www.gi.sanu.ac.rs, www.doiserbia.nb.rs
J. Geogr. Inst. Cvijic. 2024, 74(1), pp. 63–76

Original scientific paper

UDC: 911.3:314.7(597)
https://doi.org/10.2298/IJGI2401063H

Received: February 19, 2024
Reviewed: March 21, 2024
Accepted: March 26, 2024

EXPLAINING GEOGRAPHIC, SOCIAL, AND ECONOMIC DIFFERENCES AS DRIVERS OF INTERNAL MIGRATIONS IN VIET NAM: EMPIRICAL FINDINGS FROM PUSH AND PULL FORCES ANALYSIS

Huynh Truong Huy[1], Walter Nonneman[2], Nguyen Phu Son[1]*

[1]Can Tho University, School of Economics, Can Tho City, Viet Nam; e-mails: hthuy@ctu.edu.vn; npson@ctu.edu.vn
[2]University of Antwerp, Faculty of Economics and Business, Antwerp, Belgium; e-mail: walter.nonneman@ua.ac.be

Abstract: Viet Nam has deeply experienced internal migration during its development history, typically movements from rural to urban and across regions since the launch of economic reform policy in 1986. This article adopts the cost-minimization approach to calculate the push and pull forces of the internal migrations across geographic distances of provinces and then explains those forces along with socio-economic factors within 63 provinces and cities in Viet Nam based on the census data during the period 2010–2019. The empirical findings from the solution to cost-migration equations between the number of migrants and the inverse distance across 63 provinces reported that the push and pull forces are quite heteroskedastic, mostly due to differences in geographic, social, and economic development. Not surprisingly, the Mekong River Delta (MRD) is still the most repulsive region for migrants, accounting for 30% of the total number migrants of the country and notable 98% of migrants who moved to the Southeastern (SE) region as the most attractive destination. It is obviously proven that the push and pull forces of migrations in a province correlate strongly and significantly with economic factors including relative incomes and poverty rate rather than human factors such as urbanization, population, and labor forces. Finally, discussions about policy implications of equitable investments across regions in Viet Nam are really necessary and could be a potential for creating job opportunities and improving standards of livelihoods.

Keywords: push forces; pull forces; internal migration; geographic distance; Viet Nam

1. Introduction

In the last month of 2021, the International Organization for Migration (2021) released the World Migration Report 2022 providing a global circumstance of migration flows. In the sense, the number of internally displaced people, often called internal migrants, has remarkably increased over the recent decade. There were 55 million people who lived in a province or city other than their place of birth in 2022, compared with 21 million of people in 2010. The average growth rate of this flow of

*Corresponding author, e-mail: hthuy@ctu.edu.vn

migrants was 8.4% per year during the last 12 years, which is a doubled percentage in comparison with the rate of 4.1% for the international movement of people. In the history of migration theory, this pattern of migration is fairly consistent with the conclusion drawn by some of world-known theorists of migration such as Ravenstein (1889), Lee (1966), and Todaro and Smith (2020). In addition, most of the developing countries are basically characterized with the shift of economic structure out of agriculture, disparities of social and economic development among regions, and between rural and urban areas. In that sense, it is widely accepted that most migrants tends to move in short distance or across regions within the country as a rationale choice rather than movements across borders, due partly to costs of social and physical concerns and cultural gaps.

In the empirical studies of internal migrations during two recent decades, researchers attempted to examine factors driving or restricting people to move (Bell et al., 2015; Bhagat, 2011; Chan, 2013; Molloy et al., 2011; Piras, 2017). More specifically, these factors are commonly classified into two groups, namely push and pull factors (Lee, 1966). Push factors are normally characterized with disadvantaged circumstances of economic, social, and environmental features in origins. In contrast, pull factors often imply better conditions of employment, income, and lifestyle in destinations. However, a gap of these existent studies has not yet estimated the push and pull forces of each location within the country, which are probably seen as representative and comparative indicators for the migration pattern among locations considering that locations (i.e., provinces, regions) differ widely in the volume of migration flows and other denoted economic, social, and spatial features (Bell et al., 2015). Therefore, an explanation of the push and pull forces basing upon the estimated coefficients over locations would fail and, as a result, the comparative analysis of migration streams, for example net migration rates, among locations is not really relevant.

Similar to other developing countries in Southeastern of Asia, Viet Nam also has long experienced the internal migration along with its adjustment periods of economic structure. According to statistical data of migration from the Viet Nam' General Statistics Office (VNGSO) Portal (VNGSO Portal, n.d.), the number of internal migrants in Viet Nam increased steadily over the period 1989–2009, but decreased in the decade thereafter. More specifically, interprovincial migration increased rapidly from 1.3 million in 1989 to 2.0 million in 1999 and reached 3.4 million, accounted for 3.96% of the population in 2009. However, this figure was just recorded as 2.83 million or 2.94% of the total population in 2019. In the recent decade, the internal migration in Viet Nam has caused the creation of burgeoning cities in the Southeastern (SE) region, but a shortage of labor force in other regions like Mekong River Delta (MRD) or Central Coast (CC). This induces challenging development policies to both places of origin and destinations. To have more updated and sufficient information about internal migrations, particularly about interprovincial migration, the VNGSO have incorporated the information about annual flows of interprovincial migrations from places of origin and destinations into its population census since 2009 and onwards.

Empirical studies of internal migrations in Viet Nam have just begun since the late 1990s. Some authors (Anh, 1999; Guest, 1998) attempted to examine the nature and patterns of labor migration, regarding the Government's movement of population distribution to rural areas, low populated density areas after the introduction of the economic reforms launched in 1986. Thereafter, a few of empirical studies (Coxhead et al., 2019; Kim Anh et al., 2012; Nguyen-Hoang & McPeak, 2010) attempted to adopt the neo-classical economic theoretical models introduced by John (1970) for estimating flows of internal migration in associating with social, economic, and demographic variables over the places of origin and destinations during the

periods 1989–2009 and 2002–2012. These stages are known as the decades of impressive economic transformation of the country, characterized with the fast development of industrialization and urbanization in some provinces of the SE region and the CC. In the recent 10 years, some empirical studies of internal migrations in Viet Nam have been much focused on analyzing migrations' effects on employment opportunities, income sources, and livelihoods in both the places of origin and destinations (Cuong & Linh, 2018; Haemmerli et al., 2021; Huy & Nonneman, 2016; Truc & Hung, 2020). Besides, a few of the most recent studies focused on the evaluation of environment-related issues in internal migrations (Berlemann & Tran, 2020; Evertsen & van der Geest, 2020).

As previously mentioned about the research gap in the existent studies of the internal migration, the central purpose of this article is to estimate push and pull forces of migration over 63 provinces and cities in Viet Nam in the period 2010–2019. Further, these forces are treated as two core indicators—one representing the total repelling power of a particular origin and another denoting the total attracting power of a specific destination. These indicators will be used to compare and explain the relation to socio-economic factors across 63 provinces and cities in Viet Nam.

2. Theoretical approach of push and pull forces

2.1. Cost-minimization of migrations in a closed network

In this article, the mathematical model of the push and pull forces proposed by Dorigo and Tobler (1983) in measuring the total push (R_i) and the total pull (E_j) forces of both the places of origin and destinations that drive and attract people to migrate was adopted. Then, the number of migrants within the pairs of locations would be directly estimated by a sum of these two indicators and be proportionally inversed to the distances. It may be written in a general form as follow (Dorigo & Tobler, 1983):

$$M_{ij} = \frac{R_i + E_j}{d_{ij}};\ i \neq j \tag{1}$$

in which M_{ij} is the number of migrants moving from location i to location j during some period of time; R_i is standing for "rejection" or "repulsion", or the "push" forces driving people to move away from the location i; E_i is standing for "enticing" or "attracting", or the "pull" forces pulling people into location j; and d_{ij} is the distance between both locations, measured in some appropriate units, be it physical (kilometers, border length, travel costs, travel time) or social distance.

From Equation 1, it may be inferred that the number of migrants between both locations within a country can be easily forecasted by the resultant sum of the two forces, labeled as "push, R_i" and "pull, E_j", and discounted for distance, d_{ij}. In practice, the number of migrants moving intralocation—self-migration, M_{ij}—seems not to be recorded. As a result, the number of independent equations in the system (Equation 1) will definitely equal to $n*(n–1)$; of which, n denotes the number of locations in the country.

The number of migrants, M_{ii}, in a network of locations, having to overcome deterrent factor, d_{ij}, to go from place of origin i to destination j at minimal effort, is comparable to the minimum loss distribution of people in a network, when costs of distribution are linear in the flow volumes, so that the Equation 1 above will be estimated as a quadratic objective function with the minimized solution as follows (Dorigo & Tobler, 1983):

$$\text{Minimize: } \sum_{i=1}^{n}\sum_{i=j}^{n} M_{ij}^{2}.d_{ij} \tag{2.1}$$

$$\text{subject to: } \sum_{j=1}^{n} M_{ij} = O_i \tag{2.2}$$

$$\text{and } \sum_{i=1}^{n} M_{ij} = I_j \tag{2.3}$$

The system of Equations 2 with additional requirement, $M_{ij} \geq 0$, may be solved by the solution of a quadratic programing problem with linear constraints. As a result, the total push (R_i) and the total pull (E_j) forces are proportional to the Lagrange multipliers corresponding to Equation 2.2 and Equation 2.3, respectively. More specifically, R_i is the effect on the minimum loss if the outflow at the place of origin increases by one unit (the push effect) and E_j is the effect on the minimum loss if the inflow at a destination increases by one unit (the pull effect).

Since the number of interprovincial migrants between locations takes place in a closed network, the total of these numbers of emigration and immigration should also be balanced within the country. This is presented in Equation 3 below (Dorigo & Tobler, 1983).

$$\sum_{i=1}^{n} O_i = \sum_{j=1}^{n} I_j \tag{3}$$

2.2. Measurement of push and pull forces

Following Equation 1 above, the indicators of push (R_i) and pull (E_j) forces for both locations (i.e., the place of origin and the destination) may be calculated from the matrix of the total number of out-migrants (O) and in-migrants (I) of locations, and inversed to the distances between locations. In other words, summing Equation 1 over n locations, it yields the total number of out-migrants from location (O_i) and the total number of in-migrants in location (I_j) underlying Equation 4.1 and Equation 4.2, as follows (Dorigo & Tobler, 1983):

$$\sum_{j=1}^{n} M_{ij} = O_i = R_i \sum_{j=1}^{n} \frac{1}{d_{ij}} + \sum_{j=1}^{n} \frac{E_j}{d_{ij}} \tag{4.1}$$

$$\sum_{i=1}^{n} M_{ij} = I_j = \sum_{i=1}^{n} \frac{R_i}{d_{ij}} + E_j \sum_{i=1}^{n} \frac{1}{d_{ij}} \tag{4.2}$$

Both Equation 4.1 and Equation 4.2 will be incorporated into a system of 2**n* as the closed network, because the total number of out-migrants would equal the total number of in-migrants within the country, without the presence of self-migration or intralocation migration. Thus, there are 2*(n–1) independent equations and then we can calculate the indicator of a pull force for the last location (E_j) specifically (Dorigo & Tobler, 1983).

$$E_j = \left(I_j - \sum_{i=1}^{n} \frac{R_i}{d_{ij}} \right) \Big/ \sum_{i=1}^{n} \frac{1}{d_{ij}} \tag{4.3}$$

According to the estimation procedure, the full system of Equations 4.1 and 4.2 can be estimated by solving the following matrix (Equation 5).

$$\begin{bmatrix} U & V \\ V & U \end{bmatrix} \cdot \begin{bmatrix} R \\ E \end{bmatrix} = \begin{bmatrix} O \\ I \end{bmatrix} \tag{5}$$

in which U is an *n*-by-*n* diagonal matrix with zero off diagonal values, and V is an *n*-by-*n* matrix, where the elements of these two matrices, U and V, are given in Equation 6.

$$U_{ij} = \sum_{j=1}^{n} \frac{1}{d_{ij}} \qquad and \qquad V_{ij} = \frac{1}{d_{ij}} \tag{6}$$

Given the values of the total number of out-migrants and in-migrants for each location and the distance between locations, pull and push forces, R_i and E_j, can be obtained. This is achieved by solving the system of Equation 7.1 and Equation 7.2.

$$\sum_{j=1}^{n} M_{ij} = O_i = R_i \sum_{j=1}^{n} \frac{1}{d_{ij}} + \sum_{j=1}^{n} \frac{E_j}{d_{ij}} \tag{7.1}$$

$$\begin{bmatrix} R \\ E \end{bmatrix} = \begin{bmatrix} U & V \\ V & U \end{bmatrix}^{-1} \cdot \begin{bmatrix} O \\ I \end{bmatrix} \tag{7.2}$$

2.3. Disentangling push and pull forces

Based on the estimation of the matrix (Equation 7.1 and Equation 7.2) above, the pair of push and pull forces for each location will be obtained. If the push force is larger than the pull force ($R_i - E_i > 0$), then that location is seen as a dispersive area. Otherwise, if the pull force is larger than the push force, or $R_i - E_i > 0$, then that location is an attractive area.

In the light of economic theories of labor migration, the number of migrants is primarily explained by both an attraction and a dispersion of social and economic welfares between two locations (Kusumo et al., 2023). It reveals a form of the gravity model (Equation 8), as follows:

$$M_{ij} = k \cdot \frac{y_i^{\alpha} \cdot y_j^{\beta}}{d_{ij}^{\gamma}} \tag{8}$$

in which y_i and y_j are some indicators of welfares in location i and location j, d_{ij} is the geographic distance between locations, and expectedly estimated coefficients with $\alpha < 0$, $\beta > 0$.

In dealing with the possibility to explain the push and pull forces underlying indicators of welfares in both locations, we proceed to substitute Equation 1 into Equation 8. Finally, it yields the simplified Equation 9 here:

$$R_i - E_j = k \cdot y_i^{\alpha} \cdot y_j^{\beta} \quad (9)$$

Therefore, the advantage of an empirical application of this model is not only to calculate the attraction (pull force) or dispersion (push force) made from each location. It also involves simultaneously estimating factors used for further explanations about the push and pull forces in each location within a country.

3. Data and estimation specification

3.1. Data source

All variables used in this article are derived from the VNGSO portal (n.d.), which consists of the flows of migrants from the place of origin and to a destination, and socio-economic indicators over 63 provinces an cities (i,j = 63, i ≠ j) in Viet Nam. These variables are annually updated and may be downloaded from the VNGSO portal. It is currently viewed as an officially unique source for measuring the number of internal migrants in Viet Nam that identifies the number of Vietnamese who change their residences within Viet Nam each year. Interprovincial distances are measured by a road (spatial) distance (d_{ij}, in km) between both locations, or the place of origin (i) and a destination (j), and it is assumed that $d_{ij} = d_{ji}$. In practice, these distances are easily estimated by using the Google map application.

3.2. Estimating determinants of push and pull forces

Based on the values of push and pull forces obtained from the estimation of Equation 7.2 above, these two forces for each location can be interpreted with estimated coefficients from a basic specification of disentangling push and pull forces as follows:

$$R_{it}, E_{it} = f(\beta_1 Urb_{it}, \beta_2 Pop_{it}, \beta_3 Y^*_{it}, \beta_4 Lab_{it}, \beta_5 Pov_{it}, \beta_6 Ind_{it}, \varepsilon_{it}) ; i = 63, t = 10 \quad (10)$$

In Equation 10, R_{it} and E_{it} are push and pull forces in each province; abbreviated terms in the bracket are vectors of predictor variables respectively including urbanization rate (Urb, in %), population size (Pop, in million), relative ratio of the monthly average income (*Y*, smaller, equal, or larger than one), labor force (Lab, in %), poverty rate (Pov, in %), and industrial development index (Ind, in ratio), and ε_{it} is a stochastic disturbance.

According to the theoretical basis, it may be expected that $\beta_1 > 0$ responds to *R*, but negatively to E; $\beta_2 > 0$ responds to both *R* and *E*; $\beta_3 < 0$ responds to *R*, but positively to *E*; $\beta_4 > 0$ responds to *R*, but negatively to *E*; $\beta_5 > 0$ responds to *R*, but negatively to *E*; and $\beta_6 < 0$ responds to *R*, but $\beta_6 > 0$ responds to *E*.

As concerning measuring the panel data (i.e., the period 2010–2019), there is a variety of alternative techniques of estimation, often known such as Fixed Effects (FE), Random Effects (RE), and Pooled Ordinary Least Squares (POLS). The POLS model is just performed with a unique purpose of comparison among estimated coefficients, which does not consider whether the time-series feature is present in the analysis. According to Wooldridge (2010), FE method may be one of the appropriate tools, if the predictor variables do not vary much over time. On the other hand, RE method seems a more appropriate estimator for interpreting

coefficients in relation to an effect of time-series factor. To proceed a decision for selecting optimal estimator among FE and RE method, Hausman test is popularly known as the formal technique that performs with the assumption underlying a presence of endogeneity among explanatory variables, as following:

- H_0: the RE model is correct when it implies no correlation between the error term and the explanatory variables, Cov (β_{it}, X_{it}) = 0, and
- H_a: the FE model is appropriate when Cov (α_{it}, X_{it}) ≠ 0.

There are some further tests needed to be conducted after selecting the optimal model of estimation between RE and FE. First of all, if it is assumed that a FE model is consistent, a test for time-fixed effects may be done by controlling variables that are constant across entities, but vary over time. Regarding this test, the H_0 is that the coefficients for all years are jointly equal zero. In contrast, it concludes that the coefficients for all years are jointly different from zero. Secondly, assuming that the RE model is selected, a test for random effects (often known as Breusch-Pagan Lagrange Multiplier, LM test) helps to decide to choose either RE or POLS model. The LM test's null hypothesis is that the variance across entities equals zero, meaning no significant difference across units.

Given that locations usually differ from others relating to the scale of social and economic factors, the heteroskedasticity in ε_{it} is always a potential problem for the analysis (Wooldridge, 2010). In dealing with such a phenomenon of heteroskedasticity, LM test or White test must be performed with the null hypothesis being that the covariances are constant, or $E(e^2|X_1, X_2,..., X_k) = E(e^2) = \sigma^2$. If the null hypothesis is rejected, then using a Robust-standard error estimation will be more consistent.

4. Results and discussion

4.1. Stylized facts of internal migration

The statistical data of migration from the VNGSO reveal how internal migrations have changed over the last three decades. Specifically, the number of internal migrants aged five and older was steadily increased during two decades between 1989 and 2009, from 2.4 million in 1989 to 6.7 million in 2009, but then went down to 6.4 million in 2019. In relative terms, the migration rate rapidly rose from 4.5‰ in 1989 to 6.5‰ in 1999 and 8.5‰ in 2009, while this rate was only 7.3‰ in 2019. Considering the data series of internal migrations in the period 2010–2019, it shows a decline in the number of internal migrants, from nearly 850,000 migrants or 9.75‰ in 2010 to 613,000 migrants, or 6.35‰ after nearly 10 years.

It can be initially inferred that such a change of internal migrations could be linked to the implementation of the Government's intervention policies in boosting the socio-economic development, for example the agricultural restructure toward added-value increase and off-farm service development, national target program for building new-style rural areas, one village one product program, value chain based market linkage development, transportation development, etc. Therefore, these policies are partly expected to narrow economic gaps among regions, provinces, rural–urban areas, and thus reduce the number of internal migrants.

In regard to internal migrations, information depicted in Figure 1 reveals how the internal flows of migrants differ over 63 provinces and cities in Viet Nam for only 2010 and 2019 as a notable example. As for the number of out-migrants, there was a decline in their number per province, from over 30,000 persons in 2010 to around 25,000 persons in 2019. Out of all the 63 provinces, the MRD region (with 13 provinces) is still viewed as the most repelling area of people in moving in

Viet Nam, in which five provinces such as An Giang, Dong Thap, Kien Giang, Soc Trang, and Ca Mau were the top 10 largest provinces of sending out-migrants in 2019, while only three provinces (An Giang, Kien Giang, and Ca Mau) were in this list for the year of 2010.

As considering patterns of internal migrations (such as the number of migrants) categorized with the geographic aspect, the 2019 Viet Nam Population and Housing Census highlighted a contribution of urban–urban flows in the total number of internal migrants within Viet Nam, with the growth of up to 36.5% in 2019 from 26.4% in 2009. This is seen as the main pattern of internal migration in the recent decade, exceeding the remaining flows of migration such as: rural–urban (27.5%), rural–rural (26.4%), and urban–rural (9.6%; VNGSO, 2020).

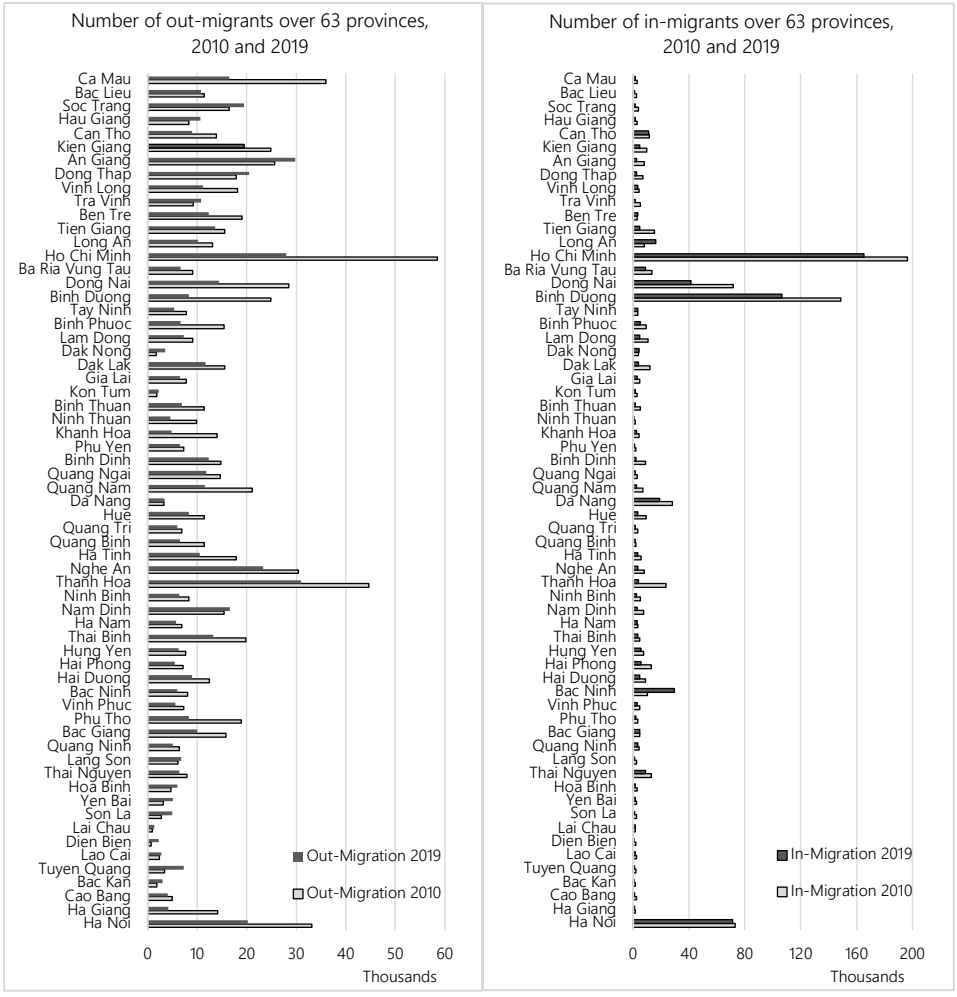

Figure 1. Interprovincial migration among 63 provinces and cities, 2010 and 2019.
Note: Data on the figure are adapted from *In-migration rate, out-migration rate and net-migration rate by province*, by VNGSO, n.d. (https://www.gso.gov.vn/en/px-web/?pxid=E0221-23&theme=Population%20and%20Employment). In the public domain.

On the right side of Figure 1 relating to information about the number of in-migrants over 63 provinces and cities in Viet Nam, it reveals that Ho Chi Minh Metropolitan, Binh Duong, Dong Nai Province, and Ha Noi City are the most attractive destinations which pulled nearly 50% of migrants from all regions of the whole country in 2010, and then still rose to 57%, or equivalent to about 352,000 persons in 2019. In each of these four provinces and cities, the number of in-migrants often account for over 10% of the total population, while this share did not to exceed 1% in other provinces and cities (Kim Anh et al., 2012).

4.2. Push and pull forces: descriptive analysis

A descriptive analysis of push and pull forces and some main variables in 63 provinces and cities in the period 2010–2019 is presented at Table 1. It has been proven that the pull forces among provinces are larger than the push forces, or 0.043 compared to 0.016 units. This average differential between two forces has a statistical significance at 0.01. In fact, the increase in the pull forces during the recent decade may be explained by the rapid development of the industrial sector in some provinces surrounding the SE region like Long An, Tien Giang, and Tay Ninh, and of the tourism sector in Quang Ninh, Da Nang, and Lam Dong province.

During the economic restructuring process since 1986, Viet Nam's development often has combined with the urbanization development, especially surrounding provinces to the large cities or metropolitan areas, like Ho Chi Minh, Ha Noi, Da Nang, and Can Tho. Table 1 shows that the urbanization rate is on average 27.4% of the total population. It increased steadily from 25.5% in 2010 to 28.9% after 10 years; among 63 provinces and cities, Da Nang, Ho Chi Minh, Binh Duong, and Can Tho reached a high urbanized rate at more than 70%, while this rate was lower than 20% for some of intensively agricultural or mountain provinces in the Red River Delta region (RRD) and North Central Coach region (NCC).

Concerning the monthly incomes for laborers over 63 areas, a typical laborer can earn on average $183 per month. These incomes also rose from $130 per month in 2010 to over $260 per month in 2019, corresponding to an annual growth rate of 8%. In dealing with the differential in location characteristics in explaining the difference in incomes across provinces, the ratio of the provincial income level and, inversely, at the national income level—relative incomes indicates that 54 out of 63 provinces had a lower level of incomes than the national level in 2019. This implies an imbalance of welfare across provinces, more specific laborers working in a majority of provinces/cities of the SE region gained a higher amount of incomes than the rate in other regions of the whole country.

Relating to the employment rate, the share of employed persons aged 15 and older in the total population, information from Table 1 also shows that this variable varies slightly during the data period with a range between 57 and 59%. In practice, it may be expected that an increase in the labor force would induce a higher pressure in seeking employment (on demand) and, of course, a proportion of the labor force is forced to leave out their home province to seek employment opportunity in other locations. The statistical result of the poverty situation over 63 provinces/cities expresses that the average rate of poverty has trended in significant decline from 16.7% in 2010 to 8.5% in 2019. In fact, a majority of provinces/cities had a rate of poverty less than 10%, excluding the provinces in Highlands region like Dak Nong and Gia Lai exceeding 10%, and some mountain provinces in the NCC region evenly exceeding 20%, like Dien Bien, Ha Giang, and Cao Bang. Finally, the calculation for the index of the industrial development shows a fact that this sector in Viet Nam gained a slow growth at around 10% to 12% per year during the decade.

Despite that, it contributed 34.5% of Gross Domestic Product and attracted 30.2% of the total labor force in 2019 (VNGSO Portal, 2020).

Table 1. Descriptive statistics on variables

Variables	Mean	Std. Dev	Min	Max
R (millions)	0.016	0.067	−0.206	0.418
E (millions)	0.043	0.123	−0.108	1.054
Urbanization rate (%)	27.4	17.0	9.7	87.3
Population (1,000 persons)	1,453.6	1,292.7	297.5	9,038.6
Monthly incomes (USD)	183.2	54.3	73.8	372.2
Relative incomes (ratio)	0.928	0.144	0.615	1.428
Employment rate (%)	58.4	3.7	47.3	71.3
Poverty rate (%)	12.6	10.5	0	53.9
Industrial development (ratio)	1.114	0.178	0.433	3.228

Note: Data in columns are calculated based on *In-migration rate, out-migration rate and net-migration rate by province*, by VNGSO, n.d. (https://www.gso.gov.vn/en/px-web/?pxid=E0221-23&theme=Population%20and%20Employment). In the public domain.

4.3. Push and pull forces: determinant analysis

In the procedure of estimating the panel-typed data, the estimated coefficients of the push and pull forces from the pooled OLS, FE, and RE model are at first employed by a simple regression analysis via *xtreg, fe,* and *re* command in Stata. The results show the *p*-values to be mostly less than .05, which implies a significant correlation between the dependent variables, the push and the pull forces, and the predictors included in the estimation. In other words, we have enough of empirical evidence on using these predictors for explaining the push and pull forces among provinces/cities. In the next step an appropriate model between FE and RE was selected by performing the Hausman test. The testing results support the hypothesis that the FE model is more appropriate than the RE one in explaining determinants of the push and pull forces with *p*-value less than .05.

Table 2 presents the estimated results for Equation 10 with the FE model that regresses the determinants of the push and pull forces among provinces and cities during the period 2010–2019. In general, the push and pull forces of provinces significantly depend on some socio-economic factors, and are consistent with theoretical predictions as discussed earlier.

Table 2. Regression results of the push and pull forces with fixed effects model

	Push model		Pull model	
Variables	Coef (β)	Std. Err	Coef (β)	Std.Err
Urbanization rate (%)	0.0026^{***}	0.0008	-0.0026^{***}	0.0009
Population (1,000 persons)	-0.0001^{***}	0.0000	-0.0001^{***}	0.0000
Relative incomes (ratio)	-0.0674^{**}	0.0335	0.0291^{NS}	0.0395
Employment rate (%)	0.0055^{***}	0.0013	-0.0045^{***}	0.0016
Poverty rate (%)	-0.0114^{**}	0.0054	0.0083^{NS}	0.0064
Industrial development (ratio)	-0.0178^{NS}	0.0112	-0.0051^{NS}	0.0132
Constant	-0.1311^{NS}	0.0861	0.5607^{***}	0.1010
R^2 within	.102		.136	
R^2 between	.344		.569	
R^2 overall	.166		.432	

Note. $*p < .1$, $**p < .05$, $***p < .01$, NS = non-significant.

Of those coefficients in Table 2, it has been empirically proven that an increased trend of urbanization in provinces would make stronger forces in pushing people to move, but the urban development decreases the attraction to migrants. In practice, the urbanization process in Viet Nam is highly concentrated on building new residences in suburban areas that results in a part of farmers to be forced to shift their employment into off-farm activity or to migrate.

The provinces with larger size of population are likely to become weakened by pushing or pulling people to or from other provinces, despite a very small, or zero, effect. Following given arguments by Todaro and Smith (2020), the urban development in a given location would gradually attract flows of in-migrants from other locations with less developed conditions. In other words, an increase in population due to flows of in-migration at a given location can drive increased demand of markets, including goods and services that induce employability for both local residents and migrants in different sectors in that location, although increase in the flows of in-migrants will lead to reduced wage rates in labor market. It is also evidenced that people tend to stay at or return to their places of origin when they face socio-economic shocks at destinations, and especially if the livelihood opportunities at their places of origin have improved (Nguyen et al., 2017).

As assumed earlier, most economic theories of migrations indicate that the income differences between regions or provinces may be a crucial driving force of migration. The results reveal how the relative incomes can influence the push and pull forces of migration for provinces—the higher the rate of relative income at the place of origin, the lower the push force. It may be explained that the more economic prosperity (i.e., higher rate of the relative income) of a province does not create strong incentives for local people to stay at their place of origin in which they can earn higher wages, but that it can also be a magnet for attracting people from other provinces (Ngoc et al., 2017; Nguyen, 2023).

Concerning the relationship between the push and pull forces and the labor force in provinces, the estimated results indicate that the increased number of labor force in a location can surely induce a larger pressure of competing for seeking employment in that location. However, this effect seems more complex in reality, because it probably depends on the circumstances of economic development among regions or provinces. For example, some provinces, such as Ho Chi Minh, Binh Duong, Dong Nai, Da Nang, and Lam Dong, are widely known as the most developed locations of industries and services in Viet Nam which certainly offer more jobs to local laborers. Opposite to less developed provinces, an increased number of labor force in those locations is a driver of moving out. The estimated results have aligned with the theoretical prediction related to the shift of labor during the stage of economic transformation, or development disparity among regions, as highlighted by Todaro (1970). The findings of this study are also consistent with the recent empirical finding by Nguyen et al. (2021).

Both theoretically and empirically, poverty and migration are closed related. Initially, poverty status is seen as a significant motive to migrate, and in turn, migration has effects on poverty dynamics. Estimated coefficient of the poverty rate in provinces indicates that the higher the rate of poverty, the weaker force of repulsion is. In fact, poverty status of people is often characterized with low incomes level and limited resources of assets, human capital, and social networks. Therefore, people living in poverty sometimes face a lot of constraints to migrate elsewhere, not only because of the costs of moving, but also because of social networks, cultural gaps, and family ties (Angelucci, 2015; Ho et al., 2022; Phan, 2012).

Finally, the estimated coefficient of the industrial index in provinces reveals the appropriate directions of the effect on push and pull forces, but not statistically significant at .05. This result may be explained by the imbalance of the industrialization development across regions and provinces in Viet Nam. As known, there is a rapid development of industrialization in some provinces of the SE region, such as Binh Duong, Dong Nai, and Long An.

In the next step of selecting the fixed effects method, it should be carefully tested for the presence of the heteroskedasticity in the analysis as proposed by Wooldridge (2010). The testing results for both push and pull models suggest to reject the null hypothesis as values of Prob > X^2 are close to zero. In other words, it is statistically significant to confirm the presence of heteroskedasticity in the estimation of both push and pull models. In reality, the occurrence of this phenomenon may be explained by a vast difference in pulling of migrants into Ho Chi Minh metropolitan, Binh Duong province, and Ha Noi or in pushing migrants from some provinces in the MRD region including An Giang and Kien Giang, and the NCC region including Nghe An and Thanh Hoa. In dealing with it, both push and pull models were re-estimated with the Robust standard error method. The result shows that all the coefficients are likely more efficient in explaining push and pull forces, particularly to the industry and poverty variable. Finally, a test for multicollinearity problem among predictor variables performed along with the regression estimation also supports the fact of independence and non-multicollinearity among the explanatory variables, when all Variance Inflation Factor values of these variables are smaller than two.

5. Conclusion

Internal migrations, particular according to interprovincial patterns, have always come with the process of the economic transformation and the regional inequalities of development in Viet Nam. This article described the number of migrants across 63 locations—provinces and cities in Viet Nam in the period 2010–2019 and then presented the calculated values of push and pull forces of migrations over 63 locations with the cost-minimization approach as introduced by Dorigo and Tobler (1983). According to the statistical description of the number of internal migrations in Viet Nam have reflected a diversified phenomenon aligning with socio-economic and geographical disparities. In the last decade, urban–urban and rural–urban movements of people have been increased among the patterns of internal migrations in Viet Nam. It is also not surprising that the MRD region still stands at the top position as the place of origin of the most of internal migrants. Meanwhile, some large cities in the SE region of Viet Nam, including Ho Chi Minh, Binh Duong, and Dong Nai have become the prominent destinations for the majority of Vietnamese migrants during many decades, because of their impressive growth of economic perspectives and improved standards of living.

Based on the result of the Hausman test for choosing an appropriate estimation between FE and RE model for interpreting determinants of push and pull forces over 63 locations, the FE model was selected. The estimated results indicated that push and pull forces are significantly driven by a range of social and economic factors. Two of these factors, relative incomes and poverty rate, indeed serve as significant drivers of push and pull forces of migrations between locations, rather than population size, labor force, and industrial development.

Despite the application of push and pull forces model as a simple, but useful approach offering an insight in the situation of internal migration across provinces of Viet Nam and identifying drivers of those flows of migration, this tool still has its limitations, such as the

following: (a) because of the complexity in human behavior, drivers of migration are not only driven by conventional factors such as geographic distance, income disparities, poverty status, population pressure, as suggested by some scholars (Lee, 1966; Ravenstein, 1889; Todaro & Smith, 2020), but they are also associated with other factors such as individual's decision, decision of dual-earners, family ties, cultural gaps, and legal controls of residence; (b) using the data gathered from the population census of the VNGSO completely depends on the availability of the recorded variables (i.e., factors) as compared to experimental surveys. It results in the estimations gained with low values of correlations. In dealing with the limitations of this work, further analyses of internal migrations in Viet Nam may apply the approach of push and pull forces that explore the individual-based data to gain more comprehensive understandings of patterns of internal migration, especially after COVID-19 pandemic period.

Given the empirical findings discussed, it is stated that the patterns of internal migrations in Viet Nam have been taking place for over three recent decades of economic transformation, providing policymakers with challenges and opportunities in observing, managing the trends, features of internal migrations, and socio-economic development. In dealing with potentially negative effects of migrations, there are national policies that boost equitable development of economic sectors and infrastructure across regions and provinces. Such investments are important to create a lot of opportunities of employment and improve standards of living for local people at their places of origin.

References

Angelucci, M. (2015). Migration and Financial Constraints: Evidence from Mexico. *The Review of Economics and Statistics, 97*(1), 224–228. https://doi.org/10.1162/REST_a_00487

Anh, D. N. (1999). Market Reforms and Internal Labor Migration in Vietnam. *Asian and Pacific Migration Journal, 8*(3), 381–409. https://doi.org/10.1177/011719689900800307

Bell, M., Charles-Edwards, E., Ueffing, P., Stillwell, J., Kupiszewski, M., & Kupiszewska, D. (2015). Internal Migration and Development: Comparing Migration Intensities Around the World. *Population and Development Review, 41*(1), 33–58. https://doi.org/10.1111/j.1728-4457.2015.00025.x

Berlemann, M., & Tran, T. X. (2020). Climate-Related Hazards and Internal Migration Empirical Evidence for Rural Vietnam. *Economics of Disasters and Climate Change, 4*, 385–409. https://doi.org/10.1007/s41885-020-00062-3

Bhagat, R. B. (2011). Internal migration in India: Are the underprivileged migrating more? *Asia-Pacific Population Journal, 25*(1), 27–45. https://doi.org/10.18356/b748277d-en

Chan, K. W. (2013). *China: internal migration*. Blackwell Publishing Ltd.

Coxhead, I., Nguyen, V. C., & Vu, H. L. (2019). Internal Migration in Vietnam, 2002–2012. In A. Y. C. Liu & X. Meng (Eds.), *Rural-Urban Migration in Vietnam* (pp. 67–96). Springer. https://doi.org/10.1007/978-3-319-94574-3_3

Cuong, N. V., & Linh, V. H. (2018). The Impact of Migration and Remittances on Household Welfare: Evidence from Vietnam. *Journal of International Migration and Integration, 19*, 945–963. https://doi.org/10.1007/s12134-018-0571-3

Dorigo, G., & Tobler, W. (1983). Push-Pull Migration Laws. *Annals of the Association of American Geographers, 73*(1), 1–17. https://doi.org/10.1111/j.1467-8306.1983.tb01392.x

Fossum Evertsen, K., & van der Geest, K. (2020). Gender, environment and migration in Bangladesh. *Climate and Development, 12*(1), 12–22. https://doi.org/10.1080/17565529.2019.1596059

Guest, P. (1998). *The dynamics of internal migration in Viet Nam* (Vol. 1). United Nations Development Programme.

Haemmerli, G., Bélanger, D., & Fleury, C. (2021). Care Needs and Migration: Household Determinants of Internal Labour Migration in Vietnam. *Journal of Comparative Family Studies, 52*(1), 4–26. https://doi.org/10.3138/jcfs.52.1.003

Ho, H.-A., Martinsson, P., & Olsson, O. (2022). The origins of cultural divergence: evidence from Vietnam. *Journal of Economic Growth, 27*(1), 45–89. https://doi.org/10.1007/s10887-021-09194-x

Huy, H. T., & Nonneman, W. (2016). Economic effects of labor migration on agricultural production of farm households in the Mekong River Delta region of Vietnam. *Asian and Pacific Migration Journal, 25*(1), 3–21. https://doi.org/10.1177/0117196815621199

International Organization for Migration. (2021). *World Migration Report 2022*. International Organization for Migration.

John, H. R., & Todaro, M. P. (1970). Migration, unemployment and development: A two-sector analysis. *American Economics Review, 60*(1), 126–142. https://www.jstor.org/stable/1807860

Kim Anh, L. T., Hoang Vu, L., Bonfoh, B., & Schelling, E. (2012). An analysis of interprovincial migration in Vietnam from 1989 to 2009. *Global Health Action, 5*(1), Article 9334. https://doi.org/10.3402/gha.v5i0.9334

Kusumo, R. A. B., Kurnia, G., Setiawan, I., & Tirtosudarmo, R. (2023). The Interplay of Migration Dynamics with Agricultural Paradigm Shifts in Indonesia. *Society, 11*(2), 329–342. https://doi.org/10.33019/society.v11i2.441

Lee, E. S. (1966). A theory of migration. *Demography, 3*(1), 47–57. https://doi.org/10.2307/2060063

Molloy, R., Smith, C. L., & Wozniak, A. (2011). Internal Migration in the United States. *Journal of Economic Perspectives, 25*(3), 173–196. http://doi.org/10.1257/jep.25.3.173

Ngoc, L. B., Ha, N. T., & Anh, H. T. (2017). Internal Migration to the Southeast Region of Vietnam: Trend and Motivations. *Journal of Population and Social Studies, 25*(4), 298–311. http://doi.org/10.25133/JPSSv25n4.001

Nguyen, B. (2023). Regional informal institutions, local governance and internal migration in Vietnam *Regional Studies, 57*(7), 1189–1206. https://doi.org/10.1080/00343404.2022.2107191

Nguyen, H. K., Chiong, R., Chica, M., & Middleton, R. H. (2021). Understanding the dynamics of inter-provincial migration in the Mekong Delta, Vietnam: an agent-based modeling study. *Simulation, 97*(4), 267–285. https://doi.org/10.1177/0037549720975128

Nguyen, L. D., Grote, U., & Sharma, R. (2017). Staying in the cities or returning home? An analysis of the rural-urban migration behavior in Vietnam. *IZA Journal of Development and Migration, 7*(3), 1–18. https://doi.org/10.1186/s40176-017-0089-z

Nguyen-Hoang, P., & McPeak, J. (2010). Leaving or Staying: Inter-Provincial Migration in Vietnam. *Asian and Pacific Migration Journal, 19*(4), 473–500. https://doi.org/10.1177/011719681001900402

Phan, D. (2012). Migration and Credit constraints: Theory and Evidence from Vietnam. *Review of Development Economics, 16*(1), 31–44. https://doi.org/10.1111/j.1467-9361.2011.00644.x

Piras, R. (2017). A long-run analysis of push and pull factors of internal migration in Italy. Estimation of a gravity model with human capital using homogeneous and heterogeneous approaches. *Papers in Regional Science, 96*(3), 571–603. https://doi.org/10.1111/pirs.12211

Ravenstein, E. G. (1889). The Laws of Migration. *Journal of the Royal Statistical Society, 52*(2), 241–305. https://doi.org/10.2307/2979333

Todaro, M. P., & Smith, S. C. (2020). *Economic Development* (13th ed.). Pearson.

Truc, T. T., & Hung, D. V. (2020). The Effect of Internal Migrants on the Economic Lives of the Leftbehind Elderly in Vietnam. *Indian Journal of Economics and Development, 16*(3), 327–335. https://doi.org/10.35716/IJED/20079

Viet Nam's General Statistical Office. (2020). *The completed result of the 2019 Viet Nam population and housing census*. Viet Nam's General Statistical Office.

Viet Nam's General Statistics Office Portal. (2020). *Number of employed persons and structure employed persons in the economy by kinds of economic activity* [Data set]. Retrieved from https://www.gso.gov.vn/en/px-web/?pxid=E0242&theme=Population%20and%20Employment.

Viet Nam's General Statistics Office Portal. (n.d.). *In-migration rate, out-migration rate and net-migration rate by province* [Data set]. Retrived September 14, 2022 from https://www.gso.gov.vn/en/px-web/?pxid=E0221-23&theme=Population%20and%20Employment

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.