

A Gravity Model Analysis of International Migration to South-East Asian and European Countries

Dharmadasa, R.A.P.I.S.,

Uva Wellassa University-Sri Lanka

sdharmadasa@gmail.com

Herath, H.M.T.R.,

Uva Wellassa University-Sri Lanka

ruwiniberath92@gmail.com

Abstract

Throughout the long history of labor migration in Sri Lanka, Middle East region dominated the foreign employment market. But recently, Sri Lankan migrants are paying more attention on moving to South-East Asian and European countries. In Sri Lanka, macroeconomic studies related to migration are less than that of microeconomic studies. As a contribution to reduce this gap, this research study examines the macroeconomic determinants of international labor migration from Sri Lanka to South-East Asian and European countries using gravity model of migration. When the heteroscedasticity is present, linear estimators result in inconsistency in estimated coefficients. Therefore, Poisson Pseudo Maximum Likelihood estimation technique was used to estimate panel data directly from its multiplicative form instead of log linearization. Secondary data over the period of 2007 to 2015 were used to estimate the model along with destination-year fixed effects to capture unobserved time-variant and time-invariant variables as well as to account for the multilateral resistance. According to the results, GDP per capita and unemployment rate of Sri Lanka are the push factors which force people to move from Sri Lanka while the destination countries' population and dependency ratio are the pull factors which attract migrants towards the destination. Moreover, population of Sri Lanka and poverty head count ratio were also discovered as significant under the research study.

Keywords: Gravity model, Labor migration, Poisson pseudo maximum likelihood technique, South-east Asian and European countries

INTRODUCTION

Labor migration as defined by Perruchoud and Redpath-Cross (2011) is the "Movement of persons from one State to another, or within their own country of residence, for the purpose of employment". Since the end of the 1990s, issues related to international migration, and more

particularly to the international mobility of both highly-qualified workers and unskilled workers, are receiving increase attention from policy makers. There are now an estimated 258 million people living in a country other than their country of birth — an increase of 49% since 2000 — according to new figures released by United Nations Department of Economic and Social Affairs (2017), on International Migrants Day. The International Migration Report (2017) (Highlights), a biennial publication of the department, states that 3.4% of the world's inhabitants today are international migrants.

When Sri Lanka is concerned, international labor migration has grown in importance for the last several decades and the numbers have increased more than tenfold during the same period. The total number of out migrants of Sri Lanka on employment abroad at present is estimated to be 212,162 (female departures 72,891 and male departures 139,271) (Central Bank, 2017).

Foreign employment has become the largest source of foreign exchange in the Sri Lankan economy during the past few years. Since 1970's when formal employment migration commenced, foreign employment has generated substantial inflows of remittance while relieving pressure on unemployment of youth by providing employment abroad. During the year 2015, the workers' remittances accounted a sum of Rs. 948,957 million and it was around 9% of the GDP of the country (Sri Lanka Bureau of Foreign Employment, 2016).

Sri Lanka Bureau of Foreign Employment (SLBFE) (2016) concludes that although continuously Saudi Arabia has secured a significant high share of workers, in the recent past there has been a decline in the rate of growth in the departures and new destinations have become more lucrative especially for semi-skilled workers. Countries like Maldives, Cyprus, South Korea, Singapore and Malaysia are becoming more attractive destinations with regard to better pay and better working conditions.

International labor migration is thus an important and stable source of foreign currency inflow to the country reducing the pressure on authorities on account of the unemployment issue in the country.

Migration to South-East Asian and European Countries

International migration flows have increased in magnitude and complexity over the past decades receiving ever more attention at policy level. It has become increasingly significant and potentially a beneficial component of the socioeconomic fabric of Sri Lanka. International migration can generate significant welfare gains for migrants as well as to countries of origin

and destination in reduction in poverty levels and enhancing the living standards of many. People are exploring different destinations for this purpose. The emerging interest on European and South-East Asian countries is a result of it. According to Srivastava and Pandey (2017) 1.66% of total Sri Lankan migrations are for South-East Asia and 27.31% to Europe.

The South-East Asia region consists of 10 countries: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. These countries are members of the Association of Southeast Asian Nations (ASEAN). This region has experienced dynamic socio-economic developments that bring significant changes to the living conditions and labor productivity. In line with the increasing level of development, urbanization and international migration in the region have increased significantly. As Sugiyarto (2015) points out in his research of internal and international migration in South East Asia, Singapore tops the list with an urbanization rate of 100%. Other countries with high urbanization rates are Brunei and Malaysia, each with more than 70%. On the international front, the region is one of the main sources of migrants worldwide. It contributes more than 13 million or 6% of the total global migrant stock, which is estimated at 216 million (Canuto and Rafha, 2011).

After World War II Western Europe became one of the main immigration regions of the world (Zaiceva and Zimmermann, 2008). In Western Europe, many countries from which migrants departed in large numbers in the past century are now major destinations, especially Italy, Ireland, Portugal and Spain (United Nations, 2008). According to the data confronted by the SLBFE (2016) the major destinations of Sri Lankan migrants in Europe are UK, Italy, Cyprus, Greece and Ireland.

Srivastava and Pandey (2017) conclude that migration of low skilled workers to European Union (EU) countries, especially the United Kingdom, Italy, Germany and Spain, has been increased in recent years as a result of labor shortages in these countries. In recent years, the EU Commission has recognized the importance of skilled immigration from non-EU countries, but has so far failed to convince the member states of the need to establish a common European economic immigration policy. The United Kingdom is one of the EU countries that already executes a policy to attract such migrants from the new Eastern member states and non-EU countries under its Managed Migration policies and Highly Skilled Migrant Program (Ruhs and Martin, 2008).

The common problem encountered in gathering information about emigrants to this region is the irregular migration. The restriction of emigration at source, and restrictions on immigration at destination, result in irregular migration flows (Wickramasekara, 2002). Major destinations for Sri Lankan irregular migrants are Greece, France, Italy, the United Kingdom and Canada (United Nations Office on Drugs and Crime, 2012). Therefore the actual number of migrants to these countries are always higher than available amount.

The main purpose of this study is to find the determinants of international migration to South-East Asian and European countries. The study contributes to the available literature by empirically estimating the determinants of migration using push and pull factors together in one model. The estimation is done using nine years data from 2007 to 2015 and by applying the Extended Gravity Model. Results presented in the literature will be helpful for the policy makers to develop better migration policies.

The study is divided into the following sections: Section 2 presents the review of literature, Section 3 discuss the methodology and provides estimation technique and detail about data employed, and Section 4 explores the factors influencing international migration, while the last section provides conclusions and policy implications.

REVIEW OF LITERATURE

Determinants of International Migration

When examining through numerous of researches it was obvious that researchers have used several categories of determinants in realizing the reasons behind international migration. Most of the literature suggests that economic factors are the largest motivators which drive people (Lowell, 2009). Relatively a few studies like Hoffmeyer-Zlotnik (2007) and Deaux (2006) focus on social and cultural factors. Some other determinant categories are geographical factors, development indices of both source and destination countries, role of admission policies; the country's integration into the global economy and gender equality.

Starting from the most initial researches, in 1932, Sir John Hicks argued that differences in net economic advantages, chiefly differences in wages, are the main causes of migration. Borjas (2000) declared workers calculate the value of the opportunities available in each of the alternative labor markets, net out the cost of making the move, and choose whichever option maximizes the net present value of lifetime income.

Jayawardhana and Jaythilaka (2009) describe that one of the most commonly known causes of migration is the Push-Pull factors of migration. Push factors are factors which drive people to leave their country, and the pull factors are factors that attract them to a new country. Most commonly known push factors of migration are elements such as economic, social, and political hardships in the origin country, while the pull factors include the comparative advantages in the richer countries' economic and social policies. Therefore, in Sri Lanka, a combination of push and pull factors have affected the size and direction of migration flows of the country.

Kim and Cohen (2010) investigated non-economic variables as predictors of international migration. Because economic and demographic factors are closely related, the present study leaves open the option of using demographic variables like life expectancy, infant mortality rate (IMR), and potential support ratio (PSR) as proxies for economic or living conditions of countries.

According to Mayda (2005) economic and non-economic determinants affecting international migration are destination country's per worker GDP, distance between the source and host country and share of the origin country's young population.

Per capita GDP of destination and origin countries, the populations of both countries, the distance between the countries as well as colonial relationships, common language and contiguity are important determinants of global bilateral migration flows (Cuaresma *et al.*, 2013).

In the case of Sri Lanka, there are few research studies regarding the determinants of international migration and almost all of them have conducted using micro level factors. For example, Manel (2015), Manel and Perera (2017), Dharmadasa and Rathnayake (2017) and Dharmadasa and De Zoysa (2014) show that household size is major determinant of migration. Apart from household size, ethnicity (Manel, 2015; Manel and Perera 2017) and level of education (Manel and Perera, 2017) are also shown to be the determinants of migration. However, according to the best of our knowledge based on the available literature, studies to find out the macroeconomic determinants of international migration to South-east Asian and European countries using gravity model are lacking in Sri Lanka.

Gravity Model

Tinbergen (1962) first used the gravity model to explain international trade patterns. It has been well-proved as a robust ex-post methodology in that aspect. However, migration studies relying on the gravity model are fewer than those in the fields of trade and investment. Among others, Lewer and Berg (2008) applied this model to analyze various facets of international labor migration.

There are many theoretical hypotheses and models concerning the determinants of migration. Gravity model is selected as the framework because it yields results that were easy to interpret, and as recent developments in panel-data analysis enable estimation based on the model. The gravity model, in its simplest form, views migration as determined by the sizes of the populations of destination and origin and the distance between origin and destination. Gravity models are one of the macro models under the interaction models.

Gravity models were initially based on Newton's gravity law, but recent contributions have also provided the micro foundations in the context of migration analysis

The original gravity model is expressed as;

$$GF_{ij} = g \times \frac{M_i^\alpha \times M_j^\beta}{D_{ij}^\gamma} ; i \neq j \dots \dots \dots (1)$$

Where;

GF_{ij} - Gravitational bond between objects i and j

g - Gravitational constant

M_i and M_j - Masses of i and j

D_{ij} - Square of the distance between objects i and j

According to his law, the gravitational force is directly proportional to the masses of the objects and indirectly proportional to the distance between them.

Later, this equation was used to model international trade and investment. As the initial step, Zipf in 1946 used this equation to model migration replacing gravitational force with migrant flow from region i to region j and masses with populations of two regions.

The mathematical form of the gravity model is as follows;

$$M_{ijt} = k \times \frac{P_{it}^\alpha \times P_{jt}^\beta}{D_{ijt}^\gamma} ; i \neq j \dots \dots \dots (2)$$

Where;

M_{ijt} denotes the number of migrants from origin i to destination j in t time, P_{it} denotes population of i in t time, P_{jt} denotes population of j in t time, D_{ijt} refers to distance between i and j in t time, and k denotes a constant.

It predicts that, all other things being equal, countries with large populations send more emigrants to destinations than countries with small populations, and that countries with large populations attract more immigrants. The greater the distance between origin and destination, the smaller the migration predicted.

Gravity models are estimated in terms of natural logarithms, denoted ‘log’. If we take the above equation in its logarithm form,

$$\log M_{ij} = \beta_0 \log(k) + \alpha \log(P_i) + \beta \log(P_j) + \gamma \log(D_{ij}) + \epsilon_{ij} \dots \dots \dots (3)$$

$\beta_0, \alpha, \beta, \gamma$ - Elasticities

ϵ_{ij} - Random Error

There are additional factors that can affect migration flows. For this reason, gravity models are enlarged with variables related to different migration pull and push factors; for instance, better economic opportunities in the destination country (i.e. prospects for higher wages or lower unemployment rates), safer conditions, and higher political freedom, among others (Ramos, 2016). In 1966 Lowry extended this basic gravity model to the following form including push and pull factors. Currently the following extended model is used by almost all the researchers.

$$\log M_{ij} = \beta_0 + \beta_1 \log(P_i) + \beta_2 \log(P_j) + \beta_3 \log(X_i) + \beta_4 \log(X_j) + \beta_5 \log(D_{ij}) + \epsilon_{ij} \dots \dots \dots (4)$$

X_i – explanatory variables describing different features of the origin (i.e. push factors)

X_j - explanatory variables describing different features of the destination (i.e. pull factors)

Most criticism of the gravity model has concerned its use as a predictive tool. Redding and Venables (2004) show that gravity model estimates are likely to be biased by standard error clustering when some variables in the model apply to only one of the two countries in each observation. Feenstra (2004) shows that adding fixed effects to the model eliminates this bias. According to Ramos (2016) the primary limitation to gravity models within the context of migration analysis has been the limited availability of bilateral migration data; however, the situation is improving quickly. Nowadays, the main concerns are related to issues such as multilateral resistance to migration or the frequent presence of zero observations.

Poisson Pseudo Maximum Likelihood Estimation Technique

As Santos Silva and Tenreyro (2006) points out, the log-linearization of the gravity equation changes the property of the error term, thus leading to inefficient estimations in the presence of heteroscedasticity.

Gomez (2013) concludes that if the data are homoscedastic, the variance and the expected value of the error term are constant but if they are not, the expected value of the error term is a function of the regressors. The conditional distribution of the dependent variable is then altered and OLS estimation is inconsistent. Heteroscedasticity does not affect the parameter estimates; the coefficients should still be unbiased, but it biases the variance of the estimated parameters and, consequently, the t-values cannot be trusted. Hence, the recent literature concerning estimation techniques have opted to use nonlinear methods as well as two parts models for estimating the gravity equation.

Among nonlinear estimation methods, the most frequently used are Nonlinear Least Squares (NLS), Feasible Generalized Least Squares (FGLS), the Heckman sample selection model and Gamma and Poisson Pseudo Maximum Likelihood (GPML and PPML) (Gomez, 2013).

Poisson Pseudo Maximum Likelihood technique estimates Poisson regression by pseudo maximum likelihood. It differs from Poisson because it uses the method of Santos Silva and Tenreyro (2010) to identify and drop regressors that may cause the non-existence of the (pseudo) maximum likelihood estimates. PPML is similar to GPML, but assigns the same weight to all observations.

Using the PPML estimator, we can avoid the problem of log-linearization which is found by Santos Silva and Tenreyro (2006) to lead to inconsistent estimates in the presence of heteroscedasticity. Recent works in the trade literature, Fally (2014) show that gravity

equations estimated using the Poisson Pseudo-Maximum Likelihood estimator with origin and destination are fully consistent with the structural constraints imposed to account for multilateral resistance factors.

Considering these factors and since the PPML estimator is becoming increasingly available using standard statistical software packages, these results suggest that it should be a valuable tool for econometric analysis of the gravity model.

METHODOLOGY

Data

Panel data from the year 2007 to 2015 were used to identify the significant macroeconomic determinants of international labor migration by applying Gravity model.

All the data regarding the variables were gathered from secondary data sources. Labor departures to ten countries namely Brunei, Malaysia, Singapore, Thailand, Cyprus, Greece, Italy, UK, Ireland were collected from Economic and Social Statistics of Central Bank of Sri Lanka-2016. These ten countries were considered as destination countries and Sri Lanka was considered as the origin country.

Distance between capital cities (in kilometers) was collected from the CEPII's database. Data regarding the populations of countries, unemployment rates, GDP per capita and the dependency ratio were collected from World Bank's World Development Indicators. From the Department of Census and Statistics Sri Lanka, poverty head count ratios were collected.

Variables

The gravity model presumed a (mechanical) direct relationship between migration and the size of the destination and origin regions, as well as an inverse relationship between migration and distance (Borjas,2000). Therefore, the coefficient should have a negative value.

When discuss about the population, the higher the population the higher is the potential stock of migrants, *ceteris paribus*(Rotte and Vogler, 1998). Similarly, larger the population in the destination country, larger the labor market for immigrants (Lewer and Berg, 2008). Hence, the coefficient is expected to have a positive sign.

Coefficient of the GDP per capita in the origin is expected to have a negative value while the coefficient of the destination is expected to have a positive value.

Jennissen (2003) describes that unemployment has a negative effect on net international migration. A rise in the unemployment rates of the origin will increase emigration and a rise in the unemployment rate of the destination will reduce migration towards the destination. Therefore, the coefficients of origin and destination are expected to have a positive and a negative values respectively.

Age dependency ratio is the ratio of dependents (people younger than 15 or older than 64) to the working-age population (those age 15-64). Low dependency ratio means more adults of working age are available. Increased dependency ratio has negative impacts on the growth of the economy resulting lower productivity in the country (Lainton, 2011). Therefore, coefficient is expected to have a positive value due to the fact that higher dependency ratio in a destination country will tend to encourage immigration.

Coefficient of poverty headcount ratio is expected to have a negative value referring that larger the percentage of people below the poverty line lesser the emigration.

Data Analysis

Taking logarithms gives the standard gravity model in linearized form, but makes clear that the error term is in logarithms too. The mean of log of error term depends on higher moments of error term, thus including its variance. If the error term is heteroskedastic, which means that if the error term does not have a constant variance which is highly probable in practice, then the expected value of the error term depends on one or more of the explanatory variables because it includes the variance term. Then the logarithmic transformation causes inconsistency in the estimated coefficients.

The presence of heteroscedasticity under the assumption of a multiplicative error term in the original nonlinear gravity model specification requires adoption of a completely different estimation methodology.

As a solution to this problem Silva and Tenreyro (2006) present that under weak assumptions – essentially just that the gravity model contains the correct set of explanatory variables – the Poisson pseudo-maximum likelihood estimator provides consistent estimates of the original nonlinear model. It is exactly equivalent to running a type of nonlinear least squares on the original equation. Since we are dealing with a pseudo-maximum likelihood estimator, it is not necessary that the data be in fact distributed as Poisson. Therefore, although Poisson is more

commonly used as an estimator for count data models, it is appropriate to apply it farmore generally to nonlinear models such as gravity.

Moreover, logarithmic transformation can cause troubles when dealing with zero migrant flows. Therefore, Breusch-Pagan/Cook-Weisberg test was conducted to check for the heteroscedasticity.

Owing to the presence of heteroscedasticity which was revealed from the test, application of OLS method will result in inconsistent estimation. Therefore, the analysis was done using PPML estimation technique following Silva and Tenreyro (2006).

Ramos (2016) states that multilateral resistance to migration which is related to the influence of third countries in determining migration flows between two particular countries should be considered when modeling migration. If it is not considered, the influence of alternative destinations could bias the results of analysis. One of the possible solutions to overcome this problem is to include origin-year dummies or destination-year dummies. Inclusion of these different type of fixed-effects also helps to reduce other potential negative effects, such as the omitted variable bias.

Beine and Parsons (2012) investigated climatic factors as determinants of international migration and used dummies to represent fixed effects to capture destination specific factors and time invariant origin factors with PPML technique. Chort and De La Rupelle, (2016), used PPML with destination year fixed effects to find out the determinants of Mexico-US outward and return migration flows using a state level panel data set.

Following the empirical studies, this research study uses destination-year fixed effects (DES_{jt}) using dummies to account for both time invariant and time variant destination specific characteristics as well as to account for the multilateral resistance.

The study was conducted under 2 main gravity equations as the basic gravity model and extended gravity model. According to the basic gravity equation, functional form of the equation can be written (Amirault *et al.*, 2012) as follow,

$$\text{MIGRATION}_{ijt} = f(\ln\text{POPULATION}_{it}, \ln\text{POPULATION}_{jt}, \ln\text{DISTANCE}_{ijt}) \dots \dots \dots (5)$$

The estimation was assumed in a time frame due to the application of panel data to the study. Therefore, t (time index) was added to the equation.

Statistical form of the extended gravity model which was used for the application of PPML technique is expressed as,

$$(\text{MIGRANT}_{ijt} | X_{ijt}) = \exp(\beta_0 + \beta_1 \ln \text{POP}_{it} + \beta_2 \ln \text{POP}_{jt} + \beta_3 \ln \text{DISTANCE}_{ijt} + \beta_4 \text{GDPPC}_{it} + \beta_5 \text{GDPPC}_{jt} + \beta_6 \text{UNEMPR}_{it} + \beta_7 \text{UNEMPR}_{jt} + \beta_8 \text{DPNDNCYR}_{jt} + \beta_9 \text{PVRTYHR}_{it} + \beta_{10} \text{DES}_{ji} \epsilon_{ijt}) \dots \dots \dots (6)$$

MIGRANT_{ijt} -Migrant flow from Sri Lanka to destination

$\ln \text{POP}_{it}$ – Natural logarithm of Population of Sri Lanka

$\ln \text{POP}_{jt}$ – Natural logarithm of Population of destination region

$\ln \text{DISTANCE}_{ijt}$ - Natural logarithm of Distance between two regions

GDPPC_{it} – GDP per capita of Sri Lanka

GDPPC_{jt} – GDP per capita of destination

UNEMPR_{it} – Unemployment rate of Sri Lanka

UNEMPR_{jt} - Unemployment rate of destination

DPNDNCYR_{jt} - Dependency ratio of destination

PVRTYHR_{it} Poverty Headcount Ratio of Sri Lanka

DES_{ji} - Destination year fixed effects

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}$ – Coefficients (elasticities) to be estimated

ϵ_{ijt} – Random Error

RESULTS AND DISCUSSION

This section presents the results and discussion of the study. First we checked the presence of heteroscedasticity using Breusch-Pagan / Cook-Weisberg test. Result of the Breusch-Pagan / Cook-Weisberg test for was turned out as follows,

Ho: Constant variance

Variables: fitted values of MigrantFlow

chi² (1) = 36.79

Prob > chi² = 0.0000

The test checks the null hypothesis that all the error variances are constant versus the alternative, error variances are not constant. A large chi-square indicates that heteroscedasticity is present. As the heteroscedasticity is present in the data, estimation of the model through OLS technique results in biased estimates. Therefore, we used PPML technique to have unbiased estimates. The results of the parameter estimates of Gravity Model using PPML technique is

	(1)	(2)
Population of destination (in logs)	-0.4300***	0.4500 *
Population of origin(in logs)	-22.2700	-436.3900***
Distance between origin and destination (in logs)	-1.9800**	0.9900
GDP per Capita of destination	-0.0000	-0.0000
Unemployment rate of destination	0.0200	-0.1900
Dependency ratio of destination	0.0500	0.0032*
GDP per capita of origin	0.0600	0.0200***
Unemployment rate of origin	0.0007	9.2900***
Poverty headcount ratio of origin	-0.0200	-0.8000***
Constant	399.9666	7239.7510***
N	90	90
R-squared	0.1320	0.9350
Destination-year fixed effects	No	Yes

shown in the table 1.

Table 1: Results of PPML Estimation Technique

***p < 0.10, **p < 0.05, ***p < 0.01**

According to the methodology explained, column 1 indicates the results of extended gravity model without destination-year fixed and column 2 records the results of extended gravity model with destination-year fixed effects.

According to the results of applying PPML technique to extended gravity equation without fixed effects as shown in the first column, only the population of destination country and distance between the 2 countries were found out to be significant under 1% and 5% significant levels respectively. When considering the coefficient signs, distance has obtained expected negative sign but the destination population has obtained negative sign objecting the theory.

After implementing PPML technique to extended gravity model with fixed effects (column 2) six variables namely destination population, origin population, dependency ratio, GDP per capita, unemployment rate and poverty rate of origin turned out to be significant. Destination population and dependency ratio were significant under 10% significance level whereas origin population, GDP of origin, unemployment rate in origin and poverty head count ratio in origin were significant under 1% significance level. The expected signs for coefficients were resulted for destination population, dependency ratio, unemployment rate and poverty rate of origin. The signs of coefficients of origin population, and GDP per capita of origin are opposing to the expected signs.

According to the literature, population of both origin and destination should have a positive coefficient. Since the population reflects the labor force in a country it is agreed that with the increment of population migration also increases.

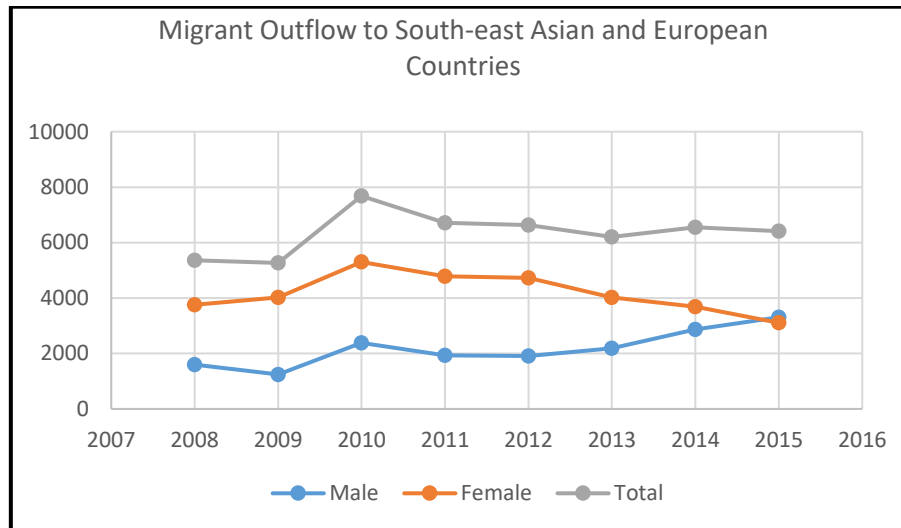


Figure 4: Migrant Flow from Sri Lanka to the selected Countries

According to the results with the increase in population in Sri Lanka migration decreases. Sri Lanka is recognized as a country where the female migration is higher. Therefore reduction in female migration results in the drop of total migration. According to figure 1 it is clear that total departures for the selected countries have reduced after the year 2010. If we carefully observe the male and female migration patterns we can observe that although male migration has increased while female migration has reduced over the years. Since the female migration is dominant in our country the reason behind the reduction of migration with increase in population of our country could be this reduction in female migration.

Various regulatory measures taken by the SLBFE to reduce the female migration on the influence of social cost may have been impacted on the decrease of the female migration which are shown below.

1. Increasing the lower limit of age of females leaving for domestic sector employment started on 14.02.2011.

2. NVQ Level III qualification has been made compulsory for employment as Domestic Housekeeping Assistants in K.S.A, Hong Kong with effect from 14.08.2013.

3. Requirement of a family background report (FBR) for all female migrant workers has been made compulsory to ensure that they do not have children under five years old.

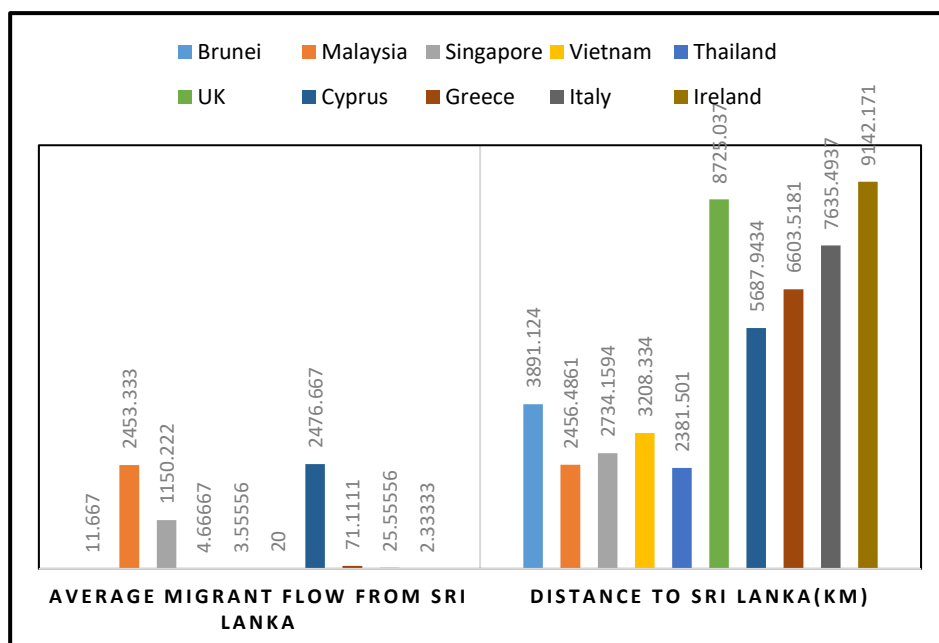


Figure 5: Distances and Average Migrant Flows from Sri Lanka to the selected Countries

The figure 2 depicts the distances and average migrant flows from Sri Lanka to the selected countries. According to the statistical results the coefficient of distance was insignificant with a positive sign.

Mayda (2010) declares that greater geographic distance between the two countries implies higher travel costs for the initial move as well as for visits back home. In addition, the further away the origin and destination economies are from one another, the more costly it is to acquire information about the foreign labor market.

From this graph it is clear that the closer countries to Sri Lanka are Malaysia, Vietnam and Thailand and therefore, migration is expected be higher to such countries. However, this assumption is true only for Malaysia and Vietnam. But for Brunei, Thailand and Vietnam it is

the opposite. Also for Cyprus which is a very distant country the migrant flow takes a higher value. Therefore, we can conclude that in our research the distance is an insignificant variable in projecting migration for these counties. As Wickramasekara (2011) found out Sri Lanka shows the lowest costs, probably reflecting an effective migration administration system, in migration.

According to the research carried out by Rotte and Vogler in 1998 in finding the Determinants of International Migration from Developing Countries to Germany they could observe that among the other explanatory variables distance was insignificant for African countries and those resulted positive coefficient value for distance variable.

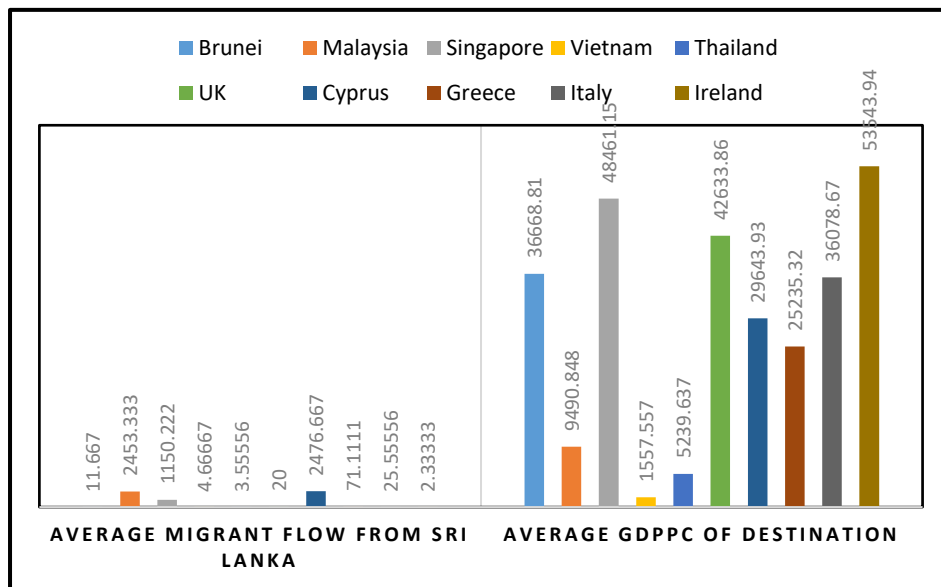


Figure 6: Average GDP per capita of destination and average migrant flows from Sri Lanka to the selected Countries

From the statistical analysis it was found out that the coefficient of GDPPC of destination to be insignificant and negative. As depicted by this graph, Ireland, Singapore and UK claim for higher GDP per capita. Therefore, we would expect a higher migrant flow to these countries. But according to the result it is obvious that this is true only for Singapore. Malaysia whose GDP per capita is 9490.8480, which is the 3rd lowest GDP per capita has the highest average migrant flow of 2453. Also Cyprus where the GDP per capita is 29643.9300 which is the 5th highest average GDP per capita has the highest average migrant flow. Hence it would be clear that the GDP per capita being insignificant in our research is justifiable.

Borja (2000) describes as workers move to the region that provides the best opportunities, they eliminate regional wage differentials. Since the workers can find the best living conditions, facilities and safety from these countries unlike the middle-east countries, we assume people are compelled to forget about the differences in GDP per capita.

Following the standard practice in the literature, the immigrant's income perspectives in the host country are proxied by GDP per capita. Borjas (1989) and Mayda (2010), however, argue that this proxy does not signal the true income opportunities for an immigrant because differences between the GDP per capita in host and source country are affected by differences in skill intensity.

Jennissen (2003) conducted a research in realizing the economic determinants of net international migration in Western Europe. The results of this research can be confronted in order to support our result. Through his research he could find that the coefficients of GDP per capita in Austria, Sweden and Switzerland are not significant.

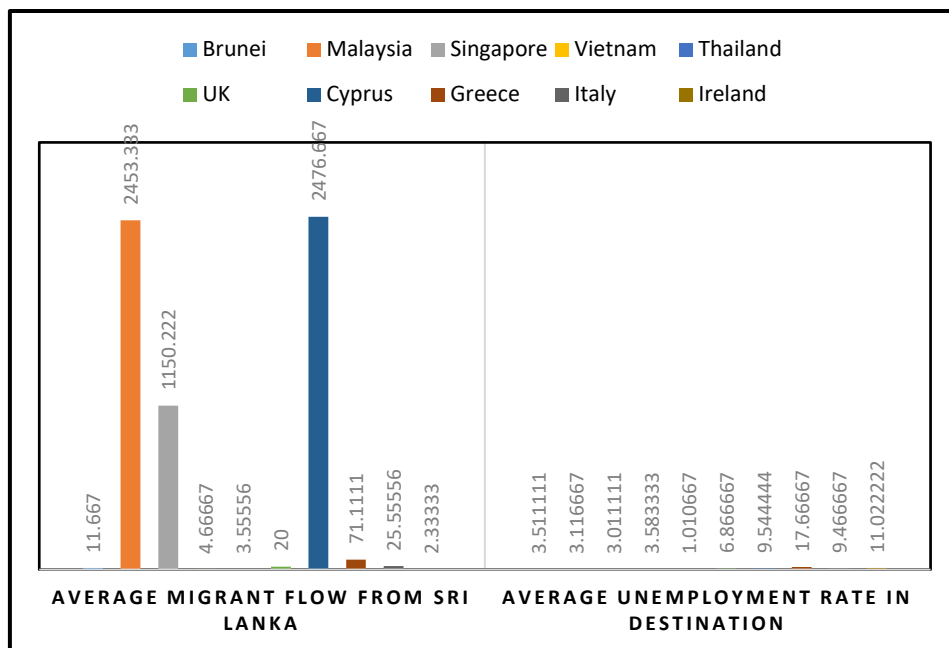


Figure 7: Average GDP per capita of destination and average migrant flows from Sri Lanka to the selected Countries

Although the expectation was a significant, positive coefficient value for the variable unemployment rate in destination the result was insignificant with the expected sign. Therefore, through figure 4, this scenario is explained. As the figure shows, Malaysia which holds a lower average unemployment rate as 3.1167% has the 2nd highest average migration flow and Cyprus

which has the 3rd highest average unemployment rate of 9.5444% ranks first as the country which highest average Sri Lankan migration flow is destined. Hence, it is apparent that unemployment rate in the destination is insignificant when considering to migrate to South-eastern and European countries.

Most of the time the migrations to these countries occur through direct contacts. The migrants may have either relatives or friends who are dwellers in these countries. Therefore, via their support migrants find occupations and then travel.

According to analyses by Van der Gaag and Van Wissen (1999), unemployment turned out to be the most important economic indicator of international migration in Germany, the Netherlands and the UK. But, Zaiceva and Zimmermann (2008) have found that the unemployment rate does not significantly affect the emigration intentions when considered at a 5% level in their research conducted in finding out the determinants of labor migration in Europe.

Mitchell and Pain (2003) carried out a research to identify the determinants of international migration into the UK using a panel based modelling approach. What they found was the unemployment rate of US as the destination country was insignificant and had positive sign.

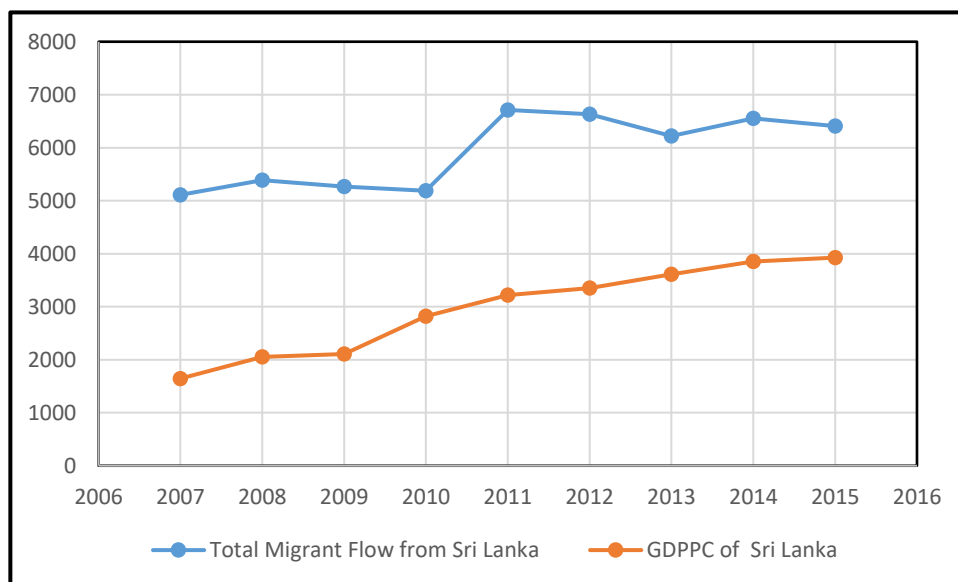


Figure 8: GDPPC of Sri Lanka and total migrant flow from Sri Lanka to the selected Countries

After referring to the literature we expected GDP per capita of Sri Lanka to be a significant variable with a negative coefficient sign. Nevertheless, after the statistical analysis it was revealed that when the GDPPC of our country increases by one unit the migration also increases

by 9.29%. The variable was significant under 1%, 5% and 10% significant levels with a positive sign. When looking at the figure 5, at a glance it is obvious that curve of total migration flows is an upward-sloping although there are several fluctuations in the curve. The figure 5 also denotes the directly proportional relationship between the migration flow and GDP per capita of Sri Lanka. Therefore, the positive coefficient which resulted for Sri Lanka's GDP per capita can be justifiable.

Moreover, this can be explained in another aspect. GDP per capita is a measure of average income per person per year which can be calculated by dividing the GDP by mid-year population. Since employees are categorized according to their skilled level as professional, middle level, clerical and related, skilled, unskilled and housemaids, there is a significant income inequality present in the country according to their wage rate. GDP per capita is constituted with the income of all these six categories. Therefore, considerable increment or decrement in any skilled level can cause significant fluctuations in country's GDP per capita.

As an example, if the income of professionals or any other higher wage category increases considerably compared to other categories with low wages, GDP per capita of the country also increases. But, the situation of the poor remains unchanged. Therefore, although the GDP per capita of our country increases poverty remains the same and ultimately people migrate irrespective of the GDP per capita of our country.

While identifying the determinants of Mexico-US outwards and return migration flows analyzing state-level panel data, Chort and De La Rupelle (2016), found that after controlling for other time variant factors at the Mexican state level (violence, climatic shocks) and dyadic factors, the GDP per capita at origin has a positive impact on the size of outward migration flows.

If we observe the variables as push and pull factors generally we can understand that out of the 5 push factors 4 become positive and out of the 5 pull factors 4 become negative. Mayda (2010) in her research of empirically investigating the determinants of migration inflows into fourteen OECD countries by country of origin, between 1980 and 1995 she has interacted an indicator variable of changes in destination countries' migration policies with pull and push factors, respectively. According to her findings pull effects become more positive and push effects turn negative in those years when a host country's immigration laws become less restrictive.

Jayawardhana and Jaythilaka (2009) states that the number of professionals, middle level and clerical and related migrants recorded a decline in 2007. This decline in skilled categories is

mainly due to restrictive migrant laws that were imposed in the wake of the global economic crisis. Hence, we can come to the conclusion that these restrictive migrant laws imposed by these countries can be a reason for the general results achieved through this research.

At the same time, it has to be noted that the data pertaining to professionals, middle level and skilled categories do not give the full picture as most migrants in these groups tend to migrate direct and do not register with SLBFE. Therefore, data pertaining to the skilled categories will be much higher if the direct migrant numbers are added. (Jayawardhana and Jaythilaka, 2009)

It should be emphasized that mainly the unskilled workers and the housemaids register with the SLBFE while the other tend to find jobs independently using direct channels. Therefore, these workers who migrate independently find job opportunities using direct contacts and do not register with the SLBFE as the existing law that mandates all migrants who go on employment needs registration with SLBFE is not practiced and monitored sufficiently. For example for 2007, the SLBFE shows that not a single professional worker has migrated to UK, USA, South Korea, Cyprus, Italy, China and Greece, which is a gross underestimation and contrary to the evidence in the foreign employment patterns for professional workers. (Jayawardhana and Jaythilaka, 2009)

Population of the destination found out to be significant under 10% significance level. Unit increment of the population in the destination country increases the migration outflow from Sri Lanka by a rate of 0.45%. When the population stock in the destination country the need of constructions and development of infrastructure and increases causing a higher demand for labor. For example the situation report on international migration in East and South-East Asia (2008) says that although the growth rate of the population of Malaysia remains relatively high, the country's robust economy and urbanization have generated a demand for foreign workers that is met by large numbers of both regular and irregular migrants. Therefore it is acceptable that migration increases as a result.

As defined by the United Nations (2017) dependency ratio relates the number of children (0-14 years old) and older persons (65 years or over) to the working-age population (15-64 years old). Dependency ratios indicate the potential effects of changes in population age structures for social and economic development, pointing out broad trends in social support needs. From the statistical analysis we could find a positive relationship of dependency ratio of destination on the migration from Sri Lanka to the selected countries. Dependency ratio is significant under 10% significance level. With the increment of dependency ratio, productivity of a country

reduces (Lainton, 2011). As a result, destination countries encourage immigration to enhance their economic growth. A unit increment of dependency ratio in destination increases the out-migration from our country by 0.0032%.

Jones (2008) mentions about rapid fertility decline in his research study. The effect of rapid fertility decline on population ageing is what has attracted a lot of attention from planners in East and Southeast Asia. By 2030 Thailand's proportion of elderly will have reached 15 per cent.

The demographic transition in countries such as Japan, Korea, and Singapore, along with longer periods spent by the youth in school, has reduced the supply of new workers entering the labor force. The imminent decline in the labor force in a number of East Asian countries (Japan, South Korea, Taiwan, Singapore) will require increasing reliance on overseas workers, at both ends of the skill spectrum, and the European debates on 'replacement migration' will have increasing resonance in the region (Demeny, 2003). Sugiyarto (2015) also supports this idea. The author states that ageing in Singapore and Thailand has been increasing very fast over 2000-2010, such that they are now above the world average level.

Unemployment rate in the origin is significant under all the 3 significance levels and show a positive relationship with the migration from Sri Lanka. When unemployment rate in our country increases by one unit it increases the migration outflow by 0.02%. When the number of employments in the origin country are insufficient people decide to migrate in search of job opportunities.

Poverty headcount ratio is the percentage of the population living below the national poverty lines. It is significant under all considered significance levels and constitutes with a negative coefficient in the statistical analysis results. Generally, it is believed that when people are poor migration would be increased. But, according to the results migrant flow from Sri Lanka reduces with the increment of the people below the poverty line. It is true that the poverty can be reduced with the migration due to the impact of remittances (Adams and Page, 2003). But, if the people are unable to fulfil the initial requirement of migration, cost of moving, then their dream would not come true. Consequently, the migration reduces. Thus, when the poverty head count ratio increases by one unit the migrant flow reduces by 0.8%.

CONCLUSIONS

This research study was conducted to find out the macroeconomic determinants of international migration from Sri Lanka to selected ten South-East Asian and European countries over the period 2007-2015. Poisson Pseudo Maximum Likelihood estimation technique was applied to estimate the gravity model with destination-year fixed effects instead of linear estimators due to the presence of heteroscedasticity.

According to the results, GDP per capita and unemployment rate of Sri Lanka are the push factors which force people to move from Sri Lanka while the destination countries' population and dependency ratio are the pull factors which attract migrants towards the destination. Moreover, population of Sri Lanka and poverty head count ratio were also discovered as significant under the research study.

The coefficient sign of population and GDP per capita of Sri Lanka deviated from the expected sign and the variables, GDP per capita of destination, distance between origin and destination and unemployment rate of destination turned out to be insignificant in determining migrating to South-East Asian and European countries. However, by approaching necessary facts and figures those consequences were attempted to explain.

REFERENCES

- Amirault, D., Munnik, D. d. & Mille, S.(2012), “ What Drags and Drives Mobility: Explaining Canada’s Aggregate Migration Patterns”, Ontario: Canadian Economic Analysis Department, Bank of Canada.
- Anderson, J. E. (2011), "The gravity model", *Annu. Rev. Econ.*, 3, 133-160.
- Beine, M. and Parsons, C. (2015), " Climatic factors as determinants of international migration", *The Scandinavian Journal of Economics*, 117(2), pp.723-767.
- Borjas, G.J. (1989), "Economic theory and international migration", *International Migration Review*, 23, 457-485.
- Borjas G.J. (2000), "Economics of Migration" [Article], *International Encyclopedia of the Social and Behavioral Sciences*, pp.1-21.
- Boswell, C. (2008), "Combining economics and sociology in migration theory", *Journal of Ethnic and Migration Studies* 34(4): 549–66.
- Canuto, O. and Rafter, D. (2011). Migration and remittances. Factbook 2011.es Factbook 2011.
- Chort, I. & De La Rupelle, M. (2016), " Determinants of Mexico-US outward and return migration flows: a state-level panel data analysis", *Demography*, 53, 1453-1476.
- Cuaresma, C. J., Moser, M. & Raggl, A. (2013), “On the determinants of global bilateral migration flows”, *WWFforEurope Working Paper*.
- Dharmadasa, R. A. P. I. S., & Rathnayake, K. K. H. M. (2017), "Determinants of Migration and Remittances: Evidence from Rural Sector of Sri Lanka”, *Vidyodaya Journal of Management*, 3(2), 33–58.
- Dharmadasa, R.A.P.I.S. & de Zoysa.M. (2012), “The Determinants of Labor Outmigration in Tea Plantation Sector in Badulla District” International Conference on Business Management on Capacity Development in a Post-war Context, 2012, Jaffna University. Pp 1-8
- Deaux, K. (2006). To be an immigrant. Russell Sage Foundation.
- Demeny, P. (2003), "Population policy dilemmas in Europe at the dawn of the twenty-first century”, *Population and Development Review*, 29(1): 1-28.
- Fally, T. (2015), “Structural gravity and fixed effects”, *Journal of International Economics*, 97(1), pp.76-85.

Feenstra, R.C. (2004). *Advanced International Trade: Theory and Evidence*, Princeton University Press, Princeton, NJ

Fertig, M. & Schmidt, C. M. (2000), "Aggregate-Level Migration Studies as a Tool for Forecasting Future Migration Streams", *IZA Discussion Paper* No. 183.

Gomez-Herrera, E. (2013), "Comparing alternative methods to estimate gravity models of bilateral trade" ,*Empirical Economics*, 44, 1087-1111.

Hoffmeyer-Zlotnik, J.H.P. (2007), "Harmonisation of Demographic and Socio-Economic Variables in Cross-National Comparison", *Concepts and Methods in Migration Research*. Conference Reader.

International Organization for Migration. (2018). *Key Migration Terms*. [online] Available at: <https://www.iom.int/key-migration-terms> [Accessed 25 Jan. 2018].

International Organization for Migration. (2018). *World Migration Report: Migration and migrants: A global overview*, Vol 4, International Organization for Migration, Geneva.

Jayawardhana, T. & Jaythilaka, R. (2009). *International Migration Outlook-Sri Lanka, 2008*. International Organization for Migration, Colombo; Institute of Policy Studies of Sri Lanka, Colombo.

Jennissen, R. (2003), "Economic determinants of net international migration in Western Europe" , *European Journal of Population/Revue Européenne de Démographie*, 19, 171-198.

Jones, G. W. (2008), "Underlying factors in international labor migration in Asia: population, employment and productivity trends", ILO Asian Regional Programme on Governance of Labor Migration. *Working Paper No.1*

Kim, K. & Cohen, J. E. (2010), " Determinants of international migration flows to and from industrialized countries: A panel data approach beyond gravity" , *International Migration Review*, 44, 899-932.

Lainton, A. (2011). *Dependency ratio and Immigration/emigration*. [Online] Available at: <https://andrewlainton.wordpress.com/2011/05/29/dependency-ratio-and-immigration/> [Accessed 25 November 2017].

Lewer, J.J. & Berg, H. Van den. (2008), "A Gravity Model of Immigration" ,*Economic Letters*. 99(1):164-167

López-Córdova, E.(2005), " Globalization, migration and development: The role of Mexican migrant remittances" INTAL. ITD *Working Paper*.

Lowell, B. (2009), "Immigration "Pull" Factors in OECD Countries over the Long Term, in OECD, *The Future of International Migration to OECD Countries*", *OECD Publishing*. doi: 10.1787/9789264064126-4-en.Management and Business Administration Gödöllő website: https://szie.hu/file/tti/archivum/Huzdik_Katalin_thesis.pdf

Manel D.P.K. (2015), "Determinants of inter-district and intra-district migration in Sri Lanka: the case study of Gampaha District", Annual Research Symposium-2015, Department of Demography, University of Colombo.

Manel D.P.K. & Perera S. (2017), "Determinants of employment participation of urban migrant women in the Kalutara District", Annual Research Symposium - 2017, University of Colombo [Internet].

Mayda, A. M. (2005), "International migration: a panel data analysis of economic and non-economic determinants", *IZA Discussion Papers*, No. 1590

Mayda, A. M.(2010), "International migration: A panel data analysis of the determinants of bilateral flows" *Journal of Population Economics*, 23, 1249-1274.

Ministry of Foreign Employment (2015). Annual Performance Report. [online] Available at: <https://www.parliament.lk/uploads/documents/paperspresented/performance-report-ministry-of-foreign-employment-2015.pdf>, [Accessed 15 November 2017].

Mitchell, J. & Pain, N. (2003), "The determinants of international migration into the UK: A panel based modelling approach", National Institute of Economic and Social Research London.

Perruchoud, R. and Redpath-Cross, J. (2011). Glossary on Migration. 2nd ed. [ebook] Geneva: International Organization for Migration, p.58. Available at: http://publications.iom.int/system/files/pdf/iml25_1.pdf [Accessed 6 Sep. 2018].

Ramos, R. (2016), " Gravity models: a tool for migration analysis" , *IZA World of Labor*.

Redding, S. & Venables, A. J. (2004), " Economic geography and international inequality" *Journal of international Economics*, 62, 53-82.

Regional Thematic Working Group(2008). Situation Report on International Migration in East and South-East Asia.

Rotte, R. & Vogler, M. (1998), "Determinants of International Migration: Empirical Evidence for Migration from Developing Countries to Germany", *IZA Discussion paper series*, No. 12

Ruhs, M. & Martin, P. (2008), "Numbers vs. Rights: Trade-Offs and Guest Worker Programs", *International Migration Review*, Volume 42 Number 1 (Spring 2008):244–260

Silva, J. S. & Tenreyro, S. (2006), "The log of gravity", *Review of Economics and Statistics*, 88, pp. 641–658.

Silva, J. S. & Tenreyro, S.(2010), "On the existence of the maximum likelihood estimates in Poisson regression" , *Economics Letters*, 107, 310-312.

Sri Lanka Bureau of Foreign Employment (SLBFE). (2016). *Annual Statistical Report of Foreign Employment – 2016*. Colombo: Sri Lanka Bureau of Foreign Employment.

Srivastava, R. and Pandey, A.K. (2017). Internal and International migration in South Asia: Drivers, interlinkage and policy issues. United Nations Educational, Scientific, and Cultural Organization (UNESCO), pp.1-62.

Stewart J.Q. (1948) Demographic Gravitation: Evidence and Application, *Sociometry*, 11, 31-58

Sugiyarto, G. (2015). Internal and international migration in Southeast Asia. *Routledge Handbook of Southeast Asian Economics*, Abingdon: Routledge.

Tinbergen, J. (1962). An analysis of world trade flows. *Shaping the world economy*, 3, pp.1-117.

United Nations. (2008). UN statistics show migration as a dynamic and diversifying force in global development. [online] Available at: <http://www.un.org/migration/presskit/pressrelease12sept.pdf> [Accessed 6 Sep. 2018].

United Nations Office on Drugs and Crime (UNODC). (2012). *Migrant Smuggling in Asia: A Thematic Review of Literature*. Bangkok: United Nations Office on Drugs and Crime.

Migration Report 2015. New York: United Nations, Population Division, Department of Economic and Social Affairs.

United Nations, Department of Economic and Social Affairs, Population Division (2017). *International Migration Report 2017: Highlights*(ST/ESA/SER.A/404).

United Nations, Department of Economic and Social Affairs, Population Division (2017) *World Population Prospects: The 2017 Revision*, New York: United Nations. ESA/P/WP/248

van der Gaag, N. & van Wissen, L.(1999), "Analysis and forecasting of international migration by major groups (Part II)", *Working Paper*, Eurostat, 3/1999/E/no.9.

Vogler, M. & Rotte R. (2000), "The Effects of Development on Migration: Theoretical Issues and New Empirical Evidence", *Journal of Population Economics* 13:485–508.

Wickramasekara, P. (2002). Asian labor migration: Issues and challenges in an era of globalization, International Migration Programme, International Labor Office, Geneva. *International Migration Papers* 57. Available at: https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_160632.pdf [Accessed 6 Sep. 2018].

Wickramasekara, P. (2011), "Labour Migration in South Asia: A Review of Issues, Policies and Practices", *International Migration Working Paper* No. 108. Available at SSRN: <https://ssrn.com/abstract=1913316>.

Wickramasinghe, A. & Wimalaratana, W.(2016), "International Migration And Migration Theories", *Social Affairs*, 1, 13-32.

Central Bank of Sri Lanka (2017). Annual Report, Central Bank of Sri Lanka

Zaiceva, A. & Zimmermann, K. F.(2008) , "Scale, diversity, and determinants of labor migration in Europe", *Oxford Review of Economic Policy*, 24, 427-451.

Zipf, G. K.(1946), "The P1 P2/D hypothesis: On the intercity movement of persons", *American Sociological Review*, vol. 11(6):677-686. URL <http://www.jstor.org/stable/2087063> .