, 2009; Aubry et al., 2012).

Afghanistan is one of the biggest migrant-sending countries in the world and was the world's tenth migrant-sending country in 2020 according to a report by the United Nations¹. However, migrants comprised 13% of this country's population in 2019, at which the migration statistics increased by 5.4% compared to the former period.

Concerning the large number of Afghan migrants in different countries of the world and the numerous ways they impact the trade volume, this paper evaluated the effect of migration on the foreign trade of Afghanistan with Afghan-receiving countries and its trading partners. Identifying the relationship between immigration and trade can help to determine the appropriate trade policies to exploit the capacity created by Afghan immigrants for the development of trade

¹. <https://worldmigrationreport.iom.int/wmr-2020-interactive/>

between Afghanistan and immigrant-receiving countries. A bulk of studies tackling the effect of migration on foreign trade are linked to migrant-receiving countries and have employed parametric methods, while there are few surveys on migrant-sending countries using the semiparametric method. Thus, among the innovations of this study, we can refer to its methodology and research location, which is a migrant-sending country. The study employed the semiparametric gravity model to investigate the effect of Afghan immigrants on the country's trade flows with its main trading partners during the 2001-2019 period. The following sections will include a discussion of theoretical foundations, a review of the literature, a specification of the research model, an analysis of empirical results, and a conclusion of the study.

2. Relationship between Migration and Foreign Trade

Although migration is not equally defined in international terms, it can be recognized as individuals' or groups' relocation from a place they reside to another in the country or other countries by crossing international boundaries for temporary or permanent residency¹. Depending on their levels of development, countries can experience both immigration and emigration. In the migration literature, a prevalent classification of migration divides migration into two forms of forced and voluntary migration. Individuals moving from one country to another as asylum seekers, refugees, and domestic displaced persons are considered forced migrants. However, others moving for various purposes, e.g., supplying the labor force, are heeded as voluntary migrants. The first group has no choice but to migrate due to facing struggles in their countries, while the second group migrates looking for their benefits (Hugo, 2008; Koppenberg, 2012; Zetter, 2015).

To perceive the reasons for migration, Kurekova (2011) classifies migration theories into domains of migration determiners and migration perpetuation according to the studies of prominent scholars, such as Massey et al. (1993) and Arango (2000). Based on this classification, the theories of neoclassical, human capital, new economics, world system, and dual labor market fall into the determinant factors of migration. In addition, Massey et al. (1993) explained that the geographical difference between labor force supply and demand, the difference in labor force return rate, risk management, and household decisions, the relationships between the capitalist society and neighboring countries, and the perpetual demand of the industrial society for migrant labor forces constituted

¹. <https://www.iom.int/who-is-a-migrant>

migration factors in the neoclassical, human capital, new economics, world system, and dual labor market theories, respectively.

The migration-trade relationship is debatable in two respects. The traditional perspective claims that the international transfer of goods and production factors can be replaced (Massey, 1993; Mundel, 1957). That is why one can suppose that trade liberalization can restrain migration (Lodefalk and Hatzigeorgiou, 2021) and vice versa when it comes to policymaking. This logic gave rise to the North American Free Trade Agreement (NAFTA) between America, Canada, and Mexico (Uchitelle, 2007).

However, the basic assumption of the neoclassical theory advocates concerning the migration-trade replacement cannot persist when some underlying model assumptions, such as the presence of unequal technologies, exist throughout the world. For this reason, we can assert that, unlike the conventional theories of migration and trade, new theories confirm a complementary relationship between them. These applied theories and models were initially developed and presented by Clerides et al. (1998), Bernard et al. (2003), and Melitz (2003). They generally explain that the concurrent growth of migration and trade refers to a direct relationship between these two economic behaviors (Van den Berg and Lewer, 2009). There is a bulk of evidence revealing that migration positively impacts the surge of trade between the origin and destination countries of migrants. Accordingly, Mundel (1957) employed Heckscher-Ohlin's standard trade model to show that the mobility of both production and trade factors complement each other (Markusen, 1983; Schiff, 2006).

Regarding the relationships between migration and trade, we can generally state that migration influences the trade flow through different channels, as we discuss in the following.

Information path: Migrants can provide the origin country with information related to the job opportunities and official and commercial environments of the host country (Murat and Pistiresi, 2009). Migrants are more privileged in knowledge acquisition due to their familiarity with the economies of different countries and societies. Thus, trading becomes possible due to the product or cost differences between the host and origin countries (Dunlevy, 2004). In other words, a common barrier to trade is having no or incomplete knowledge of trade opportunities. However, migrants have the advantage of being able to connect themselves to trade systems and find customers or suppliers in the host country (Gould, 1994). Gould (1994) argues that less information about the host country before the migration enhances the commercial effect of migration. The

informational impact implies that those migrants should increase exports and imports (Wagner et al., 2002).

Consumer preferences path: Some researchers believe that migrants prefer to consume the products of their own country (Gould, 1994) and call it the effect of the preference. Nonetheless, not all migrants enjoy these preferences, while only some demand the domestic products of the origin country. Tai (2009) expects that migrants' orientations toward demanding the products of their own country, as White (2007) named the *transplanted home bias*, transfer to the other individuals in the host country and raise the total importation (*preferences effect*). In addition, it is implicitly assumed that preferences may transfer from the host to the origin country and enhance the exportation of the host country to migrants' origin countries. On the whole, we can conclude that the effect of the preference can increase bilateral imports between the origin and destination countries of migrants.

The Effect of Transaction Cost: There are mechanisms through which migrants can reduce bilateral transaction costs of trade if they possess adequate knowledge of the origin country. The first is the person-specific mechanism in which the bilateral transaction costs of trade decline due to the commercial relationships or personal contacts of migrants. Regardless of which country migrants come from, migration always decreases bilateral transaction costs of trade in this mechanism. In the second non-specific mechanism, bilateral trade costs decrease due to the extra knowledge of migrants about foreign markets and different social institutions. According to this mechanism, whether migration reduces the bilateral transaction costs of trade or not relies on which countries migrants come from. If they are from countries with identical social and political institutions to the host country, they will be less effective in decreasing bilateral transaction costs of trade (Girma and Yu, 2002). Put differently, it is assumed that migration impacts trade with those origin countries that lack formal procedures for contract conclusion and are usually developing countries. Gould (1994) believes that inadequate information in the host country before migration makes the commercial effect of migration bolder.

In addition, another common assumption is that migrants reduce the fixed trade costs so that new trades are stimulated. It is expected that migrants decrease the fixed costs at the outset of trading a new product internationally, along with the variable costs of its trade (Hiller, 2013; Lodefalk and Hatzigeorgiou, 2019).

Remittances: Remittances are among trade-impacting migration channels. McKenzie and Sasin (2007) confirm that the effect of migration on trade cannot be separated from the impact of remittances and vice versa. Tung (2018) revealed that

input remittances negatively impacted the trade balance of the Asian and Oceania countries. Besides, it was illuminated that the per capita growth of the annual Gross Domestic Product (GDP) negatively impacted the trade balance, indicating that the income flourishing might give rise to the escalation of the exportation value, besides imbalances in countries' international trades. Furthermore, individuals migrating from developing countries often send remittances to their families and thus indirectly impact trade, investment, and technology diffusion (Portes et al., 1989; Poot and Strutt, 2010; Hubler, 2016).

Foreign direct investment (FDI): FDI is one of the channels through which migration can influence trade. However, the relationship between migration and FDI flows is complicated. Light & Rosenstein (1998) and Saxenian (2002) assert that entrepreneur migrant communities provoke numerous flows of international investments, while Lucas (1990) argues that capital always transfers to countries with large numbers of workers. Studies on migration and foreign direct investment often assume that this relationship is positive regardless of the investment incentive (Van den Berg and Lewer, 2009). Thus, migrants promote investment in the origin country and reduce information friction using their foreign relationships and knowledge. Migrants' transfer of international information concerning job opportunities in the origin country creates trade opportunities for exporters and investors. Since exporters build relationships with investors, this information leads to trade enhancement via investments in the origin country that increase products by accessing cheap production resources. In the meantime, the migration of skilled labor forces is associated with exportation and direct foreign investment more strongly than the total migration (Aubry et al., 2012).

Productivity: Given the employment of migrants with varying capacities in different sectors, it is possible to change productivity and enhance competition in migrant-receiving industries. Migrants may replace intermediate importation inputs whose production used to be outsourced by the companies. However, these inputs can be produced by emigrants inside the country. Hence, we can assert that emigrants influence productivity and exportation costs. Concerning the effect of emigrants on the exportation practices of companies, we can explain that emigrants may increase the flow of exportation to their origin countries in two ways: They may help with customizing and targeting services to the customers of their own countries, such that domestic companies can successfully penetrate the new market. On the other hand, emigrants assist with the expansion of the present market for companies by improving the already-presented services. Therefore,

they raise sales and the earning of income from that market, known as the intensive margins of trade (Ottaviano et al., 2018).

Migrants increase skill diversity across companies and thus positively impact their productivity (Kerr and Lincoln, 2010; Ortega and Peri, 2014; Peri et al., 2015; Ghosh et al., 2014). Just as outsourcing reduces the prime costs of companies, the employment of migrants in production processes can also decrease their costs (Grossman and Rossi-Hansberg, 2008).

Entrepreneurship: Today, entrepreneurship accompanies several concepts such as global competition, innovation, productivity, employment, economic development, and welfare. This relationship can also be established by migrant entrepreneurship. Some factors such as the development of information and communication tools, transportation facilitation, the world shrinking, people moving beyond national borders, and the desire to live in prosperity in different attitudes lead to immigrant entrepreneurship with integration. Migrant entrepreneurship was first studied in America and then in Europe, especially after World War II (Light, 1973). Since entrepreneurship stimulates the backward and forward linkages of the economy and offers new jobs to the market, entrepreneurs help promote the exportation trade of a country, which is a foremost economic development. They produce goods and services on large scales to attain enormous sums of foreign exchange resources through exports and prepare the necessary sources for the supply of imports (Dhaliwal, 2016).

Figure 1 summarizes what we already discussed the channels of migration that affect foreign trade.

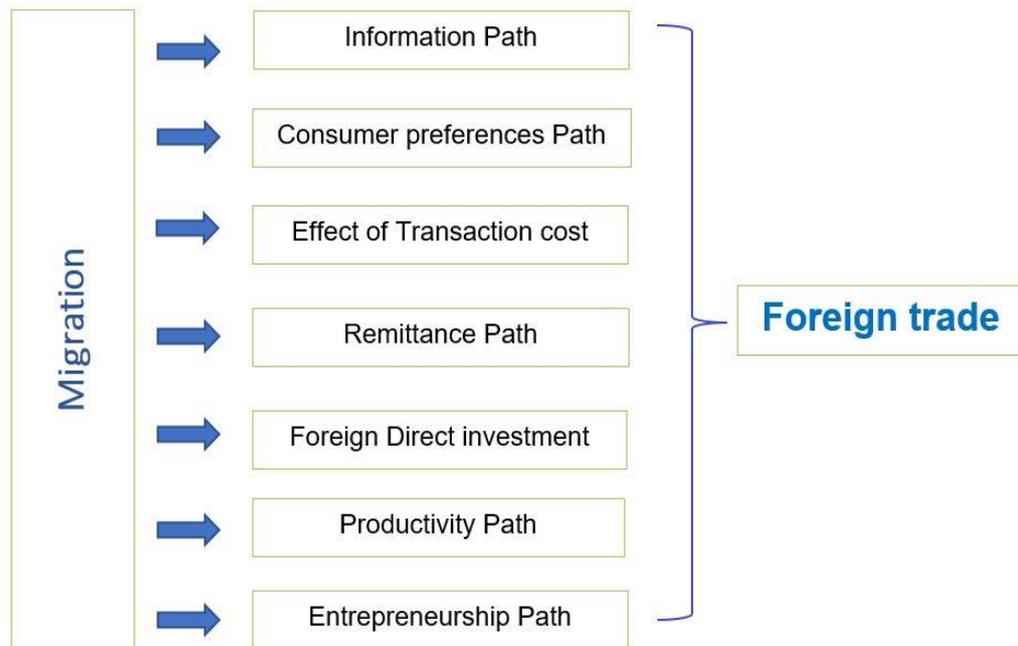


Figure 1. Effects of Migration Channels on Trade

Source: Research finding.

3. Literature Review

Hatzigeorgiou and Lodefalk (2021) investigated the literature on the relationship between migration and internationalization and examined the contribution of migrants to international trade, as well as transboundary and direct foreign investments. They conclude that although evidence shows migration facilitates trade and internationalization, the respective literature also reflects the existing gaps and fundamental inconsistencies.

Pellegrina and Sotelo (2021) investigated the relationships between migration, privatization, and trade in Brazil from 1950 to 2010. The results of their study showed that farmers migrated to regions with high employment rates, where they started working and earned more income than other migrants. Thus, the recession of migration costs noticeably enhances Brazil's contribution as a pioneer goods exporter.

Ma and Tang (2020) examined the migration-trade relationship inside China, considering 279 cities dominated by this country. The findings revealed that despite its negative impact on density and nominal wage, the flow of migrant workers elevated welfare in destination cities between the years 2000 and 2005

and provided neighboring cities with higher welfare achievements through inter-city trades.

Mihi- Ramirez et al. (2019) investigated the international mobility of capital and labor force in a paper entitled ‘The Interaction of Emigration and Immigration with Foreign Direct Investment, International Trade, and remittances’. Focusing on two periods, i.e., before (1998-2007) and after (2008-2016) the great depression, their study employed a Mixed Linear Model (MMA) to analyze the statistics of 112 countries having close migratory, commercial, and capital-transfer relationships with Spain. The results display that the numerousness of emigrants in Spain increased foreign direct investment, outward and inward remittances, and the country’s exportation to and importation from emigrants’ origin countries, while emigration from Spain was reversely correlated with foreign direct investment and outward remittances.

Steingress (2018) examined the effect of immigrants on US foreign trade using the exogenous effect of the resettlement of political refugees in different US states between 2008 and 2013 and found that immigrants by changing preferences and reducing transaction costs increase imports from their country of origin of migrants and increases exports to these countries.

In a paper titled ‘Determinants of Iran’s Emigration Flows: An Application of Dynamic Panel Data Approach, Renani et al. (2014) examined the reasons for the emigration of Iranians. This research applied confirmatory analysis to develop the quality-of-life index and explore its effect, besides economic and political indices, on the flow of emigration. The results revealed that institutional quality and political and institutional factors affected emigration from Iran. In addition, the presence of Iranian emigrants in the destination country is one of the reasons for the surge of emigration in those countries. However, the variable of distance has a negative effect on emigration from Iran.

Tayebi et al. (2012) investigated the effect of migration and brain drain on the economic growth of origin countries. Using panel data, this study probed 79 origin countries as senders of specialized emigrants and 6 destination countries during the 1991-2004 period. The investigation illuminated that brain drain slowed down the economic growth of these countries by reducing the accumulation of human capital in the countries of origin.

In general, the literature has confirmed the significant effect of migration on trade. In most of these studies, the effect of immigrants on the trade of host countries is considered a parametric relationship between foreign trade and migration, in which an econometric regression model has been specified and

estimated to show such a relationship. However, by reviewing the research done, it is clear that immigration can act as a substitute based on the model of Heckscher-Ohlin and cause an increase or decrease in trade against the direction of migration, or it can complement trade and with the increase in immigration, international trade will increase. So it is possible to explore a non-parametric relationship between migration and trade. In this research, an attempt has been made to fill this literature gap by examining the effect of emigration on the foreign trade of the immigrant-sending country using a semiparametric method.

4. The Model

Globalization and the mobility of production factors lead to many changes in the macroeconomic variables of countries. Heckscher-Ohlin's theory assumes that production factors exist inside the country and cannot transfer to other countries. However, the migration and globalization issues have resulted in numerous studies probing the effect of migration on the countries' volumes of foreign trade and the development of international trade theories. Migrants impact and—in other words—facilitate the flow of trade through information channels, consumer preferences, transaction costs, remittances, foreign investment, productivity, and entrepreneurship. One of these channels is the effect of migrants on the transaction cost and trade facilitation. In this respect, Gould (1994) employed Bergstrand's microeconomics model (1985), considering the gravity equation, and explained the effect of migration on trade parametrically while nonlinearly as below:

$$\log EX_{US,i} = \alpha_1 (M_{i,US} / (\alpha_2 + M_{i,US})) + \varepsilon_{ex} \quad (1)$$

$$\log IM_{i,US} = \beta_1 (M_{i,US} / (\beta_2 + M_{i,US})) + \varepsilon_{im} \quad (2)$$

In these equations, migrant stock (M) is considered a substitute for the transaction cost, and their effects on (EX/IM) trade are investigated. However, the decline of the transaction cost in trade is a channel by which migrants influence trade, and migrants differently impact the trade flow regarding the information levels they transfer to reduce transaction costs and the particular characteristics of trade partners. In addition, it is significant to use the migrant stock instead of migrant flow since migration impacts the transaction cost by not only the current migration flow but also the population of the past migrants. When entering their countries of origin, migrants bear new information that has probably not been shared by old and new migrants. For this reason, the migratory effect on trade, resulting from alterations in migrant accumulation, is probably bolder in countries that have already a large number of migrants than in countries with a small migrant population (Mundra, 2005). Mundel (1957) and Massey (1993) confirmed the

presence of a substitutive relationship between migration and trade based on Heckscher-Ohlin's model, while Markusen (1983) and Schiff (2006) approved the complementary relationship between migration and trade. It is noteworthy that these contradictory perspectives confirm the different effects of migration on trade flows. Mundra (2005) investigated the nonlinear relationship between migration and trade. On the other hand, a misspecification of a functional form of an empirical model for migration may lead to estimation bias. Thus, it can be appropriate to use non-parametric models, as one solution to this problem, that does not have functional form constraints. Such models are employed when no distinct relationship is already determined between the dependent and independent variables. Therefore, if the relationship of the independent variables with the dependent variable is specified and determined in a model, and if the relationship of an explanatory variable with the independent variable is unspecified, semiparametric regression is applied (REF?). As defined previously, Equations 1 and 2 explain the nonlinear relationship between migration and trade flows, while this relationship lacks a specific functional form due to the varying impacts of migrants on trade. Therefore, to investigate the effect of migration on Afghanistan's foreign trade, we have employed a semiparametric regression, wherein the variables of the gravity model are parametrical, and migrant accumulation is considered a nonparametric variable. Mundra's (2005) model was used for specifying the semiparametric gravity model of trade as below:

$$\ln Y_{ijt} = \alpha_i + \forall \ln Y_{ijt-1} + \beta_1 \ln GDP_{PER}_{it} + \beta_2 \ln GDP_{PER}_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln DIST_{ijt} + \beta_6 \ln OE_{XR}_{ijt} + \beta_7 ECO + \beta_8 COMBORDER + m(Z_{it}) + U_{ijt} \quad (3)$$

where $\ln Y_{ijt}$ is the logarithm of the trade flow from country i to country j , estimated in two separate equations (export and import), and $\ln Y_{ijt-1}$ is the logarithm of the trade lag and includes lagging exportation and importation, leading to the method of the panel model and adjusting the trade-related costs. Such adjusting costs may arise in trade transactions owing to Ladder contracts, which impede the immediate reaction of trade partners to technology shocks and trade costs (Baltagi et al., 2014). Emikonel (2022) shows that partial adjustment is made to the trade about its long-run equilibrium value. $\ln GDP_{PER}_{it}$ is the logarithm of GDP per capita of Afghanistan, $\ln GDP_{PER}_{jt}$ is the logarithm of GDP per capita of the destination country (selected trade partners), $\ln POP_i$ is the logarithm of Afghanistan population, $\ln POP_j$ is the logarithm depicting the population of the destination country (selected trade partners), $\ln DIST_{ijt}$ is the logarithm of the

distance between the capital of country i with country j (the distance of Kabul with trade partners), $LnOEXR_{ijt}$ is the logarithm of the official exchange rate between countries i and j , ECO is the dummy variable of membership in ECO (Economic Cooperation Organization), COMBODER is the dummy variable of sharing a border with Afghanistan, and $m(Z_{it})$ is the nonparametric variable of migration. It is worth noting that i and j represent Afghanistan and its trade partners in this equation, respectively.

For model estimation, we have used data from Afghanistan's 27 trading partners that simultaneously have had bilateral trade relations with the country, as well as Afghani emigrants residing in these countries in the 2001-2019 period. The data related to the bilateral trade, GDP per capita, population, exchange rate, the distance between Kabul and the capitals of partner countries, and migration were extracted from the COMTRADE¹ database, World Bank², the distance between countries site³, population database of the United Nations⁴.

The gravity model is widely used in international trade to explain bilateral trade flows and has been very successful in empirical analysis. The gravity equation is based on the fact that the volume of trade between two countries is directly related to the gross national product (GNP) or gross domestic product (GDP) of the two countries and inversely related to the geographical distance between them. Tinbergen (1962) and Poyhonen (1963) are the pioneering studies of the gravity model. Anderson (1979) and Deardorff (1998) consider that the gravity equation can explain international trade (Leitao and Tripathi, 2013). Tinbergen's theoretical foundation of this model was improved by Anderson (1979), Bergstrand (1989), Brocker (1989), Deardorff (1998) and Linnemann (1966), and Rasoulinezhad and Kang (2016).

The gravity model has been used in many studies in a parametric way, but few studies have been done in a non-parametric way. Due to the non-parametric nature of the migration variable, a semiparametric gravity model has been used to estimate the data. Robinson's method is used for estimating the semiparametric model. According to this method, the partial linear semiparametric model is defined as below:

$$Y = x'\beta + m(z) + u \quad (4)$$

where $u = y - E[y|x,z]$ and refers to the following relation:

1. www.comtrade.un.org

2. <https://data.worldbank.org/indicator>

3. <https://www.distance-between-countries.com>

4. <https://www.un.org/en/development/desa/population/migration/data>

$$E[y|z] = E[x|z]'\beta + m(z) \quad (5)$$

Since $E[u|x,z]=0$ implies $E[u|z]=0$, we obtain the below equation by subtracting the above equations from each other:

$$Y - E[y|z] = (x - E[x|z])'\beta + u \quad (6)$$

The conditional moments of the equation above are unknown but can be replaced with nonparametric regressions. Thus, Robinson introduced the Ordinary Least Squares (OLS) regression estimation:

$$y_i - \hat{m}_{yi} = (x_i - \hat{m}_{xi})'\beta + v \quad (7)$$

where \hat{m}_{yi} and \hat{m}_{xi} are predictions from nonparametric regression of, respectively, y_i and x_i over z_i . Given independence over i , the OLS estimator of β in the above equation is \sqrt{N} consistent and asymptotically normal with:

$$\sqrt{N}(\hat{\beta}_{pl} - \beta) \xrightarrow{d} N[0, \sigma^2(\text{plim} \frac{1}{N} \sum_{i=1}^N (x_i - E[x_i|z_i])(x_i - E[x_i|z_i])')^{-1}] \quad (8)$$

We assume that u_i reflects iid[0, σ^2]. For the estimation of $V[\hat{\beta}_{pl}]$, $(x_i - E[x_i|z_i])$ is replaced with $(x_i - \hat{m}_{xi})$. Since the $m(z) = E[y|z] - E[x|z]'\beta$ equation is established, it can be constantly estimated by the $\hat{m}(z) = \hat{m}_{yi} - \hat{m}_{xi}'\hat{\beta}$ expression. Various nonparametric estimators of \hat{m}_{yi} and \hat{m}_{xi} can be applied. Concerning Robinson's model, this study employed the kernel smoothing function. The estimator of the kernel density was introduced by Rosenblatt (1956) in the form of the below equation, wherein the $k(\cdot)$ weight function is called the kernel function.

$$\hat{f}(x_0) = \frac{1}{Nh} \sum_{i=1}^N \frac{(x_i - x_0)}{h} \quad (9)$$

where h is the smoothing parameter called the bandwidth, and $2h$ is the window width. Density is estimated by the $\hat{f}(x_0)$ evaluation in a range wider than the values used for histogram drawing, i.e., x_0 . Evaluation is usually made in samples of x_1, x_2, \dots, x_n , leading to the attainment of a density estimation smoother than that of the histogram. Although there are various kernel functions such as the Triangle kernel, Fourth-order Gaussian kernel, Gaussian Kernel, Epanechnikov Kernel, Uniform Kernel, and Tricoboc Kernel, the present study employed the Epanechnikov Kernel for its purpose.

5. Empirical Results

In this section we investigate empirically the effect of Afghan migrants on the exports and imports volumes of this country with its trading partners. To this purpose, two semiparametric augmented gravity equations specified in the previous section were estimated by the Stata. Robinson's (1988) estimator and the

Epanechnikov Kernel were used for estimation and smoothing, respectively. Tables 1 and 2 report the estimated values of the imports and exports gravity models, respectively. Figures 1 and 2 indicate the nonparametric relationships between imports, exports, and Afghan emigrants, respectively.

Table 1. Parametric Estimation for Afghan Imports Gravity Model

Parametric Estimation for Gravity Model			
Variable	Coefficient	t-Statistic	P> t
lnimp1	0.735	25.14	0.000
lnpopi	-0.066	-2.41	0.016
lnpopj	0.018	6.19	0.000
lndisij	-0.017	-3.72	0.000
lnoexrij	0.006	3.00	0.003
comborder	0.066	2.91	0.004
eco	0.02	1.96	0.050
lngdpperi	0.016	0.82	0.411
lngdpperj	0.036	5.49	0.000

Source: Research finding.

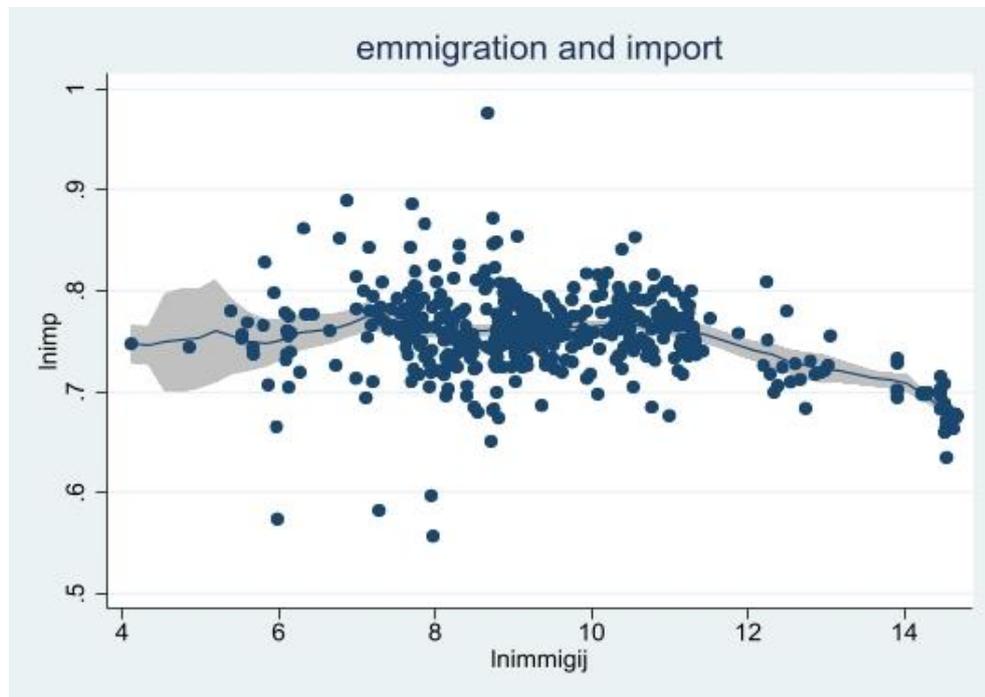


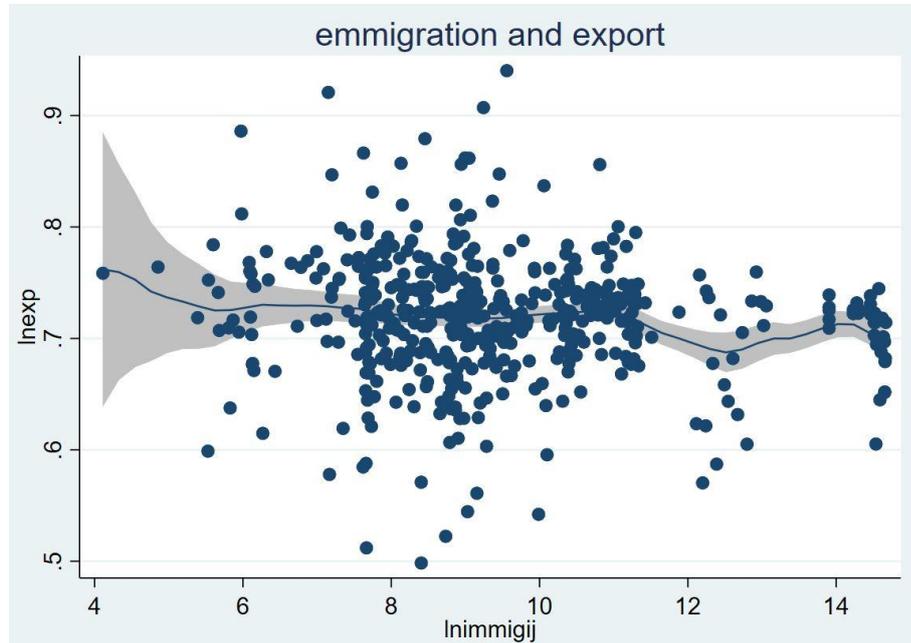
Figure1. Nonparametric Relationship between Afghan Imports and Emigration

Source: Research finding.

Table 2. Parametric Estimation for Afghan Exports Gravity Model

Parametric Estimation for Gravity Model			
Variable	Coefficient	t-Statistic	P> t
lnexp1	0.698	21.77	0.000
lnpopi	-.053	-1.35	0.179
lnpopj	0.018	4.66	0.000
Indisij	-.025	-3.92	0.000
Inoexrij	0.002	0.90	0.368
comborder	0.000	0.03	0.979
eco	0.019	1.27	0.204
lngdpperi	0.049	1.73	0.084
lngdpperj	0.028	3.13	0.002

Source: Research finding.

**Figure 2.** Nonparametric Relationship between Afghan Exports and Emigration

Source: Research finding.

Considering the results of the parametric estimations in Tables 1 and 2, most findings are in line with the theoretical foundations and the results of studies conducted by Baltagi et al. (2014) and Emikonel (2022). The population of Afghanistan has a negative and significant effect on its volume of importation from other countries. According to the latest report of the World Bank in 2020, almost

74% of Afghanistan's population resides in rural regions. Concerning the low level of development, the dominance of the rural economy, and the spread of poverty in Afghanistan, we can argue that population growth in this country reduces import flows of the country with its selected trading partners, which the finding is consistent with the findings of the Mundra's (2003) study. The populations of the trading partners of Afghanistan also have a positive and significant effect on its imports from and exports to these countries. Since a country's population reflects the market potential and economics of scale, we can assert that the increasing size of the market of Afghanistan's trade partners encourages exports to and imports from these countries. Based on the theoretical foundations, the geographical distance between the two countries variable, representing trade transportation costs, negatively and significantly impacts the exportation and importation volumes of Afghanistan. This result corresponds with the findings of a study carried out by Abafita and Tadesse (2021). The exchange rate variable has a positive and significant effect on the volume of imports, implying that the imports of Afghanistan also increase when its exchange rate goes up. The reason for this contradiction perhaps lies in the way the exchange rate is determined in this country. The exchange rate in Afghanistan is controlled in a managed way by the Central Bank and the use of foreign aid comprises almost 50% of the budget and 12% of the GDP of Afghanistan annually and makes the country's monetary value stronger than the economic realities; another reason for the extensive trade deficit of this country during the examined period. The contiguity (joint boundary) variable has also a positive and significant impact on imports, implicating that it reduces trade costs while increasing import flows. ECO membership is directly and significantly related to exports and increases the country's imports from the selected partners. International trade unions and economic organizations are developed to facilitate inter-country trading. Therefore, results suggest that the enrolment of Afghanistan in ECO raises the importation of this country from the member countries. The per capita income variable of Afghanistan only influences its exports positively and significantly, implying that the exports of this country go up with the rise of its per capita income. The variable associated with the per capita income of the trading partners is positively and significantly related to the values of exports and imports. Additionally, imports from and exports to these countries increment with an increase in the per capita income of these countries. This relationship means that the rise of per capita income augments economies and raises trade values.

Concerning the nonparametric part of the model, the semiparametric regression of the fixed effects of the imports and exports equations was implemented by Robinson's estimator and the Epanechnikov Kernel smoother, and the results were presented in Figures 1 and 2, reflecting the effect of Afghan emigration on the exports and imports of this country, respectively. The findings indicate that Afghan migrants leave different impacts on import and export values, such that at some migratory levels, the upsurge in the number of Afghan emigrants leads to trade enhancement and affirms the presence of a complementary relationship between migration and trade in contrast with Heckscher-Ohlin's theory. By introducing the products of the origin country to the host society and vice versa, Afghan emigrants reduce trade costs and elevate Afghanistan's exportation to and importation from these countries due to their familiarity with the markets of the origin and destination countries. This outcome is congruent with the findings of the studies by Markusen et al. (1995), Martin (2001), and Mitchel and Pain (2003). However, the increased number of emigrants decreases the values of imports and exports of Afghanistan at other levels of migrant accumulation. Among the reasons for this reduction, we can refer to the integration of migrants with the host society, their disconnection from their origin country, and the differences in their skill and information levels. In this case, according to Heckscher-Ohlin's theory, a substitutive relationship between migration and trade is established, and many emigrants reduce Afghanistan's trade volume. This result is consistent with the results of Bruder (2004). Furthermore, Hijzen and Wright (2010) illuminated that the migration-trade relationship could be either substitutive or complementary to the skill level of migrants.

6. Conclusion and Suggestions

The present study investigates the relationship between migration and foreign trade in Afghanistan from 2001 to 2019. For this purpose, data estimation was conducted using a semiparametric gravity model. The literature tackling the relationship between migration and foreign trade vividly reflects a substitutive or complementary relationship between these two variables. Several studies have investigated and confirmed the relationship between migration and trade in migrant-receiving countries. Thus, replicating such studies for migrant-sending countries such as Afghanistan, with numerous emigrants from different countries worldwide, can help employ their potential to reinforce foreign trade. However, since few studies have attended this area in the semiparametric debate despite its applied merits, the present research could confirm the presence of a semiparametric

relationship between migration and foreign trade. The effect of Afghan immigrants has an impact on the trade volume of this country with the countries receiving immigrants in both export and import sectors according to the obtained results.

The values of trade with some partners of Afghanistan increased at the confidence level of 95% when the number of Afghan emigrants was large in these countries, affirming a complementary relationship between migration and trade. The existence of a complementary relationship confirms this fact that with the increase of immigrants, better and more information is provided to the markets for both host and guest countries, which reduces the transaction costs, and as a result, the volume of trade increases in the same direction as the number of immigrants.

However, other parts of Figures 1 and 2, demonstrated that the volume of trade with some other partners of Afghanistan decreased, confirming Heckscher-Ohlin's result and the presence of a substitutive relationship between trade and migration. This outcome could be due to the successful integration of the emigrants in the host country and the fading ties between migrants and their country of origin. Since Afghanistan is faced with an abundance of labor and according to the theorem of Heckscher-Ohlin, the confirmation of the substitution relationship between Afghan immigrants and the trade volume of the countries receiving these immigrants means that these countries are similar in the production of labor-intensive goods and with the increase in immigration, the trade of these goods has decreased, so it is recommended to be careful in the commercial policy towards these countries, to adopt the appropriate comparative advantage and plan for its products due to the presence of immigrants in these countries. In general, it can be concluded that when formulating trade policy, the effect of immigrants on trade should be taken into consideration and that this potential is used to strengthen trade between Afghanistan and the immigrant-receiving countries.

Investigating the effect of immigrants on trade with more detail in final goods, intermediaries, and raw materials and also, the separation of immigrants based on skills can provide more accurate and practical results. Unfortunately, this information was not available for Afghanistan at the time of the investigation, but it can be one of the research options for researchers in large immigrant-receiving countries such as Iran and Pakistan. Finally, a policy toward opening the economy would be helpful to reduce Afghan emigrants, who seek employment abroad.

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