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Examining the cyclical pattern of remittance flow, migrants stock, and income of 31 pairs of countries with India

Hemachandra Padhan,[1] Deepak Kumar Behera,[2] Santosh Kumar Sahu,[3] and Umakant Dash[4]

Abstract

This study has examined the cyclical pattern of remittances, migrants' stock, and income of 31 pairs of countries with India for the period from 2010 to 2016. The main motivation was to examine whether immigration and emigration policies play an influential role to improve welfare between the host and origin country or not in terms of bilateral remittance flows. As our bilateral remittance and migrant stock data follow a binomial distribution, so we have applied both ordered logit and ordered probit regression models to examine the smoothing hypothesis which was a new addition to the literature. Our result shows that remittance and migrant stocks show a counter-cyclical movement with an income of country origin while it shows a pro-cyclical movement with an income of country destination. The study concludes that financial constraint is a major issue for immigrants' movement that leads to low remittances flows and should be alleviated. Further, immigration and emigration policies should be determined by looking at the unemployment rate, the magnitude of migration, and the population size of both host and origin countries.

Keywords: *Bilateral Remittance flow; Migrant stocks; Cyclical Pattern; India*

Introduction

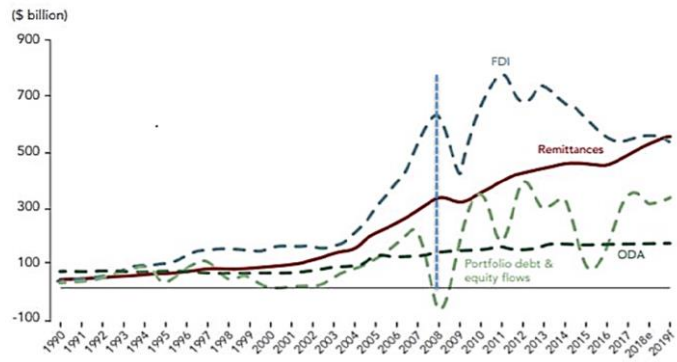
The movement of the population from one country to another country to earn a better income and sustain their livelihood has been a regular phenomenon in the past two decades or more in almost all developing economies (Chami et al., 2005; Özden et al., 2011). Overall world migration data reveals that more than 250 million people live and work outside of their origin country for livelihood purposes in 2016 and this would be doubled in 2050 (World Bank, 2019). The literature argues migration decision is based on the family decision and the central element is remittances flow that can be used as a source of family income and overall development of households (Borjas, 1999; Ratha, 2007). The latest World Bank Report (2019) says the world remittance inflows have increased from US$ 101.3 billion to US$ 615 billion over the period from 1995 to 2018. So, remittance is now considered the second largest capital inflow after Foreign Direct Investment (FDI) inflows. Figure 1 has presented the trends of remittance inflows across sub-categories of countries. In the case of low-middle income group

[1] Dr. Hemachandra Padhan, Assistant Professor (Economics),Department of Humanities and Social Sciences
Symbiosis School of Economics, Symbiosis International University, Pune - 411004, India.
E-mail: padhanhemanta000@gmail.com ORCID ID: https://orcid.org/0000-0003-2971-7032
[2] Dr. Deepak Kumar Behera, Assistant Professor (Economics), Department of Economics, Birla School of Social Sciences & Humanities, Birla Global University, Bhubaneswar, Odisha 751029. (Corresponding Author)
E-mail: deepakkumar.behera59@gmail.com
ORCID ID: https://orcid.org/0000-0001-6539-4280
[3] Dr. Santosh Kumar Sahu, Assistant Professor (Economics), Department of Humanities and Social Sciences, Indian Institute of Technology (IIT) Madras, Chennai – 600036, India. E-mail: santosh@iitm.ac.in
ORCID: https://orcid.org/0000-0003-3480-6507
[4] Dr. Umakant Dash, Director and Professor, Institute of Rural Management Anand (IRMA), Gujarat – 388001.
E-mail: umakant@irma.ac.in ORCID: https://orcid.org/0000-0001-5348-9530

economies, remittances are recorded to have increased to US$451.1 billion from US$451.1 billion between 1995 and 2018. In the case of developing economies, remittances increase to US$459.1 billion from US$55.2 billion in 1995-2018 respectively. Appendix Table A1 shows the share of remittance to GDP in the sample of 31 counties. It has been shown that India possesses a top remittance-receiving country that contribution is around 2.8% of GDP, followed by Mexico (2.70%), Belgium (2.10%), and Portugal (2.00%). Due to the upsurge of remittance inflows in India, this study wants to examine the determinants of remittance and migrant stock flows between India and a pair of 31 countries over the period from 2000 to 2016. Further, the study examines the smoothing hypothesis to determine the cyclical movement of remittance inflow/outflow and migrant stock inflow/outflow during good/bad economic conditions of both the origin country and the destination country of migration.

The smoothing hypothesis can be pro-cyclical or counter-cyclical in terms of remittance flow which means remittances increase when the country of origin is suffering in relative recession while reducing the remittances when the income of the country of origin has above the relative income (Gordon, 1985; Chemi et al*.,* 2005). Moreover, the counter-cyclical is equally important for countries that are host countries to immigrants (remittances sending countries) as for the counterparty countries (remittances receiving countries). The outward flows of remittances are high during boom time while it is low in bad times (Agunias, 2006). In the case of boom times, it solves the potential labor shortages and improves the danger of monetary policy expansion. In bad times, the flows of remittances tend to solve domestic unemployment and improve the balance of payment components (Yang, 2011). The pro-cyclical is also essential like the counter-cyclical effect and also called Dutch disease (Acosta et al., 2009; Behera et al. 2020).[5]. Our main motivation is to explore the cyclical pattern of remittances, migrants' stock, and income that play a vital role in improving the intertemporal welfare between the host country and the origin country.

Figure 1. Capital flows in developing countries.



Source: Author's estimation

[5] Remittances raise the disposable income. The rise in disposable income increases the consumption of tradable goods and non-tradable goods. The price of tradable goods remains constant because it is determined by the world price that is called expenditure effect. While non-tradable goods price will raise because of rising aggregate demand. For more demand in the market, the producer will rise the scale and size of the production process, they will also use more factors of production for increasing output to mitigate the market demand that push the costs of production which is denoted as resources movement effect. Finally, both expenditure movement effect and resources movement effect appreciate the exchange rate that is called as Dutch diseases.

As per the existing literature, this paper contributes in four novel ways. First, this is the first study that explores the cyclical pattern of remittances, migrants' stock, and income in the case of 31 pairs of countries that interact with India. Figure 2 represents the scatter plot of the relationships between migrant stock flow, remittance flows, and income. The figure shows that there are positive related to each other. By looking at the cyclical pattern of remittances, migrants' stock, and income, we investigate the roles immigration and emigration policies play in improving inter-temporal welfare between the host and origin country that plays a vital role in improving the intertemporal welfare between the host country and the origin country. Second, we have used the bilateral remittances, migrant stocks, and income data over the period 2010-2016. In the case of bilateral remittances and bilateral migrant stocks data, the availability of data is still limited. Third, we have used Ordered Logistic and Ordered Probit models that are not used by other studies on counter-cyclical and pro-cyclical patterns of remittances, migrants' stock, and income.

Figure 2a. Relationship between Income and Migrant stock

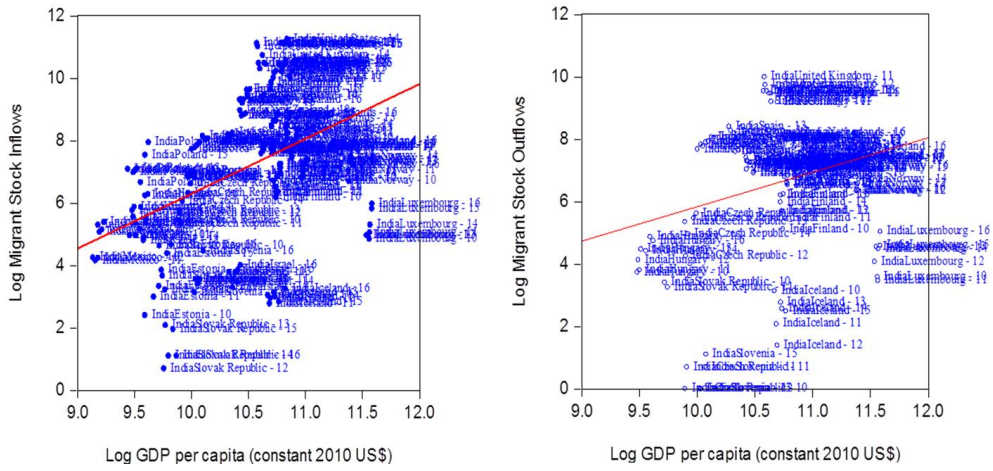
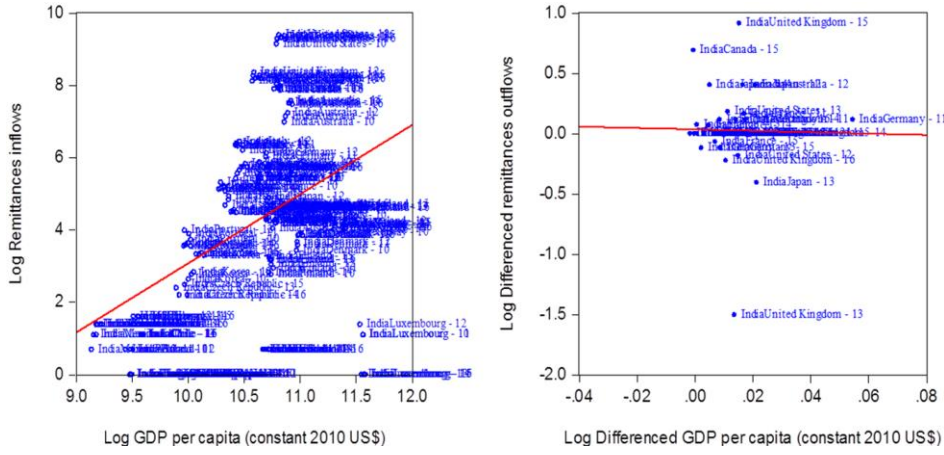


Figure 2b. Relationship between Income and Remittances



Source: Author's estimation

The remainder of the study is organized as follows. Section 2 presents the literature review. Section 3 presents data and methods. Section 4 analyses the empirical results. Section 5 contains discussions. Finally, section 6 contains conclusions and policy implications.

Literature Review

The movement of migrants from country-origin to country-destination is always backed by some motivation that might be at the individual micro-level or aggregate macro-level of any economy. The literature argues there are three motivations of migrants such as altruistic motives, self-interested and enlightened self-interest motives that lead to migration at the micro-level (Agarwal and Horowitz, 2002; Karpestam, 2009; Lucas and Stark, 1985; Osili, 2007; Stark, 1991; and Agunias, 2006). An altruistic motive arises while migrants derive utility from the family's degree of consumption by using remittance money (Agarwal and Horowitz, 2002; Karpestam, 2009). Self-interest motive occurs when migrants want to remit money for acquiring mortgage property or maintenance of the inherited building (Lucas and Stark, 1985; Osili, 2007). Enlightened self-interest motive exists while remittance is used for the development of the community of country-origin (Stark, 1991; Agunias, 2006). Similarly, the migrant has embodied some cost that impacts county's macroeconomic fundamentals such as an increase in the size of the diaspora, exchange rate, interest rate, and immigration policies (Freund and Spatafora, 2008; Faini, 1994; El-Sakka and MaNabb, 1999; Docquier et *al.,* 2012). So, remittance is mutually beneficial for both the migrants and families in the country of origin and country of destination.

There are a series of discussions in the literature about the cyclical movement of remittance and migrants' stock with an income of country-origin or country-destination. The concept of cyclicality in remittance was come into the picture by the World Migration Report (2010), which argues that the effects of per capita remittances are positive on per capita income in the case of country-origin while the effects are weak on the income of country-destination. Thereafter, many studies have started a discussion on the nature of cyclical movement[6] and whether remittance and migrant cost plays a pro-cyclical and counter-cyclical with business cycle fluctuation in the income of both country-origin and country-destination (Ratha 2007; Sayan 2006; Luith and Ruiz-Arranz, 2006 & 2008; Clarke and Wallstein, 2004; Kapur 2005; Chami et *al.,* 2005; Yang, 2011; and Yang and Choi, 2007). Ratha (2007); Sayan (2006); Luith and Ruiz-Arranz (2006 & 2008) support the pro-cyclical argument that remittance flow positively influences the income of the country-origin by regenerating remittance through the second stage of migration flow to the country destination. Ratha (2007) argues that remittances constitute a large and stable source of income for remittance receipts countries that lead to more emigrants. Similarly, Luith and Ruiz-Arranz (2006, 2008) argue that remittances do not influence further emigrants by flowing more income to the country-origin while country destination suffers any type of natural disaster or conflict situation like WAR. So, in both the case of good and bad economic conditions remittance plays a procyclical pattern.

[6] Fiscal policy literature argues that procyclicality occurs in both bad and good economic fluctuations means during economic recession, government reduce taxation and increase spending while in economic recovery, government increase taxation and reduces spending. Similarly, the counter-cyclical pattern ocular in business cycle fluctuations when spending increases during economic recession and spending decrease during economic recovery (Behera et al. 2020).

Similarly, few have argued that counter-cyclical behaviour of remittance flow and suggests that remittance flow increases during unfavourable situations such as natural disaster, recessions, and WAR and vice-versa (Clarke and Wallstein, 2004; Kapur 2005; Chami et *al.,* 2005; Yang, 2011; and Yang and Choi, 2007). Clarke and Wallstein (2004) find that remittances go up in Jamaica during the natural disaster Kapur (2005) finds that remittances go up in the case of an economic slowdown in developing countries sample. Chami et *al.,* (2005) find that counter-cyclical remittances adversely affect the output, saving, and consumption of country-destination effect on output, saving, and consumption. Yang (2011) finds that hurricane disasters increased remittance flow and became a counterstrategy to mitigate the disaster damage in the case of a developing country. Yang and Choi (2007) find an opposite argument of counter-cyclical remittance inflows during good economic conditions that shows that remittance flow was reduced in the Philippines due to better weather conditions.

As discussed, the earlier inflow of remittance has serious implications on macroeconomic fluctuations in international trade, exchange rate, and overall economic growth that led to the rising/fall of immigration pattern (Corden and Neary, 1982; Rajan and Subramanian, 2005; Amuendo-Dorentas and Pozo, 2004; Lillo and Garay, 2019; Bettin et *al.,* 2015; Arvin and Lew, 2012; Walmsley et *al.,* 2007). Corden and Neary (1982) and Rajan and Subramanian (2005) argue that the prevalence of Dutch disease in the destination country leads to an appreciation of exchange rate and a lesser inflow of remittance to the origin country in the case of Latin American countries. A similar argument between the appreciation of the exchange rate and Dutch disease has also been brought by Acosta et *al.,* (2009); Amuendo-Dorentas and Pozo (2004); and Lopez et *al.* (2007) and argue that raising the price of a non-tradable good lead to welfare-improving smoothing behaviour.

Few studies have empirically tested the smoothing hypothesis of remittances inflow or outflow patterns and factors associated with these changes using an advanced methodology (Lillo and Garay 2019; Bettin et *al.,* 2015; Arvin and Lew, 2012; Docquier et *al.,* 2012; Özden et *al.,* 2011; Frankel, 2011; Lueth and Ruiz-Arranz, 2006, 2008; and De Sousa and Duval, 2010). Using network flow analysis Lillo and Garay (2019) find India and China are the highest inflow remittances countries while the USA and Saudi Arabia are the highest outflow remittances countries. Using the poison distribution technique Bettin et *al.,* (2015) finds that adverse condition in the macroeconomic fundamental lead to a reduction of remittance inflows in Italian provinces. Using the instrumental variable model Arvin and Lew (2012) find a positive association between remittance inflow and happiness. Using the gravity model, Docquier et al. (2012) find that remittance inflow is positively correlated with migrant education by comparing OECD and Non-OECD countries. Ozden et al. (2011) find gender differences in international migration and male plays a dominant role in remittance flow to the country-origin. Using the smoothness hypothesis Frankel (2011) finds a bilateral remittance flow exists among European countries and shows a counter-cyclical impact on the income of both host and home country. Similarly, Lueth and Ruiz-Arranz (2006, 2008) argue that a fifty percent variation in remittance flows across time and countries is due to variation in income, distance, and language in the European Union. De Sousa and Duval (2010) also argue that remittance flow increase with increased geographical distance in Romania provinces.

Overall literature discussion finds that inflow and outflow of remittance can be pro-cyclical or counter-cyclical depending on both macroeconomic situations of the host and the home country at the aggregate level while at the individual household level, is influenced by many socioeconomic factors and self-interest of migrants. Therefore, measurement of the cyclical movement of remittance using pertinent macroeconomic and household factors is crucial to determine its likely impact on the income of both host and home country.

Methodology

Data

The study has examined the cyclicality of bilateral remittance flow and migrant stock of selected 31 pair countries with India from 2000 to 2016. Figures 3a and 3b represent the cumulative distribution of both migrant stock and remittance flow. The figure shows that there are distributed asymmetrically among the selected countries. Appendix Table A2 presents the list of 3l countries. Table 1 shows the description of the variables adopted in this study. We have collected a set of dependent variables that includes Remittances Inflow (US$ Million), Remittances Outflow (US$ Million), Migrant Stock Inflows (US$ million), and Migrant Stock Outflows (US$ million). Further, to examine the factors responsible for the cyclicality of bilateral remittance flow and migrant stock, we have included a set of independent variables such as Foreign Direct Investment (% GDP), Gross Domestic Product (constant US$2010), Unemployment Rate (% GDP), Export (% GDP), Import (% GDP), and Total population (POP). International migration flows and migrant stock data have been obtained from the United Nations Population Divisions (2019). Migrant stock inflow and outflow data have been obtained from the Department of Economics and Social Affairs, United Nations (2019) Population Division while all other data has been collected from the World Development Indicator (WDI) of the World Bank (2019).

Table 1. Variable Description and Data Source

Variables	Definition	Unit	Source
RI	Remittances Inflow	US$ million	WDI, World Bank (2019)
Ro	Remittances Outflow	US$ million	WDI, World Bank (2019)
MSI	Migrant Stock Inflows	US$ million	DESA, United Nation (2019)
MSO	Migrant Stock Outflows	US$ million	DESA, United Nation (2019)
FDI	Foreign Direct Investment	% GDP	WDI, World Bank (2019)
GDP	Gross Domestic Product	constant US$2010	WDI, World Bank (2019)
UR	Unemployment Rate	% GDP	WDI, World Bank (2019)
EXP	Export	% GDP	WDI, World Bank (2019)
IMP	Import	% GDP	WDI, World Bank (2019)
POP	Population	Million	WDI, World Bank (2019)

Source: Author's estimation
Note: WDI: World Development Indicators; DESA: Department of Economics and Social Affairs.

Figure 3a. Cumulative distribution of remittances flow

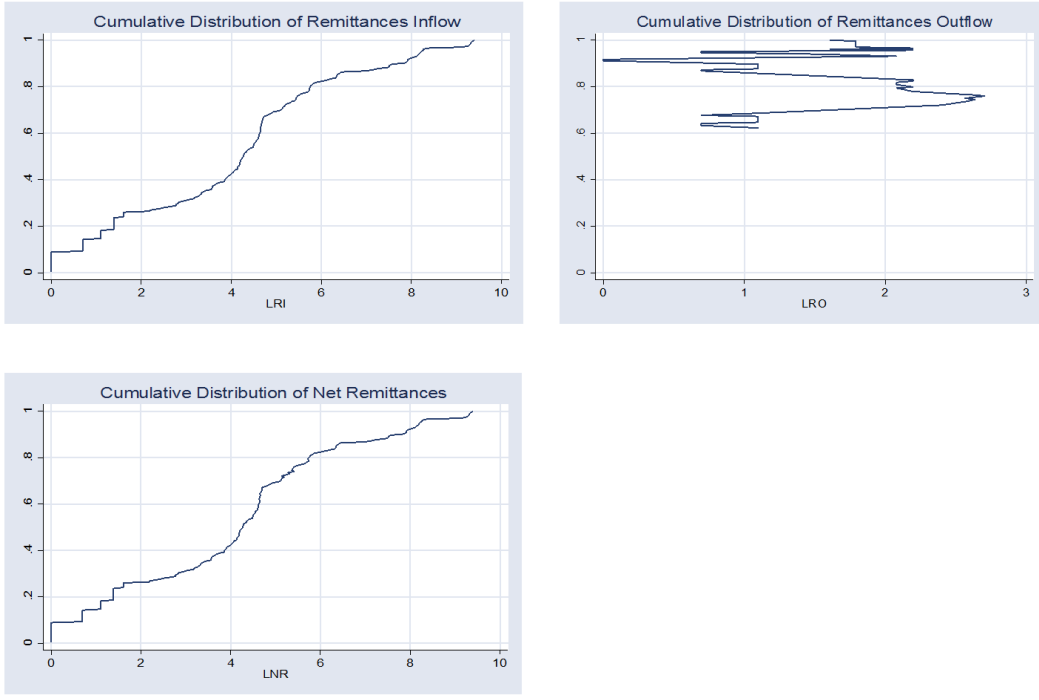
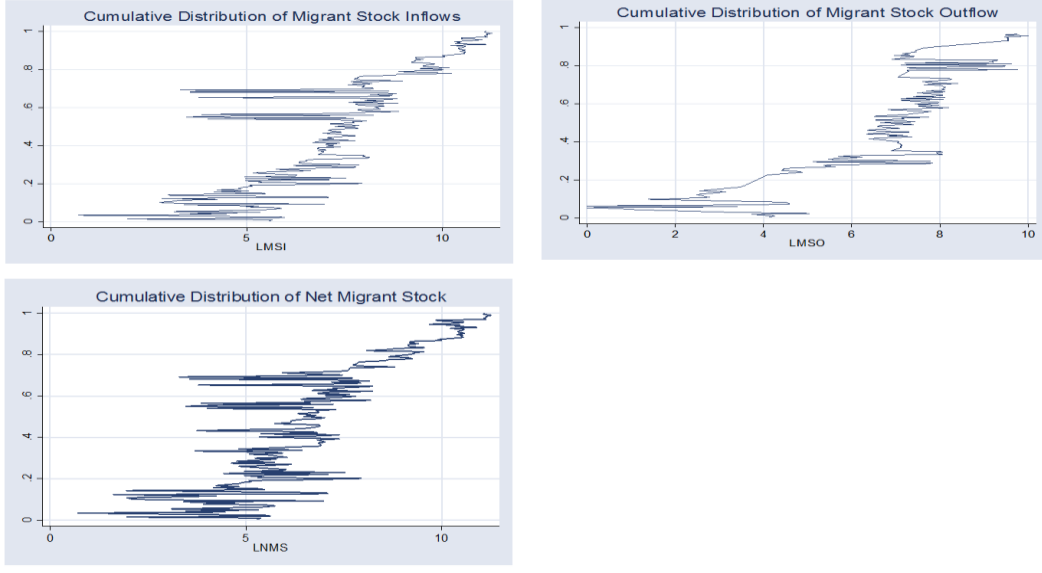


Figure 3b. Cumulative distribution of Migrant stock flow



Source: Author's estimation

Methods

The study has applied both Ordered Logistic Regression (OLR) and Ordered Probit Regression (OPR) models[7] to examine the determinants of bilateral remittance flow and migrant stock flow using a set of independent variables such as GDP, UR, POP, FDI, EXP, and IMP as suggested by Padhan et al. (2022). The reason for using the OLR method is that the migrant stock data follows an ordinal distribution. The OLR can be explained in the following equation:

$$\log \frac{\delta(Y_{ij} \leq 1)}{1-\delta(Y_{ij} \leq 1)} = \theta_0 + \sum_{k=1}^{\tau-1} \theta_{jk} X_{ijk} + \upsilon_{ij}, \quad c = 1,....,\Omega - 1 \tag{1}$$

In EQ (1), θ_0 and $\Omega - 1$ represents the intercept of the equation and is interpreted as the marginal frequencies in the OLR model. θ_{jk} presents the slope coefficient; X_{ijk} vector of independent variables; and υ_{ij} the omitted variables that are not captured in this model or residuals. Furthermore, $\delta(Y_{ij} \leq 1)$ denotes the probability of an event that will happen while $1-\delta(Y_{ij} \leq 1)$ explaining the probability that will not occur. $k = 1$ is the first independent variable whereas $\tau - 1$ is the last independent variable of the ordered logistic regression model.

Additionally, we have applied the OPR model for the robustness of our OLR model. The OPR model is better in controlling the degree of freedom reduction due to the independence of irrelevant alternatives than the multinomial logit and multinomial probit model (Ben-Avika and Lerman, 1985; Greene, 2000). The OPR model can be explained in the following ways:

$$T_n^* = \beta' z_n + \mu_n \tag{2}$$

Eq. (2), T_n^* presents the latent and continuous measure of migrant stock migrating by n number of population; z_n shows the list of explanatory variables; β' shows the slope coefficient parameter, and μ_n shows the error term. T_n^* is determined from the model in the following ways and has been represented in Figure A1[8] Appendix.

$$T_n^* = \left[1 \ if \ -\infty < T_n^* < 0.25\right]$$

$$T_n^* = \left[2 \ if \ 0.25 < T_n^* < 0.50\right]$$

[7] Both OLR and OPR are qualitative response regression model. These model are applied while the outcome variables i.e. dependent variables are not continuous means it might be discrete variables. In the case discreet variables, we can apply Ordinary Least Square (OLS) regression model.

[8] In Figure A1, ϖ_{11i} denotes the omitted variables that are not captured in the models.

$$T_n^* = \left[3 \ if \ \ 0.50 < T_n^* < \infty \right]$$

Results

The result section is divided into two steps. First, preliminary results have been presented such as descriptive statistics, pair-wise correlation, cross-sectional dependency, and panel Correlated Standard Errors (PCSE) test for serial correlation of heterogeneous panels as suggested by the literature (Behera and Dash, 2017). Second, the main regression result has been presented using both OLR and OPR models.

Descriptive statistics

Table 2 presents the description of variables in the logarithmic form. $\ln MSI_{it}$ is the log of Migrant Stock Inflows; $\ln MSO_{it}$ is the log of Migrant Stock Outflows; $\ln NMS_{it}$ is the log of Net Migrant Stock; $\ln RI_{it}$ is the log of Remittances Inflow, $\ln RO_{it}$ is the log of Remittances Outflow, $\ln NR_{it}$ is the log of Net Remittances, $\ln GDPoc_{it}$ is the log of Gross Domestic Product of Origin Country, $\ln GDPhc_{it}$ is the log of Gross Domestic Product of Host Country, $\ln URoc_{it}$ is the log of Unemployment Rate of Origin Country, $\ln URhc_{it}$ is the log of Unemployment Rate of Host Country, $\ln FDIoc_{it}$ is the log of Foreign Direct Investment of Origin Country, $\ln FDIhc_{it}$ is the log of Foreign Direct Investment of Host Country, $\ln EXPoc_{it}$ is the log of Export of the Origin Country, $\ln EXPhc_{it}$ is the log of Export of the Host Country, $\ln IMPoc_{it}$ is the log of Import of the Origin Country, $\ln IMPhc_{it}$ is the log of Import of the Host Country, Population of the Origin Country ($\ln POPoc_{it}$) and Population of the Host Country ($\ln POPhc_{it}$).

Table 2 presents descriptive statistics of variables. In the case of mean, $\ln POPoc_{it}$ (20.970), $\ln POPhc_{it}$ (16.444) country is highest followed by $\ln GDPhc_{it}$ (10.453), $\ln GDPoc_{it}$ (7.358), $\ln MSI_{it}$ (7.103), $\ln NMS_{it}$ (6.631), $\ln MSO_{it}$ (6.552), $\ln RI_{it}$ (4.032), $\ln NR_{it}$ (4.028), $\ln EXPhc_{it}$ (3.792), $\ln IMPhc_{it}$ (3.744), $\ln IMPoc_{it}$ (3.274), $\ln EXPoc_{it}$ (3.119), $\ln URhc_{it}$ (1.940), $\ln RO_{it}$ (1.546), $\ln URoc_{it}$ (0.984), $\ln FDIhc_{it}$ (0.895), and $\ln FDIoc_{it}$ (0.546). For standard deviation, $\ln RI_{it}$ is the highest deviation (2.469), followed by $\ln NR_{it}$ (2.467), $\ln NMS_{it}$ (2.386), $\ln MSI_{it}$ (2.373), $\ln MSO_{it}$ (2.154), $\ln FDIhc_{it}$ (1.420), $\ln RO_{it}$ (0.744), $\ln GDPhc_{it}$ (0.577), $\ln EXPhc_{it}$ (0.560), $\ln IMPhc_{it}$ (0.507), $\ln URhc_{it}$ (0.420), $\ln FDIoc_{it}$ (0.155), $\ln IMPoc_{it}$ (0.143), $\ln GDPoc_{it}$ (0.108), $\ln EXPoc_{it}$ (0.099), $\ln URoc_{it}$ (0.050), and $\ln POPoc_{it}$ (0.023) respectively.

Table 2 also presents correlation results. It shows that GDP, POP, and UR are positively correlated with RI while FDI, IMP, and EXP are negatively correlated with RI. RO is positively correlated with UR of the host country, POP of host country, FDI of origin country, EXP of the host country, and IMP while it is adversely correlated with GDP, POP origin country, FDI host country, and EXP of the origin country. Similarly, GDP, UR origin country, and POP are FDI origin countries positively correlated while other variables are negatively correlated with MSI and MSO.

Cross-sectional dependency

Table A3 Appendix presents the cross-section correlation results using the Cross-sectional Dependency (C-D) test as suggested by Pesaran (2004). The null hypothesis of the C-D test is cross-sectional independence, and the alternative hypothesis is cross-sectional dependence between the variables. Our result finds that the null hypothesis CD-test is rejected at a 1% level of significance which indicates the existence of cross-sectional dependence in the dataset.

Table 2. Descriptive statistics and Correlation of variables

				Correlation					
Variables	-9+	Mean	Std. Dev.	$\ln RI_{it}$	$\ln RO_{it}$	$\ln NR_{it}$	$\ln MSI_{it}$	$\ln MSO_{it}$	$\ln NMS_{it}$
$\ln RI_{it}$	Remittances Inflow	4.032	2.469	1					
$\ln RO_{it}$	Remittances Outflow	1.546	0.744	-0.157	1				
$\ln NR_{it}$	Net Remittances	4.028	2.467	1	-0.164	1			
$\ln MSI_{it}$	Migrant Stock Inflows	7.103	2.373	0.855	-0.305	0.855	1		
$\ln MSO_{it}$	Migrant Stock Outflows	6.552	2.154	0.849	0.739	0.848	0.895	1	
$\ln NMS_{it}$	Net Migrant Stock	6.631	2.386	0.843	-0.274	0.843	0.959	0.750	1
$\ln GDPoc_{it}$	Gross Domestic Product of Origin Country	7.358	0.108	0.024	-0.067	0.024	0.057	0.138	0.057
$\ln GDPhc_{it}$	Gross Domestic Product of Host Country	10.453	0.577	0.442	-0.516	0.442	0.427	0.250	0.353
$\ln URoc_{it}$	Unemployment Rate of Origin Country	0.984	0.050	0.034	-0.128	0.034	0.029	0.110	0.026
$\ln URhc_{it}$	Unemployment Rate of Host Country	1.940	0.420	0.010	0.456	0.0106	-0.129	-0.114	-0.049
$\ln POPoc_{it}$	Population of Origin Country	20.970	0.023	0.027	-0.079	0.027	0.053	0.137	0.054
$\ln POPhc_{it}$	Population of Host Country	16.444	1.555	0.551	0.281	0.551	0.648	0.722	0.6446
$\ln FDIoc_{it}$	Foreign Direct Investment of Origin Country	0.546	0.155	-0.004	0.001	-0.004	0.042	0.021	0.048
$\ln FDIhc_{it}$	Foreign Direct Investment of Host Country	0.895	1.420	-0.242	-0.044	-0.241	-0.208	-0.170	-0.202
$\ln EXPoc_{it}$	Export of Origin Country	3.119	0.099	-0.001	-0.023	-0.001	-0.055	-0.092	-0.059
$\ln EXPhc_{it}$	Export of Host Country	3.792	0.560	-0.645	0.321	-0.644	-0.553	-0.483	-0.592
$\ln IMPoc_{it}$	Import of Origin Country	3.274	0.143	-0.008	0.049	-0.008	-0.059	-0.119	-0.061
$\ln IMPhc_{it}$	Import of Host Country	3.744	0.507	-0.633	0.345	-0.632	-0.551	-0.489	-0.576

Source: Author's estimation

Note: ln: Natural logarithm, i country and t time; Std. Dev.: Standard Deviation

Panel correlated standard errors

Table 3 explains the Panel Correlated Standard Errors (PCSEs) test result. The PCSEs technique is used in the estimation of the dynamic heterogeneous panel because the PCSEs model is less sensitive to outliers and provides robust standard error estimates without any serial correlation (Reed and Webb, 2010; Bailey and Katz, 2011; Millo, 2014; Ikpesu, et *al.,* 2019). Model-1 show $\ln MSI_{it}$ is a function of $\ln RI_{it}$, $\ln RO_{it}$, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$ $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. Model -1 results show the variables such as $\ln RI_{it}$, $\ln RO_{it}$, $\ln GDPoc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln EXPhc_{it}$ and $\ln EXPoc_{it}$ are positive while $\ln GDPoc_{it}$, $\ln URoc_{it}$ $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$ are negatively associated with $\ln MSI_{it}$. Model-2 show $\ln MSO_{it}$ is a function of $\ln RI_{it}$, $\ln RO_{it}$, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$ $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. We have found that variables such as $\ln RI_{it}$, $\ln RO_{it}$, $\ln GDPoc_{it}$, $\ln POPoc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, and $\ln IMPoc_{it}$ are positive while $\ln GDPhc_{it}$, $\ln POPhc_{it}$, $\ln FDIhc_{it}$, and $\ln IMPhc_{it}$ are negatively associated with $\ln MSO_{it}$. similarly, in Model-3, we have regressed $\ln NMS_{it}$ with other explanatory variables and found that the variables such as $\ln RI_{it}$, $\ln RO_{it}$, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln EXPoc_{it}$ and $\ln EXPhc_{it}$ are positive while $\ln GDPoc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$ are negatively connected $\ln NMS_{it}$.

Table 3. Results of PCSEs test for Migrant stock flows

	Model – 1			Model – 2			Model – 3		
	DEP: $\ln MSI_{it}$			DEP: $\ln MSO_{it}$			DEP: $\ln NMS_{it}$		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
$\ln RI_{it}$	0.8658	0.0491	0.000	0.1549	0.1578	0.327	0.8120	0.0467	0.000
$\ln RO_{it}$	0.0710	0.0619	0.252	0.1354	0.0618	0.028	0.1195	0.0579	0.039
$\ln GDPoc_{it}$	-1.2928	4.4819	0.773	16.8560	4.4321	0.000	-13.8272	3.6392	0.000
$\ln GDPhc_{it}$	2.4359	0.4974	0.000	-4.4114	1.9262	0.022	2.8319	0.5909	0.000
$\ln URoc_{it}$	-2.9320	1.1574	0.011	2.6833	0.4803	0.000	-9.5158	0.8931	0.000
$\ln URhc_{it}$	-1.4924	0.2149	0.000	0.3687	0.2113	0.081	-0.8869	0.1690	0.000
$\ln POPoc_{it}$	11.5199	21.0790	0.585	-65.6472	19.4892	0.001	70.6057	17.1649	0.000
$\ln POPhc_{it}$	0.0261	0.0617	0.672	0.1217	0.4121	0.768	0.1501	0.0513	0.003
$\ln FDIoc_{it}$	-0.1824	0.1139	0.109	0.2822	0.0909	0.002	-0.3152	0.1392	0.024
$\ln FDIhc_{it}$	-0.2023	0.0610	0.001	-0.1140	0.0381	0.003	-0.0743	0.0494	0.132

$\ln EXPoc_{it}$	3.5620	0.3960	0.000	1.4922	0.6785	0.028	3.9662	0.4132	0.000
$\ln EXPhc_{it}$	1.6383	0.6455	0.011	1.4197	0.4576	0.002	0.5129	0.6265	0.413
$\ln IMPoc_{it}$	-3.1072	0.3965	0.000	0.6116	0.6600	0.354	-4.0936	0.4193	0.000
$\ln IMPhc_{it}$	-0.5859	0.7890	0.458	-0.4500	0.5707	0.43	-1.1674	0.7829	0.136
Constant	210.6643	404.5059	0.603	1292.052	363.3031	0.000	-1392.795	328.8373	0.000

Source: Author's estimation

Migrant stock inflows and outflows estimation using ordered logistic regression

Table 4 explains the Order logistic regression results. In Model-4, we use Growth of Migrant Stock Inflows ($dMSI_{it}$) as a function of dRI_{it}, dRO_{it}, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. The independent variables dRI_{it} dRO_{it} $\ln GDPhc_{it}$ $\ln POPoc_{it}$ $\ln POPhc_{it}$ $\ln EXPoc_{it}$ $\ln EXPhc_{it}$ are positive while $\ln GDPoc_{it}$ $\ln URoc_{it}$ $\ln URhc_{it}$ $\ln FDIhc_{it}$ $\ln FDIoc_{it}$ $\ln IMPoc_{it}$ and $\ln IMPhc_{it}$ negatively related $dMSI_{it}$. In model - 5, we have regressed the growth of Migrant Stock Outflows ($dMSO_{it}$) with other explanatory variables and found that variables such as dRI_{it} $\ln POPoc_{it}$ $\ln FDIhc_{it}$ and $\ln EXPhc_{it}$ are negatively connected while other exogenous variables are positively related $dMSO_{it}$. In Model - 6, we have estimated the growth of Net Migrant Stock ($dNMS_{it}$) with other explanatory variables and found that dRI_{it} dRO_{it} $\ln GDPhc_{it}$ $\ln POPoc_{it}$ $\ln POPhc_{it}$ $\ln EXPoc_{it}$ $\ln EXPhc_{it}$ are positive while $\ln GDPoc_{it}$ $\ln URoc_{it}$ $\ln URhc_{it}$ $\ln FDIhc_{it}$ $\ln FDIoc_{it}$ $\ln IMPoc_{it}$ and $\ln IMPhc_{it}$ negatively related $dNMS_{it}$.

Table 4. Results of Ordered Logistic Regression for Migrant stock flows.

	Model - 4			Model – 5			Model – 6		
	DEP: $\ln MSI_{it}$			DEP: $\ln MSO_{it}$			DEP: $\ln NMS_{it}$		
	Coef.	P>t	Std. Err.	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
$\ln RI_{it}$	0.0014	0.000	0.0003	-5.6100	0.0001	0.972	0.0013	0.0003	0.000
$\ln RO_{it}$	0.3719	0.002	0.1204	0.0741	0.2065	0.72	0.3017	0.1107	0.006
$\ln GDPoc_{it}$	-68.7328	0.179	51.1107	38.3836	52.2643	0.463	-91.1633	51.2899	0.076
$\ln GDPhc_{it}$	0.6385	0.011	0.2518	0.5094	0.2454	0.038	0.4906	0.2471	0.047
$\ln URoc_{it}$	-25.1508	0.241	21.4403	30.7864	21.8598	0.159	-39.8887	21.5755	0.064
$\ln URhc_{it}$	-0.2888	0.364	0.3183	0.4982	0.3492	0.154	-0.1884	0.3223	0.559
$\ln POPoc_{it}$	359.4052	0.15	249.4769	-217.615	254.6059	0.393	471.8238	250.4158	0.06
$\ln POPhc_{it}$	0.4350	0.000	0.1178	0.4427	0.1228	0.000	0.3015	0.1188	0.011
$\ln FDIoc_{it}$	-1.8035	0.216	1.4567	2.5597	1.5	0.088	-3.0375	1.4739	0.039
$\ln FDIhc_{it}$	-0.1363	0.194	0.1049	-0.0160	0.1015	0.874	-0.1648	0.1037	0.112

$\ln EXPoc_{it}$	6.9876	0.238	5.9156	-8.3256	6.0718	0.17	11.0374	6.0172	0.067
$\ln EXPhc_{it}$	2.1156	0.23	1.7616	4.1057	1.7557	0.019	0.3337	1.7969	0.853
$\ln IMPoc_{it}$	-8.2632	0.196	6.3932	8.5273	6.5269	0.191	-14.4304	6.3866	0.024
$\ln IMPhc_{it}$	-1.6298	0.38	1.8566	-3.3723	1.8787	0.073	-0.1580	1.9033	0.934

Source: Author's estimation

Migrant stock inflows and outflows using ordered probit regression

Table 5 illustrates the Order Probit Regression (OPR) results. In Model -7, we have regressed the $dMSI_{it}$ with other independent variables such as dRI_{it}, dRO_{it}, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. We have found that variables dRI_{it}, dRO_{it}, $\ln GDPhc_{it}$, $\ln POPoc_{it}$, $\ln POPhc_{it}$, $\ln EXPoc_{it}$, and $\ln EXPhc_{it}$ are positive while $\ln GDPoc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$ are negatively associated with $dMSI_{it}$. But in Model - 8, the independent variables $\ln POPoc_{it}$ $\ln FDIhc_{it}$ $\ln EXPoc_{it}$ are adverse effects $dMSO_{it}$ while other exogenous variables are positively related $dMSO_{it}$. Similarly, in Model -9, we have regressed the $dNMS_{it}$ with other explanatory variables and found that dRI_{it}, dRO_{it}, $\ln POPoc_{it}$, $\ln POPhc_{it}$, and $\ln EXPoc_{it}$ are positively and statistically significant with $dNMS_{it}$ while $\ln GDPoc_{it}$, $\ln URoc_{it}$, $\ln FDIoc_{it}$, and $\ln IMPoc_{it}$ are negatively and statistically significant association with $dMSI_{it}$.

Table 5. Result of Ordered Probit Regression for Migrant stock flows

	Model - 7			Model – 8			Model – 9		
	DEP: $\ln MSI_{it}$			DEP: $\ln MSO_{it}$			DEP: $\ln NMS_{it}$		
	Coef.	P>t	Std. Err.	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
$\ln RI_{it}$	0.0007	0.000	0.0001	2.2200	8.9500	0.804	0.0006	0.0001	0.000
$\ln RO_{it}$	0.1490	0.016	0.0617	0.0615	0.0603	0.308	0.1488	0.0614	0.015
$\ln GDPoc_{it}$	-50.5583	0.102	30.9358	22.1066	31.1998	0.479	-61.1409	30.9664	0.048
$\ln GDPhc_{it}$	0.3329	0.026	0.1491	0.2378	0.1504	0.114	0.2309	0.1480	0.119
$\ln URoc_{it}$	-22.9896	0.077	12.9870	17.4224	13.1217	0.184	-29.7306	13.0146	0.022
$\ln URhc_{it}$	-0.1110	0.548	0.1849	0.2183	0.1867	0.243	-0.0985	0.1849	0.594
$\ln POPoc_{it}$	263.0397	0.082	151.3054	-127.953	152.5884	0.402	317.5854	151.5209	0.036
$\ln POPhc_{it}$	0.2382	0.001	0.0698	0.2405	0.0702	0.001	0.1467	0.0690	0.034
$\ln FDIoc_{it}$	-1.81	0.035	0.8575	1.4179	0.8656	0.101	-2.2983	0.8582	0.007
$\ln FDIhc_{it}$	-0.0703	0.236	0.0594	-0.0073	0.0598	0.903	-0.0819	0.0593	0.168
$\ln EXPoc_{it}$	7.5411	0.033	3.5389	-4.2210	3.5858	0.239	9.3165	3.5466	0.009
$\ln EXPhc_{it}$	1.4432	0.122	0.9330	2.1485	0.9525	0.024	0.3717	0.9342	0.691
$\ln IMPoc_{it}$	-8.5556	0.024	3.7842	4.2545	3.7860	0.261	-11.192	3.7884	0.003
$\ln IMPhc_{it}$	-1.1598	0.251	1.0113	-1.7717	1.0328	0.086	-0.2629	1.0128	0.795

Source: Author's estimation

Remittances inflow and outflow using ordered logistic regression

Table 6 shows the OLR Estimates of Remittances Inflow, Outflow, and Net Remittances. In Model -10, we use the growth of Remittances Inflow (dRI_{it}) as a function of $dMSI_{it}$, $dMSO_{it}$, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $lPOPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. We have found variables such as $dMSI_{it}$, $dMSO_{it}$, $\ln GDPhc_{it}$, $lPOPoc_{it}$, $\ln POPhc_{it}$, $\ln FDIoc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$ are positively and statistically significant relationships with dRI_{it} while $\ln GDPoc_{it}$, $\ln EXPhc_{it}$, and $\ln EXPoc_{it}$ are negatively and statistically, significant association with dRI_{it}. But in Model-11, we have regressed the growth Remittance Outflow (dRO_{it}) with other explanatory variables and found that variables such as $dMSI_{it}$ and $dMSO_{it}$ are positive and statistically significant effects on dRO_{it} while other variables show a statistically insignificant relationship dRO_{it}. In Model-12, we use dNR_{it} as a dependent variable and found that $dMSI_{it}$ $dMSO_{it}$ $\ln GDPhc_{it}$ $lPOPoc_{it}$ $\ln POPhc_{it}$ $\ln FDIoc_{it}$ $\ln IMPoc_{it}$ and $\ln IMPhc_{it}$ are positive and statistically significant relationships with dNR_{it} while the negative and statistically significant association with $\ln GDPoc_{it}$, $\ln EXPhc_{it}$, and $\ln EXPoc_{it}$.

Table 6. Result of Ordered Logistic Regression for Remittances Flows

	Model - 10			Model – 11			Model – 12		
	DEP: $\ln RI_{it}$			DEP: $\ln RO_{it}$			DEP: $\ln NR_{it}$		
	Coef.	P>t	Std. Err.	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
$\ln MSI_{it}$	0.0001	0.000	3.2100	5.9800	1.8600	0.001	0.0001	3.2100	0.000
$\ln MSO_{it}$	0.0002	0.009	8.5200	0.0002	9.6200	0.018	0.0002	8.5100	0.009
$\ln GDPoc_{it}$	-142.705	0.01	55.4230	-67.3008	86.8508	0.438	-141.272	55.4628	0.011
$\ln GDPhc_{it}$	1.15766	0.000	0.27962	0.6952	0.4372	0.112	1.1327	0.2795	0.000
$\ln URoc_{it}$	-0.42	0.985	22.3016	-38.0257	37.2229	0.307	-0.3109	22.3308	0.989
$\ln URhc_{it}$	-0.3211	0.303	0.3115	0.1367	0.5473	0.803	-0.3276	0.3121	0.294
$\ln POPoc_{it}$	584.8461	0.03	268.7144	372.1147	425.3322	0.382	577.4954	268.947	0.032
$\ln POPhc_{it}$	0.2245	0.058	0.1183	0.0008	0.2070	0.997	0.2200	0.1181	0.063
$\ln FDIoc_{it}$	3.9668	0.007	1.4727	-0.2580	2.4793	0.917	4.0081	1.4737	0.007
$\ln FDIhc_{it}$	0.0470	0.654	0.1049	-0.18725	0.1608	0.244	0.0503	0.1051	0.632
$\ln EXPoc_{it}$	-39.9855	0.000	6.5584	4.3074	10.6587	0.686	-40.1507	6.5664	0.000
$\ln EXPhc_{it}$	-5.5998	0.002	1.7827	-2.8657	2.6726	0.284	-5.4829	1.7914	0.002
$\ln IMPoc_{it}$	16.1817	0.01	6.2780	-3.1197	10.2749	0.761	16.3505	6.2935	0.009
$\ln IMPhc_{it}$	5.1764	0.006	1.8838	2.5240	2.8959	0.383	5.0634	1.8919	0.007

Source: Author's estimation

Remittances inflow and outflow using ordered probit regression

Table 7 shows the OPR Estimates of Remittances Inflow, Outflow, and Net Remittances. In Model -13, we use the growth of Remittances Inflow (dRI_{it}) as a function of $dMSI_{it}$, $dMSO_{it}$, $\ln GDPoc_{it}$, $\ln GDPhc_{it}$, $lPOPoc_{it}$, $\ln POPhc_{it}$, $\ln URoc_{it}$, $\ln URhc_{it}$, $\ln FDIoc_{it}$, $\ln FDIhc_{it}$, $\ln EXPoc_{it}$, $\ln EXPhc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$. We have found variables such as $dMSI_{it}$, $\ln GDPhc_{it}$, $lPOPoc_{it}$, $\ln POPhc_{it}$, $\ln FDIoc_{it}$, $\ln IMPoc_{it}$, and $\ln IMPhc_{it}$ are positively and statistically significant relationships with dRI_{it} while $\ln GDPoc_{it}$, $\ln EXPhc_{it}$, and $\ln EXPoc_{it}$ are negatively and statistically significant association with dRI_{it}. But in Model-14, we have regressed the growth Remittance Outflow (dRO_{it}) with other explanatory variables and found that variable $dMSI_{it}$ is a positive and statistically significant effect dRO_{it} while other variables show a statistically insignificant relationship dRO_{it}. In Model-15, we use dNR_{it} as a dependent variable and found that $dMSI_{it}$, $\ln GDPhc_{it}$ $lPOPoc_{it}$, $\ln FDIoc_{it}$ $\ln IMPoc_{it}$ and $\ln IMPhc_{it}$ are positive and statistically significant relationships with dNR_{it} while the negative and statistically significant association with $\ln GDPoc_{it}$, $\ln EXPhc_{it}$, and $\ln EXPoc_{it}$.

Table 7. Results of Ordered Probit Regression for Remittances Flows

	Model - 13			Model – 14			Model – 15		
	DEP: $\ln RI_{it}$			DEP: $\ln RO_{it}$			DEP: $\ln NR_{it}$		
	Coef.	P>t	Std. Err.	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
$\ln MSI_{it}$	7.3400	0.000	1.4300	2.8400	1.0500	0.007	7.3500	1.4300	0.000
$\ln MSO_{it}$	7.5600	0.114	4.7900	6.9300	0.00005	0.174	7.5100	4.7900	0.117
$\ln GDPoc_{it}$	-87.5397	0.007	32.2674	-40.2452	43.9158	0.359	-85.2836	32.2714	0.008
$\ln GDPhc_{it}$	0.5481	0.000	0.1560	0.2847	0.2153	0.186	0.5348	0.1559	0.001
$\ln URoc_{it}$	-0.9668	0.942	13.2518	-20.7576	18.4296	0.26	-0.0989	13.2661	0.994
$\ln URhc_{it}$	-0.1768	0.344	0.1868	0.0810	0.2710	0.765	-0.1856	0.1869	0.321
$\ln POPoc_{it}$	358.6728	0.022	157.1532	214.6241	214.6934	0.317	347.243	157.1979	0.027
$\ln POPhc_{it}$	0.1160	0.098	0.0701	-0.0324	0.0984	0.742	0.1139	0.0701	0.104
$\ln FDIoc_{it}$	2.1730	0.014	0.8803	-0.0037	1.2101	0.998	2.2263	0.8813	0.012
$\ln FDIhc_{it}$	0.0027	0.964	0.0601	-0.0964	0.0841	0.251	0.0054	0.0601	0.927
$\ln EXPoc_{it}$	-24.0218	0.000	3.8651	1.3693	5.0386	0.786	-24.2315	3.8727	0.000
$\ln EXPhc_{it}$	-2.6304	0.007	0.9668	-1.4894	1.2763	0.243	-2.5469	0.9674	0.008
$\ln IMPoc_{it}$	9.1527	0.018	3.8679	-1.9766	5.3186	0.71	9.4380	3.8739	0.015
$\ln IMPhc_{it}$	2.4994	0.016	1.0418	1.3094	1.4048	0.351	2.4152	1.0424	0.021

Source: Author's estimation

Discussion

In the previous section, we have estimated the cyclical behaviour of remittance flow and migrants' stock with income from 31 pairs of countries to India for the period 2020-2016. We have applied both ordered logit and ordered probit regression models to determine the factors influencing migrant stock inflows, migrant stock outflows, net migrant stock, remittance inflows, remittance outflows, and net remittance. Our results find five insights as follows.

Firstly, remittance flow and migrant stock show a pro-cyclical relationship between the pair of countries and India. In other words, remittances inflow by the migrant has been used for a productive purpose in the origin country that led to the overall development of the economy. Our result is like the past studies where that have argued that remittances improve technical efficiency, ideas, knowledge, and human capital development in the origin country (Lipton, 1980; Conway and Cohen, 1998). Similarly, we have found that remittance outflow also positively impacts migrant stock inflow which means migrants usually return to their origin country for short period and again return to the host country. This might happen either in any economic crisis that persisted, or migrants have fully exhausted the remittance money by filling all the household demands in the origin country (Luith and Ruiz-Arranz, 2006 and 2008; Alesina et *al.,* 2008; Sayan 2006).

Secondly, the study finds that remittance inflow is counter-cyclical with the income growth of the origin country. That means remittance inflow increases more when the origin country suffers a recession and a reduction in remittance inflow occurs while there is a good economic condition in the origin country. Similarly, remittance outflow is pro-cyclical for the destination country. That means outward flows of remittances increases more in the time of boom while it is low in bad times. The literature argues that in times of boom, the outflow of remittance solves the potential labor shortages and improves the danger of monetary policy expansion while in bad times, the outflows of remittances tend to solve the domestic unemployment and improve the balance of payment components. Our findings are similar to past studies that argue that the counter-cyclical movement of remittance is mutually beneficial for both host countries and the destination country of immigrants (Clarke and Wallstein, 2004; Kapur, 2005; Chami et *al.,* 2005; Acosta et *al.,* 2007; Yang and Choi, 2007; Yang, 2011).

Thirdly, import harms the inflow of migrant stock or migration which is similar to the past studies that argue that the inflow of migrants has been influenced by international trade (Akkoyunlu (2010; Egger et *al.*, 2012; Majlesi and Narciso, 2018). They argue that if people move from labor-abundant countries where productivity and wages are very low to a country where labour scares and wage is very high, then productivity will grow, and the economy will boost.

Fourthly, our study finds that foreign direct investment has a positive impact on remittances while harming migration. It shows that large inflows of foreign direct investment are being used for transaction costs, debt before sending remittances, and fees for official transactions. On the other side, it hinders further migration because capital flows might have been used for domestic production, domestic labour supply that not only increases productivity but also boosts wages. This argument is matching with the earlier literature of Faini et al (1999); Hazari and Sgro (2013); Lucas (1990) who fined that foreign direct investment plays an important role in international trade that links trade and factor mobility. Faini et al (1999) and Hazari and Sgro (2013) argue that if foreign direct investment increases economic growth that led to

increased labour productivity in the host countries and eventually capital flows and migration will be a substitute for each other. Similarly, Lucas (1990) argues that higher productivity and economic growth increase the domestic demand for labour which leads to a fall in emigration and vice-versa.

Fifthly, our result finds that unemployment influences migrant flows that lead to inflows of remittance during the economic recession in the origin country which is closely related to earlier studies (DaVanzo 1978; Pissarides and Wadsworth1989); Albercht and Vroman (2002); Charlot et *al.,* 2005). They argue that unemployment impacts migration in two ways. First, the unemployed are more likely to move out than the employed because they have less given up than employed workers that have a greater impact on net migration. Second, if unemployment is risk-averse or liquidity constraint, the migrants eat their assets, and net migration declines (Gordon, 1985). Further Pissarides and McMaster (1989) argue that interregional migration depends on wage and regional unemployment ratio.

Conclusions

This study has examined the cyclical pattern of remittances, migrants' stock, and income of 31 pairs of countries with India for the period from 2010 to 2016. The main motivation was to examine whether immigration and emigration policies play an influential role to improve welfare between the host and origin country or not in terms of bilateral remittance flows. As our bilateral remittance and migrant stock data follow a binomial distribution, so we have applied both ordered logit and ordered probit regression model to examine the smoothing hypothesis which was a new addition to the literature. A study has found that remittances and migrant stocks are counter-cyclical concerning income in the worker's country of origin, while pro-cyclical concerning the distinction country. The study concludes that financial constraint is a major issue for immigrants' movement that leads to low remittances flows and should be alleviated. Further, immigration and emigration policies should be determined by looking at the unemployment rate, the magnitude of migration, and the population size of both host and origin countries. The study also has some limitations that should be discussed. First, there is a greater level of data limitation on bilateral remittances across countries and over the period. Second, the adoption of human capital indicators, gender, occupational categories of migrants, and age variations could be an influential role to determine the magnitude of remittance flow and migrants' stocks.

Declarations

Ethics approval and consent to participant

Not Applicable

Consent for publication

Not Applicable

Availability of data and materials

The data used for this study can be obtained from the World Development Indicators (WDI) of the World Bank. These data are available in the public domain for research purposes.

Competing interests

The authors declare that they have no competing interests.

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References

Acosta, P. A., Lartey, E. K., and Mandelman, F. S. (2009). Remittances and the Dutch disease. *Journal of International Economics*, 79(1), 102-116.

Agarwal, R., & Horowitz, A. W. (2002). Are international remittances altruism or insurance? Evidence from Guyana using multiple migrant households. *World Development*, *30*(11), 2033-2044.

Agunias, D. R. (2006). *Remittances and development: Trends, Impacts, and Policy Options: A review of the literature*. Migration Policy Institute.

Akkoyunlu, S. (2010). Can trade, aid, foreign direct investments and remittances curb migration from Turkey?. *Migration Letters*, *7*(2), 144-158.

Albrecht, J., & VROMAN1, S. U. S. A. N. (2002).A matching model with endogenous skill requirements. *International Economic Review*, *43*(1), 283-305.

Amuedo-Dorantes, C., &Pozo, S. (2004). Workers' remittances and the real exchange rate: a paradox of gifts. *World Development*, *32*(8), 1407-1417.

Arvin, B. M., & Lew, B. (2012). Do happiness and foreign aid affect bilateral migrant remittances?. *Journal of Economic Studies*.

Behera, D. K., & Dash, U. (2017). Impact of GDP and tax revenue on health care financing: An empirical investigation from Indian states. *Theoretical & Applied Economics*, *2*(611), 249-266.

Behera, D. K., Mohanty, R. K., & Dash, U. (2020). Cyclicality of public health expenditure in India: role of fiscal transfer and domestic revenue mobilization. *International Review of Economics*, *67*(1), 87-110.

Bettin, G., Presbitero, A. F., and Spatafora, N. L. (2015).Remittances and vulnerability in developing countries. *The World Bank Economic Review*, *31*(1), 1-23.

Borjas, G. J. (1999). Immigration and welfare magnets. *Journal of Labor Economics*, *17*(4), 607-637.

Chami, R., Fullenkamp, C., &Jahjah, S. (2005). Are immigrant remittance flows a source of capital for development?. *IMF Staff Papers*, *52*(1), 55-81.

Charlot, O., Decreuse, B., &Granier, P. (2005). Adaptability, productivity, and educational incentives in a matching model. *European Economic Review*, *49*(4), 1007-1032.

Clarke, G., &Wallsten, S. (2004). *Do remittances protect households in developing countries against shocks? Evidence from a natural disaster in Jamaica.* World Bank.

Corden, W. M., &Neary, J. P. (1982). Booming sector and de-industrialisation in a small open economy. *The Economic Journal*, *92*(368), 825-848.

DaVanzo, J. (1978). Does unemployment affect migration? Evidence from micro data. *The Review of Economics and Statistics*, 504-514.

De Sousa, J., and Duval, L. (2010). Geographic distance and remittances in Romania: Out of sight, out of mind?. *EconomieInternationale*, (1), 81-97.

Docquier, F., Rapoport, H., &Salomone, S. (2012). Remittances, migrants' education and immigration policy: Theory and evidence from bilateral data. *Regional Science and Urban Economics*, *42*(5), 817-828.

Egger, P. H., Von Ehrlich, M., & Nelson, D. R. (2012). Migration and trade. *The World Economy*, *35*(2), 216-241.

El-Sakka, M. I., & McNabb, R. (1999). The macroeconomic determinants of emigrant remittances. *World Development*, *27*(8), 1493-1502.

Faini, R. (1994). Workers remittances and the real exchange rate. *Journal of Population Economics*, *7*(2), 235-245.

Frankel, J., and Rose, A. (2002).An estimate of the effect of common currencies on trade and income. *The Quarterly Journal of Economics*, *117*(2), 437-466.

Freund, C., &Spatafora, N. (2008).Remittances, transaction costs, and informality. *Journal of Development Economics*, *86*(2), 356-366.

Gordon, I. (1985). The cyclical interaction between regional migration, employment and unemployment: a time series analysis for Scotland. *Scottish Journal of Political Economy*, *32*(2), 135-158.

Kapur, D. (2005). Remittances: the new development mantra?. *Remittances: Development Impact and Future Prospects*, *2*(1), 331-360.

Karpestam, P. (2009). Economics of Migration. *Lund Economic Studies*, *153*.

Lillo, F., and Molina Garay, J. A. (2019). The global remittance network: an inflow and outflow analysis. *The Journal of Mathematical Sociology*, *43*(2), 59-75.

Lopez, H., Bussolo, M., & Molina, L. (2007). *Remittances and the real exchange rate.* World Bank Policy Research Working Paper, (4213).

Lucas, R. E., & Stark, O. (1985). Motivations to remit: Evidence from Botswana. *Journal of Political Economy*, *93*(5), 901-918.

Lueth, E., and Ruiz-Arranz, M. (2006). *A gravity model of workers' remittances (No. 2006-2290).*International Monetary Fund.

Lueth, E., and Ruiz-Arranz, M. (2008).Determinants of bilateral remittance flows. *The BE Journal of Macroeconomics*, *8*(1).

Majlesi, K., &Narciso, G. (2018). International import competition and the decision to migrate: Evidence from Mexico. *Journal of Development Economics*, *132*, 75-87.

Osili, U. O. (2007). Remittances and savings from international migration: Theory and evidence using a matched sample. *Journal of Development Economics*, *83*(2), 446-465.

Özden, Ç., Parsons, C. R., Schiff, M., and Walmsley, T. L. (2011). Where on earth is everybody? The evolution of global bilateral migration 1960–2000. *The World Bank Economic Review*, *25*(1), 12-56.

Padhan, H., Behera, D. K., Sahu, S. K., & Dash, U. (2022). Does Corruption Hinderance Economic Growth Despite Surge of Remittance and Capital Inflows Since Economic Liberalization in an Emerging Economy, India. *Journal of the Knowledge Economy*, 1-24.

Pissarides, C. A., & Wadsworth, J. (1989).Unemployment and the inter-regional mobility of labour. *The Economic Journal*, *99*(397), 739-755.

Rajan, R. G., & Subramanian, A. (2005). What undermines aid's impact on growth? (No. w11657).*National Bureau of Economic Research*.

Ratha, D. (2007). Leveraging remittances for development. *Policy Brief*, *3*(11).

Sayan, S. (2006). *Business cycles and workers' remittances: How do migrant workers respond to cyclical movements of GDP at home?* (No. 6-52). International Monetary Fund.

Stark, O.(1991). The Migration of Labor.*Blackwell, Cambridge, and Oxford, UK*.

United Nations (2019). *International Migrant Stock. Department of Economic and Social Affairs, United Nations Population Division*. Doi: www.unmigration.org.

World Bank (2019). *Annual Remittances Data: Migrant Remittance Inflows*. Doi: http://www.worldbank.org/en/

World Migration Report (2010). *World Migration Report*, International Organization for Migration.

Yang, D. (2011).Migrant remittances. *Journal of Economic Perspectives*, *25*(3), 129-52.

Yang, D., & Choi, H. (2007). Are remittances insurance? Evidence from rainfall shocks in the Philippines. *The World Bank Economic Review*, *21*(2), 219-248.

Appendix

Table A1. Share of Remittances on GDP (2018)

Country	% Share of GDP	Country	% Share of GDP
Australia	0.10	Norway	0.10
Austria	0.70	Poland	1.30
Belgium	2.10	Portugal	2.00
Canada	0.10	Slovak Republic	2.10
Czech Republic	1.70	Spain	0.70
Denmark	0.40	Sweden	0.50
Finland	0.30	Switzerland	0.40
France	0.90	United Kingdom	0.20
Germany	0.40	United States	0.00
Hungary	3.00	Chile	0.00

Iceland	0.70	Estonia	1.70
Italy	0.40	Israel	0.30
Japan	0.10	Slovenia	1.00
Korea	0.40	India	2.80
Luxembourg	2.70		
Mexico	2.80		
Netherlands	0.30		

Source: World Bank (2019)

Table A2. Lists of 31 Country's sample

Australia	Norway
Austria	Poland
Belgium	Portugal
Canada	Slovak Republic
Czech Republic	Spain
Denmark	Sweden
Finland	Switzerland
France	United Kingdom
Germany	United States
Hungary	Chile
Iceland	Estonia
Italy	Israel
Japan	Slovenia
Korea	India
Luxembourg	
Mexico	
Netherlands	

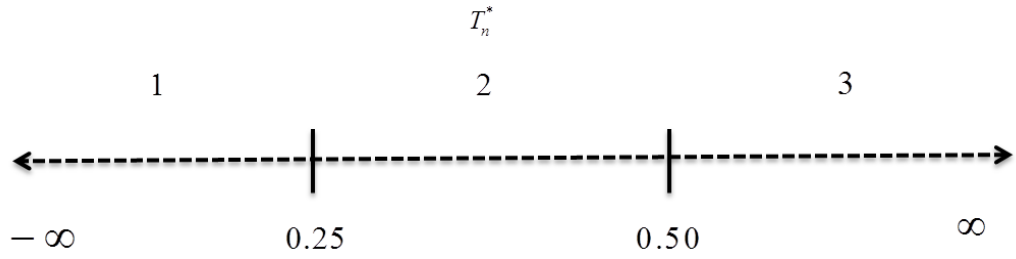
Source: World Bank (2019)

Table A3. Results of Pesaran Cross-sectional Dependence tests (2004)

Variable	CD-test	p-value	Corr	abs (corr)
ln RI	1.9	0.058	0.303	0.588
ln RO	0.61	0.0539	0.097	0.338
ln NR	1.85	0.064	0.296	0.592
ln MSI	0.68	0.0498	0.1	0.775
ln MSO	-0.44	0.66	-0.074	0.394
ln NMS	0.89	0.0371	0.137	0.712
ln GDPhc	57.05	0.000	1.000	1.000
ln POPhc	57.05	0.000	1.000	1.000
ln URhc	57.05	0.000	1.000	1.000
ln GDPoc	34.92	0.000	0.612	0.728
ln POPoc	19.81	0.000	0.347	0.921
ln URhc	4.56	0.000	0.08	0.641
ln FDIhc	57.05	0.000	1.000	1.000
ln FDIoc	57.05	0.000	1.000	1.000
ln EXPhc	57.05	0.000	1.000	1.000
ln EXPoc	11.59	0.000	0.203	0.582
ln IMPhc	57.05	0.000	1.000	1.000
ln IMPoc	15.13	0.000	0.265	0.519

Source: Author's estimation

Figure A1. Latent and continuous measure of migrant stock



Source: Author's estimation