

Migration, Foreign Direct Investment and Vulnerability: Panel-Based Evidence

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Abstract

This study examines the effects of migration on economic vulnerability in small island developing states. Using data from 32 small island developing and fixed-effects model and the fixed-effect panel threshold model we find that migration reduces economic vulnerability in SIDS while FDI contributes to economic vulnerability. More importantly, we noted migration's effect diminishes with an increase in FDI ratio.

1. Introduction

Recently, the concept of vulnerability is receiving unprecedented attention within policy makers and development economist. Increasing extreme phenomena in the last decade such as cyclone Winston in Fiji, flood in New Zealand, heat wave in Europe and Horn of Africa drought, global financial crisis and Pandemic significantly demonstrates the potential vulnerability of human existence to extreme events and disturbances. The vulnerability refers to the sensitivity and exposure of key sectors of an economy to exogenous shocks and resilience refers to its ability to withstand and recover from these shocks. Reducing the vulnerability of communities and nations is critically important for economic stability and economic resilience to exogenous shocks. Thus, it is immensely important to identify which factors contribute to and which factors impede vulnerability. This study using economic vulnerability index of Feindouno & Goujon (2016)¹ formally examines the effects of migration stock on economic vulnerability (EV) in small island development states (SIDS).

Although extreme climatic events and external shocks affect both developed and developing countries, they vary in their susceptibility to exogenous shocks, as well as their level of exposure, commitment, and response strategies. Small island developing states (SIDS) which are characterized by low level of economic and social development, unique geography and size

¹ This index, composed of shocks (scale and possibility of natural or external shocks) and exposure (structural exposure to those shocks), is a weighted average index of population, export concentration, agriculture, forestry and fisheries, natural disasters, and exports of goods and services.

are at immense risk from exogenous and incur greatest cost of adjusting to threats associated with global warming and climate change (Briguglio, 2014; Easterly and Kraay, 2000; ECLAC, 2005). High burden of cost relates to low resilience of social, physical and environment factors. SIDS are highly likely to confront a future where limited natural endowments, lack of economic opportunities and infrastructure, can potentially be exposed not only to large-scale climate disaster but also to a more permanent state of stress because of sea level rise, long spell of droughts, more frequent and severe cyclones (Julca and Paddison, 2010, Sanders, 1997).

Increasing concentration of economic activities, physical infrastructure and greater population densities further acerbates vulnerability of SIDS to hazards. In this perspective, labour migration and its associated remittances inflow become a double-edged sword, on the one hand, they can lessen vulnerability through reduced risk of social instability like protests and violence by reducing the demand for public services. In addition, according to altruism hypothesis, individual and families migrate to spread household risk and protect household against unexpected changes in income due to natural disasters and/or economic shocks. On the other hand, labour migration can make the country more vulnerable by causing the loss of highly skilled workers and affect food supply (Julca and Paddison, 2010). Studies such as Kinzig et al., 2006 and Craven (2015) argue that migration can provoke increase vulnerability in sending countries, households, and communities by creating dependence on unsecure income sources.

The link between migration (remittances) and vulnerability is particularly important for SIDS for the following reasons. Migrant-remittances to SIDS have been steadily increasing, particularly in comparison to capital flows, due to the growing international labour mobility. Following COVID-19, the migration of workers from SIDS has significantly grown. Many OECD countries are experiencing a significant increase in labor shortages, partly due to a sharp increase in demand following the pandemic and partly due to structural changes as many workers seek better-paying and higher-quality jobs (Causa, et al. 2022). The labor shortage in OECD countries presents a significant opportunity for employment and migration for workers and households in SIDS. Secondly, remittances have proven remarkably resilient during global crises such as the 2008 financial crisis and the current COVID-19 pandemic. In many cases, remittance flows to SIDS, particularly PICs, have increased during these crises, providing much-needed support for these countries.

Despite growing significance of migrant remittances to SIDS in general and PICs in particular, there is lack of studies examining the impact of remittances and migration on economic vulnerability in SIDS. Moreover, some studies examined the issue in the context of the developing countries, but the evidence is inconclusive. This study therefore examines the impact of migration on economic vulnerability in SIDS. The study makes novel contributions to the extant literature. This is one of the first study to examine impact of migration on economic vulnerability, using unique dataset from SIDS. SIDS presents a special case as traditionally migrants from SIDS mostly consist of skilled and highly qualified personals and its impact is likely to be unique to SIDS. This study further examines the impact of foreign direct investment (FDI) on economic vulnerability and impact FDI on migrations' influence on economic vulnerability.

On the positive note migration of skilled workers has helped reduce the burden on domestic labor markets and eased the possibility of social unrest and dissatisfaction (Julca and Paddison, 2010). For example, countries like Fiji, Tonga, Samoa among other SIDS have seen a significant number of people migrating over the last thirty years, yet these economies are still unable to generate adequate employment opportunities for even a small percentage of their yearly graduates. Migration has therefore provided an alternative means of employment for these individuals, and also helped overcome vulnerabilities arising from poorly defined property rights. Similarly, the migration of farm workers can also reduce vulnerability by releasing pressure on key natural resources such as ocean, forestry, and land. This can help sustainably manage these resources, leading to improved economic outcomes in the long term. In addition, families in the migrant's home country can improve their social and economic status by utilizing the remittances they receive.

On contrary, the loss of skilled workers can result in national-level vulnerability, instance, in the the emigration of skilled medical professionals has led to a shortage of healthcare workers, resulting in lower quality healthcare and increased vulnerability to public health crises (Julca and Paddison, 2010, Brown and Connell, 2005). Likewise, the rapid increase in migration from Small Island Developing States (SIDS) may exacerbate their vulnerability to climate change, as it can lead to the underutilization of critical infrastructure, such as coastal protection systems, and a shortage of specialized personnel, such as disaster response and recovery experts. Moreover, the recent surge in the migration of farm and semi-skilled workers can potentially contribute to vulnerability by creating labor shortages in the key sector of the economy, economic disruption, higher wage inflation and food shortage. The over-reliance on these transfers can create moral hazards that negatively affect households and discourage diversification of income sources. This dependence on remittances has been observed in many SIDS Such as Tonga, Samoa, Cook Islands, Niue, where it has resulted in undesirable consequences such as a decline in economic activity and deterioration of the country's current account balance when remittances stop flowing (Julca and Paddison, 2010).

In the context of the above background, this study examines the impact of migration on economic vulnerability using panel data of 32 small island countries over the period 2002-2018. We also examined the interactive effects of FDI and migration. Using fixed-effects model and the fixed-effect panel threshold model we find that migration reduces economic vulnerability in SIDS while FDI contributes to economic vulnerability. More importantly, we noted migration's effect diminishes with an increase in FDI ratio.

The rest of the paper is organised as follows. Section 2 provides the methodology, section 3 presents results and discussion, section 4 outlines the implication of the finding and final section concludes the paper.

2. The model

Given the lack of theoretical frameworks for this field, the current empirical analysis is based on a cointegration induced model. The analysis starts with the implication of growth theories and considers a range of macroeconomic indicators, including migration stock, gross national income, labor participation, investment, unemployment, personal remittance, official development assistance received, foreign direct investment, domestic credit to private sector, exports and imports, final consumption expenditure, industry value added, central government debt, and inflation. Given the different quality of data across different indicators, some macroeconomic indicators, such as personal remittance, central government debt, and inflation, are excluded from the analysis. Furthermore, due to high correlations amongst many macroeconomic indicators, combined with their statistical significance in explaining economic vulnerability, the final model is settled with the following fixed-effects structure:

$$ev_{it} = \alpha_{0i} + \alpha_1 mig_{it} + \alpha_2 fdi_{it} + \alpha_3 mig_{it} \times fdi_{it} + \alpha_4 gni_{it} + e_{it} \quad (1)$$

The dependent variable $ev_{i,t}$ is the economic vulnerability index measured out of 100. The larger the index, the more vulnerable an economy is. This index is one of the three criteria for the identification of the Least Developed Countries. Data comes from the FERDI.² The explanatory variables of interest is natural logarithmic migration stock, $mig_{i,t}$, sourced from United Nations Department of Economic and Social Affairs. Given our proposed hypothesis that migration's effect on economic vulnerability may interact with that of foreign investment, FDI to GDI ratio henceforth enters the model in both additive ($fdi_{i,t}$) and multiplicative ($mig_{i,t} \times fdi_{i,t}$) forms. The control variable is natural logarithmic gross national income, $gni_{i,t}$. Data on FDI and GNI are sourced from World Bank's World Development Indicators database.

Equation (1) only points out the interactive effects between migration and FDI, and it doesn't provide the evidence whether migration's effect is subject to changes in FDI, or it should be the other way around. To test our proposed hypothesis that the effect of migration on economic vulnerability is subject to changes in FDI, a fixed-effect panel threshold model is further adopted as follows:

$$\begin{cases} ev_{it} = \beta_{0i} + \beta_1^{lower} mig_{it} + \beta_2^{lower} gni_{it} + u_{it}, & mig_{it} < \gamma \\ ev_{it} = \beta_{0i} + \beta_1^{upper} mig_{it} + \beta_2^{upper} gni_{it} + u_{it}, & mig_{it} \geq \gamma \end{cases} \quad (2)$$

where mig_{it} is the proposed threshold variable, and γ is the proposed single threshold level.

² Feindouno S. and Goujon M. (2016) "The retrospective economic vulnerability index, 2015 update" Ferdi Working Paper P147, March 2016. Updated Data 2020 accessed on <http://byind.ferdi.fr/>.

2.1 Data description

The current study utilizes the data on 32 small island developing countries over the period 2002-2018, subject to the limitation of data availability. List of countries is presented in Table 1. It is noted that none of European SIDS is covered in the current sample. Economic vulnerability data come from the FERDI database and the rest series come from World Development Indicators database. The trends of utilized series are described in the figures.

Table 1. List of sample countries

| Country | Country | Country |
|---------------------|-----------------------|----------------------------------|
| Antigua and Barbuda | Grenada | Solomon Islands |
| Bahrain | Guyana | Sao Tome and Principe |
| Bahamas | Haiti | Suriname |
| Belize | Jamaica | Seychelles |
| Barbados | Kiribati | Tonga |
| Comoros | Saint Kitts and Nevis | Trinidad and Tobago |
| Cape Verde | Saint Lucia | Tuvalu |
| Dominica | Maldives | Saint Vincent and the Grenadines |
| Dominican Republic | Mauritius | Vanuatu |
| Fiji | Papua New Guinea | Samoa |
| SGP | Singapore | |

Figure 1. Trends of economic vulnerability index over 2002-2018



Figure 2. Trends of migration stock (natural logarithm) over 2002-2018



Figure 3. Trends of FDI inflows to GDP ratio over 2002-2018

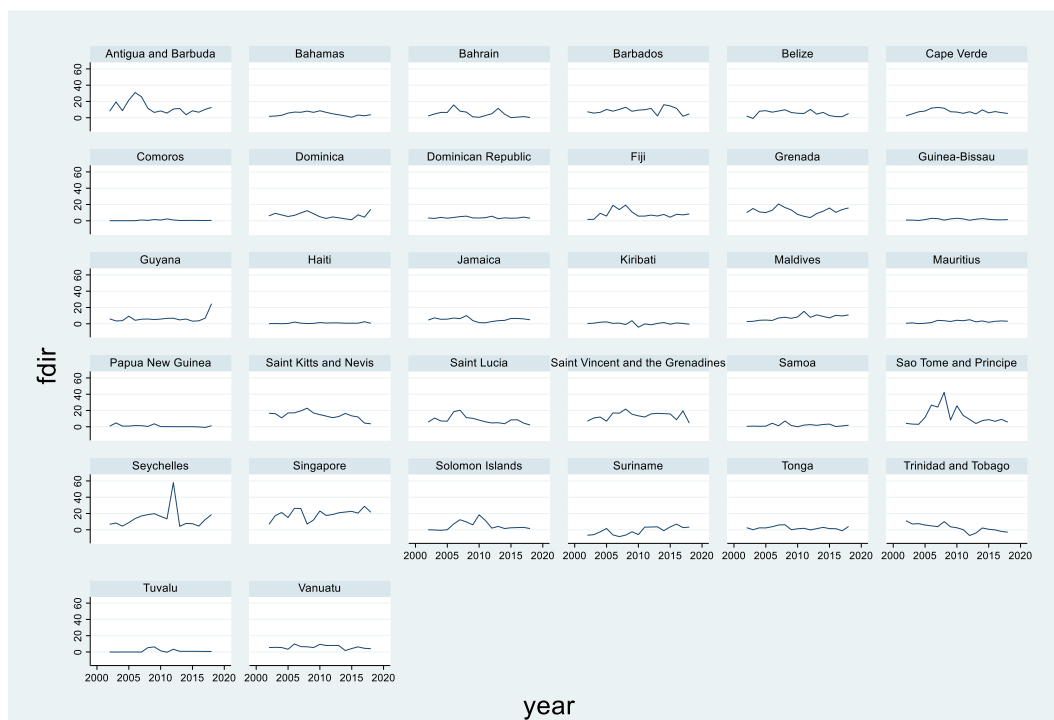
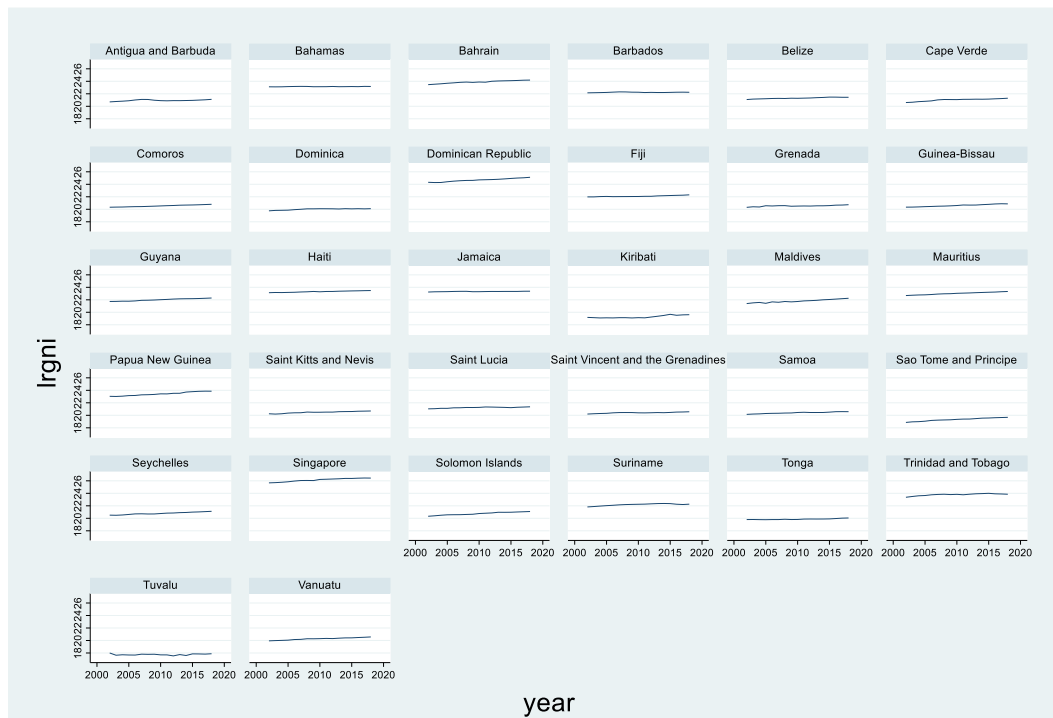
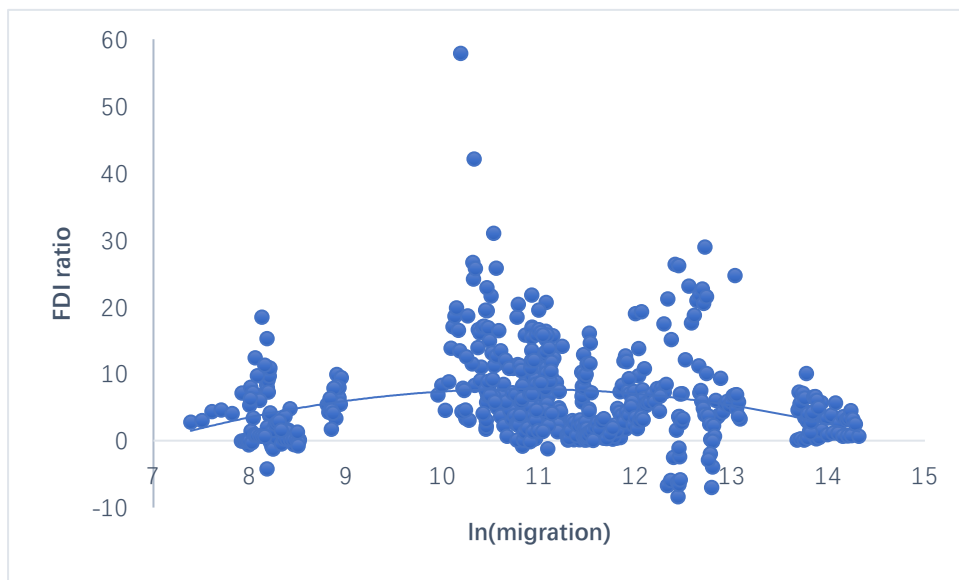


Figure 4. Trends of real gross national income (natural logarithm) over 2002-2018



The utilized series show clear non-stable trends in most sample countries. And the interaction between migration stock and FDI ratio is further exhibited in a scatter diagram, which shows a quadratic relationship between the two series. This provides a preliminary support of using FDI ratio as the regime variable to test for the threshold effects of migration stock.

Figure 5. Scatter diagram between migration stock (natural logarithm) and FDI ratio



3. Empirical findings and Discussion

The empirical analysis follows the procedure of testing for unit root, cointegration and cross-sectional dependence, conducting regressions. Results are summarized in Tables 2-5.

Karavias and Tzavalis (2014) panel unit root test is used to test for the null hypothesis that all panel time series are unit root processes. The tests hypothesize cross-section dependence and cross-section heteroskedasticity in individual series, and one potential structural break. As this test requires strongly balanced panel data, number of years used in individual tests vary with series. The null hypothesis is not rejected for all series at level but rejected in their first differences, leading to the conclusion that all series are integrated of order one. Test results are reported in Table 2.

Table 2. Panel unit root tests

| Variable | minZ-stat | p-value | Variable | minZ-stat | p-value |
|-------------|-----------|---------|--------------------|-----------|---------|
| $ev_{i,t}$ | -1.4734 | 0.4700 | $\Delta ev_{i,t}$ | -18.6971 | 0.0000 |
| $mig_{i,t}$ | -2.0168 | 0.4048 | $\Delta mig_{i,t}$ | -1.8595 | 0.0315 |
| $gni_{i,t}$ | -0.0002 | 0.6700 | $\Delta gni_{i,t}$ | -0.2288 | 0.0300 |
| $fdi_{i,t}$ | -1.1057 | 0.1344 | $\Delta fdi_{i,t}$ | -10.8365 | 0.0000 |

We employ Kao (1999), Pedroni (1999, 2004), and Westerlund (2005) tests to test for the null hypothesis of no panel cointegration. Assumptions used in the tests include panel specific cointegrating vector, panel means included, no time trend, and panel-specific AR parameter. Most tests reject the null hypothesis. Test results are shown in Table 3.

Table 3. Panel cointegration tests

| Test | stat | p-value | Test | stat | p-value |
|---------------------------|---------|---------|-----------------------------------|---------|---------|
| Kao (1999) tests | | | Pedroni (1999, 2004) tests | | |
| Dickey-Fuller t | -1.6766 | 0.0468 | Modified Phillips-Perron t | 3.8960 | 0.0000 |
| Modified D-F t | -0.3330 | 0.3696 | Phillips-Perron t | -2.0077 | 0.0223 |
| Augmented D-F t | -1.3131 | 0.0946 | Augmented D-F t | -1.4040 | 0.0802 |
| Unadjusted modified D-F t | -0.4814 | 0.3151 | Westerlund (2005) test | | |
| Unadjusted D-F t | -1.7744 | 0.0380 | Variance ratio | 1.9264 | 0.0270 |

We adopt Frees (1995, 2004), Friedman (1937) and Pesaran (2004) tests to test the hypothesis of cross-sectional independence in panel-data models with small T and large N by implementing two semiparametric tests proposed by Friedman (1937) and Frees (1995, 2004),

as well as the parametric testing procedure proposed by Pesaran (2004). And two of the three tests do not reject the null hypothesis that error terms of the model are independent across cross sections.

Table 4. Cross-sectional independence

| Test | stat | 5% critical value | p-value |
|-----------------|--------|-------------------|---------|
| Frees (1995) | 5.030 | 0.1996 | |
| Friedman (1937) | 19.635 | | 0.9433 |
| Pesaran (2004) | 0.168 | | 0.8665 |

To assess migration stock's complex effects on economic vulnerability in SIDS, the fixed-effects model and the fixed-effect panel threshold model exhibited in Equations (1) and (2) are estimated by the fixed-effects (FE) estimator. Robustness analysis is further conducted by using sub-samples. Given insufficient number of countries in most continents, sub-samples are different combinations of continents. Regression results are summarized in Table 5.

It should be noted that findings are consistent to a large degree across different regressions. According to Columns (1)-(6), GNI plays a significant role, both statistically and quantitatively, in reducing economic vulnerability in the sample SIDS. Migration stock's mitigation effects are significant in most regressions. Migration's complex effects on economic vulnerability is reflected in the interactive term $mig_{i,t} \times fdi_{i,t}$ in Column (1), where the negative sign suggests that migration's effect diminishes with an increase in FDI ratio. This is further clarified in the threshold regressions from Columns (2)-(6), which shows larger magnitudes of migration when natural logarithmic migration stock is below the estimated threshold level and smaller magnitudes otherwise. More specific, with an increase in migration, the level of economic vulnerability in the sample SIDS respect to FDI has decreased. At lower levels of migration, inflows of FDI have been more used to build up resilience capacity and hence reduce economic vulnerability. At higher levels of migration stock, FDI inflows are less directed towards building resilience capacity and as a result will ease economic vulnerability less.

Table 5. Regressions of economic vulnerability $ev_{i,t}$

| Variables | (1) | (2) | (3) | (4) | (5) | (6) |
|------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| $gni_{i,t}$ | -5.55*** (-5.01) | -5.24*** (-4.76) | -3.68*** (-2.98) | -7.24*** (-5.14) | -4.82*** (-4.76) | -3.93*** (-2.81) |
| $mig_{i,t}$ | -1.11 (-0.67) | -3.38* (-1.93) | -3.94** (-2.09) | -4.15 (-1.54) | -3.40** (-2.16) | -2.69 (-1.30) |
| $fdi_{i,t}$ | .59*** (2.33) | - | | | | |
| $mig_{i,t} \times fdi_{i,t}$ | -.06*** | | | | | |

| | | | | | | |
|---------------------------|---------------------|---------------------|---------------------|------------------------------------|-----------------------|---------------------|
| | | (-2.59) | | | | |
| $\text{cat}\#c.fdi_{i,t}$ | | | | | | |
| 0 | - | -1.89*** (-4.28) | -2.26*** (-4.44) | -3.25*** (-5.00) | -1.79*** (-4.53) | -2.02*** (-4.18) |
| 1 | - | -.07*** (-2.68) | -.11*** (-3.00) | -.05 (-1.49) | -.04** (-1.85) | -.07*** (-2.53) |
| constant | 176.2*** (10.94) | 194.7*** (12.03) | 168.1*** (8.54) | 247.0*** (12.92) | 184.2*** (12.35) | 158.1*** (8.25) |
| γ | - | 7.8153 | 7.7017 | 7.6073 | 7.9133 | 7.7017 |
| Sigma_u | | 9.7940 | 9.8882 | 13.2074 | 8.0262 | 8.8894 |
| Sigma_e | | 2.9056 | 3.0262 | 3.0133 | 2.6006 | 2.8710 |
| rho | | .9191 | .9143 | .9505 | .9049 | .9055 |
| Sample | All continents | All continents | Exc. Africa | Exc. North & Central America | Exc. South America | Exc. Pacific |
| # countries | 32 | 32 | 26 | 19 | 30 | 24 |
| N | 544 | 544 | 442 | 323 | 510 | 408 |
| R^2 (between) | 0.5348 | 0.5257 | 0.5218 | 0.4822 | 0.6522 | 0.3127 |

Notes: t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4 Implications

4.1 Migration

Our findings imply that worker migration can lessen the effects of internal exogenous shocks, eg. Sea level rise, and external ones which are crisis and sudden short-term disturbances. The climate change and lack of economic opportunities in SIDS will increasingly expose vulnerable households to new challenges and hardship. The depletion of resources on one and inability of labour market to provide sufficient employment is forcing many individuals and household in SIDS to move across boarder in search of better employment prospects. Migration can provide opportunities to nationals in SIDS to improve the welfare of their families and relatives back home. Household that send migrants are able to diversify and generate new source of income, insurance and savings. Migrant remittance is emerging as the most important foreign exchange earner for many of the SIDS. Thus migration reduces vulnerability of households and economies to exogenous shocks (Howell, 2017). In absence of migration opportunity, families could have been trapped in location where food security and opportunities to make a livable income are scarce (Bharadwaj et al., 2021 and Silchenko and Murray2023). The findings is similar to Bouoiyour, Selmi and Miftah (2016) who noted that remittance reduce economic volatility in case of Morocco. Chami et al (2008) and Bugamelli and Paterno (2009) also noted that remittances reduce growth volatility using cross-section of 70 and 60 countries respectively.

4.2 FDI

Increasing reliance of SIDS on FDI can potentially make SIDS dumping grounding of outdated technologies, over-exploitation of natural resources with no beneficial value added local productions, or engaging assembly only with little local inputs (Nguyen and Le, 2021). FDI in SIDS is mainly concentrated in industries such as mineral and petroleum sector, fuel wholesale and retail, and fisheries, forestry exploitation as well key service sector including tourism, finance, and utilities. Studies such as Suane and Roca-Sagales (2015) argue that over concentration of foreign investment in few industries can amplify inequality in the recipient countries. Similarly, Wu and Hsu (2012) argue that FDI can increase inequality in recipient countries due to poor absorptive capacity. Similarly, Adams and Klobodu (2017) noted that foreign investment contributed to increased short-term and as well as long-long inequality and inequality causes economic vulnerability (Beckfield, 2006, Rash, 2017, Ryder, 2017). Moreover, studies such UNCTADSTAT (2016) and Alvarado, Iniguez and Ponce (2017) argue that concentration of FDI in primary produce can make economy more volatile as commodity prices are highly volatile over time. The results can be applied to SIDS as most of the FDI is concentrated in commodity extraction and exploitation of forestry and fisheries.

According to investment dependency theory, countries highly dependent on foreign investment are likely to organize its economy around export-oriented production (Jorgenson, Dick and Mahutga, 2007). This argument can be applied to the SIDS which have increasingly provided favorable conditions in taxes, land rents, repatriation of profits and capital, environmental regulation, tariffs to attract FDI. Thus, the volume of imports and exports in SIDS have significantly increased. In addition, SIDS are increasingly dependent on multinationals for machinery, technologies, and other intermediate inputs. High degree of openness and dependence on global economy can make these economies more vulnerable to a variety of global political economic condition and external shocks particularly when there is interplay between its' trade exposure and external shocks (Brigguglio, 2009, Jorgenson, Dick and Mahutga, 2007). These vulnerabilities can potentially suppress economic growth and provoke higher income inequality, cause uncontrolled urbanization and urban primacy (Kentor 2001) and thus heightened economic vulnerability. According to Gibson, Ostrom and Ahn (2000) multinationals maximize profit by achieving economies of scale at the expense of local ecology and ecological vulnerability increase socio-economic exposure (Siegel, Cabral, McHenry, Ojea, Owashi and Lester, 2019). Foreigners are also acquiring houses and properties in SIDS which have significantly increased prices of houses and created housing shortages for the locals. Recently, social tension has also increased due increasing land ownership by foreigners which depriving access to popular beaches and sites to locals (CEPAL, 2000).

5 Conclusion

This study aims to examine the effects of migrant from SIDS on economic vulnerability of SIDS. Our findings show that migration reduces economic vulnerability in SIDS. We also find that FDI increases economic vulnerability in SIDS, moreover, we find that migration's effect diminishes with an increase in FDI ratio. Our findings imply that worker migration can lessen the effects of internal exogenous shocks, eg. Sea level rise, and external ones which are crisis and sudden short-term disturbances. During the COVID-19 crisis we show significant increase in remittances flow to most of the SIDS. On the other hand, the productive structure of SIDS suggests that FDI oriented to the exploitation and extraction of natural resources contributes to economic volatility. It also implies that SIDS do not have the technological absorption capacity which limits productive linkages with small and medium firms. The findings has several policy implication.

Firstly, our result suggest that migration can effectively contribute to reducing economic vulnerability of SIDS while FDI can potentially amplify economic vulnerability. Firstly, we suggest that SIDS should continue to increase investment in human capital, which is likely to mitigate any negative effects of migration and labor shortages. Secondly, the government should redirect FDI from exploitation of natural resources to other high value-added sectors such manufacturing, ICT and food processing. The government should also direct FDI to more sustainable projects such eco-tourism and projects that can provide more inclusive development of the society.

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