

RESEARCH ARTICLES

Economic Globalisation and the Islands of the Indian Ocean: An Econometric Analysis

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Keywords: islands, Indian Ocean, co-integration, causality, Economic globalisation

<https://doi.org/10.24043/001c.125908>

Island Studies Journal

Vol. 20, Issue 2, 2025

This study investigates economic globalisation's impact on Indian Ocean islands from 1980 to 2020, focusing on the influence of trade, foreign direct investment (FDI), population, and financial aid on economic growth. Using a robust co-integration and causality approach, the study reveals that trade openness negatively impacts economic growth, whereas FDI and population exert a positive influence. Conversely, financial aid is found to have no significant effect on development. Detailed case studies of Comoros, Madagascar, Maldives, Mauritius, Seychelles and Sri Lanka indicate distinct policy interventions tailored to each nation's unique challenges and opportunities. This research significantly contributes to the limited literature on globalisation's effect on island economies and provides actionable recommendations for policymakers to foster sustainable economic performance and resilience in the Indian Ocean region.

Introduction

In the past decade, globalisation has been intensely debated, encompassing cultural, political, and economic dimensions. Cultural globalisation involves interactions that transform lifestyles and foster new values (UNDP, 1999). Political globalisation pertains to international institutions shaping political and economic power (Woods, 2017). Economic globalisation, central to this discourse, highlights the interdependence of global economies through technological advancements and the free flow of capital and labour (Obadan, 2008; Shangquan, 2000).

Over time, the concept of economic globalisation has evolved. Although there is no agreement as to when it began, most of the currently available literature points to the aftermath of World War II (Scholte, 1996). The emphasis was on primary resource extraction in developing countries (Gereffi et al., 2011). Thereafter, the focus shifted to international production and sourcing (Dicken, 2003). Advances in logistics have facilitated communication and transportation, thereby significantly easing global

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exchanges and reducing barriers to international trade by enabling businesses to expand and capitalise on new opportunities (Janelle & Beuthe, 1997). And now, the concept of globalisation has expanded to include such as hyper-globalisation, dematerialisation, and mega-traders (Subramanian & Kessler, 2013).

Despite extensive literature on globalisation, the focus is largely on industrialised nations, often overlooking the Indian Ocean islands. Historically, this region has been seen as the cradle of globalisation (Davis & Balls, 2019). Foreign trade dates to the 1400s with Portuguese explorations and the Dutch East India Company in the early 1600s (Flecker, 2010). Established trade routes saw India trading spices and textiles with Africa and Europe (Chaudhuri, 1985). Trade volume grew by 9.4% annually from 2000 to 2009 but slowed to 4.8% between 2011 and 2017 due to the financial crisis (UNCTAD, 2018). In recent years, initiatives such as China's Belt and Road Initiative (BRI), launched in 2013, aim to enhance global economic cooperation by connecting Asia, Africa, and Europe (Schulhof et al., 2022). Additionally, the Asia-Africa Growth Corridor (AAGC), established in 2017, seeks to channel infrastructure investments from India, Africa, and Japan (Taniguchi, 2020). By 2025, Indian Ocean economies are projected to contribute 20% of global GDP (Sri Lanka's Lakshman Kadirgamar Institute, 2020).

Most studies support their claims with theoretical explanations rather than empirical evidence, leaving the net effect of economic globalisation on growth ambiguous (Samimi & Jenatabadi, 2014). This study aims to investigate the impact of globalisation on the economic development of Indian Ocean islands from 1980 to 2020 by examining trade openness, foreign investment inflows, labour contribution, and foreign aid receipt. It assesses the impacts of these variables on growth and explores possible causal relationships. Despite the extensive literature on economic globalisation, there is a significant research gap regarding its impact on island economies, especially those in the Indian Ocean. These islands face unique economic challenges, such as limited natural resources, geographic isolation, and vulnerability to environmental changes, which are not adequately addressed in current studies (Brett, 2021; Latif et al., 2023). This research aims to fill this gap by providing empirical evidence on the effects of globalisation on the economic development of Indian Ocean islands, a relatively underexplored geographical area, offering valuable insights for scholars and policymakers working towards sustainable economic strategies for these regions. Previous studies, such as those by Baldacchino (2006) and Bertram (2006), have often overlooked the unique circumstances of island economies. This research links specific economic challenges faced by Indian Ocean islands to broader globalisation literature and provides targeted policy recommendations.

The research study is presented as follows: the next section defines the key concepts of economic globalisation and the islands to be analysed in the literature review. It will be followed by the econometric analysis with a focus on co-integration and causality analysis, in Section 4. Finally, the conclusion and policy recommendations in Section 5 will be provided.

Literature Review

Economic Globalisation

Global economic interconnectedness arises from several factors. Stiglitz (2006) identifies key drivers of economic globalisation as shifts in government ideologies and the creation of international organisations such as the WTO and IMF. Trade blocs and agreements have further facilitated market liberalisation by reducing trade and financial barriers. Technological advancements have expanded market economies and optimised production, improving goods and services. This integration has significantly lowered barriers to international interactions, enhancing global accessibility and interconnectedness (McKinnon, 2010; Rodrigue et al., 2017).

Economic globalisation enhances growth through global knowledge spillovers from international transactions and conferences, fostering local and global knowledge accumulation (Grossman & Helpman, 2015). This drives firms to adopt advanced production techniques and innovate. Increased global competition stimulates continuous innovation and learning, further boosting growth. Potrafke (2015) emphasised that globalisation is generally beneficial, provided that trade openness and foreign direct investment (FDI) do not destabilise the credit market or welfare system, thus promoting economic growth and reducing poverty. Additionally, internet access has increased social awareness and gender equality, linking higher trade and capital openness to faster economic growth (Dreher, 2006).

Even though many economists believe that the advantages of globalisation outweigh the drawbacks (Dreher, 2006), various studies have revealed that the consequences of globalisation differ across economies. Ezcurra and Rodríguez-Pose (2013) and Potrafke (2015) pointed out that the higher the degree of economic integration, the higher the rate of regional inequality. Low and middle-income countries, which rely more on economic integration to enlarge their markets, tend to be the most impacted by inequality. Agenor (2002) also demonstrated that globalisation, beyond a certain threshold, might hurt the poor in some countries, necessitating greater institutional reforms, financial regulations, and legal infrastructure. Rodrik (2007) suggested that countries should focus on domestic needs and national policy imperatives, rather than merely opening their markets, to boost economic development and promote social peace.

Island economies, unlike developed and least developed countries, have unique structural characteristics such as limited natural resources, small domestic markets, and high dependency on external trade and aid, making them more vulnerable to economic shocks (Baldacchino, 2015). They

leverage their geographical and cultural attributes to attract tourism and foreign investment. For instance, the Maldives and Seychelles have utilised their natural beauty and biodiversity to build strong tourism industries, driving economic growth (UNCTAD, 2020). Mainland countries, in contrast, might rely more heavily on diversified industrial bases and larger internal markets. The World Bank (2021) notes that islands often pursue specialised strategies; for instance, Mauritius transitioned from mono-crop agriculture to a diversified economy incorporating textiles, tourism, and finance. Island economies also show resilience through diversified strategies and strong community networks, maintaining stability despite frequent disasters and economic downturns (Briguglio, 2020; UNCTAD, 2020; *World Development Indicators*, 2021).

Despite their geographic isolation, islands can effectively participate in globalisation due to technological advancements that mitigate the challenges of location and distance. Improved transportation and e-commerce technologies have reduced the impact of distance barriers, enabling island economies to engage more robustly in regional and global digital markets (Armstrong et al., 1998; Armstrong & Read, 2000; Pua, 2023; Purcell et al., 2004). Furthermore, forming trade alliances and blocs enhances market access, fostering better integration into the global trade network (Armstrong et al., 1998). Technological advancements have alleviated geographic isolation challenges for island economies by improving connectivity and access to global networks. Connell and Lea (2018) and Briguglio and Kisanga (2020) note that information and communications technology (ICT) adoption has enhanced global trade participation, education, healthcare, and business opportunities in small island states. Despite these improvements, islands must still address their inherent vulnerabilities and dependencies to sustain growth in a globalised economy (Baldacchino, 2020). Trade liberalisation and the free flow of capital are central to economic globalisation, promoting growth by enhancing efficiency, fostering innovation, and expanding market access. Rajan and Zingales (2003) highlight that open trade regimes facilitate technological capital accumulation and global knowledge spillover, benefiting island economies by enabling access to advanced technologies and improved competitive positioning (Anderson et al., 2017). However, Rodrik (2018) and Stiglitz (2017) note that trade liberalisation's benefits are not uniform, with increased vulnerability to external shocks and erosion of local industries posing significant risks, especially for Small Island Developing States (SIDS) reliant on narrow export bases and facing diversification challenges.

Similarly, the free flow of capital presents a dual-edged sword. On one hand, it can attract FDI, which is vital for economic development through technology transfer, labour, and enhanced productivity (Blonigen, 2005). On the other hand, uncontrolled capital flows can lead to financial instability, as exemplified by the Asian financial crisis of the late 1990s (Stiglitz, 2017). For SIDS, balancing the attraction of beneficial FDI while mitigating the risks associated with volatile capital flows is crucial.

Recent research underscores the need for policies tailored to SIDS. Read (2008) suggests combining trade liberalisation with stringent financial regulations to prevent capital flight and volatility. Regional trade agreements can reduce dependency on distant markets and enhance resilience (UNCTAD, 2020; World Bank, 2021b), while also promoting best practices and regional cooperation (Muggah & Goldin, 2021; OECD, 2023). In conclusion, while trade liberalisation and the free flow of capital are fundamental aspects of economic globalisation, their implementation must be carefully managed to maximise benefits and minimise risks, particularly for small island economies.

1. The Concept of Trade

International trade serves as a catalyst for growth by enabling efficient specialisation in production methods, leading to global trade surpluses (Salvatore, 2011). Countries involved in global trade prioritise diversification and continuous learning to balance technological advancements with human capital accumulation (López, 2005). Frankel and Rose (2005) show that trade does not harm the environment, supporting the implementation of pro-environmental policies by both domestic and foreign firms. Engaging in international trade enhances productivity as firms gain insights from foreign markets, improving their manufacturing processes and product quality. The intense global competition compels firms to perform optimally, fostering continuous innovation and learning, and thereby furthering economic growth. International trade fosters efficient production methods, enabling countries to achieve global trade surpluses (Salvatore, 2011). However, its impact on economic growth is heterogeneous across nations.

Least Developed Countries (LDCs) are highly vulnerable to trade disruptions, threatening economic stability (Moon, 1997). Trade reforms often cause short-term unemployment and poverty by increasing competition and shifting labour to more profitable sectors, leading to firm closures (Agenor, 2002). The advancements in maritime and air transport have integrated island economies into the global market, reducing transportation costs and fostering growth (Hummels, 2007; Rodrigue et al., 2017). Primary trade sectors include the marine industry and tourism. Improved marine technology and port infrastructure have boosted maritime trade, but rising piracy due to poverty poses a threat (Pandya et al., 2011).

2. Foreign Direct Investment

Foreign direct investment is crucial for international economic efficiency, bringing capital, expertise, and technology that boost competitiveness and productivity. It fosters growth, especially under open trade policies, developed financial markets, and low corruption rates (Farole & Winkler, 2012). However, FDI can impede growth. Agenor (2002) argues that economic globalisation enhances foreign bank presence in developing countries, improving financial services but primarily benefiting large firms and limiting access for SMEs. Additionally, exposure to volatile shocks raises

domestic interest rates due to higher default risks. Proper regulation of domestic financial systems and sovereign debt management is essential to prevent financial instability and economic crises.

Recent empirical studies support these findings, highlighting that countries with well-developed financial systems and low corruption levels attract higher FDI inflows, leading to enhanced economic growth (Alfaro, 2017; Chen et al., 2023). Conversely, FDI could also slow down growth under certain conditions. For instance, Hanafy (2015) studied the Egyptian economy and found a positive FDI spill-over effect in the manufacturing sector, no impact in the service sector, and a negative FDI effect in agriculture. Additionally, recent research by Smith (2022) confirms that the sectors with low supply elasticity of foreign capital and low substitution elasticity of labour and capital might experience negative growth effects due to FDI. With a low supply elasticity of foreign capital and a low substitution elasticity of labour and capital, labour force expansion will require more payment to foreign investors. Consequently, FDI negatively affects growth (Bhagwati, 1958). Recent studies have further expanded this understanding by examining the role of political stability and economic policies in mediating the effects of FDI on growth, finding that stable political environments and supportive economic policies are essential for positive FDI impacts (Muggah & Goldin, 2021; OECD, 2023; WTO, 2022).

Empirical evidence highlights the varied effects of FDI on economic growth. Alguacil et al. (2019) found that in Latin America, FDI drives growth through technology transfer and improved management. In contrast, Asiedu (2013) showed that in resource-rich Sub-Saharan Africa, FDI often results in slower growth due to the “resource curse.” Chen et al. (2023) found that political stability and sound policies enhance FDI’s benefits, while Li and Tanna (2019) emphasised the roles of financial sector development and human capital in maximising FDI’s impact.

Island economies, despite their limited labour, resources, small markets, and high transportation costs, attract foreign direct investment (FDI) through open trade policies and trade liberalisation (Read, 2008). Their rich marine resources and strategic locations appeal to global businesses (Craigwell, 2007). The tourism industry, a major income source, further attracts international investors (Selvanathan et al., 2012). Thus, despite inherent challenges, islands leverage their natural resources and strategic advantages to attract FDI and drive economic growth.

Economic Globalisation on Small Islands

Small islands face significant economic vulnerabilities due to limited natural resources and small market sizes. Briguglio (1995) notes that these constraints force islands to rely heavily on imports, making them dependent on foreign exchange earnings to cover import costs. Worrell (1992) notes that import-substitution policies can degrade local goods’ quality and increase prices, as islands are price-takers. The limited non-renewable resources and geographic isolation further hinder development by raising transport costs

and causing delays (Briguglio, 1995). Environmental disasters, like earthquakes and cyclones, also threaten island economies. Addressing these challenges is crucial for their economic sustainability.

While most studies emphasise the size and remoteness of island states, their strategic adaptability in dynamic environments is pivotal. Baldacchino and Bertram (2009) highlight that island states can transition between sectors and even transnationally, leveraging diverse income streams and sectoral expertise. External factors such as fluctuations in tourism, financial aid, or industry performance necessitate a “rapid response capability” strategy (Bertram & Poirine, 2007, p.333). This approach may encompass high-end niches in finance and manufacturing, leasing geo-strategic locations, promoting labour mobility, and utilizing expatriate remittances. However, pursuing all strategies concurrently is impractical due to potential resource conflicts.

Many studies have utilised econometric methodologies to assess the impact of economic globalisation. Adams (2009), through Ordinary Least Squares (OLS) and fixed effects estimation, analysed 42 Sub-Saharan African countries from 1990 to 2003, concluding that insufficient (FDI) adversely affects the host nation. Similarly, Chang and Lee (2010) identified a long-term unidirectional causality between globalisation indices and economic development in OECD countries. Ying et al. (2014) found that economic globalisation positively impacted ASEAN countries’ growth from 1970 to 2008, while social and political globalisation had a marginally negative effect. Research on island economies and financial aid in econometric models is limited. Baldacchino and Bertram (2009) highlight that successful island economies rely on financial transfers, including repatriated capital and development assistance. Bertram (2018) shows that the Cook Islands’ dependence on external aid grants donors significant policy influence. Gounder (2001, 2003) found that foreign aid contributed to Fiji’s growth and identified a bidirectional causal link between aid and growth in the Solomon Islands. This relationship underscores the importance of GDP as an indicator of financial assistance, which, in turn, affects aid flows. Thus, given the significant contribution to the inflows of island economies, financial aid deserves considerable attention in the context of this study.

1. The Islands in the Indian Ocean

The islands of the Indian Ocean can be divided into two groups: the western and eastern islands. Except for Sri Lanka, the eastern territory comprises small islands with limited economic influence. In contrast, the western region includes five of the Indian Ocean’s six major islands: Comoros, Madagascar, Maldives, Mauritius, and Seychelles. The Western Indian Ocean has marine assets worth US\$333.8 billion, according to the World Wide Fund (2017). Hence, the Western Indian Ocean Governance Initiative has been established to protect valuable marine resources, promote economic activities such as fisheries and marine tourism, improve

communication and collaboration among stakeholders, and promote the blue economy. Descriptions of the economic development of the six main islands of the Indian Ocean are given below which are examined in this study.

2. Comoros

The Union of the Comoros, composed of four islands in the Mozambique Channel, has faced stagnant economic development since its independence in 1975. Classified as a Heavily Indebted Poor Country (HIPC) in 2010 due to heavy reliance on foreign aid and a debt-to-export ratio of 308%, the nation has struggled economically (African Development Bank, 2011). However, in 2023, Comoros implemented significant economic reforms to enhance fiscal transparency, improve tax revenue, and strengthen the banking sector, aligned with WTO accession efforts. Supported by the IMF's Extended Credit Facility, these reforms aim to address structural weaknesses and promote sustainable growth. Projected GDP growth for 2023 is 3.0%, with further improvements anticipated. Despite these efforts, Comoros remains vulnerable to climate-related disruptions, potentially impacting these gains. The African Development Bank prioritises initiatives to improve energy infrastructure and agricultural productivity to support long-term stability (African Development Bank, 2023; IMF, 2023).

3. Madagascar

Since its independence in 1960, Madagascar's trade remained restricted until new agreements were signed in 1980. As explained by Fjeldsted (2009), the Société Générale de Surveillance (SGS) was founded to reform the customs departments and to improve the ports. E-commerce was also introduced. Likewise, FDI was promoted through the Commercial Enterprises Act of 2003, the Law on Investments in 2008, and the Law on Free Zone Companies in 2007. However, the economy suffered from political upheavals that had a major economic impact. Since the COVID-19 crisis, Madagascar's economy grew by 4.2% in 2022, supported by agricultural exports and public investment. However, inflation remained high at 10.4%, driven by elevated global commodity prices. Madagascar has seen positive economic developments in 2023, with growth driven by increased FDI and trade reforms (IMF, 2023).

4. Maldives

The Maldives, an archipelago of 1,190 islands with 203 inhabited, is located southwest of India. Since the 1980s, the country has pursued extensive trade liberalisation and encouraged FDI in tourism, telecommunications, and banking. However, the 2001 financial crisis and the 2004 tsunami caused significant economic fluctuations. The Maldivian economy grew robustly by 7.6% in 2022, driven largely by a rebound in tourism, with inflation held at 3.9%. The government continues to prioritise fiscal consolidation, debt management, and public investment in infrastructure and strategic sectors. In 2023, the economy demonstrated resilience, supported by strong tourism and strategic foreign investments, and

new reforms aimed at improving the financial sector and increasing capital access for local business (IMF, 2023). Additionally, the AfDB emphasises that sustainable tourism and environmental protection are central to the Maldives' economic strategy (AfDB, 2023).

5. Mauritius

Mauritius, situated near Madagascar in the Indian Ocean, has undergone significant economic transformation from monocrop to a diversified multi-sector economy. It has been recognised as a top-performing African country in the 19th edition of the World Economic Forum Global Competitiveness Report (2019). The creation of the Export Processing Zone (EPZ) spurred trade and FDI growth, supported by the removal of export taxes and price controls, and initiatives like the Mauritius Export Development and Investment Authority (MEDIA) and the Export Credit Guarantee Scheme. Despite these advancements, legislation such as the Investment Promotion Act caused inconsistent FDI and trade rates. By 2023, Mauritius maintained its position as a leading Sub-Saharan African economy, supported by a diversified base including textiles, tourism, and financial services. Recent structural reforms have focused on enhancing the business environment, fostering innovation, and increasing FDI. The African Development Bank (AfDB) emphasises ongoing efforts to improve ICT infrastructure and promote green energy solutions, contributing to Mauritius's long-term economic sustainability.

6. Seychelles

The Seychelles, an archipelago of 115 islands near Kenya, has evolved from agricultural to a diversified economy. The establishment of the Seychelles International Trade Zone (SITZ) and the enactment of legislative measures in 1994, such as the International Business Authority Act and the International Business Companies Act, significantly boosted foreign direct investment (FDI) (Larose, 2003). Post-COVID-19, the economy rebounded, achieving 4.5% growth in 2022, driven by tourism and fisheries, with inflation reduced to 3.8% due to stabilised global prices. Continued efforts in 2023 focused on enhancing fiscal policies, public financial management, improving the business environment, and strengthening the financial sector to attract more FDI (IMF, 2023).

7. Sri Lanka

Sri Lanka, separated from India by the Palk Strait, transitioned from a controlled economy pre-1977 to experiencing significant political upheavals. It joined the South Asian Association for Regional Cooperation in 1985 and the South Asian Preferential Trade Agreement in 1993 (Perera, 2009). The Securities and Exchange Commission Act was introduced to attract FDI, but legislative changes and bilateral agreement terminations led to trade and FDI fluctuations. The COVID-19 pandemic worsened economic conditions, with GDP growth falling from 2.3% in 2019 to -3.6% in 2020 and remaining at 1.5% in 2022, alongside 20.5% inflation. The government aims to reduce

trade barriers, stabilise the banking sector, enhance labour mobility, and ease foreign worker restrictions to stimulate growth. An independent public debt management institution is also being established to address economic shocks (African Development Bank, 2023; IMF, 2023).

Econometric Model and Methodology

This study employs panel data, co-integration techniques, and causality tests for comprehensive analysis. Panel data is selected for its increased variability, control over unobserved heterogeneity, and dynamic analysis capabilities (Baltagi, 2008; Hsiao, 2014; Wooldridge, 2010). Despite issues like missing data and potential biases (Pesaran, 2004; Verbeek, 2017), its advantages prevail. Co-integration techniques, including Pedroni tests, identify long-term equilibrium relationships among non-stationary variables, crucial for understanding stable links between economic globalisation and growth (Engle & Granger, 1987).

Causality tests, such as the Granger causality test and the Toda-Yamamoto approach, are used to determine the direction of causality between variables, essential for policy implications (Granger, 1969; Toda & Yamamoto, 1995). The neo-classical growth model is chosen for its theoretical framework on capital accumulation (FDI) and labour force growth in economic development. The model's assumptions of diminishing returns to capital and labour explain the varied responses of island economies to globalisation (Solow, 1956). Additionally, elements of endogenous growth theory, such as human capital and innovation, are integrated to emphasise internal factors in sustaining long-term growth (Grossman & Helpman, 1991; Romer, 1990). This comprehensive econometric approach allows us to provide nuanced insights into the economic effects of globalisation on these island economies, considering both cross-sectional and temporal dimensions.

Data and Model

The empirical study relies on the collection of data from various sources to examine the economic impact of globalisation on the islands in the Indian Ocean for the period 1980 to 2020. The islands consist of Comoros, Madagascar, Maldives, Mauritius, Seychelles, and Sri Lanka. Annual data were collected from various reputable sources to ensure a comprehensive analysis. GDP, trade, and population statistics were sourced from the World Bank Development Indicators. Aid flows were obtained from the International Debt Statistics 2022 and the Geographical Distribution of Financial Flows to Developing Countries 2021. FDI data were retrieved from UNCTAD's World Investment Report 2021. Additionally, specific data for Comoros in the year 2020 were acquired from the Central Bank of Comoros. For the Maldives, data for the years 2011, 2012, and 2013 were collected from the Maldives Monetary Authority Statistics Database.

The regression model follows a neo-classical growth model, that is expanded with financial aid. The neo-classical growth theory states that adjustments in labour and capital with technological improvements are

required to increase productivity (Meraj, 2013). This model is relevant in analysing globalisation since it considers changes in total factor productivity among nations driven by exogenously determined technological advancements. The variables include GDP as the dependent variable, and FDI, trade openness, population, and foreign aid, as the independent variables. GDP is used as a proxy for assessing the countries' economic growth level. Population represents the actual labour force, owing to data limitations. FDI and trade are incorporated for gauging economic integration and investment flows. As for foreign aid, it will assess the impact of external financial assistance on economic development. The regression model is as follows:

$$\ln \mathbf{GDPP}_{it} = Q_0 + Q_1 \mathbf{FDI}_{it} + Q_2 \ln \mathbf{TRA}_{it} + Q_3 \ln \mathbf{POP}_{it} + Q_4 \mathbf{AID}_{it} + \mu_{it} \quad (1)$$

where i represents each country and t represents each time period (with $t=1,2,\dots,T$); $\ln \mathbf{GDP}_{it}$ is the gross domestic product; $\mathbf{FDI}_{it}$ are the inflows of foreign direct investment, $\mathbf{TRA}_{it}$ is the degree of trade openness, $\mathbf{POP}_{it}$ is the population, $\mathbf{AID}_{it}$ is the amount of financial aid as a percentage of GDP and μ_{it} denotes the error term. Q_0, Q_1, Q_2, Q_3, Q_4 are the estimated coefficients.

Econometric Methods and Findings

1. Panel unit root tests

The most fundamental starting point in analysing data is to determine whether the variables are stationary, that is, they are integrated into the same order. Hence, the first-generation and second-generation panel unit root tests are used. The first-generation panel unit root tests assume cross-section independence. It includes the Levin, Lin, and Chu (LLC) test, which is a panel extension of the Augmented Dickey-Fuller (ADF) test proposed by Levin et al. (2002); the Im, Pesaran, and Shin (IPS) test (2003) which is an expansion of the LLC test accounting for heterogeneity on the AR coefficient; and Maddala and Wu (1999) and Choi (2001) which use a non-parametric Fisher test. [Table A1.1](#) in the appendix section illustrates the results of the first-generation panel unit root tests. At level, GDP is stationary only for LLC; FDI and aid are stationary while trade remains non-stationary for all four tests; population is stationary for LLC. At first difference, all the variables are stationary.

The second-generation panel unit root tests consider cross-section dependency and include PANIC by Bai and NG (2004) which tests the common factors and idiosyncratic components individually rather than testing the unit root directly and CIPS by Pesaran (2007) which extends the ADF regressions by the cross-section averages of lagged levels and first differences. The outcomes of the second-generation panel unit root tests are reported in [Table A1.1](#) in the appendix section. At level, all the variables

are stationary for CIPS, except GDP and trade. For PANIC, only FDI is stationary. At first difference, all the variables are stationary except for population.

Finally, to select the most appropriate panel unit root test, a cross-sectional dependence test is performed to prevent bias and measurement errors. Breusch and Pagan (1980) introduced a Lagrange Multiplier (LM) statistic for fixed N as T approaches infinity. Pesaran (2004) applied this LM statistic for small T and large N , also proposing the CD statistics, which are suited for small N and T with a zero mean. The results are presented in [Table A1.1](#) of the appendix. Given the study's data limitations, Pesaran CD (2004) is deemed more appropriate and significant at the level. Therefore, first-generation panel unit root tests are used, assuming cross-sectional independence of variables.

2. Panel Co-integration Tests

After assessing the order of integration, if the main variables are $I(1)$, a panel co-integration test should be used to investigate whether a long-run equilibrium link exists among the non-stationary variables (Baltagi, 2008). Variables which are $I(1)$ can be cointegrated given that their linear combination is $I(0)$.

Pedroni (1999, 2004) extended his panel co-integration approach based on Engle and Granger (1987) by using the residuals from the long-run regression, proposing seven-panel co-integration statistics which are classified into within-dimension tests and between-dimension tests. Within-dimension tests assume homogeneity and consist of panel v -statistic, panel rho-statistic, panel p -statistic, and panel t -statistic. The between-dimension tests assume heterogeneity and consist of the group rho-statistic, group PP-statistic and group ADF-statistic. Kao (1999) panel co-integration test is a residual-based Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) test which considers only homogeneity among the variables.

[Table 1](#) provides the results of the co-integration tests. Kao cointegration test rejects the null hypothesis of no co-integration at 1% level of significance. Similarly, all Pedroni co-integration tests reject the null hypothesis, except panel v -statistic. Hence, 14 out of 15 tests rejected the null hypothesis which proved the existence of co-integration relationships among the variables.

3. Panel Data Estimators

Upon establishing a co-integrating relationship among the variables, point estimation is performed to evaluate the impact of independent variables on the dependent ones (Lehmann & Casella, 2006). We employ Pooled OLS (POLS), Fixed Effects Models (FEM), and Random Effects Models (REM). POLS assumes homoscedasticity and no autocorrelation among error terms (Baltagi, 2008). FEM and REM address heteroscedasticity and use instrumental variables for endogeneity. The Hausman test (1978) distinguishes between FEM and REM, indicating FEM's superiority if the null hypothesis is rejected. Additionally, the Breusch-Pagan LM test

Table 1. Results from panel co-integration tests

Study	Test	Constant		Constant and Trend	
		Statistic	p-value	Statistic	p-value
Kao (1999)	Panel ADF	-6.889***	0.000	-	-
Pedroni (1999, 2004)	Panel v-Statistic	1.860**	0.031	0.568	0.285
	Panel rho-Statistic	-4.623***	0.000	-3.213***	0.001
	Panel PP-Statistic	-7.445***	0.000	-8.563***	0.000
	Panel ADF-Statistic	-7.403***	0.000	-8.310***	0.000
	Group rho-Statistic	-3.519***	0.000	-1.939**	0.026
	Group PP-Statistic	-7.185***	0.000	-9.354***	0.000
	Group ADF-Statistic	-7.047***	0.000	-7.683***	0.000

Maximum number of lags is set to 12 and the optimal number of lags is determined by the Schwarz information criterion for Kao (1999) and Pedroni (1999, 2004) tests. To construct the panel statistics, the individual statistics are obtained based on the long-run variance estimator by using the Barlett method with Newey-West automatic bandwidth selection for Kao (1999) and Pedroni (1999, 2004) tests. ***(1%), **(5%), and *(10%).

Table 2. Results from panel co-integration estimators and diagnostics

	POLS	FEM	REM	IV FEM	IV REM
C	11.202*** [0.0000]	-8.382 [0.4261]	11.301*** [0.0000]	2.852 [0.8210]	12.492*** [0.0000]
Fdi	0.035* [0.0777]	0.032* [0.0729]	0.043** [0.0436]	0.167* [0.0633]	0.071* [0.0788]
Lntrade	0.254 [0.1423]	-0.451 [0.3487]	0.147 [0.5753]	-1.026** [0.0351]	-0.018 [0.9235]
Lnpop	0.693*** [0.0000]	2.278*** [0.0031]	0.712*** [0.0000]	1.623* [0.0657]	0.691*** [0.0000]
Aid	-11.401*** [0.0000]	-4.742** [0.0368]	-10.091*** [0.0000]	-4.639 [0.1586]	-15.017*** [0.0000]
		Chi 2	Prob		
BPLM Test					
POLS vs. REM		50.893***	0.0000		
Hausman Tests					
FEM vs. REM		0.0000	1.0000		
IV FEM vs. IV REM		56.893***	0.0000		

POLS: Pooled Ordinary Least Squares, FEM: Fixed Effects Model, REM: Random Effects Model, IV: instrumental variables. One lagged value of dependent and independent variables is used as an instrument. BP LM Test: Breusch and Pagan (1980) cross-dependency test, and the Hausman test is the test for zero correlation between individual random effects and independent variables. The numbers in parentheses are the t-ratios, and in brackets are the p-values.

***(1%), **(5%), and *(10%).

determines the appropriateness of REM over POLS. [Table 2](#) presents the results of the analysis. Both POLS and REM indicate that FDI and population positively influence GDP, while aid negatively impacts GDP, with trade being positive but not statistically significant. FEM also shows similar effects for FDI, population, and aid, with trade remaining negative and insignificant. When incorporating instrumental variables, both FEM and REM confirm the positive impact of FDI and population on GDP. However, IV FEM shows that trade has a significant positive impact and aid has an insignificant negative effect, whereas IV REM demonstrates opposite results for trade and aid compared to IV FEM.

The Breusch-Pagan LM (BPLM) test and Hausman test were used to select the appropriate panel co-integration estimator, as shown in [Table 2](#). The BPLM test, used to choose between POLS and REM, rejected the null hypothesis, indicating POLS as more suitable. The Hausman test, used to choose between FEM and REM, accepted the null hypothesis, indicating REM as more efficient. POLS and REM yielded similar results. However, after addressing endogeneity with instrumental variables, the Hausman test rejected the null hypothesis, indicating that IV FEM is better than IV REM.

4. Panel Causality Tests

Causality tests evaluate long-term cause-and-effect relationships between variables. This study applies both homogeneous and heterogeneous panel causality tests. The homogeneous test applies a joint restriction across the panel, while the heterogeneous test addresses country-specific characteristics. Additionally, a Toda-Yamamoto country-wise causality test is performed.

The homogeneous causality tests carried out in this study consist of the Panel Granger causality test by Emirmahmutoğlu-Köse (2011) and the Toda-Yamamoto (1995) causality test. The panel Granger causality test assumes all series to be stable at the same level, that is; X_t is causing Y_t if we can use all the available information up to time t in predicting Y_t , other than the information from X_t . However, the Toda-Yamamoto (1995) causality test assumes the series to be stable at a different level in the panel. Hence, minimising the risk of misidentification of the order of integration, and loss of information. [Table A2.1](#) in the appendix shows the results. The Granger causality tests indicate unidirectional causality from GDP to population, trade to FDI, trade to population, and aid to population, with bidirectional causality between FDI and population. The Toda-Yamamoto test shows unidirectional causality from GDP to trade, GDP to population, trade to FDI, trade to population, and aid to population, with bidirectional causality between FDI and population.

The heterogeneous causality tests include Dumitrescu and Hurlin (2012) and the Fisher causality test. Dumitrescu and Hurlin (2012) proposed an extended model of the Granger causality test which accounts for heterogeneity. It is suitable for a panel consisting of both $I(0)$ and $I(1)$ variables, as well as asymptotic ($T > N$) and semi-asymptotic ($N > T$) distributions. Fisher causality combines the significance levels of the standard causality test such as the Granger-based causality test and is based on the Fisher formula (Furuoka, 2018). The outcomes of the heterogeneous causality tests are shown in [Table A2.1](#) in the appendix. Dumitrescu and Hurlin Granger causality test shows a unidirectional causality from FDI to GDP, trade to GDP, GDP to aid, aid to FDI, trade to aid and population to aid; and a bi-directional relationship between FDI and population. The Fisher panel causality test shows a unidirectional causal relationship from trade to GDP, GDP to aid, aid to FDI, and trade to aid; and a bi-directional relationship between FDI and population.

The results of the country-wise analysis using the Toda-Yamamoto approach are illustrated in [Table A2.2.](#) in the appendix section. Comoros indicates only unidirectional causal relationships running from population to GDP, to FDI and to aid; aid to GDP and FDI; and GDP to FDI. Likewise, Madagascar shows only unidirectional causal relationships: trade causes population and aid, respectively, while aid affects FDI, and FDI influences population. As for the Maldivian economy, only unidirectional causal relationships running from GDP to FDI and trade; and from FDI to trade, are shown. Mauritius indicates a single unidirectional causal relationship which occurs from trade to FDI. As for the Seychelles, population affects the level of FDI, and its GDP influences the amount of financial aid it receives. Finally, the Sri Lankan economy indicates a unidirectional causal relationship from trade to GDP and aid respectively, and from GDP to aid.

Conclusions and Recommendations

This study's analysis of the economic globalisation impacts on Indian Ocean islands from 1980 to 2020, using a neo-classical growth model, provides nuanced insights into the region's economic dynamics. The findings of this study support key aspects of the neo-classical growth model, particularly the significance of capital accumulation (through FDI) and labour force growth. The model's assumption of diminishing returns to capital and labour is evident in the varied responses of island economies to globalisation. Additionally, the study highlights the need for endogenous growth factors, such as innovation and human capital development, to sustain long-term growth (Barro & Sala-i-Martin, 2004; Grossman & Helpman, 2015). This approach not only validates the model's assumptions but may also provide a nuanced understanding of how globalisation impacts these economies differently compared to larger, mainland nations.

Key Findings

The study reveals that an open trade regime does not uniformly benefit the islands. While trade liberalisation generally promotes economic growth by enhancing market efficiency and access, small island economies face unique challenges such as limited market size and vulnerability to external shocks (Armstrong et al., 1998; Read, 2008). It means that its impact can be variable. This finding aligns with the conclusions of Appiah-Otoo et al. (2022), who highlight the importance of tailored trade policies that consider local economic contexts. For example, they could prioritise exporting niche products or focus on sectors where they have competitive advantages such as tourism (Baldacchino, 2015). Additionally, since island economies rely heavily on importing essential goods, contingency trade policies could be implemented to build resilience when global supply chains are disrupted (Komlev & Encontre, 2004).

FDI positively influences economic growth across the islands. This supports the neoclassical growth theory's emphasis on capital accumulation through FDI and aligns with empirical studies by Borensztein et al. (1998) and Alfaro (2017), highlighting the positive impacts of FDI on productivity and growth. Countries like Mauritius and Seychelles have leveraged FDI to diversify their economies and promote sustainable growth (IMF, 2023; World Bank, 2021a). Various policies that attract FDI-aligned long-term growth goals can be adopted, including investments in renewable energy, digital infrastructure, and sectors that foster knowledge and skill transfer to the local workforce, thereby ensuring a balanced and sustainable economic structure (ESCAP, 2019).

The positive impact of population growth on GDP underscores the importance of human capital in driving economic development. This finding is consistent with endogenous growth theories that emphasise the role of human capital and innovation in sustaining long-term growth (Romer, 1990). This is particularly relevant for islands where human capital is a critical driver of economic activity. For instance, Gruzina et al. (2021) highlight how dynamic human capital development cycles foster economic growth. Similarly, Jahanger et al. (2022) show that globalisation and human capital are pivotal for sustainable growth, particularly in developing economies. Therefore, investment in education and skills development is critical for islands like Comoros and Madagascar (African Development Bank, 2023), where they can benefit from partnerships with international organisations to fund tailored programs for developing the skills needed in key sectors. Thus, reducing brain drain and fostering a cycle of education and skills development.

Financial aid shows an insignificant impact on economic growth, suggesting that reliance on aid alone is not sufficient for sustainable development. This finding suggests that aid, while potentially helpful in crises, does not contribute to sustainable long-term growth, aligning with the observations of Baldacchino and Bertram (2009). Effective utilisation of aid combined with robust economic policies and proper governance is necessary to achieve meaningful growth (Appiah-Otoo et al., 2022; Baldacchino & Bertram, 2009; ElMassah & Mohieldin, 2020; Gounder, 1995; Tafirenyika & Kararach, 2022). Aid could be channelled to projects that enhance economic productivity rather than for only short-term needs, and a transparent and accountable mechanism for aid utilisation can boost donor confidence and encourage continued investment in these economies.

Country-Specific Recommendations

Comoros should enhance governance and the business environment by creating a secure setting for business, offering credit facilities, and easing regulations to expand the domestic market and competition. Strengthening the financing ecosystem and promoting property rights will attract foreign investment (IMF, 2023). Comoros could enhance its economic environment by introducing lower-interest financing options and simplifying business

registration processes, leveraging the World Bank's SME Financing Program (World Bank, 2020). Improving public access to education will enhance academic and professional outcomes. A robust financial system and skilled labour force will better position the country for global competition (African Development Bank, 2023).

Madagascar should reduce non-tariff barriers, implement a more efficient border clearance system, and support small and medium-sized businesses through credit facilities and venture capital. These measures can enhance both domestic and international market participation (World Bank, 2023a). It should attract more foreign investment and financial support to train workers and improve their professional and digital skills. Hence, helping the country better reap the benefits of globalisation (IMF, 2023). Madagascar could benefit from the World Bank's Trade Facilitation Program to advance its border digitalisation efforts while targeting investments in skills training would help build a workforce equipped with the professional and digital expertise needed to reap the advantages of globalisation (IMF, 2023).

Maldives should encourage active foreign participation in the economy, particularly in tourism, to improve the country's economic situation. Access to financial services and credit for innovative investors should also be encouraged (AfDB, 2023). It should implement sustainable tourism practices and environmental protection measures to ensure long-term economic stability (IMF, 2023). Maldives could adopt green certifications for hotels and tourism operators, supported by the Global Environment Facility (GEF), to promote eco-friendly practices (Global Environment Facility, 2021). This strategy would enhance Maldives' appeal on the international stage while preserving its essential environmental resources (IMF, 2023).

Mauritius should establish more research institutions to attract foreign investors and foster innovative companies. This can create new markets and further propel economic growth (AfDB, 2023). For instance, Singapore has established research institutes and introduced special incentive programs to support tech start-ups, aiming to retain a skilled workforce and foster innovation (Singapore Economic Development Board, 2022). Mauritius could also leverage the World Bank's Knowledge for Change Program (KCP) to further strengthen its innovation and human capital, which are essential for long-term economic growth, similar to Singapore's model.

Seychelles should improve its financial sector by enhancing the soundness of its banks by providing better access to domestic credit to attract foreign investors. Seychelles should diversify the economy by promoting sectors beyond tourism, such as fisheries and renewable energy, to reduce economic dependency on a single industry (AfDB 2023). It could strengthen its financial infrastructure by leveraging the World Bank's Financial Sector Strengthening Program (FSSP).

Sri Lanka should reduce both non-tariff and tariff barriers, to enhance economic interactions and boost international trade and growth (World Bank, 2023b). The focus should also be on improving labour mobility and

implementing financial sector reforms by strengthening banking stability and easing restrictions on hiring foreign workers. Sri Lanka could strengthen its ability to cope with economic shocks and increase labour mobility by easing restrictions on foreign workers through the World Bank's Resilience and Crisis Response Program (RCRP), thereby contributing to long-term growth.

Limitations of the Study

Since the study focuses on small island economies, collecting reliable and comprehensive data is challenging due to the lack of extensive records. Reputable sources such as the World Bank and UNCTAD were used to gather data on the selected variables, and local statistical sources were utilised to fill data gaps. Inconsistencies across the sources may affect the precision of cross-country comparisons. Additionally, the econometric methodologies provide valuable insights but might not fully capture the sector-specific dynamics of each island's economies. Each island's unique economic characteristics and vulnerability to external shocks may be hard to capture due to heterogeneity. Lastly, the findings should not be broadly generalised. The impacts of the variables vary across different islands, implying that these insights might be specific to the sample used.

Future Research Directions

This study reveals the effects of globalisation on Indian Ocean island economies, highlighting the need for future research to deepen our understanding of sectoral and regional impacts. To overcome the study's limitations, future research could improve data accessibility by collaborating with local governments, central banks, and international institutions to build more comprehensive data records for small island economies. Moreover, non-linear or sector-specific models could capture the distinct economic dynamics of small islands, expanding the scope to factors like environmental sustainability and climate vulnerability by examining the impacts of green investments on sustainable growth. Research simulating various macroeconomic policies could identify strategies to manage islands' exposure to climate change and economic risks. Future research could investigate how digital infrastructure and technology, such as e-commerce and fintech, can reduce geographic isolation and enhance economic opportunities for small island economies in global markets. Such directions will yield valuable policy insights to enhance resilience, sustainability, and global alignment of island economies.

ACKNOWLEDGEMENTS

The first author conducted the research presented herein as part of their master's thesis under the supervision of the second author.



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Appendix

Table A1.1. Results from panel unit root tests

<i>Level</i>	<i>LLC</i>	<i>IPS</i>	<i>MW</i>	<i>Choi</i>	<i>CIPS</i>	<i>PANIC</i>
<i>Lngdp</i>	-2.483*** [0.0065]	0.932 [0.8245]	7.845 [0.7971]	0.927 [0.8231]	-1.892	0.489 [0.6246]
<i>Fdi</i>	-3.305*** [0.0005]	-4.283*** [0.0000]	48.002*** [0.000]	-4.012*** [0.0000]	-4.152***	INF*** [0.0000]
<i>Lntrade</i>	1.051 [0.8536]	-0.148 [0.4409]	17.552 [0.1300]	-0.089 [0.4643]	-2.389	-0.819 [0.4125]
<i>Lnpop</i>	-4.002*** [0.0000]	0.071 [0.5283]	11.306 [0.5028]	0.124 [0.5496]	-3.616***	1.650 [0.0989]
<i>Aid</i>	-4.292*** [0.0000]	-4.251*** [0.0000]	49.042*** [0.0000]	-3.578*** [0.0000]	-4.006***	-1.308 [0.1906]
First Difference						
<i>Lngdp</i>	-7.664*** [0.0000]	-8.719*** [0.0000]	93.191*** [0.0000]	-7.507*** [0.0000]	-4.984***	INF*** [0.0000]
<i>Fdi</i>	-16.651*** [0.0000]	-17.182*** [0.0000]	175.787*** [0.0000]	-11.465*** [0.0000]	-8.021***	INF*** [0.0000]
<i>Lntrade</i>	-8.669*** [0.0000]	-9.878*** [0.0000]	107.091*** [0.0000]	-8.335*** [0.0000]	-4.886***	3.490*** [0.0005]
<i>Lnpop</i>	-2.298** [0.0108]	-4.255*** [0.0000]	57.145*** [0.0000]	-3.543*** [0.0002]	-2.348	-0.102 [0.9188]
<i>Aid</i>	-10.099*** [0.0000]	-10.232*** [0.0000]	113.489*** [0.0000]	-7.878*** [0.0000]	-8.022***	2.787*** [0.0051]
Cross-Sectional Dependence Tests		t-statistics		p-value		
<i>Breusch-Pagan LM (1980)</i>		74.793***		0.0000		
<i>Pesaran scaled LM (2004)</i>		10.917***		0.0000		
<i>Pesaran CD (2004)</i>		2.625***		0.0087		

LLC refers to Levin, Lin & Chu (2002), IPS refers to Im, Pesaran and Shin (2003), MW refers to Maddala and Wu (1999), Choi refers to Choi (2001), CIPS refers to Pesaran (2007), and PANIC refers to Bai and Ng (2004). Maximum number of lags is set to 12 and the optimal number of lags is determined by Schwarz information criterion. Numbers in brackets are p-values. CIPS critical values are -2.56 (1%), -2.33 (5%), and -2.21 (10%) for constant model. The number of common factors for PANIC test is determined by the IC_{p2} criterion of Bai and Ng (2002) by setting the maximum number of factors to 5. INF is a result of the fact that at least one individual statistic has zero p-p-values. ***(1%), **(5%), *(10%).

Table A2.1. Results from homogeneous and heterogeneous panel causality tests

	<i>Homogeneous Panel Causality Tests</i>				<i>Heterogeneous Panel Causality Tests</i>			
	<i>Panel Granger causality</i>		<i>Panel Toda - Yamamoto</i>		<i>DH heterogeneous panel causality</i>		<i>Fisher panel causality</i>	
	<i>Wald</i>	<i>p-value</i>	<i>Wald</i>	<i>p-value</i>	<i>w</i>	<i>p-value</i>	<i>Fisher</i>	<i>p-value</i>
<i>Fdi</i> → <i>Ingdp</i>	28.165	0.1056	20.164	0.3848	1.12	0.0427	5.3807	0.8643
<i>Ingdp</i> → <i>fdi</i>	22.765	0.3005	22.450	0.2624	3.19	0.4005	10.337	0.4113
<i>Lntrade</i> → <i>Ingdp</i>	14.470	0.8059	14.072	0.7794	2.85	0.0266	17.065*	0.0729
<i>Ingdp</i> → <i>Intrade</i>	27.337	0.1260	27.302	0.0978	2.76	0.2904	14.491	0.1517
<i>Lnpop</i> → <i>Ingdp</i>	19.001	0.5217	17.696	0.5428	2.73	0.2301	14.330	0.1584
<i>Ingdp</i> → <i>Lnpop</i>	36.205**	0.0145	27.589	0.0916	2.50	0.4702	9.6847	0.4685
<i>Aid</i> → <i>Ingdp</i>	18.179	0.5756	17.033	0.5876	1.89	0.7453	9.0665	0.5258
<i>Ingdp</i> → <i>Aid</i>	26.112	0.1621	26.094	0.1276	3.51	0.0706	17.003*	0.0742
<i>Lntrade</i> → <i>fdi</i>	31.356*	0.0507	30.440	0.0465	2.70	0.9539	15.442	0.1167
<i>Fdi</i> → <i>Intrade</i>	18.151	0.5774	13.846	0.7926	2.63	0.7578	13.274	0.2087
<i>Lnpop</i> → <i>fdi</i>	50.293***	0.0002	50.222***	0.0001	3.61	0.0001	19.399**	0.0354
<i>Fdi</i> → <i>Lnpop</i>	62.967***	0.0000	61.900***	0.0000	3.59	0.0004	19.266**	0.0370
<i>Aid</i> → <i>fdi</i>	25.771	0.1735	20.464	0.3672	3.43	0.0042	19.111**	0.0388
<i>Fdi</i> → <i>Aid</i>	12.956	0.8793	11.755	0.8958	1.01	0.2002	5.3267	0.8683
<i>Lnpop</i> → <i>Intrade</i>	11.204	0.9408	10.794	0.9306	3.29	0.7158	6.8183	0.7424
<i>Lntrade</i> → <i>Lnpop</i>	92.470***	0.0000	92.465***	0.0000	2.44	0.8515	14.221	0.1631
<i>Aid</i> → <i>Intrade</i>	11.023	0.9456	9.760	0.9586	1.94	0.2227	11.395	0.3275
<i>Lntrade</i> → <i>Aid</i>	18.368	0.5632	15.972	0.6591	2.99	0.0138	18.682**	0.0444
<i>Aid</i> → <i>Lnpop</i>	38.513***	0.0077	36.703***	0.0086	1.20	0.4989	5.3111	0.8694
<i>Lnpop</i> → <i>Aid</i>	16.443	0.6887	12.249	0.8747	2.17	0.0424	5.4982	0.8555

Note: *Fdi* → *Ingdp* denotes causality running from *fdi* to *Ingdp*. *Ingdp* → *fdi* denotes causality running from *Ingdp* to *fdi*. The causal relationship between the two variables is shown in the direction column. The number of lags is set to 18 for panel granger causality tests and 19 for panel Toda-Yamamoto tests. *w* refers to the average of the wald statistic. Fisher causality includes chi-squared distribution of fisher statistic. The optimal number of lags has been selected as per autocorrelation. ***(1%), **(5%), *(10%).

Table A2.2. Results from the country-wise Toda-Yamamoto causality tests

Lags	Comoros		Madagascar		Maldives		Mauritius		Seychelles		Sri Lanka	
	3		2		3		2		2		1	
	Statistic	p-val	Statistic	p-val	Statistic	p-val	Statistic	p-val	Statistic	p-val	Statistic	p-val
<i>Fdi</i> → <i>Ingdp</i>	1.336	0.721	0.217	0.897	2.046	0.563	0.478	0.787	2.655	0.265	0.017	0.894
<i>Ingdp</i> → <i>Fdi</i>	8.023**	0.045	1.209	0.546	7.260**	0.064	0.536	0.764	2.111	0.348	0.031	0.861
<i>Intrade</i> → <i>Ingdp</i>	2.271	0.518	4.588	0.101	3.012	0.389	3.623	0.163	0.381	0.826	3.246*	0.071
<i>Ingdp</i> → <i>Intrade</i>	1.755	0.624	1.175	0.556	10.84**	0.013	1.889	0.388	0.557	0.756	0.349	0.554
<i>Inpop</i> → <i>Ingdp</i>	12.26***	0.006	0.833	0.659	2.262	0.519	0.194	0.907	0.237	0.888	0.620	0.431
<i>Ingdp</i> → <i>Inpop</i>	5.956	0.114	3.926	0.141	1.906	0.592	0.941	0.624	0.916	0.632	1.380	0.240
<i>Aid</i> → <i>Ingdp</i>	7.571*	0.056	0.972	0.615	1.388	0.708	0.573	0.750	0.882	0.643	0.011	0.915
<i>Ingdp</i> → <i>Aid</i>	4.689	0.196	2.212	0.331	4.460	0.215	0.429	0.806	6.25**	0.043	3.054*	0.080
<i>Intrade</i> → <i>Fdi</i>	3.601	0.308	4.092	0.129	1.573	0.665	5.858*	0.053	0.203	0.903	0.884	0.346
<i>Fdi</i> → <i>Intrade</i>	5.233	0.155	1.177	0.555	7.432*	0.059	1.561	0.458	0.134	0.934	0.278	0.597
<i>Inpop</i> → <i>Fdi</i>	13.54***	0.004	0.639	0.726	1.100	0.776	0.464	0.793	5.762*	0.056	0.172	0.678
<i>Fdi</i> → <i>Inpop</i>	3.676	0.299	9.960***	0.007	5.297	0.151	2.339	0.310	0.185	0.912	0.107	0.742
<i>Aid</i> → <i>Fdi</i>	7.966**	0.047	6.859**	0.032	2.035	0.565	2.099	0.350	0.795	0.672	0.865	0.352
<i>Fdi</i> → <i>Aid</i>	1.146	0.766	1.606	0.447	1.635	0.651	1.350	0.509	0.145	0.929	0.194	0.659
<i>Intrade</i> → <i>Inpop</i>	0.695	0.874	13.42***	0.001	1.838	0.606	0.246	0.884	1.316	0.517	2.219	0.136
<i>Inpop</i> → <i>Intrade</i>	0.573	0.903	3.038	0.218	5.828	0.120	1.134	0.567	2.527	0.282	1.543	0.214
<i>Aid</i> → <i>Intrade</i>	0.226	0.973	3.668	0.159	2.582	0.460	3.868	0.144	0.911	0.634	0.432	0.511
<i>Intrade</i> → <i>Aid</i>	1.946	0.584	8.663**	0.013	1.038	0.791	0.056	0.972	2.492	0.287	3.781*	0.051
<i>Aid</i> → <i>Inpop</i>	2.129	0.546	0.498	0.779	2.471	0.480	1.151	0.562	0.967	0.616	0.0001	0.991
<i>Inpop</i> → <i>Aid</i>	7.744*	0.052	1.942	0.378	0.776	0.855	1.352	0.508	1.071	0.585	0.188	0.663

Note: *Fdi* → *Ingdp* denotes causality running from *fdi* to *Ingdp*. *Ingdp* → *fdi* denotes causality running from *Ingdp* to *fdi*. The optimal number of lags for each country has been selected as per autocorrelation. ***(1%), **(5%), *(10%).